CITY OF CHINO HILLS

PARADISE RANCH

INITIAL STUDY

Prepared for:

CITY OF CHINO HILLS
14000 CITY CENTER DRIVE
CHINO HILLS, CA 91709

Prepared by:

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MARCH 30, 2022

APPENDICES

TABLES

FIGURES

ACRONYMS AND ABBREVIATIONS

AB	California Assembly Bill
AF/YR	Acre-feet year
AMC	Antecedent Moisture Content
APN	Assessor Parcel Number
AQMP	air quality management plans
ASTM	American Society for Testing and Materials
BMP	best management practice
C&D	construction and demolition
CALFIRE	California Department of Forestry and Fire Protection
CARB	California Air Resources Board
CBC	California Building Code
CDA	Chino Basin Desalter Authority
CEC	California Energy Commission
Cf	cubic feet
CCR	California Code of Regulations
CCWRF	Carbon Canyon Water Recycling Facility
CDA	Chino Desalter Authority
CEQA	California Environmental Quality Act
CHMC	Chino Hills Municipal Code
CRES	controlled RECs
CVC	California Vehicle Code
CVIFD	Chino Valley Independent Fire District
CVUSD	Chino Valley Unified School District
DBH	Diameter at Breast Height
DRA	Drought Risk Assessment
DTSC	California Department of Toxic Substances Control
EIR	Environmental Impact Report
EMFAC	Emissions Factor
EPA	US Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FMZ	Fuel Modification Zones
FPP	Fire Protection Plan
GAC	granular activated carbon
GHG	greenhouse gas
GPCD	gallons per capita per day
gpd	gallons per day
GWh	gigawatt-hours
HCD	California Department of Housing and Community Development
HCP	Habitat Conservation Plan
HREC	historical RECs
IEUA	Inland Empire Utilities Agency
kWh	kilowatt-hours
MGD	million gallons per day
MS4	Municipal Separate Storm Sewer System
MVWD	Monte Vista Water District
MWD	Metropolitan Water District

NCCP	Natural Community Conservation Plan
NFPA	National Fire Protection Association
NPDES	National Pollutant Discharge Elimination System
OCP	Organochlorine pesticide
OVA	Organic vapor analyzer
PM	Particulate matter
PPM	Parts per million
PV	Photovoltaic
REC	Recognized environmental conditions
RPS	Renewables Portfolio Standard
RTP	Regional Transportation Plan
RWQCB	Regional Water Quality Control Board
SB	California Senate Bill
SBCFCD	San Bernardino County Flood Control District
SBCL	San Bernardino County Library System
SBSD	San Bernardino County Sheriff's Department
SCAB	South Coast Air Basin
SCE	Southern California Edison
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SGMA	Sustainable Groundwater Management Act
SoCalGas	Southern California Gas Company
SR	State Route
SCS	Sustainable Communities Strategy
SVOC	semi-volatile organic compound
SWP	State Water Project
SWPPP	stormwater pollution prevention plan
TCR	Tribal Cultural Resources
TMDL	Total Maximum Daily Load
TPH	petroleum hydrocarbons
TTM	Tentative Tract Map
USFWS	United States Fish and Wildlife Service
VHFHSZ	very high fire hazard severity zone
VMT	vehicle miles traveled
VOC	volatile organic compounds
WFA	Water Facilities Authority
WQMP	Water Quality Management Plan

1.1 INTRODUCTION AND REGULATORY GUIDANCE

This document contains an Initial Study, with supporting environmental studies, which concludes that a Focused Environmental Impact Report (EIR) is the appropriate California Environmental Quality Act (CEQA) document for the proposed Paradise Ranch Project (Project). This Initial Study has been prepared in accordance with Public Resources Code Section 21000 et seq., and the CEQA Guidelines, California Code of Regulations Section 15000 et seq.

An Initial Study is conducted by a lead agency to determine whether a project may have a significant effect on the environment. In accordance with CEQA Guidelines Section15002(k)(3), an EIR must be prepared if an Initial Study indicates that the proposed project under review may have a potentially significant impact on the environment that cannot be initially avoided or mitigated to a level that is less than significant. Based on the information presented in this Initial Study, a the Focused EIR will address the following topics: Air Quality, Biological Resources, Cultural Resources, Geology/Soils, Greenhouse Gas Emissions, Noise, Transportation, and Tribal Cultural Resources.

1.2 LEAD AGENCY

The lead agency is the public agency with primary responsibility over a proposed project. Where two or more public agencies will be involved with a project, CEQA Guidelines Section 15051 provides criteria for identifying the lead agency. In accordance with CEQA Guidelines Section 15051(b)(1), "the lead agency will normally be the agency with general governmental powers, such as a city or county, rather than an agency with a single or limited purpose." Based on the criteria above, the City of Chino Hills (City) is the lead agency for the Proposed Project.

1.3 PURPOSE AND DOCUMENT ORGANIZATION

The purpose of this Initial Study is to evaluate the potential environmental impacts of the Project. This document is divided into the following sections:

1.0 Introduction – This section introduces and describes the purpose and organization of the document.

2.0 Project Information – This section provides general information regarding the Project, including the Project title, lead agency and address, contact person, brief description of the Project location, General Plan land use designation and zoning, identification of surrounding land uses, and identification of other public agencies whose review, approval, and/or permits may be required. Also listed in this section is a checklist of the environmental factors that are potentially affected by the Project.

3.0 Project Description – This section describes the Proposed Project in detail.

4.0 Environmental Checklist – This section describes the environmental setting and overview for each of the environmental subject areas and evaluates a range of impacts classified as "no impact," "less than significant impact," "less than significant impact with mitigation incorporated," and "potentially significant impact" in response to the environmental checklist.

5.0 References – This section identifies documents, websites, people, and other sources consulted during the preparation of this Initial Study.

1.4 EVALUATION OF ENVIRONMENTAL IMPACTS

Section 4.0, Environmental Checklist, is the analysis portion of the document. The section evaluates the potential environmental impacts of the Project. **Section 4.0** includes 21 environmental issue subsections, including CEQA Mandatory Findings of Significance. The environmental issue subsections, numbered 1 through 21, consist of the following:

1. Aesthetics
2. Agriculture/Forestry Resources
3. Air Quality
4. Biological Resources
5. Cultural Resources
6. Energy
7. Geology/Soils
8. Greenhouse Gas Emissions
9. Hazards & Hazardous Materials
10. Hydrology/Water Quality
11. Land Use/Planning
12. Mineral Resources
13. Noise
14. Population/Housing
15. Public Services
16. Recreation
17. Transportation
18. Tribal Cultural Resources
19. Utilities/Service Systems
20. Wildfire
21. Mandatory Findings of Significance

Each environmental issue subsection is organized in the following manner:

The **Setting** summarizes the existing conditions at the regional, subregional, and local levels, as appropriate, and identifies applicable plans and technical information for the particular issue area.

The **Discussion of Impacts** provides a detailed discussion of each environmental issue checklist question. The level of significance for each topic is determined by considering the predicted magnitude of the impact. Four levels of impact significance are evaluated in this Initial Study:

No Impact: No Project-related impact on the environment would occur with Project development.

Less Than Significant Impact: The impact would not result in a substantial adverse change in the environment. This impact level does not require mitigation measures.

Less Than Significant Impact With Mitigation Incorporated: An impact that may have a "substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the Project" (CEQA Guidelines Section 15382). However, the incorporation of mitigation measures that are specified after analysis would reduce the Project-related impact to a less than significant level.

Potentially Significant Impact: An impact that is "potentially significant" but for which mitigation measures cannot be immediately suggested or the effectiveness of potential mitigation measures cannot be determined with certainty, because more in-depth analysis of the issue and potential impact is needed. In such cases, an EIR is required.

1. Project title:
Paradise Ranch Project

2. Lead agency name and address:
City of Chino Hills
14000 City Center Drive
Chino Hills, California 91709

3. Contact person and phone number:
Michael Hofflinger, Planning Manager
Community Development Department
(909) 364-2777

4. Project location:
The approximately 85.2-acre Project Site is located at 16200 and 16220 Canyon Hills Road in the City of Chino Hills. The Project Site encompasses Assessor's Parcel Numbers (APNs) 1000-051-09 and 1000-051-19 and is bounded by single-family residential to the north, south and east, and by undeveloped land to the west. Esquilime Drive is located further north of the Project Site, Saint Joseph Hill of Hope is located further west of the Project Site, and Summer Canyon is located further south of the Project Site.

5. Project sponsor's name and address:
The True Life Companies
2372 Morse Avenue, Suite 618
Irvine, California 92614
(949) 500-7998
Attn: Gordon Jones
Attn: Michael Torres

6. General Plan designation:
Rural Residential

7. Zoning:
R-R (Rural Residential)

8. Project description:
The Proposed Paradise Ranch Project (Project) would subdivide an 85-acre property into a total of 51 lots. The Project would include the development of 50 cluster lots ranging in size from 7,200 to 12,412 square feet. Each of the 50 lots would include the development of a two-story single family residential home. The dwelling units would range in size from 3,970 to 4,616 square feet (including three-car garages). The residential uses would include six architectural styles, and four different floor plans for each style. Lot 51 will maintain the existing single-family home, and Lot A will remain as vacant native land.

9. Surrounding land uses and setting:
The Project Site is surrounded by residential development on the north, south, and east. To the west, the adjacent parcel is undeveloped. To the north and east of the Project Site is the Oak Tree Downs Community, which includes single-family homes. To the west of the Project Site is undeveloped land,

further to the west is the Saint Joseph Hill of Hope. To the south of the Project Site is the Hillcrest development, which includes single-family homes.

10. Environmental factors potentially affected:

The environmental factors checked below would be potentially affected by this Project, involving at least one impact that is a "potentially significant impact" as indicated by the checklist on the following pages. These are the factors that will be discussed in the Project Focused EIR.

☐	Aesthetics	☐	Agriculture/Forestry Resources	☒	Air Quality
☒	Biological Resources	☒	Cultural Resources	☐	Energy
☒	Geology/Soils	☒	Greenhouse Gas Emissions	☐	Hazards & Hazardous Materials
☐	Hydrology/Water Quality	☐	Land Use/Planning	☐	Mineral Resources
☒	Noise	☐	Population/Housing	☐	Public Services
☐	Recreation	☒	Transportation	☒	Tribal Cultural Resources
☐	Utilities/Service Systems	☐	Wildfire	☒	Mandatory Findings of Significance

11. Determination: (To be completed by the lead agency)

On the basis of this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☒ I find that the proposed project MAY have a significant effect on the environment relative to the factors checked above, and a Focused ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

[signature]	3/30/22
Signature	Date
Michael Hofflinger	City of Chino Hills
Printed Name	Lead Agency
Planning Manager	
Title	

3.1 PROJECT LOCATION

The approximately 85.2-acre Project Site is in a rural area at 16200 and 16220 Canyon Hills Road in the City of Chino Hills. The Project Site encompasses Assessor's Parcel Numbers (APNs) 1000-051-09 and 1000-051-19 and is bounded by single-family residential to the north, south and east, and by undeveloped land to the west. Esquilime Drive is located further north of the Project Site, Saint Joseph Hill of Hope is located further west of the Project Site, and Summer Canyon is located further south of the Project Site (see **Figure 3.1, Regional and Vicinity**).

Regional access to the Project Site is provided by SR142 (State Route 142) located approximately 0.8 miles to the south of the Project Site via Canon Hills Road. Local access to the Project Site is provided via Canyon Hills Road. The OmniRide microtransit service serves residents, visitors, students, and employees in the Chino and Chino Hills area and provides local service to the Project Site.

3.2 EXISTING CONDITIONS

The Project Site is currently split into two lots, one located at 16200 Canyon Hills Road in the northeastern portion of the Project Site, and one located at 16220 in the western portion of the Project Site. The 10.71-acre lot located at 16200 Canyon Hills Road was built in the 1920s and is developed with an approximately 1,250-square foot, three-bedroom residential home, a barn, stables, and fenced pasture.[1] The 71.9-acre lot located at 16220 Canyon Hills Road was built in the 1915 and is developed with an approximately 1,180-square foot, two bedroom residential home.[2] This residential home at 16220 Canyon Hills Road will remain on-site as Lot Number 51. The rest of the area is undeveloped, hillside slopes, and is covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant. Elevations range from a low of approximately 959 feet to a high of approximately 1,256 feet. Project Site photos are presented in **Figure 3.2, Existing Site Photos**.

3.3 SURROUNDING LAND USES

The Project Site is surrounded by residential development on the north, south, and east. To the west, the adjacent parcel is undeveloped. To the north and east of the Project Site is the Oak Tree Downs Community, which includes single-family homes. To the west of the Project Site is undeveloped land, further to the west is the Saint Joseph Hill of Hope. To the south of the Project Site is the Hillcrest development, which includes single-family homes. Surrounding land use photos are presented in **Figure 3.3, Surrounding Land Use Photos**.

According to the City of Chino Hills General Plan Land Use Map, the Project Site has a land use designation of Rural Residential and is currently zoned R-R (Rural Residential). **Table 3.1, General Plan Land Use Designation and Zoning Designation for Surrounding Uses** shows the Land Use and Zoning Designation for the uses surrounding the Project Site.

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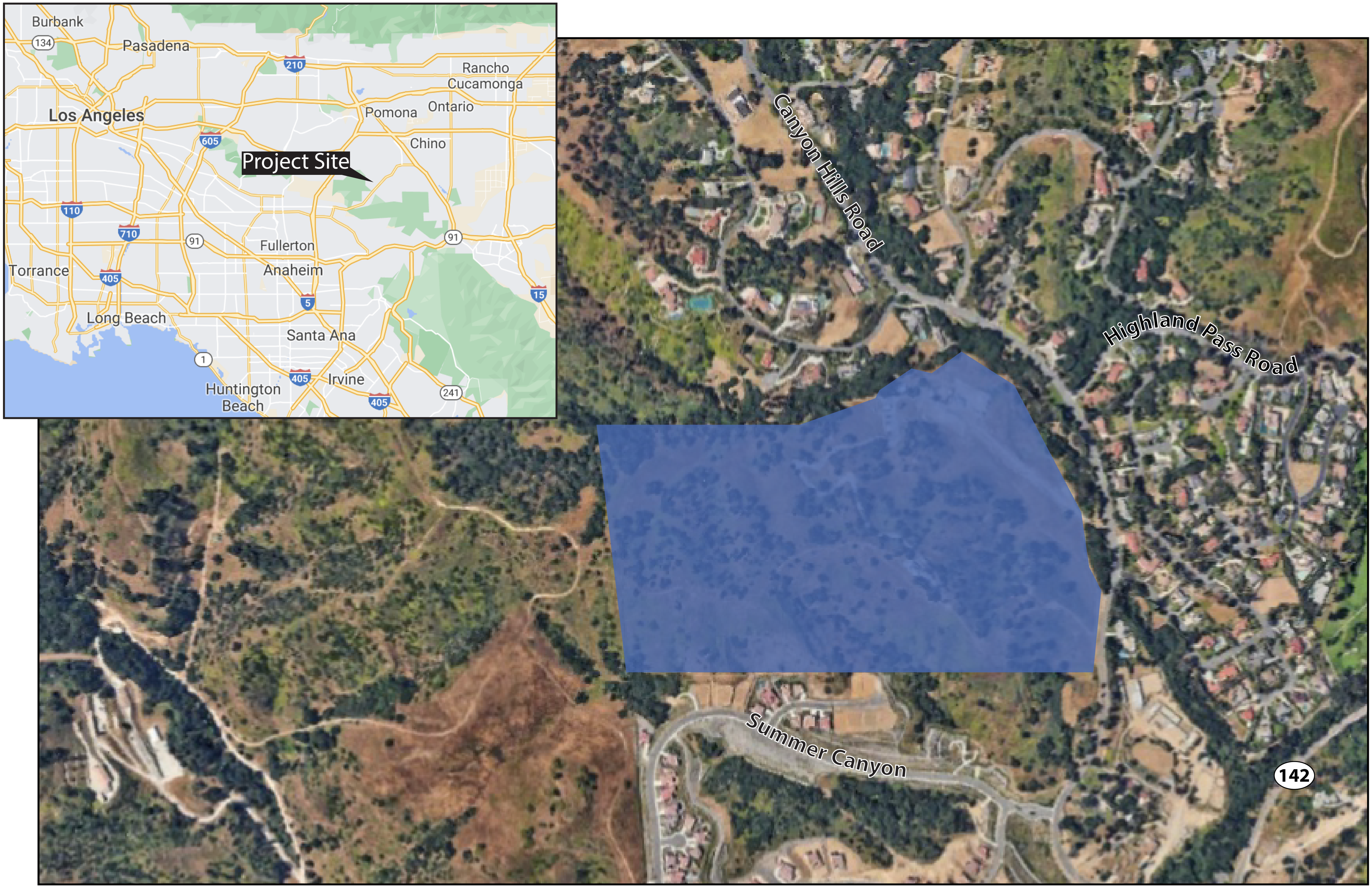
1 *San Bernardino County Property Information Management System for Assessor Parcel Number 1000-051-09-0-000.*

2 *San Bernardino County Property Information Management System for Assessor Parcel Number 1000-051-19-0-000.*



Project Site
Source: Google, 2021

EcoTierra consulting

Figure 3.1 Regional and Vicinity Map

Project Site
House and Stables
Views
House

View 1: Looking Northwest from Canyon Hills Road Toward House and Stables on Project Site

View 2: Aerial View Looking Northeast Toward House and Stables on Project Site

View 3: Aerial View Looking Southwest Toward House That Will Remain on Project Site

Source: Google, 2021

EcoTierra consulting

Figure 3.2
Existing Site Photos

Project Site

Views

View 1: Aerial View Looking North Toward the Residential Uses Located North of Project Site

View 2: Aerial View Looking Northeast Toward the Oak Tree Downs Community Located East of the Project Site

View 3: Aerial View Looking Northwest Toward the Hillcrest Development Located South of Project Site

Source: Google, 2021

EcoTierra consulting

Figure 3.3
Surrounding Land Use Photos

Table 3.1
General Plan Land Use Designation and Zoning Designation for Surrounding Uses

Location	Land Use	General Plan Designation	Zoning
North	Existing Single-Family Homes (Oak Tree Downs Community)	Low Density Residential	PD 5-157 (Low Density Residential)
West	Existing Religious Institution (Saint Joseph Hill of Hope)	Agriculture/Ranches	R-A (Agriculture-Ranch)
South	Existing Single-Family Homes (Hillcrest, largely built out)	Rural Residential	R-R (Rural Residential)
East	Existing Single-Family Homes (Oak Tree Downs Community)	Low Density Residential	PD 5-157 (Low Density Residential)

3.4 PROJECT OVERVIEW

The Project would demolish the 1,250 square foot, three-bedroom residential use, barn, and stables. The applicant is proposing to subdivide the 85.2-acre property into a total of 51 lots. Lots 1 through 50 will include the development of a single-family residential homes. The Project includes the development of six architectural styles with a total of four different floor plans for each style. The six architectural styles include: Adobe Ranch, Cottage Farmhouse, Monterey Andalusian, Santa Barbara, Agrarian Traditional, and Tuscan Farmhouse. The design of the residential homes also include three enhanced elevations: Front Enhanced, Side Enhanced, and Rear Enhanced. There are a total of four different floor plans for the residential homes , each of which are two-story and range between four and five bedrooms. Floor Plan 1 is approximately 3,970 square feet (including garage), Floor Plan 2 is approximately 3,946 square feet (including garage), Floor Plan 3 is approximately 4,373 square feet (including garage), and Floor Plan 4 is approximately 4,616 square feet (including garage). See **Figures 3.4 through 3.9**, below, for site plan, elevations, and floor plans.

Lots 1 through 50 will range from a lot size of 7,200 square feet to 12,412 square feet. Lot 51 will maintain the existing single-family home on-site and Lot A will remain vacant native land. A summary of the Project development is provided in **Table 3.2, Project Development Summary**.

Table 3.2
Project Development Summary

Lot Number	Unit Type	Total Living Area Square Footages With Garages (sf)	Lot Area (sf)	Lot Coverage %
Lot 1	1A	3,970	7,907	32.2
Lot 2	3B	4,373	7,201	35.6
Lot 3	2D	3,946	9,219	29.2
Lot 4	4ER	4,616	11,031	25.0
Lot 5	3CR	4,373	8,473	31.7
Lot 6	1AR	3,970	7,207	35.3
Lot 7	3BR	4,373	7,282	36.9
Lot 8	1C	3,970	8,902	28.6
Lot 9	2F	3,946	8,168	31.4

Table 3.2
Project Development Summary

Lot Number	Unit Type	Total Living Area Square Footages With Garages (sf)	Lot Area (sf)	Lot Coverage %
Lot 10	4E	4,616	9,684	28.4
Lot 11	3A	4,373	12,412	21.7
Lot 12	1B	3,970	7,292	34.9
Lot 13	3AR	4,373	7,760	34.9
Lot 14	2E	3,946	7,458	34.4
Lot 15	4DR	4,616	7,413	37.1
Lot 16	1B	3,970	7,416	34.3
Lot 17	4F	4,616	7,353	37.4
Lot 18	1A	3,970	7,204	35.3
Lot 19	2ER	3,946	7,205	35.6
Lot 20	3BR	4,373	7,308	36.8
Lot 21	1C	3,970	7,489	34.0
Lot 22	4D	4,616	9,893	27.8
Lot 23	2F	3,946	8,066	31.8
Lot 24	4ER	4,616	9,670	28.5
Lot 25	4FR	4,616	9,800	28.1
Lot 26	2D	3,946	7,447	34.4
Lot 27	4FR	4,616	10,976	25.1
Lot 28	3C	4,373	8,396	32.0
Lot 29	2DR	3,946	7,554	33.9
Lot 30	1BR	3,970	7,342	34.7
Lot 31	3AR	4,373	8,066	33.3
Lot 32	4DR	4,616	7,852	35.1
Lot 33	2F	3,946	8,058	31.8
Lot 34	4E	4,616	8,420	32.7
Lot 35	1C	3,970	10,395	24.5
Lot 36	3B	4,373	10,738	25.0
Lot 37	4FR	4,616	8,194	33.6
Lot 38	2ER	3,946	9,162	28.0
Lot 39	3AR	4,373	9,264	29.0
Lot 40	1B	3,970	7,731	32.9
Lot 41	3CR	4,373	7,458	36.0
Lot 42	2ER	3,946	7,200	35.6
Lot 43	3A	4,373	7,287	36.9
Lot 44	4DR	4,616	7,444	37.0
Lot 45	2FR	3,946	7,464	34.4
Lot 46	4ER	4,616	7,568	36.4
Lot 47	3C	4,373	7,764	34.6
Lot 48	4D	4,616	7,859	35.0
Lot 49	2F	3,946	7,425	34.5
Lot 50	1C	3,970	7,202	35.3

sf = square-feet
Unit Type Number = Floor Plan Type. There are four different floor plan options.

Table 3.2
Project Development Summary

Lot Number	Unit Type	Total Living Area Square Footages With Garages (sf)	Lot Area (sf)	Lot Coverage %
A= Adobe Ranch B=Cottage Farmhouse C=Monterey Andalusian D=Santa Barbara E=Agrarian Traditional F=Tuscan Farmhouse R=Reversed Floor Plan Source: KTGY Group, July 2020.				

ZONING, DEVELOPMENT STANDARDS AND BUILDING HEIGHT

The Project Site is currently zoned R-R (Rural Residential) in the City, which designates the land use of the property as Rural Residential. The Project is proposing to develop under the City's Clustering Ordinance No. 298, and the City of Chino Hills Municipal Code (CHMC) Section 16.10.030. Per Ordinance No. 298, a cluster development is a means of preserving open space while permitting residential development by clustering homes on only a portion of the development parcel, thereby preserving the remainder of the parcel in open space. The clustering of residential homes into a small area is made possible by reducing the individual lot sizes and corresponding development standards. This Ordinance is intended to allow the City to establish development standards, regulations, and review procedures for clustering single-family residential development in the Agriculture -Ranch (R -A) and Rural Residential (R -R) zoning districts.

Per CHMC Section 16.10.030, clustering is permitted for certain designated properties to protect environmental and visual resources. As an alternative to the development standards set forth in Exhibit "A" Table 20-1(A), designated properties within the R-A and R-R zone may apply to have the clustering standards set forth in Exhibit "B" Table 20-1(B) of CHMC Section 16.10.030. Applications for clustering apply through and comply with the requirements of the site plan review process (Chapter 16.76) and the additional following requirements.

1. Applications to cluster must clearly demonstrate that clustering results in:

   i. Reduced grading;

   ii. Reduced roadways and driveway intrusions into sensitive habitat areas, open space, and the Chino Hills State Park;

   iii. Protection of increased amounts of open space; and

   iv. Protection of environmental and visual resources.

The R-R Clustering Development Standards are provided in **Table 3.3, R-R Residential Zone District Clustering Development Standards**. As shown, in **Table 3.3**, Zoning District R-R Clustering includes a maximum building height of 35 feet.

Table 3.3
R-R Residential Zone District Clustering Development Standards

Development Standard	Zoning District R-R Clustering	Project Consistency With Development Standards
A. Minimum Project Size	10 acres	85.2 acres
B. Minimum Lot Size (Single-Family Detached Residential Development) or Minimum Project Area	7,200 sf.	7,200 sf. (Lot 42)
C. Minimum Lot Width	50 ft. min.; 60 ft. avg.	50 ft. min.; 60 ft. avg.
D. Minimum Lot Depth	N/A	N/A
E. Maximum Lot Coverage by: Buildings	40%	37.4%
F. Maximum Coverage In Front Yard by Impervious Surfaces	50%	50%
G. Maximum Number of Units [a]		
i) Roadway Plan Contribution	2 du/1.0 ac	
ii) Non-Roadway Plan Contribution	1 du/1.0 ac	50
iii) Properties along Carbon Canyon Road that are less than 20 acres	N/A	N/A
H. Maximum Building Height [b]	35 ft.	33 ft.
I. Minimum Front Yard Setback		
i) Primary structure	20 ft. min	20 ft. min
ii) Garage	20 ft. min	20 ft. min
iii) Structures with Side Loaded Garages	16 ft min for the garage or the primary structure	N/A
J. Minimum Side Yard Setback:		
i) Collector or Larger Street Side	25 ft.	20 ft.
ii) Local Street Side	15 ft.	10 ft.
iii) Other Side	10 ft.	10 ft.
K. Minimum Rear Yard Setback	15 ft.	15 ft.
L. Minimum Usable Private Open Space	N/A	2,188,152 sf.
M. Minimum Landscape Coverage	Refer to Landscape Manual	Refer to Plans

[a] *If development of the project site requires the completion of the full width of a roadway segment consistent with the City's Circulation Element Roadway Plan (Figure 2-1 in the General Plan Circulation Element) along the property line of, or within the property comprising the project site, then the maximum number of dwelling units permissible under the General Plan is allowed. If development of the project site does not include completion of a roadway segment consistent with the City's Circulation Element Roadway Plan, then the maximum number of dwelling units allowed is limited to fifty percent (50%) of the maximum number of dwelling units permissible under the General Plan. Notwithstanding the above, the number of dwelling units may be further reduced based on site specific environmental constraints.*

[b] *Exempt antennas as defined in this Development Code are exempt from the maximum height restrictions*

Source: Chino Hills Municipal Code Section 16.10.030, Exhibit "B" Table 20-1 (B) R-A and R-R residential Zone Districts-Clustering Development Standards.

PROJECT SUMMARY - SITE

BUILDING AND ZONING CODE SUMMARY

TYPE OF CONSTRUCTION		V
EXISTING OCCUPANCY		R-R
PROPOSED OCCUPANCY		R-R
LAND USE DESIGNATION		
	EXISTING	RURAL RESIDENTIAL
	PROPOSED	RURAL RESIDENTIAL

ZONING REQUIREMENT

MIN. PROJECT SIZE		10 ACRES
MIN. LOT SIZE		7,200 SF
MIN. LOT WIDTH		50 FT./60 FT. AVG.
MIN. LOT DEPTH		NA
MAX. LOT COVERAGE/HOUSE		40%
MAX. FRONT YARD COVERAGE OF IMPERVIOUS SURFACE AREAS		50%
MAX. DENSITY PER SITE		2 DU PER 1 AC.
MAX. BUILDING HEIGHT		35 FT.
MIN. FRONT YARD SETBACK		20 FT.
MIN. SIDE YARD SETBACK		
	LOCAL STREET	15 FT.
	TYPICAL SIDE YARD	10 FT.
MIN. REAR YARD SETBACK		15 FT.
	PORCHES ALLOWED TO ENCROACH 5 FT.	
MIN PRIVATE OPEN SPACE REQUIRED		NA

SITE SUMMARY

ACRES	85.2 Acres (Net)	3,711,312 SF (Net)
TOTAL UNITS PROPOSED	50 UNITS	
DENSITY PROPOSED	1.9 DU/AC	
LOT COVERAGE	REFER TO CIVIL DWGS.	

UNIT PLAN SUMMARY

	PLAN 1	PLAN 2	PLAN 3	PLAN 4
DESCRIPTION	2-STORY 4BD/LOFT/4.5 BA	2-STORY 5BD/4.5 BA	2-STORY 5BD/4.5BA	2-STORY 5BD/LOFT/4.5 BA
# OF UNITS	11	12	13	14
TOTAL LIVING PER PLAN (GROSS)	3336 SF (±) (36,696 SF)	3311 SF (±) (39,732 SF)	3734 SF (±) (48,542 SF)	3984 SF (±) (55,776 SF)
GARAGE (GROSS)	634 SF (±)	635 SF (±)	639 SF (±)	632 SF (±)
TOTAL LIVING AREA (GROSS)	(180,746 SF) (±)			

PARKING SUMMARY (Per table 65-1 of Chapter 16.34.060)

REQUIRED TOTAL	250
PROVIDED	
PRIVATE GARAGE SPACES	150
DRIVE WAY SPACES	100
OPEN PARALLEL STREET SPACES	181
TOTAL PARKING SPACES PROVIDED	431
RATIOS	8.62 PER HOUSE

OPEN SPACE SUMMARY (PER Exhibit "B" Table20-1(B) of Chapter 16.08.070)

MIN. PRIVATE OPEN SPACE NOT REQUIRED

COMMON OPEN SPACE IS BASED ON THE LOT COVERAGE AND FRONT YARD NON-IMPERVIOUS AREAS*

NOTE: REFER TO CIVIL DRAWINGS FOR CALCULATIONS

ELEVATIONS STYLE LEGEND

- A - ADOBE RANCH
- B - COTTAGE FARMHOUSE
- C - MONTEREY ANDALUSIAN
- D - SANTA BARBARA
- E - AGRARIAN TRADITIONAL
- F - TUSCAN FARMHOUSE

ENHANCED ELEVATION LEGEND

- FRONT ENHANCED
- SIDE ENHANCED
- REAR ENHANCED

NOTES:

THIS SITE PLAN IS TO BE USED ONLY FOR REFERENCING FLOOR PLAN TYPES AND ARCHITECTURAL STYLES. REFER TO CIVIL DRAWINGS FOR GRADING AND SITE SPECIFIC ITEMS.

Source: KTGY Group, 2020

EcoTierra consulting

Figure 3.4
Site Plan

PLAN 4E	PLAN 3B	PLAN 4D	PLAN 3A	PLAN 2F	PLAN 1C
AGRARIAN TRADITIONAL	COTTAGE FARMHOUSE	SANTA BARBARA	ADOBE RANCH	TUSCAN FARMHOUSE	MONTEREY ANDALUSIAN

NOTE: THIS A HYPOTHETICAL STREET SCENE TO SHOW THE DIFFERENT ELEVATION STYLES

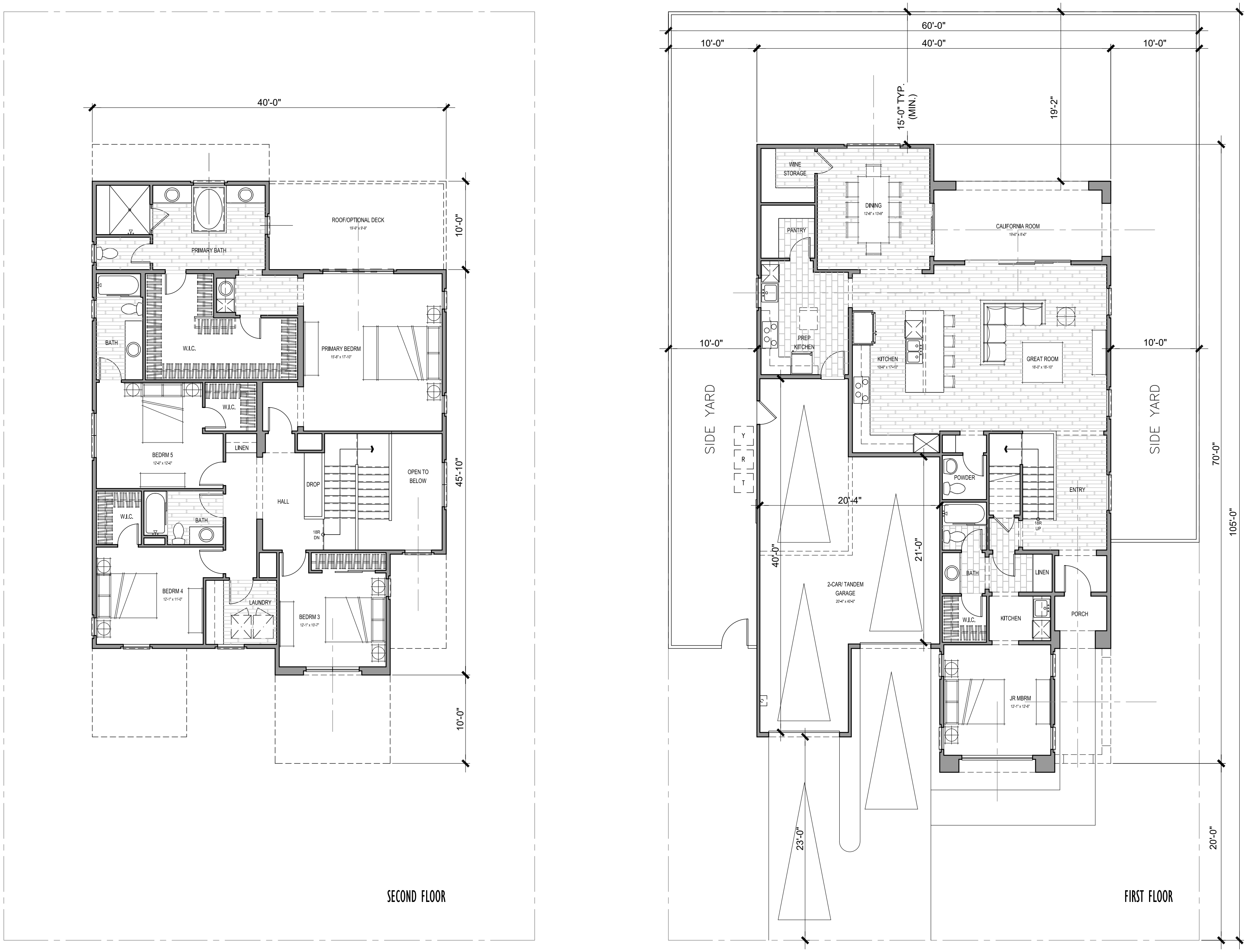
Source: KTGY Group, 2020

PLAN 1 - GROSS SF	
1ST FLOOR	1597 SQ. FT.
2ND FLOOR	1739 SQ. FT.
TOTAL LIVING	3336 SQ. FT.
DECK	226 SQ. FT.
PATIO	72 SQ. FT.
3 CAR GARAGE	634 SQ. FT.

Source: KTGY Group, 2020

EcoTierra consulting

Figure 3.6
Plan 1 Floor Plan

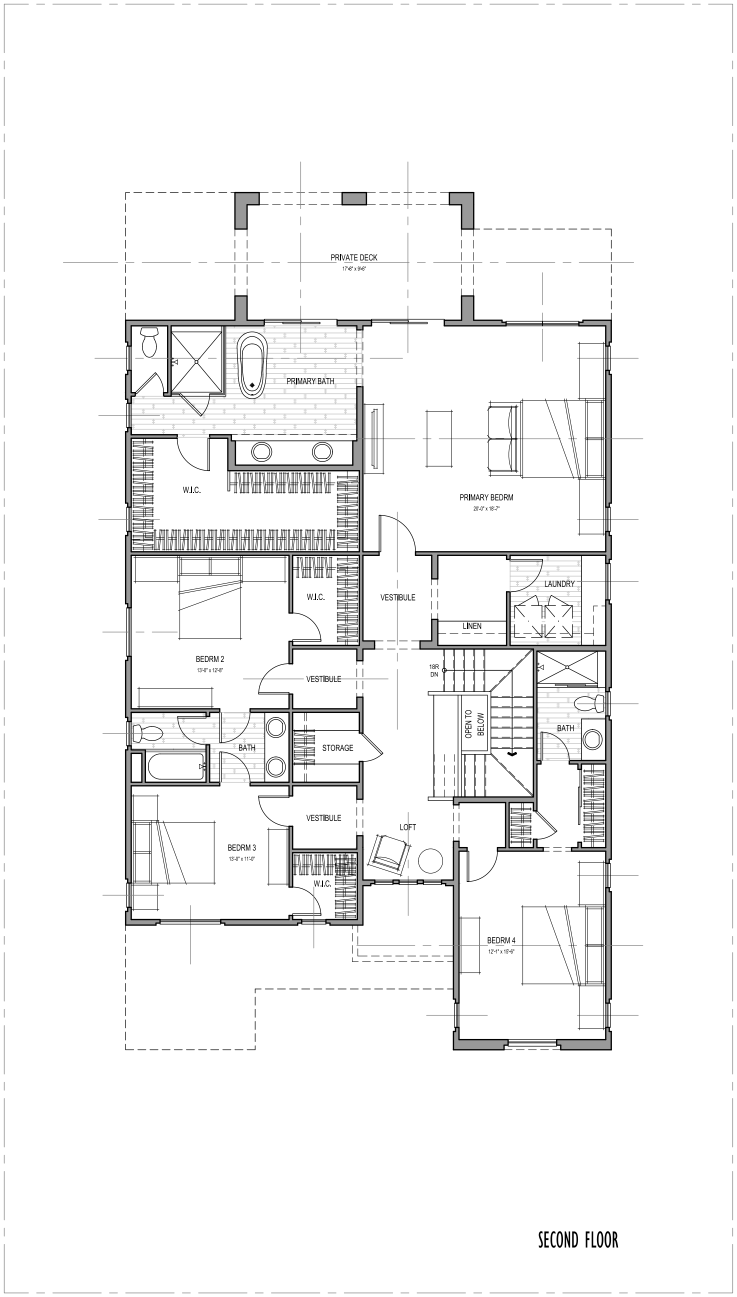


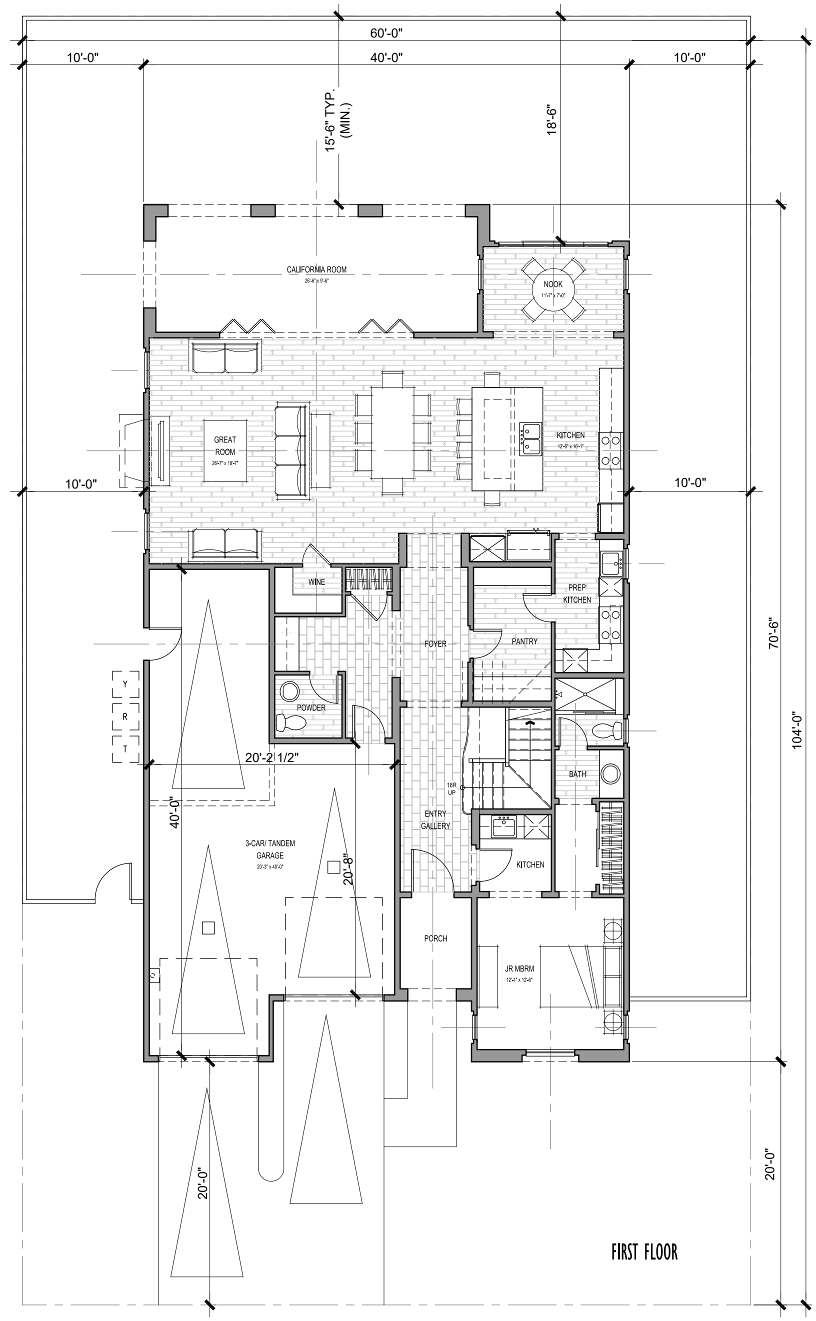
PLAN 2 - GROSS SF	
1ST FLOOR	1603 SQ. FT.
2ND FLOOR	1708 SQ. FT.
TOTAL LIVING	3311 SQ. FT.
DECK	200 SQ. FT.
PATIO	180 SQ. FT.
3 CAR GARAGE	635 SQ. FT.

Source: KTGY Group, 2020

EcoTierra consulting

Figure 3.7
Plan 2 Floor Plan



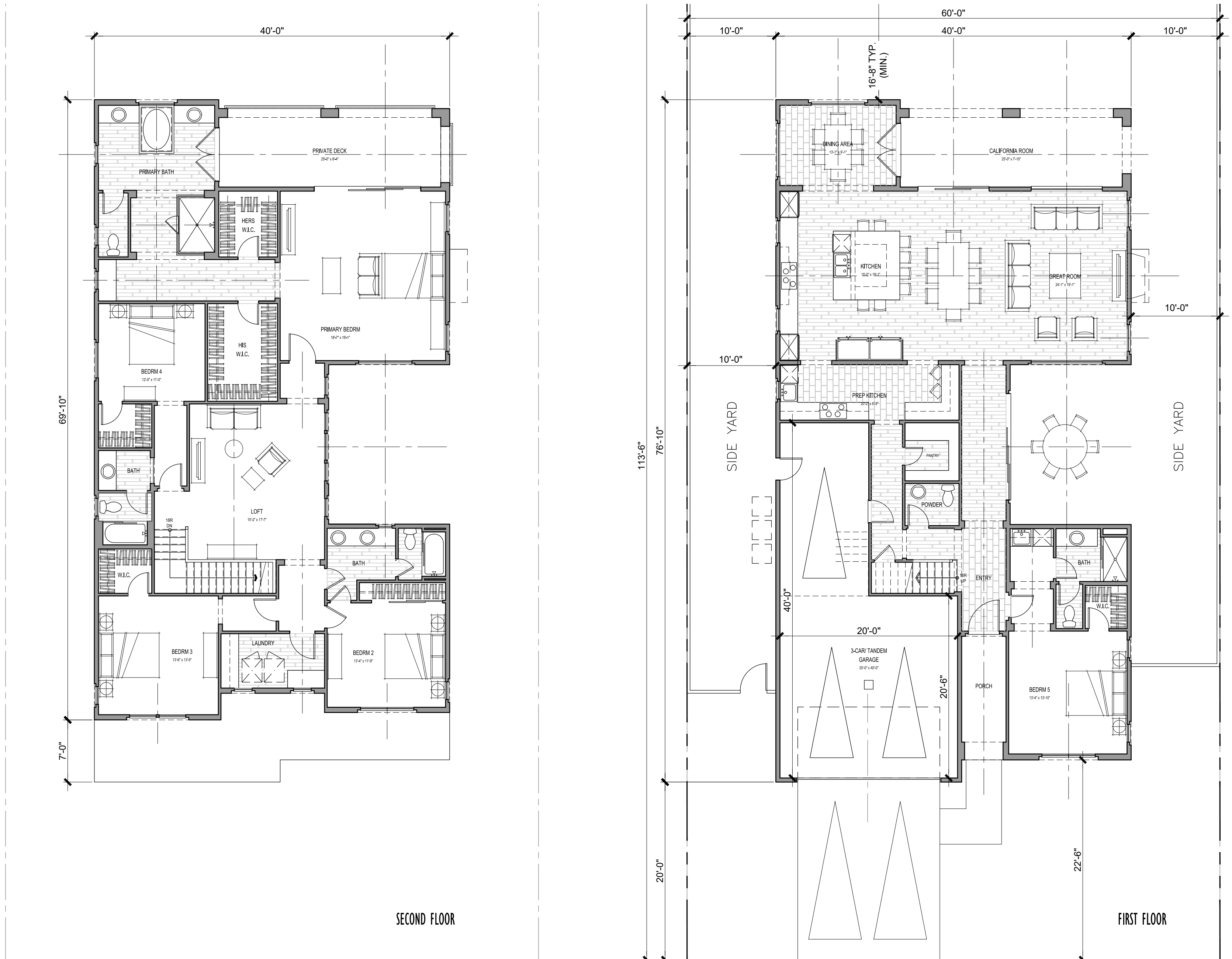


PLAN 3 - GROSS SF	
1ST FLOOR	1717 SQ. FT.
2ND FLOOR	2017 SQ. FT.
TOTAL LIVING	3734 SQ. FT.
DECK	292 SQ. FT.
PATIO	54 SQ. FT.
3 CAR GARAGE	639 SQ. FT.

Source: KTGY Group, 2020

EcoTierra consulting

Figure 3.8
Plan 3 Floor Plan



PLAN 4 - GROSS SF	
1ST FLOOR	1812 SQ. FT.
2ND FLOOR	2172 SQ. FT.
TOTAL LIVING	3984 SQ. FT.
DECK	243 SQ. FT.
PATIO	71 SQ. FT.
3 CAR GARAGE	632 SQ. FT.

Source: KTGY Group, 2020

EcoTierra consulting

Figure 3.9
Plan 4 Floor Plan

OPEN SPACE AND LANDSCAPING

Per CHMC Chapter 16.08.070, Open Space Requirements, in order to preserve open space areas and maintain the desired rural character of Chino Hills, a portion of each project is required to be set aside as open space as define in Table 15-1 in the CHMC. Per Table 15-1, the Project is required to provide a minimum percentage of open space and natural open space. Per CHMC Chapter 16.08.070, the Project would provide an equestrian trail along Canyon Hills Road on the Projects street frontage. This equestrian trail is a multi-use trail available to walkers, hikers, runners, bicyclists, and equestrians. In addition, Lot A of the Project Site which is approximately 2,189,796 square feet (50 acres) and includes approximately 1,629,570 square feet (40 acres) of natural open space and approximately 435,289 square feet (10 acres) of manufactured open space. Furthermore, the Tract Map will include a covenant for open space use and an open space easement for the Homeowner's Association HOA to maintain.

The Project would also provide landscaping to enhance the streetscape. As shown in **Figure 3.10, Conceptual Landscaping Plan**, trees and other landscaping features such's as ground cover, shrubs, and vines would be planted throughout the Project Site and along "A" Street, "B" Street, and "C" Street. Front yard shade trees would be provided on each of the residential lots.

There are 1,287 native trees (including one heritage tree; tree no. 1284) that meet the City's definition of protected trees located within and adjacent to the limits of the Project Site. The site's trees are comprised of four native tree species that meet the City's criteria for a protected native tree: coast live oak, California black walnut, scrub oak, and western sycamore.[3]

As discussed in the Tree Replacement Plan[4],254 trees (including 46 dead trees) will be impacted by the Project. Per Municipal Code Chapter 16.90 a due to the direct impact and encroachment on 254 trees, those trees would need to be replaced with a total of 591 replacement trees of various sizes (59 24-inch box trees, 236 36-inch box trees, and 296 48-inch box trees) at a ratio of 2.3:1. As stated above, the applicant is proposing to remove protected oak trees and replant them on-site. Pursuant to CHMC 16.90.070, the Project's proposed removal of protected trees will be subject to a Tree Removal Permit.

In total, the Project would provide approximately 125 trees on the slope area of the Project Site (125 trees are required per CHMC 16.90), 48 front yard trees, and 112 street trees. The applicant is also proposing to remove protected oak trees and replant them on-site. Pursuant to CHMC 16.90.070, the Project's proposed removal of protected trees will be subject to a Tree Removal Permit.

ACCESS, CIRCULATION AND PARKING

Development of the Project includes the construction of three new streets, "A" Street, "B" Street, and "C" Street which provide access to the residential homes. Vehicle access to the Project Site would be provided via a new intersection between Canyon Hills and "A" Street, and a new intersection between Canyon Hills and "C" Street.

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3 *Protected Tree Report for the 16220 Canyon Hills Road Project (TTM 20286), Dudek, October 2020.*

4 *Tree Replacement Plan for the 16220 Canyon Hills Road Project (TTM 20286) City of Chino Hills, California, Dudek, November 2021.*

Source: SMP Environmental Design, 2021

EcoTierra consulting

Figure 3.10
Conceptual Landscape Plan

The Project is required to provide 150 covered (within garage) parking spaces and 100 uncovered parking spaces per CHMC Title 16, Chapter 16.34.060, Table 65-1, Number of Automobile Parking Spaces Required. The Project includes the development of 250 parking spaces: 150 private garage spaces, and 100 driveway spaces.

LIGHTING AND SIGNAGE

The Project would include low voltage level decorative exterior lights on the proposed residential homes near the front doors and garages for security and wayfinding purposes. All lighting would comply with current energy standards and codes as well as design requirements while providing appropriate light levels. Project lighting would be designed following CHMC Section 16.09.070 Lighting Guidelines and would provide efficient on-site lighting, reducing sky-glow, and improving nighttime visibility through glare reduction. Specifically, all on-site exterior lighting, would be shielded or directed toward areas to be illuminated to limit spill-over onto adjacent streets, nearby residential uses or to cause glare to motorists (CHMC Section 16.48.040 Lights).

Proposed signage would be designed to be aesthetically compatible with the proposed architecture of the Project Site and with the requirements of the CHMC. Proposed signage would include community monument signs with split face pilasters and angled wall with sign panel at the “A” Street intersection and the “C” Street intersection. Illumination used for Project signage would comply with light intensities set forth in CHMC Section 16.38.020.

SUSTAINABILITY FEATURES

The Project residences would be designed to meet the requirements of the most current California Green Building Code and CHMC Section 16.09.090. The Project would include the following water conservation techniques:

- Water conserving plants, and plants native to hot, dry summers, utilized in 95 percent of the total plant area,
- Irrigation zones separated by plant material,
- Use of hydro zones with plants grouped based on the amount of water needed to sustain them,
- Soil amendments utilized to improve water holding capacity of the soil,
- Automatic irrigation system adjusted seasonably add with watering hours between 9:00 p.m. and 9:00 a.m.,
- Irrigation system design to water different areas of the landscape based on watering need; and
- Recommendations given for an annual irrigation schedule.

3.5 ANTICIPATED CONSTRUCTION SCHEDULE

The Project would be constructed over approximately 20 months. Major construction phases would be as follows:

- Demolition
- Excavation/Grading/Foundation
- Construction/Framing/Finishing

The Project would require the net export of approximately 59,075 cubic yards of soil and approximately 41,410 cubic yards of import of soil. The likely outbound haul routes for the Project would be via Canyon Hills Road to SR142. Waste Management would provide short term roll-off dumpster service to the Project Site. Exported materials would be disposed of in the dumpsters provided by Waste Management and hauled to a the El Sobrante Landfill in Corona.

Demolition activities are anticipated to start in May 2022, and construction completion and building occupancy are anticipated in December 2024**.**

3.6 REQUESTED PERMITS AND PROJECT APPROVALS

The list below includes the anticipated requests for approval of the Project. The Initial Study will analyze impacts associated with the Project and will provide environmental review sufficient for all necessary entitlements and public agency actions associated with the Project. The discretionary entitlements, reviews, permits, and approvals required to implement the Project include, but are not necessarily limited to, the following:

- Tentative Tract Map
- Site Plan Review for Clustered development
- Tract Design Review,
- Tree Removal Permit,
- Demolition, grading, excavation, and building permits at time of development;
- Caltrans Traffic Control Encroachment Permit, for any traffic control signage added to State Route 142 during import and export of soil, and
- Other discretionary and ministerial permits and approvals that may be deemed necessary, including, but not limited to, encroachment permit, temporary street closure permits, foundation permits, and sign permits.

4.1 AESTHETICS.

Except as provided in Public Resources Code Section 21099, would the project:

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☒	☐
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☒	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☒	☐

SETTING

Scenic Vistas

Scenic vistas are typically described as areas of natural beauty with features such as topography, watercourses, rock outcrops, and natural vegetation that contribute to the landscape's quality. The City of Chino Hills (City) derives much of its character from its hillside setting and its diverse topographic forms. The City's General Plan emphasizes preservation and enhancement of the natural features which contribute to the scenic qualities. The general hillside design regulations contained in the general plan are to be used under grading regulations contained in Chino Hills Municipal Code (CHMC) Chapter 16.50. The purpose of these regulations is to protect and enhance the unique visual resources of Chino Hills.

Scenic Resources within Scenic Highways

Scenic resources typically include trees, rock outcroppings, and historic buildings within a state scenic highway. No scenic highways within Chino Hills have been designated by the state or the City. There are no candidates for the scenic highway land use designation.

Chapter 16.30 Scenic Resources Overlay District of the CHMC establishes the scenic resources overlay district to provide development standards that will protect, preserve, and enhance Chino Hills' Important Visual Resources, including Exceptionally Prominent Ridgelines, Prominent Ridgelines, Prominent Knolls, and Associated Primary View Points.

Per CHMU Chapter 16.08.040, Exceptionally Prominent Ridgelines. Ridgelines that, by virtue of their scale, mass, and visual presence form the limits of the most exceptional viewsheds of the City, and are typically four hundred (400) feet above their associated primary view point(s). Those that provide the City with its distinct image and serve as the City's most recognizable skyline backdrop when viewed from the following transportation corridors/thoroughfares:

- Chino Valley Freeway (SR 71);
- Carbon Canyon Road (SR 142);
- Butterfield Ranch Road;
- Soquel Canyon Parkway;
- Chino Hills Parkway;
- Peyton Drive;
- Woodview Road;
- Eucalyptus Avenue;
- Tonner Canyon Road; and
- Grand Avenue.

Prominent Ridgelines. Ridgelines that form the limits of significant viewsheds and provide a natural backdrop when viewed from primary view point(s). Although they vary considerably in scale, width, scope, length, alignment, accessibility, and relationship to adjacent land uses, they are typically two hundred (200) feet above their associated primary view point(s).

Prominent Knolls. A highly visible hill or hilltop which provides a point of orientation or reference for the observer. It is generally a feature of significance within an area, rather than one of community-wide importance.

Associated Primary View Point. A specifically designated location from which a specific ridgeline may be viewed. Primary view points for any given ridgeline are selected as points from which large numbers of people are likely to be able to view the ridgeline.

There are no Knolls or Exceptionally Prominent Ridgelines on the Project Site.[1] West of the Project Site is a Prominent Ridgeline. However, views of the ridgeline from the Project Site are blocked by trees and native ground cover.

Visual Character

Visual character is the overall perceptible aesthetic quality of an area created by its unique combination of visual features such as form, bulk, scale, texture, color, and viewing range. Generally, the key factors in determining the potential adverse impact on visual character are (1) substantial changes to the existing physical features of the landscape that are characteristic of the region or locale; (2) the introduction of new features to the physical landscape that are perceptibly uncharacteristic of the region or locale or that become visually dominant from common view points; or (3) blocked or completely obscured scenic resources in the landscape.

The Project Site currently has two residences, which are not an established visual feature in the neighborhood. The Project Site and surrounding area are characterized by hilly terrain with both single-family residences and undeveloped hillsides featuring trees and native ground cover.. As stated above, there are no Knolls or Exceptionally Prominent Ridgelines on the Project Site.[2] West of the Project Site is a Prominent Ridgeline. However, the majority of the views of the Project Site and from the Project Site are blocked by trees and vegetation. The visual character of the surrounding area includes hills and ridgelines with existing residences, most of which are located on large lots with vegetation surrounding each residence.

DISCUSSION OF IMPACTS

a) **Would the project have a substantial adverse effect on a scenic vista? Less Than Significant Impact.** Scenic vistas are generally described in two ways: panoramic views (visual access to a large geographic area, for which the field of view can be wide and extend into the distance) and focal views (visual access to a particular object, scene, or feature of interest). The City does not designate specific scenic vistas in the General Plan. However, because the geography of City is characterized by hillsides, the natural vegetation and views of the surrounding area meet the definition of a scenic vista in the setting. The Project Site currently has two residences, which are not an established visual feature in the neighborhood. The Project Site is located both on a ridgeline and down slope from the ridgeline, with most of the property vegetated except for the existing residences, its barn, stables, the corrals, and the yard.

The applicant is proposing to subdivide the 85-acre property into a total of 52 lots. Lots 1 through 50 will include the development of a residential use. The Project includes the development of six architectural styles with a total of three different floor plans for each style. The six architectural styles include: Adobe Ranch, Cottage Farmhouse, Monterey Andalusian, Santa Barbara, Agrarian Traditional, and Tuscan Farmhouse. The design of the residential uses also includes three enhanced elevations: Front Enhanced, Side Enhanced, and Rear Enhanced. There are a total of four different floor plans for the residential uses, each of which are two-story and range between four and five bedrooms. Floor Plan 1 is approximately 3,970 square feet (including garage), Floor Plan 2 is approximately 3,946 square feet (including garage), Floor Plan 3 is approximately 4,373

1 *City of Chino Hills Municipal Code 16.08.020, Figure 15-1, City of Chino Hills Ridgelines & Knolls Map, September 1999, amended November 2006. Accessed June 2021.*

2 *City of Chino Hills Municipal Code 16.08.020, Figure 15-1, City of Chino Hills Ridgelines & Knolls Map, September 1999, amended November 2006. Accessed June 2021.*

square feet (including garage), and Floor Plan 4 is approximately 4,616 square feet (including garage). See **Figures 3.4 through 3.9** in **Section 3.0 Project Description**, for site plan, elevations, and floor plans.

Lots 1 through 50 will range from a lot size of 7,200 square feet to 12,412 square feet. Lot 51 will maintain the existing residential structure on-site. The rest of the area, consists of approximately 2,189,796 square feet (50 acres) and includes approximately 1,629,570 square feet (40 acres) of natural open space and approximately 435,289 square feet (10 acres) of manufactured open space. This area is designated Lot A, and will be maintained as natural open space by the project Homeowners Association (HOA). Elevations within Lot A range from a low of approximately 959 feet to a high of approximately 1,256 feet.

The City does not designate a scenic vista from the Project Site, neither is the Project Site located in the viewshed of a designated scenic vista. The Project Site is not located in, or visible from, a designated scenic vista or protected viewshed in an adopted land use plan. Development of the Project would be clustered in the lower, flatter areas of the site along Canyon Hills Road; and as noted above, 40 acres will remain as natural open space and approximately 435,289 square feet (10 acres) would include manufactured open space. Therefore, development of the Project Site would not have a substantial adverse effect on a scenic vista from a panoramic view. The proposed residences would be visible in the context of other existing hillside residences in northern views adjacent to the Project Site, and in the eastern views across Canyon Hills Road. The Project is similar in appearance to existing single-family residences in the vicinity and these focal viewpoints are not considered a designated scenic vista in an adopted land use plan. Therefore, the Project Site would have a less than significant impact on a scenic vista and no mitigation measures are required. No further evaluation of this topic is required in the EIR.

b) **Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic building within a state scenic highway? Less Than Significant Impact**. No scenic highways within the City Chino Hills have been designated by the state or the City. There are no candidates for the scenic highway land use designation. Chapter 16.30 Scenic Resources Overlay District of the CHMC establishes the scenic resources overlay district to provide development standards that will protect, preserve, and enhance Chino Hills' Important Visual Resources, including Exceptionally Prominent Ridgelines, Prominent Ridgelines, Prominent Knolls, and Associated Primary View Points. There are no Knolls or Exceptionally Prominent Ridgelines on the Project Site.[3] West of the Project Site is a Prominent Ridgeline. However, views of it from the Project Site are blocked by trees and native ground cover.

Chapter 16.90, Tree Preservation, of the City's Municipal Code makes it unlawful for any person, firm, partnership, corporation or other legal entity to destroy or remove any non-exempt protected trees within the City without a tree permit. When a tree permit is required, no grading or building permits shall be issued until the tree permit is issued, nor shall work of any kind commence that would result in the destruction, damage, or removal of any non-exempt protected tree prior to the issuance of the tree permit. When part of a proposed development, the Tree Removal Permit shall be submitted concurrent with the development permit application (Chino Hills 2020).[4]

3 *City of Chino Hills Municipal Code 16.08.020, Figure 15-1, City of Chino Hills Ridgelines & Knolls Map, September 1999, amended November 2006. Accessed June 2021.*

4 *Protected Tree Report for the 16220 Canyon Hills Road Project (TTM 20286), Dudek, October 2020.*

The Tree Preservation ordinance protects "native trees" that are 4 inches or greater DBH and are located on undeveloped property or developed property within the Fire Hazard Overlay. The species protected consist of the following:

- California sycamore or western sycamore
- California live oak or coast live oak
- California black walnut or Southern California black walnut
- coastal scrub oak or California scrub oak

In addition, the City protects "heritage trees," which are defined as "any species that is single – or multi-trunk tree having a cumulative diameter of forty-four (44) inches or greater at diameter at breast height (DBH), located on undeveloped property, and of significant age, health and quality to be deemed valuable to the aesthetics of the community by a certified arborist" (Chino Hills 2012). Excluded from the "heritage tree" designation are invasive trees as defined by the California Invasive Plant Council, and trees susceptible to breaking or falling, such as eucalyptus blue gum (Eucalyptus globulus) and/or other tree species identified by a City-approved certified arborist. Protected native or heritage trees in the following situations are exempt from requiring a Tree Removal Permit (Chino Hills 2020):

- Protected trees located on privately owned developed properties not located within the Fire Hazard Overlay District.
- Protected trees located on privately owned developed properties located within the Fire Hazard Overlay District that are not visible from adjacent public or private rights-of-way, streets, parks, or trails.
- Protected trees that are determined by the Community Development Director to create a safety hazard or are damaging public improvements.
- City trees removed pursuant to a valid tree permit issued pursuance to Municipal Code Chapter 12.26 City-Owned Trees.

There are 1,287 native trees (including one heritage tree; tree no. 1284) that meet the City's definition of protected trees located within and adjacent to the limits of the Project Site. The site's trees are comprised of four native tree species that meet the City's criteria for a protected native tree: coast live oak, California black walnut, scrub oak, and western sycamore.[5]

As discussed in the Tree Replacement Plan[6],254 trees (including 46 dead trees) will be impacted by the Project. Per Municipal Code Chapter 16.90 a due to the direct impact and encroachment on 254 trees, those trees would need to be replaced with a total of 591 replacement trees of various sizes (59 24-inch box trees, 236 36-inch box trees, and 296 48-inch box trees) at a ratio of 2.3:1. As stated above, the applicant is proposing to remove protected oak trees and replant them

[5] *Protected Tree Report for the 16220 Canyon Hills Road Project (TTM 20286), Dudek, October 2020.*

[6] *Tree Replacement Plan for the 16220 Canyon Hills Road Project (TTM 20286) City of Chino Hills, California, Dudek, November 2021.*

on-site. Pursuant to CHMC 16.90.070, the Project's proposed removal of protected trees will be subject to a Tree Removal Permit. Although the removal and replanting of protected oak trees on-site would modify the scenic quality of the Project Site, the Project Site is not located with a state scenic highway, therefore, the development of the Project Site would not damage scenic resources within a state scenic highway.

The Project Site has two existing residences, a barn, and a stable and fenced pasture on approximately 85.2 acres of land. Although, these buildings may be eligible for consideration as a historic resource because they are over 50 years of age, they are not an established visual feature in the neighborhood, and they are not located with a state scenic highway; and as such development of the Project Site would not damage scenic resources within a state scenic highway. Furthermore, there are no rock outcroppings, or other scenic resources within a state scenic highway that would add to the scenic quality of the area. Therefore, impacts would be less than significant, and no mitigating measures would be required. No further evaluation of this topic is required in the EIR.

c) **Would the project, in non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality? Less Than Significant Impact**. The Project Site currently has two residences, which are not an established visual feature in the neighborhood. The Project Site is located both on a ridgeline and down slope from the ridgeline, with most of the property vegetated except for the existing residences, its barn, stables, the corrals, and the yard. Elevations range from a low of approximately 959 feet to a high of approximately 1,256 feet.

The Project Site is surrounded by residential development on the north, south, and east. To the west, the adjacent parcel is undeveloped. To the north and east of the Project Site is the Oak Tree Downs Community, which includes single-family homes. To the west of the Project Site is undeveloped land, further to the west is the Saint Joseph Hill of Hope. To the south of the Project Site is the Hillcrest development, which includes single-family homes. Surrounding land use photos are presented in **Figure 3.3, Surrounding Land Use Photos** in **Section 3.0 Project Description**. The surrounding single-family residential development is located on large lots, with vegetation surrounding each residence.

The applicant is proposing to subdivide the 85-acre property into a total of 52 lots. Lots 1 through 50 will include the development of a residential use. The Project includes the development of six architectural styles with a total of three different floor plans for each style. The six architectural styles include: Adobe Ranch, Cottage Farmhouse, Monterey Andalusian, Santa Barbara, Agrarian Traditional, and Tuscan Farmhouse. The design of the residential uses also includes three enhanced elevations: Front Enhanced, Side Enhanced, and Rear Enhanced. There are a total of four different floor plans for the residential uses, each of which are two-story and range between four and five bedrooms. Floor Plan 1 is approximately 3,970 square feet (including garage), Floor Plan 2 is approximately 3,946 square feet (including garage), Floor Plan 3 is approximately 4,373 square feet (including garage), and Floor Plan 4 is approximately 4,616 square feet (including garage). See **Figures 3.4 through 3.9**, in **Section 3.0 Project Description** for site plan, elevations, and floor plans.

Lots 1 through 50 will range from a lot size of 7,200 square feet to 12,412 square feet. Lot 51 will maintain the existing residential structure on-site. The rest of the area is undeveloped, hillside slopes, and is covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.

The Project Site is currently zoned R-R (Rural Residential) in the City, which designates the land use of the property as Rural Residential. The Project is proposing to develop under the City's Clustering Ordinance No. 298, and the City of Chino Hills Municipal Code (CHMC) Section 16.10.030. Per Ordinance No. 298, a cluster development is a means of preserving open space while permitting residential development by clustering homes on only a portion of the development parcel, thereby preserving the remainder of the parcel in open space. The clustering of residential homes into a small area is made possible by reducing the individual lot sizes and corresponding development standards. This Ordinance is intended to allow the City to establish development standards, regulations, and review procedures for clustering single-family residential development in the Agriculture-Ranch (R-A) and Rural Residential (R-R) zoning districts.

Per CHMC Section 16.10.030, clustering is permitted for certain designated properties to protect environmental and visual resources. The R-R Clustering Development Standards are provided in **Table 3.3, R-R Residential Zone District Clustering Development Standards** in **Section 3.0 Project Description**. As shown, in **Table 3.3**, Zoning District R-R Clustering includes a maximum building height of 35 feet.

The Project would provide an equestrian trail long Canyon Hills Road on the Projects street frontage. This equestrian trail is a multi-use trail available to walkers, hikers, runners, bicyclists, and equestrians. In addition, Lot A of the Project Site which is approximately 2,189,796 square feet (50 acres) and includes approximately 1,629,570 square feet (40 acres) of natural open space and approximately 435,289 square feet (10 acres) of manufactured open space. Furthermore, the Tract Map will include a covenant written on the Tentative Tract Map and will include a condition of approval for open space use and an open space easement for the Homeowner's Association HOA to maintain.

The Project would also provide landscaping to enhance the streetscape. As shown in **Figure 3.10, Conceptual Landscaping Plan**, in **Section 3.0 Project Description**, trees, and other landscaping features such's as ground cover, shrubs, and vines would be planted throughout the Project Site and along "A" Street, "B" Street, and "C" Street. Front yard shade trees would be provided on each of the residential lots.

There are 1,287 native trees (including one heritage tree; tree no. 1284) that meet the City's definition of protected trees located within and adjacent to the limits of the Project Site. The site's trees are comprised of four native tree species that meet the City's criteria for a protected native tree: coast live oak, California black walnut, scrub oak, and western sycamore.[7]

As discussed in the Tree Replacement Plan[8],254 trees (including 46 dead trees) will be impacted by the Project. Per Municipal Code Chapter 16.90 a due to the direct impact and encroachment

[7] *Protected Tree Report for the 16220 Canyon Hills Road Project (TTM 20286), Dudek, October 2020.*

[8] *Tree Replacement Plan for the 16220 Canyon Hills Road Project (TTM 20286) City of Chino Hills, California, Dudek, November 2021.*

on 254 trees, those trees would need to be replaced with a total of 591 replacement trees of various sizes (59 24-inch box trees, 236 36-inch box trees, and 296 48-inch box trees) at a ratio of 2.3:1. As stated above, the applicant is proposing to remove protected oak trees and replant them on-site. Pursuant to CHMC 16.90.070, the Project's proposed removal of protected trees will be subject to a Tree Removal Permit.

There are no Knolls or Exceptionally Prominent Ridgelines on the Project Site.[9] West of the Project Site is a Prominent Ridgeline. However, views of it from the Project Site are blocked by trees and native ground cover.

The Project Site land use designation and zoning is the same as the residential uses located to the south of the Project Site, and the two-story design is similar to the residential uses located to the north, south, and east of the Project Site. As such the proposed residential uses would be consistent with the type of uses in the surrounding area. In addition, the proposed height and scale of the residential uses would be consistent with the height and visual qualities of the surrounding buildings.

Prior to construction, any project involving a new structure on the newly-formed parcels would be required to go through the City's design review process and would be subject to the basic design review standards and the special design review standards in the CHMC large residential lots. The design review process includes landscaping to help blend the proposed residences with the natural context of the site and to address any potential viewshed concerns. Therefore, impacts would be less than significant and no mitigation measures would be required. No further evaluation of this topic is required in the EIR.

d) **Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area? Less Than Significant Impact**. The project would introduce new sources of light and/or glare in the area from windows and exterior lighting on proposed residences, as well as from project-related traffic via vehicle headlights. Nighttime lighting would be limited to the extent necessary to illuminate the building entrances and landscape areas to provide both adequate night visibility and security for residents and visitors. Nighttime lighting for the proposed residences would be consistent with the area and would be low in height, shielded, and directed downward to minimize light spillover pursuant to CHMC standards. Therefore, light impacts would be less than significant.

Reflective surfaces that could potentially produce glare in the Project vicinity include traveling vehicles and those parked on nearby streets, exterior building windows, and surfaces of brightly painted buildings. Excessive glare not only restricts visibility but also increases the ambient heat reflectivity in a given area. Proposed landscaping consists of trees, ground cover, and shrubs to enhance the visual appeal of the built environment. Windows installed as part of the Project would be consistent with CHMC standards and would not generate a substantial amount of glare. The Project does not propose highly polished materials or highly reflective metals and glass that could reflect light and create glare. The Project would not create a new source of substantial glare affecting day or nighttime views of the area. Additionally, the architectural materials to be used

[9] *City of Chino Hills Municipal Code 16.08.020, Figure 15-1, City of Chino Hills Ridgelines & Knolls Map, September 1999, amended November 2006. Accessed June 2021.*

for the exterior would be limited to materials that do not cause excessive glare such as stucco and faux wood trim, vinyl, and adobe brick. Therefore, glare impacts would be less than significant.

Therefore, the Project would not create a new source of substantial light or glare which would adversely affect day or nighttime views in the area, impacts would be less than significant, and no mitigation measures would be required. No further evaluation of this topic is required in the EIR.

4.2 AGRICULTURE/FORESTRY RESOURCES.

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forestland, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to nonagricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

SETTING

According to the California Important Farmland Finder, the Project Site and all adjacent properties have been designated as Other Land.[10] This designation is defined as land that is not in any other category. It often includes low-density rural developments, brush, timber, wetland and riparian areas not suitable for livestock grazing, confined livestock, poultry, or aquaculture facilities, strip mines, borrow pits, and water bodies smaller than 40 acres. The Project Site has two existing residences on approximately 85.2 acres of land and therefore falls into the low-density rural development category. The site is not currently used for any type of agricultural or forestry use and is not zoned for agricultural or forestry use. The Project Site is not subject to a Williamson Act Contract.

DISCUSSION OF IMPACTS

a) **Would the project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to nonagricultural use? No Impact.** The State of California's Farmland Mapping and Monitoring Program does not identify the Project Site as Prime Farmland, Unique Farmland, Farmland of Statewide Importance, or Farmland of Local Importance."[11] The Project Site has two existing residences, a barn, and a stable and fenced pasture on approximately 85.2 acres of land. The rest of the land is currently vacant covered with mostly bare soil, grass, bushes, trees, and other native vegetation. Thus, the Project would not result in the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural uses. Therefore, no impact would occur, and no mitigation measures would be required. No further evaluation of this topic is required in the EIR.

b) **Would the project conflict with existing zoning for agricultural use, or a Williamson Act contract? No Impact**. The Project Site is currently zoned R-R (Rural Residential). The Rural Residential (R-R) zone district is a single-family zone which permits residential development on very large lots, with a minimum lot size of one half acres (maximum density two units per gross acre). Minimum lot sizes in this zoning district may be increased depending on terrain, availability of services, or other factors. The Project Site has two existing residences, a barn, and a stable and fenced pasture on approximately 85.2 acres of land. The rest of the land is currently vacant covered with mostly bare soil, grass, bushes, trees, and other native vegetation. The Project Site is not enrolled in a Williamson Act contract. As such, upon approval of the Project the Project would not conflict with a Williamson Act contract or existing agricultural zoning. Therefore, no impact would occur and no mitigation measures would be required. No further evaluation of this topic is required in the EIR.

c) **Would the project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))? No Impact**. The Project Site is currently zoned R-R (Rural Residential). The Rural Residential (R-R) zone district is a single-family zone which permits residential development

[10] *California Department of Conservation, California Important Farmland Finder, https://maps.conservation.ca.gov/DLRP/CIFF/, accessed April 2021.*

[11] *California Department of Conservation, California Important Farmland Finder, https://maps.conservation.ca.gov/DLRP/CIFF/, accessed April 2021.*

on very large lots, with a minimum lot size of one half acres (maximum density two units per gross acre). The Project Site has two existing residences, a barn, and a stable and fenced pasture on approximately 85.2 acres of land. The rest of the land is currently vacant covered with mostly bare soil, grass, bushes, trees, and other native vegetation. There are no lands zoned or currently used for forest land, timberland, or Timberland Production at or in the vicinity of the Project Site. Therefore, no impact would occur and no mitigation measures would be required. No further evaluation of this topic is required in the EIR.

d) **Result in the loss of forest land or conversion of forest land to non-forest use? No Impact.** As described previously, the Project Site does not contain any forestland. Therefore, the Project would not result in the loss or conversion of any forestland and would have no impact on forestland or timberland and no mitigation measures would be required. No further evaluation of this topic is required in the EIR.

e) **Would the project Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use? No Impact**. As described previously, the Project Site and adjacent properties are not zoned as forestland and do not meet the definition of forestland. Therefore, the Project would not result in the conversion of forestland and would have no impact and no mitigation measures would be required. No further evaluation of this topic is required in the EIR.

4.3 AIR QUALITY.

Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the project:

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Conflict with or obstruct implementation of the applicable air quality plan?	☒	☐	☐	☐
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☒	☐	☐	☐
c) Expose sensitive receptors to substantial pollutant concentrations?	☒	☐	☐	☐
d) Result in other emissions (such as those leading to odors)adversely affecting a substantial number of people?	☐	☐	☒	☐

SETTING

Air pollutants are regulated at the national, state, and air basin level; each agency has a different level of regulatory responsibility. The United States Environmental Protection Agency (EPA) regulates at the national level. The California Air Resources Board (CARB) regulates at the state level. The South Coast Air Quality Management District (SCAQMD) regulates at the air basin level.

The Project Site is located in the City of Chino Hills within the southwestern portion of County of San Bernardino, which is part of the South Coast Air Basin (SCAB) that includes all of Orange County as well as the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties. The South Coast Air Basin is located on a coastal plain with connecting broad valleys and low hills to the east. Regionally, the South Coast Air Basin is bounded by the Pacific Ocean to the southwest and high mountains to the east forming the inland perimeter.

DISCUSSION OF IMPACTS

a) **Would the project conflict with or obstruct implementation of the applicable air quality plan? Potentially Significant Impact**. The City, including the Project Site, is within the South Coast Air Basin (Basin), and the SCAQMD is directly responsible for reducing emissions from stationary (area and point), mobile, and indirect sources to meet federal and State ambient air quality standards. The SCAQMD has responded to this requirement by preparing a series of air quality management plans (AQMPs). The 2016 AQMP identifies the control measures that will be implemented over a 20-year horizon to reduce major sources of pollutants. Control measures established in previous AQMPs have substantially decreased exposure to unhealthful levels of pollutants, even while substantial population growth has occurred within the Basin. However, as construction and operation of the Project could result in an increase in emissions, the Project may conflict with or obstruct implementation of the 2016 AQMP, and potential impacts may be significant. Therefore, this topic will be further evaluated in the EIR.

b) **Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard? Potentially Significant Impact**. The Basin, wherein the Project Site is located, is currently in non-attainment for ozone, lead, and particulate matter (PM). Construction and operation of a new intensity of development from the Project would emit criteria air pollutants that may result in a cumulatively considerable net increase of ozone, lead, and/or PM, and potential impacts may be significant. Therefore, this topic will be further evaluated in the EIR.

c) **Would the project expose sensitive receptors to substantial pollutant concentrations? Potentially Significant Impact**. Sensitive receptors are generally defined as uses that house or attract groups of children, the elderly, people with illnesses, and others who are especially sensitive to the effects of air pollutants. Residential areas are examples of sensitive receptors. The Project would result in increased air pollutant emissions from the Project Site during construction (short-term) and operation (long-term). Sensitive receptors in the vicinity of the Project Site include residential uses. Additional sensitive receptors may also be identified during the preparation of the EIR. As the construction and operation of the Project could emit substantial concentrations of air pollutants near those sensitive receptors, such as the residences surrounding the Project Site, potential impacts may be significant. Therefore, this topic will be further evaluated in the EIR.

d) **Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people? Less Than Significant Impact**. Odors are typically associated with the use of chemicals, solvents, petroleum products, and other strong-smelling elements used in manufacturing processes. According to the SCAQMD CEQA Air Quality Handbook, land uses and industrial operations that are associated with odor complaints include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, composting, refineries, landfills, dairies, and fiberglass molding. The Project involves the construction and operation of a residential project, and residential uses are not typically associated with odor complaints.

Potential sources that may emit odors during construction activities include the application of materials, such as asphalt pavement. The objectionable odors that may be produced during the construction process are short-term in nature and are expected to cease upon the drying or hardening of the odor producing materials. Due to the short-term nature and limited amounts of odor producing materials being utilized, no significant impact related to odors would occur during construction of the Project. Diesel exhaust and VOCs would be emitted during construction of the Project, which are objectionable to some; however, emissions would disperse rapidly from the Project Site and, therefore, should not reach an objectionable level at the nearest sensitive receptors. As the Project involves no operational elements related to industrial projects, no long-term operational objectionable odors are anticipated.

Construction and operation of the Project would also comply with SCAQMD Rules 401, 402, and 403, regarding visible emissions violations. In particular, Rule 402 provides that a person shall not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property.[12] Therefore, impacts would be less than significant and no mitigation measures would be required. No further evaluation of this topic is required in the EIR.

[12] *SCAQMD Rule 401, Nuisance, last amended November 9, 2001.*

4.4 BIOLOGICAL RESOURCES.

Would the project:

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☒	☐	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or US Fish and Wildlife Service?	☒	☐	☐	☐
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☒	☐	☐	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☒	☐	☐	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☒	☐	☐	☐
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

DISCUSSION OF IMPACTS

a) **Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or US Fish and Wildlife Service? Potentially Significant Impact**. The Project Site has two existing residences, a barn, and a stable and fenced pasture on approximately 85.2 acres of land. The rest of the land is currently vacant covered with mostly bare soil, grass, bushes, trees, and other native vegetation. The Project Site has the potential to contain species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U. S. Fish and Wildlife Service. A qualified biologist will evaluate the site's existing biological resources and determine the presence or absence of any sensitive species. The results of the biological resources assessment(s) impacts may be significant. Therefore, this topic will be further evaluated in the EIR.

b) **Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or US Fish and Wildlife Service? Potentially Significant Impact**. The Project Site has two existing residences, a barn, and a stable and fenced pasture on approximately 85.2 acres of land. The rest of the land is currently vacant covered with mostly bare soil, grass, bushes, trees, and other native vegetation. A qualified biologist will evaluate the Project's impact area to determine if the property contains riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service. The results of the biological resources assessment(s) impacts may be significant. Therefore, this topic will be further evaluated in the EIR.

c) **Would the project Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means? Potentially Significant Impact**. The Project Site has two existing residences, a barn, and a stable and fenced pasture on approximately 85.2 acres of land. The rest of the land is currently vacant covered with mostly bare soil, grass, bushes, trees, and other native vegetation. A qualified biologist will evaluate the Project's potential to impact federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.). The results of the biological resources assessment(s) impacts may be significant. Therefore, this topic will be further evaluated in the EIR.

d) **Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites? Potentially Significant Impact**. The Project Site has two existing residences, a barn, and a stable and fenced pasture on approximately 85.2 acres of land. The rest of the land is currently vacant covered with mostly bare soil, grass, bushes, trees, and other native vegetation. A qualified biologist will evaluate the site's existing biological resources and determine the presence any wildlife corridors. Development of the Project Site has some potential to impact avian species that are protected by the federal Migratory Bird Treaty Act. The Project's potential to impact migratory birds during construction and long-term operation may be significant. Therefore, this topic will be further evaluated in the EIR.

e) **Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance? Potentially Significant Impact.** Chapter 16.90, Tree Preservation, of the City's Municipal Code makes it unlawful for any person, firm, partnership, corporation or other legal entity to destroy or remove any non-exempt protected trees within the City without a tree permit. When a tree permit is required, no grading or building permits shall be issued until the tree permit is issued, nor shall work of any kind commence that would result in the destruction, damage, or removal of any non-exempt protected tree prior to the issuance of the tree permit. When part of a proposed development, the Tree Removal Permit shall be submitted concurrent with the development permit application (Chino Hills 2020).[13]

The Tree Preservation ordinance protects "native trees" that are 4 inches or greater DBH and are located on undeveloped property or developed property within the Fire Hazard Overlay. The species protected consist of the following:

- California sycamore or western sycamore
- California live oak or coast live oak
- California black walnut or Southern California black walnut
- coastal scrub oak or California scrub oak

In addition, the City protects "heritage trees," which are defined as "any species that is single- or multi-trunk tree having a cumulative diameter of forty-four (44) inches or greater at DBH, located on undeveloped property, and of significant age, health and quality to be deemed valuable to the aesthetics of the community by a certified arborist" (Chino Hills 2012). Excluded from the "heritage tree" designation are invasive trees as defined by the California Invasive Plant Council, and trees susceptible to breaking or falling, such as eucalyptus blue gum (Eucalyptus globulus) and/or other tree species identified by a City-approved certified arborist. Protected native or heritage trees in the following situations are exempt from requiring a Tree Removal Permit (Chino Hills 2020):

- Protected trees located on privately owned developed properties not located within the Fire Hazard Overlay District.
- Protected trees located on privately owned developed properties located within the Fire Hazard Overlay District that are not visible from adjacent public or private rights-of-way, streets, parks, or trails.
- Protected trees that are determined by the Community Development Director to create a safety hazard or are damaging public improvements.
- City trees removed pursuant to a valid tree permit issued pursuance to Municipal Code Chapter 12.26 City-Owned Trees.

There are 1,287 native trees (including one heritage tree; tree no. 1284) that meet the City's definition of protected tree located within and adjacent to the limits of the Project Site. The site's

[13] *Protected Tree Report for the 16220 Canyon Hills Road Project (TTM 20286), Dudek, October 2020.*

trees are comprised of four native tree species that meet the City's criteria for a protected native tree: coast live oak, California black walnut, scrub oak, and western sycamore.[14] A qualified arborist will evaluate the site's existing trees. The Project's potential to impact native trees may be significant. Therefore, this topic will be further evaluated in the EIR.

f) **Would the project Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan? No Impact**. The Project Site is not located within Critical Habitat designated by the United States Fish and Wildlife Service (USFWS), a Habitat Conservation Plan (HCP) area, or an established Natural Community Conservation Plan (NCCP).[15] Therefore, no impact would occur and no mitigation measures would be required. No further evaluation of this topic is required in the EIR.

14 *Protected Tree Report for the 16220 Canyon Hills Road Project (TTM 20286), Dudek, October 2020.*
15 *Paradise Ranch Project Biological Technical Report, Leatherman BioConsulting, Inc., September 3, 2021.*

4.5 CULTURAL RESOURCES. Would the project:	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historical resource as defined in § 15064.5?	☒	☐	☐	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?	☒	☐	☐	☐
c) Disturb any human remains, including those interred outside of formal cemeteries?	☒	☐	☐	☐

DISCUSSION OF IMPACTS

a) **Would the project cause a substantial adverse change in the significance of a historical resource as defined in Section 15064.5? Potentially Significant Impact.** Section 15064.5 of the State CEQA Guidelines defines an historical resource as: (1) a resource listed in or determined to be eligible by the State Historical Resources Commission, for listing in the California Register of Historical Resources (California Register); (2) a resource listed in a local register of historical resources or identified as significant in an historical resource survey meeting certain State guidelines; or (3) an object, building, structure, site, area, place, record or manuscript which a lead agency determines to be significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided that the lead agency's determination is supported by substantial evidence in light of the whole record. A project-related significant adverse effect would occur if the proposed project were to adversely affect a historical resource meeting one of the above definitions.

Generally, properties eligible for listing in the National Register of Historic Places (National Register) are at least 50 years old. The California Office of Historic Preservation generally recommends an evaluation of buildings and structures older than 45 years of age by professionals meeting the Secretary of the Interior Standards Professional Qualifications for Architectural History and Archeology. The Project Site has two existing residences, a barn, and a stable and fenced pasture on approximately 85.2 acres of land. The rest of the land is currently vacant covered with mostly bare soil, grass, bushes, trees, and other native vegetation.

The buildings may be eligible for consideration as a historic resource because they are over 50 years of age. Therefore, historical resource impacts may be significant. Therefore, this topic will be further evaluated in the EIR.

b) **Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5? Potentially Significant Impact.** The Project Site has two existing residences, a barn, and a stable and fenced pasture on approximately 85.2 acres of land.

The rest of the land is currently vacant covered with mostly bare soil, grass, bushes, trees, and other native vegetation. Archaeological resources are features, such as tools, utensils, carvings, fabric, building foundations, etc., that document evidence of past human endeavors and that may be historically or culturally important to a significant earlier community. The Project Site is located within a native area. Therefore, due to the site's proximity to the general locations of known archaeological sites, potential impacts to archaeological resources may occur. Therefore, this topic will be further evaluated in the EIR.

c) **Would the project disturb any human remains, including those interred outside of formal cemeteries? Potentially Significant Impact.** A significant adverse impact could occur if grading or excavation activities associated with a project were to disturb previously interred human remains. It is unknown whether human remains are located at the Project Site. Any human remains that may have existed near the site surface are likely to have been disturbed or previously removed. The Project would require excavation to depths not previously disturbed, which would have the potential to inadvertently discover human remains that may exist within the Project Site, which may also be of Native American origin. Therefore, this topic will be further evaluated in the EIR.

4.6 ENERGY.

Would the project:

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☒	☐
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☒	☐

The following analysis is based on the findings of the *Paradise Ranch Project, Air Quality and Greenhouse Gas Impact Study, City of Chino Hills,* (Air Quality and Greenhouse Gas Study) prepared by MD Acoustics, LLC, Inc. on December 1, 2021. The Air Quality and Greenhouse Gas Study is available as **Appendix IS-A** to this document.

SETTING

ELECTRICITY/NATURAL GAS SERVICES

Southern California Edison (SCE) provides electrical services to Chino Hills through State-regulated public utility contracts. SCE, the largest subsidiary of Edison International, is the primary electricity supply company for much of Southern California. It provides 15 million people with electricity across a service territory of 180 incorporated cities, 15 counties, and approximately 50,000 square miles.[16]

The Southern California Gas Company (SoCalGas) provides natural gas services to the project area. Southern California Gas services approximately 21.8 million customers, through 5.9 million gas meters in more than 500 communities, spanning roughly 24,000 square miles of California.[17]

DISCUSSION OF IMPACTS

a) **Would the project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation? Less Than Significant Impact.**

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16 *Southern California Edison website, Who We Are. Available at: https://www.sce.com/about-us/who-we-are. Accessed December 1, 2021.*

17 *Southern California Gas Company website, Company Profile. Available at: https://www.socalgas.com/about-us/company-profile. Accessed December 1, 2021.*

CONSTRUCTION

ELECTRICITY AND NATURAL GAS

Construction activities, including the construction of new residential structures and utilities, typically do not involve the consumption of natural gas. In addition, construction of the Project would not require electricity to power most construction equipment. It is anticipated that most of the electric-powered construction equipment would be hand tools (e.g., power drills, table saws, compressors) and lighting, which would result in minimal electricity usage during construction activities. Energy calculations conducted as part of the Air Quality and Greenhouse Gas Study projected the total electrical consumption during construction of the Project to be 175,059 kilowatt-hours (kWh). Electrical demand during construction is typically a fraction of the electrical demand during operation, which, as detailed below, would be well within the supply capabilities of the provider. Electricity use during construction would vary during different phases of construction. The majority of construction equipment during demolition and grading would be gasoline- or diesel-powered, and the later construction phases would require electricity-powered equipment for interior construction and architectural coatings. Overall, the use of electricity would be temporary and would fluctuate according to the phase of construction.

TRANSPORTATION-ENERGY

During Project construction, energy would be consumed in the form of petroleum-based fuels used to power off-road construction vehicles and equipment on the Project Site, construction worker travel to and from the Project Site, and vehicles used to deliver materials to the Site. The Project would require site preparation and grading, including hauling material off-site; pavement and asphalt installation; building construction; architectural coating; and landscaping and hardscaping. According to the Air Quality and Greenhouse Gas Study (see **Appendix IS-A**), construction of the Project would consume a total of 181,634 gallons of diesel (99,219 gallons from off-road construction equipment, 45,052 gallons from vendor trips, and 37,291 gallons from hauling trips) and 77,530 gallons of gasoline (from worker trips). According to fuel sales data from the California Energy Commission, fuel consumption in San Bernardino County was approximately 977 million gallons of gasoline and 363 million gallons of diesel fuel in 2019.[18] Accordingly, the Project's transportation-energy consumption during construction would represent a negligible portion of annual gasoline and diesel consumption within San Bernardino County.

Energy use during construction would be temporary in nature, and construction equipment used would be typical of similar-sized construction Projects in the region. In addition, the Project would utilize construction contractors who demonstrate compliance with applicable CARB regulations that restrict the idling of heavy-duty diesel motor vehicles and govern the accelerated retrofitting, repowering, or replacement of heavy-duty diesel on – and off-road equipment. Construction activities would utilize fuel-efficient equipment consistent with state and federal regulations and would comply with state measures to reduce the inefficient, wasteful, or unnecessary consumption of energy. In addition, per applicable regulatory requirements, the Project would comply with construction waste management practices to divert construction and demolition debris. These practices would result in efficient use of transportation-energy necessary to

[18] *California Energy Commission, California Retail Fuel Outlet Annual Reporting (CEC-A15) Results, 2019. Diesel is adjusted to account for retail (49%) and non-retail (51%) diesel sales. Note that due to the atypical fuel consumption during 2020 as a result of the Covid-19 pandemic, 2019 sales data were relied on for this analysis.*

construct the Project. Furthermore, in the interest of cost efficiency, construction contractors would not utilize fuel in a manner that is wasteful or unnecessary.

OPERATION

ELECTRICITY AND NATURAL GAS

During operation of the Project, electricity and natural gas would be consumed for multiple purposes, including, but not limited to, HVAC, refrigeration, water heating, lighting, and the use of electronics, equipment, and appliances. According to the CalEEMod outputs prepared for the Air Quality and Greenhouse Gas Study (see **Appendix IS-A**), the Project would have an electrical demand of 398,233 kilowatt-hours per year (kWh/yr) and a natural gas demand of 1,451,123 cubic-feet (cf) per year, or 3,976 cf per day.[19] Electricity would be provided to the Project Site by SCE, which projects that the total electricity it will deliver to end users in 2024 (the Project's operational year) will be 97,168 gigawatt-hours (GWh).[20] Natural gas would be provided to the Project Site by SoCalGas, which projects that natural gas consumption within their planning area will be approximately 2,349 million cf per day in 2024.[21] As such, the Project's electrical demand would represent 0.0004 percent of SCE's available supplies. The Project's natural gas demand would represent 0.0002 percent of the natural gas consumption within SoCalGas' area.

The Project would comply with energy standards set in the California Building Code (CBC) Title 24, which would minimize the wasteful, inefficient, or unnecessary consumption of energy resources during operation**.** California's Green Building Standards Code (CALGreen; Title 24, Part 11) requires incorporation of energy reduction measures, such as energy-efficient lighting, appliances, and building materials; water-efficient plumbing fixtures, appliances, and landscape irrigation; and on-site solar energy generation, into the design of new construction Projects. Furthermore, the 2019 Building Energy Efficiency Standards of the California Energy Code (CBC Title 24, Part 6) requires newly constructed buildings to meet energy performance standards set by the Energy Commission. These standards are specifically crafted for new buildings to result in energy efficient performance so that the buildings do not result in wasteful, inefficient, or unnecessary consumption of energy. The standards are updated every three years and each iteration is more energy efficient than the previous standards.

TRANSPORTATION-ENERGY

Transportation-related energy in the form of gasoline and diesel fuel would also be consumed during Project operations related to water usage, solid waste disposal, and vehicle trips to and from the Project Site by residents and visitors. According to the Air Quality and Greenhouse Gas Study (see **Appendix IS-A**), the Project would consume 76,511 gallons of fuel per year. According to CARB's On-Road Emissions Factor (EMFAC) model, in San Bernardino County, diesel-powered

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19 *Note that the CalEEMod outputs present the Project's operational natural gas demand as 1,414,350 kilo-British thermal units (kBTU) per year. 1 kBTU = 1.026 cubic feet; 1,414,350 kBTU per year x 1.026 = 1,451,123 cf per year; 1,451,123 cf per year / 365 days per year = 3,976 cf per day.*

20 *Future electricity supplies are defined in terms of deliveries to end users. California Energy Commission, California Energy Demand, 2019-2030 Managed Forecast – Mid Demand / High AAEE Case, Electricity Deliveries to End User by Agency (GWh), Form 1.1c, Corrected February 2020.*

21 *California Gas and Electric Utilities, 2020 California Gas Report, page 144.*

vehicles will account for 24.75 percent of on-road fuel consumption in 2024 (the Project's operational year), while gasoline-powered vehicles will account for 75.25 percent of on-road fuel consumption.[22] Accordingly, using the same percentages of fuel consumption projected by EMFAC, operation of the Project would consume approximately 18,936 gallons of diesel fuel and 57,575 gallons of gasoline per year.[23] For comparison purposes, the fuel usage during Project operation would represent 0.007 percent of the projected 2024 annual on-road diesel fuel consumption and 0.007 percent of the projected 2024 annual on-road gasoline fuel consumption in San Bernardino County.[24]

The Project's future residents and visitors would utilize vehicles that comply with CAFE fuel economy standards and the Pavley standards, which are designed to result in more efficient use of transportation fuels.

SUMMARY

Based on the above, the Project would not involve the inefficient, wasteful, and unnecessary use of energy during construction or operation. Therefore, further analysis of this topic in the EIR is not required.

b) **Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency? Less Than Significant Impact.** Relevant energy conservation plans specific to Chino Hills include the City's General Plan Housing Element, specifically Goal H-3, which aims to ensure that new housing in the City is sensitive to the natural environment by encouraging the use of energy conservation design and concepts. The Project would meet this goal through mandatory compliance with the 2019 Title 24 Building Energy Efficiency Standards. The 2019 Title 24 Building Energy Efficiency Standards include provisions applicable to all buildings, which are mandatory requirements for efficiency and design. The Project would be consistent with the requirements of Title 24 through the implementation of energy-reduction measures, such as energy-efficient lighting and appliances, water-efficient appliances and plumbing fixtures, water-efficient landscaping and irrigation, and the on-site generation of renewable solar energy. The Project would include a number of sustainability features, as detailed in the Project description, including water conservation features. The Project would not conflict with or obstruct any local or state plans for renewable energy or energy efficiency. Therefore, further analysis of this topic in the EIR is not required.

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22 *California Air Resources Board, EMFAC2021 on-road vehicle emissions factor model, EMFAC2021 (Modeling input: San Bernardino County; Fleet Aggregate; Annual; 2024). The modeling input values are considered generally representative of conditions for the region and representative of the majority of vehicles associated with Project-related VMT. See Operational Transportation Energy Worksheet in the Energy Calculations Appendix (**Appendix IS-A**) to this Initial Study.*

23 *Calculated as follows for diesel: 24.75 percent of 76,511 gallons total Project fuel consumption = 18,936 gallons diesel consumption. Calculated as follows for gasoline: 75.25 percent of 76,511 gallons total Project fuel consumption = 57,575 gallons gasoline consumption.*

24 *According to EMFAC2021 modeling, San Bernardino County on-road vehicles will consume approximately 281 million gallons of diesel and approximately 854 million gallons of gasoline in 2024 (i.e., the Project's buildout year). See Operational Transportation Energy Worksheet in **Appendix IS-A** to this Initial Study.*

4.7 GEOLOGY/SOILS.

Would the project:

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐
ii) Strong seismic ground shaking?	☒	☐	☐	☐
iii) Seismic-related ground failure, including liquefaction?	☒	☐	☐	☐
iv) Landslides?	☒	☐	☐	☐
b) Result in substantial soil erosion or the loss of topsoil?	☒	☐	☐	☐
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☒	☐	☐	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☒	☐	☐	☐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒

4.7 GEOLOGY/SOILS. Would the project:	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☒	☐	☐	☐

The following analysis is based on the findings of the *Geotechnical Investigation Proposed Paradise Ranch Residential Development West of Canyon Hills Road and South of Esquilime and Alpine Drives, City of Chino Hills, California* (Geotechnical Investigation) prepared by Leighton and Associates, Inc. on July 15, 2019. The Geotechnical Investigation is available as **Appendix IS-B** to this document.

SETTING

The Project Site is located in the eastern Puente Hills. The proposed residential development is situated in the eastern portion of the site, which is characterized by a northeast-facing hillside and a relatively flat terrace located at the base of the hill. To the north and northeast, a slope gently descends from the terrace toward an adjacent natural drainage.

The ridgelines along the hillside are separated by southwest-northwest trending drainages.

The area has been historically used as open space and a ranch. Previous development on-site includes residences and ranching structures in the northeastern corner of the property, a residence at the top of the ridge in the central portion of the site, a paved road from the entrance at the eastern edge of the site to the residence at the top of the ridge, and other unimproved roads in various areas. In addition, power lines and poles are present in the southern area.

Elevations range from a low of approximately 959 feet to a high of approximately 1,256 feet.

DISCUSSION OF IMPACTS

a) **Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:**

i. **Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42? Less Than Significant Impact.** Numerous active and potentially active faults with surface expressions (fault traces) have been mapped adjacent to the City.[25] Active earthquake faults are faults where surface rupture has occurred within the last 11,000 years. The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the hazards of

25 *Chino Hills General Plan, Chapter 5 Safety Element, Figure 5-1, Active and Potentially Active Faults Affecting Chino Hills, accessed June 2021.*

surface faulting and fault rupture to built structures. Surface rupture of a fault generally occurs within 50 feet of an active fault line.

The Project Site is not located within a designated Alquist-Priolo Earthquake Fault Zone.[26] According to the California Geological Society, the nearest Earthquake Fault Zone is the Whitter Fault Zone, an approximately 25-mile long zone running along the Chino Hills mountain range, located approximately 3.91 miles to the west of the Project Site.[27] The Chino Hills Fault is located 4.2 miles east of the Project Site. The Project Site is not located within a City-designated Fault Rupture Study Area.[28] No faults are known to occur within the Project Site. Thus, the potential for fault rupture at the Project Site would be low. Furthermore, the Project would be required to comply with applicable State and local building and seismic codes. Final design-level soils and geological reports would be submitted to the City of Chino Hills Department of Building and Safety for review and approval as part of the standard building permit submittal package prior to Project construction. As a condition of approval, conformance with current Building Code requirements and site-specific design recommendations in the Geotechnical Investigation (**Appendix IS-B**) would minimize the potential for people on the Project Site to sustain loss, injury, or death as a result of fault rupture. Accordingly, impacts related to fault rupture be less than significant and no mitigation measures would be required. No further evaluation of this topic is required in the EIR.

ii. **Strong seismic ground shaking? Potentially Significant Impact**. The Project Site is located in the seismically active region of Southern California and, therefore, is susceptible to ground shaking during a seismic event. Potential impacts related to strong seismic ground shaking may be potentially significant. Therefore, this topic will be further evaluated in the EIR.

iii. **Seismic-related ground failure, including liquefaction? Potentially Significant Impact**. Liquefaction describes a phenomenon where cyclic stresses, which are produced by earthquake-induced ground motions, create excess pore pressures in cohesionless soils. As a result, the soils may acquire a high degree of mobility, which can lead to lateral spreading, consolidation and settlement of loose sediments, ground oscillation, flow failure, loss of bearing strength, ground fissuring, and sand boils, and other damaging deformations. This phenomenon occurs only below the water table, but after liquefaction has developed, it can propagate upward into overlying, non-saturated soils as excess pore water escapes. The possibility of liquefaction occurring at a given site is dependent upon the occurrence of a significant earthquake in the vicinity, sufficient groundwater to cause high pore pressures, and on the grain size, relative density, and confining pressures of the soil at the site.

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26 *California Department of Conservation, California Geologic Survey, Earthquake Zones of Required Investigation, https://maps.conservation.ca.gov/cgs/eqzapp/app/, accessed June 2021.*

27 *California Department of Conservation, California Geological Survey, Earthquake Zones of Required Investigations Interactive Map Viewer, accessed: June 2021.*

28 *California Department of Conservation, California Geological Survey, Earthquake Zones of Required Investigations Interactive Map Viewer, accessed: June 2021.*

While the Project Site is not identified by the City as located within a liquefaction zone[29], according to the Geotechnical Investigation (**Appendix IS-B**), groundwater was encountered on the Project Site at depths ranging from 22 to 33 feet along with loose sands and clay soils. As such potential impacts related to seismic-related ground failure, including liquefaction, may be potentially significant. Therefore, this topic will be further evaluated in the EIR.

iv. **Landslides? Potentially Significant Impact**. The Project Site is located within a hillside area and is located in a Landslide Zone.[30] The Project is also located in a Generally Susceptible Area for landslides.[31] Potential impacts related to landslides may be potentially significant. Therefore, this topic will be further evaluated in the EIR.

b) **Would the project result in substantial soil erosion or the loss of topsoil? Potentially Significant Impact**. The Project Site is located within a hillside area and is located in a Landslide Zone.[32] Project construction would include land clearing, grading, excavating, and other soil-disturbing activities that would expose site soils to wind and water erosion. In the long-term, development of the Project Site would increase impervious surface cover and permanent landscaping on the Project Site, thereby reducing the potential for erosion and loss of topsoil that currently occurs. The Project would be required to adhere to standard regulatory requirements, including, but not limited to, requirements imposed by the City of Chino Hills National Pollutant Discharge Elimination System (NPDES) Municipal Stormwater Permit (State Water Resources Control Board Order No. 2012-0011-DWQ) and a Project-specific Water Quality Management Plan (WQMP) that includes Best Management Practices (BMPs) to minimize water pollutants including sedimentation in stormwater runoff. The required EIR will evaluate the effectiveness of the Project's erosion-control measures and will determine whether the Project has the potential to result in substantial soil erosion and the loss of topsoil. Therefore, this topic will be further evaluated in the EIR.

c) **Would the project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse? Potentially Significant Impact.** The Project Site is located within a hillside area, and is located in a Landslide Zone.[33] Refer to the discussion of Thresholds VI (a) (iii) and (iv) for a discussion of hazards associated with liquefaction and landslide hazards. The Project Site's potential for lateral spreading or collapse is currently unknown but will be evaluated in a site-specific geotechnical evaluation. The site-specific geotechnical evaluation also will evaluate the Project Site's potential for subsidence. The required EIR will evaluate the proposed Project's potential to cause soil subsidence, lateral spreading, and collapse hazards,

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29 California Department of Conservation, California Geologic Survey, Earthquake Zones of Required Investigation, https://maps.conservation.ca.gov/cgs/eqzapp/app/, accessed June 2021.

30 California Department of Conservation, California Geologic Survey, Earthquake Zones of Required Investigation, https://maps.conservation.ca.gov/cgs/eqzapp/app/, accessed June 2021.

31 Chino Hills General Plan, Chapter 5 Safety Element, Figure 5-5, Landslide Susceptibility, accessed June 2021.

32 California Department of Conservation, California Geologic Survey, Earthquake Zones of Required Investigation, https://maps.conservation.ca.gov/cgs/eqzapp/app/, accessed June 2021.

33 California Department of Conservation, California Geologic Survey, Earthquake Zones of Required Investigation, https://maps.conservation.ca.gov/cgs/eqzapp/app/, accessed June 2021.

which could pose a threat to the future structures and workers on-site. Therefore, this topic will be further evaluated in the EIR.

d) **Would the project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property? Potentially Significant Impact**. The Project is located on soils with moderate shrink-swell potential.[34] The Project's geotechnical evaluation will evaluate the Project site's specific soil conditions and potential for containing expansive soils. The Project's potential to expose the future structure and workers on-site to hazards associated with expansive soils will be evaluated in the required EIR. Therefore, this topic will be further evaluated in the EIR.

e) **Would the project have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water? No Impact**. The project would be served by a public sewer system. Therefore, no septic tanks or alternative wastewater disposal systems would be necessary. Therefore, no impact would occur, and no mitigation measures would be required. No further evaluation of this topic is required in the EIR.

f) **Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature? Potentially Significant Impact**. Paleontological resources are the fossilized remains of organisms that have lived in a region in the geologic past and whose remains are found in the accompanying geologic strata. This type of fossil record represents the primary source of information on ancient life forms, since most species that have existing on earth from this era are extinct. The Project would require excavation likely to depths not previously disturbed, which would have the potential to disturb undiscovered paleontological resources that may exist within the Project Site. Therefore, this topic will be further evaluated in the EIR.

[34] *Chino Hills General Plan, Chapter 5 Safety Element, Figure 5-6, Expansive Soils, accessed June 2021.*

4.8 GREENHOUSE GAS EMISSIONS. Would the project:				
	Potentially Significant Impact	**Less Than Significant Impact With Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☒	☐	☐	☐
b) Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☒	☐	☐	☐

DISCUSSION OF IMPACTS

a) **Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment? Potentially Significant Impact**. Greenhouse gas (GHG) emissions refer to a group of emissions that are believed to affect global climate conditions. These gases trap heat in the atmosphere and the major concern is that increases in GHG emissions are causing global climate change. Global climate change is a change in the average weather on the earth that can be measured by wind patterns, storms, precipitation, and temperature. Construction and operation of the Project would generate GHG emissions from construction equipment, workers' vehicles, etc., which may significantly impact the environment either directly or indirectly. Therefore, greenhouse gas impacts may be potentially significant. Therefore, this topic will be further evaluated in the EIR.

b) **Would the project conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases? Potentially Significant Impact**. A significant impact would occur if a proposed project would conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs. Construction and operation of the Project would generate GHG emissions, which may be inconsistent or in some way represent a substantial hindrance to employing the policies or obtaining the goals of GHG-reduction plans. Therefore, greenhouse gas plan and policy impacts may be potentially significant. Therefore, this topic will be further evaluated in the EIR.

4.9 HAZARDS & HAZARDOUS MATERIALS.
Would the project:

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☒	☐
e) For a project located within an airport land use plan area or, where such a plan has not been adopted, within 2 miles of a public airport or a public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒
f) Impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
h) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?	☐	☐	☒	☐

The following analysis is based on the findings of the *Phase I Environmental Site Assessment, Paradise Ranch Development, West of Canyon Hills Road and South of Esquilime Drive* (Phase I ESA) prepared by Leighton and Associates, Inc. on July 16, 2019. The Phase I ESA is available as **Appendix IS-C** to this document.

DISCUSSION OF IMPACTS

a) **Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials? Less Than Significant Impact.** Construction of the Project would involve the temporary transport, use, and disposal of potentially hazardous materials. These materials include paints, adhesives, surface coatings, cleaning agents, fuels, and oils that are typically associated with development of any urban development project. All of these materials would be used temporarily during construction. Additionally, all potentially hazardous materials associated with construction activities would be used and stored in accordance with manufacturers' instructions and handled in compliance with applicable standards and regulations, which further minimizes the potential risk associated with construction-related hazardous materials. Construction activities would be contained on the Project Site and, thus, any emissions from the use of such materials would be minimal and localized to the Project Site. Therefore, construction of the Project would not expose persons or the environment to a substantial risk resulting from the release of hazardous materials or exposure to health hazards in excess of regulatory standards.

Operation of the Project would not involve the routine use, transport, or disposal of hazardous materials. The Project includes the development of a residential uses and parking associated with these uses. These typical uses do not involve the routine use of hazardous materials. Instead, the operation of the Project has limited hazardous materials to those similar to any other residential development such as cleaning solvents, paints, and pesticides for landscaping. As a result, the Project generally would not produce significant amounts of hazardous waste, use or transport hazardous waste beyond those materials typically used in an urban development. Therefore, operation of the Project would not expose persons or the environment to a substantial risk resulting from the release of hazardous materials or exposure to health hazards in excess of regulatory standards.

Moreover, the Project would adhere to regulatory requirements for source hazardous waste reduction measures (e.g., recycling, etc.) that would further minimize the generation of hazardous waste. The Project would be required to comply with the applicable City ordinances regarding implementation of hazardous waste reduction efforts on-site (i.e., the City's Green Building Ordinance). The applicable regulatory requirements further ensure that the minimal amount of hazardous materials associated with the Project are properly treated and disposed of at licensed resource recovery facilities or hazardous waste landfills. The potential transport of any hazardous materials and wastes, i.e., paints, adhesives, surface coatings, cleaning agents, fuels, and oils, if it occurs, would occur in accordance with federal and state regulations that govern the handling and transport of such materials. In accordance with such regulations, the transport of hazardous materials and wastes would only occur with transporters who have received training and appropriate licensing. Therefore, impacts related to the transport, use, and disposal of hazardous materials would be less than significant and no mitigation measures would be required. No further evaluation of this topic is required in the EIR.

b) **Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment? Less Than Significant Impact.** This significance threshold focus on the exposure of people to hazards either existing or created by the project. The Phase I ESA (**Appendix IS-C**), in conformance with American Society for Testing and Materials (ASTM) Standard E1527-13, included a review of environmental and historical records for the Project Site and a site reconnaissance to identify potential on-site hazards. A review of maps and aerial photographs revealed that the Project Site is currently split into two lots, one located at 16200 Canyon Hills Road in the northeastern portion of the Project Site, and one located at 16220 in the western portion of the Project Site. The 10.71-acre lot located at 16200 Canyon Hills Road was developed in the 1920's with an approximately 1,250-square foot, three-bedroom residential home, a barn, stables, and fenced pasture.[35] The 71.9-acre lot located at 16220 Canyon Hills Road developed in 1915 with an approximately 1,180-square foot, two bedroom residential home.[36] This residential home at 16220 Canyon Hills Road will remain on-site as Lot Number 51. The rest of the area is undeveloped, hillside slopes, and is covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.

The purpose of the Phase I ESA was to identify, to the extent feasible and pursuant to the processes prescribed in ASTM International (ASTM) E1527-13, recognized environmental conditions (RECs), historical RECs (HRECs), or controlled RECs (CRECs) in connection with the Project Site.

- RECs are defined, according to ASTM E1527-13 as "the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment. De minimis conditions are not RECs."

- HRECs are defined, according to ASTM E1527-13 as "a past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted use criteria established by a regulatory authority, without subjecting the property to any required controls."

- CRECs are defined, according to ASTM E1527-13 as "a REC resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority, with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls." (ASTM E1527-13, 2013).

[35] *San Bernardino County Property Information Management System for Assessor Parcel Number 1000-051-09-0-000.*

[36] *San Bernardino County Property Information Management System for Assessor Parcel Number 1000-051-19-0-000.*

SITE RECONNAISSANCE

During the site reconnaissance visit, surface water was not observed at the Project Site, and evidence of oil wells or oil filed-related facilities was not indicated on the Project Site.

Various small containers of diesel fuel and motor oil were observed in the vehicle storage areas. Two large plastic drums were observed in the tool shed adjacent to the chicken coop. The drums were used to hold chicken feed. Three empty 55-gallon drums were located adjacent to a barn on the northeast portion of the Project Site. The drums are used as movable barriers when corralling or transporting livestock.

Two portable storage tanks were observed on the south side of the chicken coop. The tanks are used to hold and transport water for the animals. Two propane aboveground storage tanks were observed east of the red house.

One pole-mounted transformer was observed on the Project Site. The transformer appeared to be in good condition and was not leaking. No staining was observed beneath the transformer.

PCBs were once used as industrial chemicals whose high stability contributed to both their commercial usefulness and their long-term deleterious environmental and health effects. PCBs can be present in coolants or lubricating oils used in older electrical transformers, hydraulic systems, and other similar equipment. In 1979, the USEPA generally prohibited the domestic manufacture of PCBs in electrical capacitors, electrical transformers, vacuum pumps, hydraulic pumps, and gas turbines.

Hazardous wastes are not produced on the Project Site and no evidence of dumping was observed.

Evidence of pits, ponds, lagoons, and sumps was not observed on the Project Site. A large concrete cistern is located on the north central portion of the Project Site. The cistern was used to store water for livestock.

A septic system and leach field is located on the northeastern portion of the Project Site between the two residences.

Small quantities of household pesticides were observed in the storage shed adjacent to the chicken coop, however, evidence of large-scale pesticide application was not observed.

Based on the age of the residences and barns on the Project Site, organochlorine pesticide (OCP) termiticides may have been applied to the soils beneath or surrounding the residences and barns on the Project Site.

Soil staining was observed southwest of the stables in an area used to store a backhoe. A small patch of stained soil was also observed within the vehicle storage shed on the northeast side of the Project Site. The staining appeared to be de minimis in nature.

Evidence of stressed vegetation, other than that expected in a drought, was not observed on the Project Site.

No unusual odors were detected at the Project Site.

ON-SITE

Historically, the Project Site was vacant land from prior to 1896 until approximately 1939. The oldest structure on the Project Site, the red barn dates from approximately 1914. The Project Site has been used as a ranch since approximately 1914.

Based on the age of the residences and barns on the Project Site, OCP termiticides may have been applied to the soils beneath or surrounding the residences and barns on the subject site. Evidence of large-scale pesticide use was not observed however small quantities of household pesticides were observed on the site.

The residences, red barn, hay barn, vehicle storage sheds and animal shelters may have been painted with lead-based paint in the past. When lead-based paint deteriorates it flakes off of structures and collects in the surrounding soil. Rainwater can also leach lead from lead-based paint allowing the lead to be deposited in the soils surrounding the structure. The other structures on the Project Site appear to have been constructed after the ban on lead-based paint in the United States.

A septic system and leach field was present between the two residences on the northeastern portion of the site.

Minor soil staining was observed on the ground in the vehicle storage shed on the northwest corner of the Site. The staining appears de minimis in nature. Soil staining was also identified southeast of the stables in an area used to park a backhoe.

A search of selected government databases was conducted by Leighton using the GeoSearch Radius Report environmental database report system. Details of the database search along with descriptions of each database researched are provided in the GeoSearch report included in Appendix D of the Phase I ESA. The database listings were reviewed within the specified radii established by the ASTM E1527-05. The Project Site was not identified in the GeoSearch database report.

OFF-SITE

Historically, the adjacent properties were undeveloped. Currently, the Project Site is bordered by residential development to the north, east, and south. Vacant land borders the Project Site to the northwest and west.

Environmental concerns were not identified in the GeoSearch Radius Report for the properties located in the vicinity of the Project Site.

PHASE I ESA CONCLUSIONS

The two residences, hay barn, and chicken coop constitute RECs at the Project Site. The structures are of sufficient age that there is the potential that OCP termiticides may have been applied to the soils beneath or surrounding these structures and that the structures may have been painted with lead-based paint. The red barn may also have been painted with lead-based paint, however, the lower approximately 4 feet of the structure is constructed of concrete therefore, it is unlikely that the soils beneath or surrounding the structure were treated with OCP termiticides.

The soil staining in the backhoe parking area southwest of the stable constitutes a REC at the Project Site. The stained soils have the potential to be impacted with petroleum hydrocarbons (TPH) and/or semi-volatile organic compounds (SVOCs).

The septic system and leach field between the residences on the northeastern portion of the Project Site constitutes a REC based on the unknown nature of the materials that may have been disposed of in sinks and toilets during the existence of the two residences. The leach field has the potential to have been impacted by heavy metals (Title 22 metals), TPH, SVOCs, volatile organic compounds (VOCs) and OCPs.

While not a REC, the structures on the Project Site have the potential to contain asbestos containing building materials, lead-based paint, or other Universal Waste Rule items. No off-site RECs, HRECs, or CRECs were identified that would negatively impact the Project Site.

Development of the Project Site would include demolition and excavation for grading purposes. As discussed in the Phase I ESA, excavation activities could encounter contaminated soil that would require proper handling and disposal. Specifically, if contaminated soils are encountered during construction, or construction occurs in areas of known or potential contamination, the nature and extent of the contamination would be determined and appropriate handling, disposal, and/or treatment would be implemented in accordance with applicable regulatory requirements, including SCAQMD Rule 1166.42. Specifically, SCAQMD Rule 1166 requires that an approved mitigation plan be obtained from SCAQMD prior to commencing any of the following activities: the excavation of an underground storage tank or piping which has stored VOCs; the excavation or grading of soil containing VOC material including gasoline, diesel, crude oil, lubricant, waste oil, adhesive, paint, stain, solvent, resin, monomer, and/or any other material containing VOCs; the handling or storage of VOC-contaminated soil [soil which registers >50 ppm or greater using an OVA calibrated with hexane] at or from an excavation or grading site; or the treatment of VOC-contaminated soil at a facility. SCAQMD Rule 1166 further requires that a copy of the approved mitigation plan be on-site during the entire excavation period and that the SCAQMD executive officer be notified at least 24 hours prior to excavation. In accordance with SCAQMD Rule 1166, monitoring for VOC contamination would occur at least once every 15 minutes and VOC concentration readings would be recorded. When VOC-contaminated soil is detected, the approved mitigation plan would be implemented. As a condition of approval of the Project, the applicant shall provide Project documentation and an approved plan to the City of Chino Hills Department of Building and Safety exhibiting that contaminated soil is handled and disposed of properly in compliance with existing regulations. Therefore, compliance with existing regulations would ensure the Project would not create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the handling and disposal of contaminated soil that may be encountered on-site.

Based on the above, with compliance with regulatory requirements, the Project would not result in a significant hazard to the public or the environment through reasonably foreseeable upset or accident conditions involving the release of hazardous materials into the environment. Impacts would be less than significant, and no mitigation measures are required. No further evaluation of this topic is required in the EIR.

c) **Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school? No Impact.** The Project Site is not located within 0.25 mile of a public school. The closest school to the Project Site is Hidden Trails Elementary School, located at 2250 Ridgeview Drive, approximately 4.8 miles northeast of the Project Site. As discussed above, all hazardous materials would be handled in compliance with city, county, state, and federal regulations. Therefore, the Project would have no impact on schools due to the release of hazardous materials and no mitigation measures would be required. No further evaluation of this topic is required in the EIR.

d) **Would the project be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment? Less Than Significant Impact**. Section 65962.5 of the California Government Code requires the California Environmental Protection Agency (CalEPA) to develop and update annually the Cortese List, which is a "list" of hazardous waste sites and other contaminated sites. While Section 65962.5 refers to the preparation of a "list," many changes have occurred related to web-based information access since 1992 and information regarding the Cortese List is now compiled on the websites of the Department of Toxic Substances Control (DTSC), the State Water Board, and CalEPA. The DTSC maintains the Envirostor database, which includes sites on the Cortese List and also identifies potentially hazardous sites where cleanup actions or extensive investigations are planned or have occurred. The database provides a listing of federal Superfund sites, State response sites, voluntary cleanup sites, and school cleanup sites.

The Phase I ESA (**Appendix IS-C**) included the results of consultation with local agency representatives and a review of available federal, state, tribal, local, and Environmental Data Resources, Inc. databases including, but not limited to: Department of Conservation, Division of Oil, Gas, and Geothermal, Department of Toxic Substances Control, Envirostor, Santa Ana Regional Water Quality Control Board, South Coast Air Quality Management District, Facility Inventory Detailed, and San Bernardino County Fire District. The Project Site is not located on any federal, state, tribal, local, and/or Environmental Data Resources, Inc. databases.

PHASE I ESA CONCLUSIONS

As stated above in Section 4.9 (a) the two residences, hay barn, and chicken coop constitute RECs at the Project Site. The structures are of sufficient age that there is the potential that OCP termiticides may have been applied to the soils beneath or surrounding these structures and that the structures may have been painted with lead-based paint. The red barn may also have been painted with lead-based paint, however, the lower approximately 4 feet of the structure is constructed of concrete therefore, it is unlikely that the soils beneath or surrounding the structure were treated with OCP termiticides.

The soil staining in the backhoe parking area southwest of the stable constitutes a REC at the Project Site. The stained soils have the potential to be impacted with TPH and SVOCs.

The septic system and leach field between the residences on the northeastern portion of the subject site constitutes a REC based on the unknown nature of the materials that may have been disposed of in sinks and toilets during the existence of the two residences. The leach field has the potential to have been impacted by heavy metals (Title 22 metals), TPH, SVOCs, VOCs and OCPs.

While not a REC, the structures on the Project Site have the potential to contain asbestos containing building materials, lead-based paint, or other Universal Waste Rule items. No off-site RECs, HRECs, or CRECs were identified that would negatively impact the Project Site.

As stated above in Section 4.9 (a) development of the Project Site would include demolition and excavation for grading purposes. As discussed in the Phase I ESA, excavation activities could encounter contaminated soil that would require proper handling and disposal. Specifically, in the event that contaminated soils are encountered during construction, or construction occurs in areas of known or potential contamination, the nature and extent of the contamination would be determined and appropriate handling, disposal, and/or treatment would be implemented in accordance with applicable regulatory requirements, including SCAQMD Rule 1166.42. Specifically, SCAQMD Rule 1166 requires that an approved mitigation plan be obtained from SCAQMD prior to commencing any of the following activities: the excavation of an underground storage tank or piping which has stored VOCs; the excavation or grading of soil containing VOC material including gasoline, diesel, crude oil, lubricant, waste oil, adhesive, paint, stain, solvent, resin, monomer, and/or any other material containing VOCs; the handling or storage of VOC-contaminated soil [soil which registers >50 ppm or greater using an OVA calibrated with hexane] at or from an excavation or grading site; or the treatment of VOC-contaminated soil at a facility. SCAQMD Rule 1166 further requires that a copy of the approved mitigation plan be on-site during the entire excavation period and that the SCAQMD executive officer be notified at least 24 hours prior to excavation. In accordance with SCAQMD Rule 1166, monitoring for VOC contamination would occur at least once every 15 minutes and VOC concentration readings would be recorded. When VOC-contaminated soil is detected, the approved mitigation plan would be implemented. As a condition of approval of the Project, the applicant shall provide Project documentation and an approved plan to the City of Chino Hills Department of Building and Safety exhibiting that contaminated soil is handled and disposed of properly in compliance with existing regulations. Therefore, compliance with existing regulations would ensure the Project would not create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the handling and disposal of contaminated soil that may be encountered on-site.

Based on the above, with compliance with regulatory requirements, the Project would not create a significant hazard to the public or the environment related to the Project Site's inclusion on a list of hazardous materials sites. Impacts would be less than significant, and no mitigation measures are required. No further evaluation of this topic is required in the EIR.

e) **For a project located within an airport land use plan area or, where such a plan has not been adopted, within 2 miles of a public airport or a public use airport, would the project result in a safety hazard for people residing or working in the project area? No Impact.** The Project Site is located more than 2 miles from any public or private airport. The closest airport to the Project Site is the Chino Airport, located approximately 11.1 miles northeast. Ontario International Airport is located further northeast of the Project Site, approximately 19.4 miles northeast. Accordingly, no impacts associated with safety hazards or excessive noise from proximate airports would occur and no mitigation measure would be required. No further evaluation of this topic is required in the EIR.

f) **Would the project impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan? Less Than Significant Impact.** Primary access into the Project Site is via Canyon Hills Road which connects to Carbon Canyon Road (State Highway 142). Project construction would be confined to the immediate vicinity of the Project Site and, therefore, would not interfere with these routes. All the roads, gates, and related infrastructure shall be built with the most current fire protection standards. [37]

All streets shall be a minimum of 40 feet in width. Parking is allowed on both sides as long as 26 feet of fire access is maintained clear of any obstruction. Cul-de-sacs shall be designed to the City of Chino Hills Development Code standards. All fire access roads shall meet the requirements of the City of Chino Hills, Chino Valley Independent Fire District (CVIFD), and shall be capable of supporting loads of 75,000 lbs. gross vehicle weight. Per the City, the surface is limited to the installation of concrete and asphalt. Access to all portions of each structure must be within 150 feet of the available fire department access. Access roads and driveways shall be cleared along their sides. As a condition of approval all project plans would be submitted for approval to the Chino Hills Valley Fire District. The Project would not impair implementation of or physically interfere with an adopted emergency response plan. Therefore, impacts to emergency response and evacuation plans would be less than significant and no mitigation measures would be required. No further evaluation of this topic is required in the EIR.

g) **Would the project expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires? Less Than Significant Impact**. The Project Site is located in an area designated as Fire Hazard by the City Chino Hills General Plan.[38] The Project Site is in a rural area with large lots and hilly, naturally vegetated open areas. However, the fire safety features described in **Section 4.20, Wildfires** would reduce the danger from wildland fires. Accordingly, impacts related to the exposure of people or structures to loss, injury, or death involving wildland fires would be less than significant and no mitigation measures would be required. No further evaluation of this topic is required in the EIR.

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37 *Fire Protection Plan Paradise Ranch Tracts N. 20286, 16200, & 16220, Chino Hills, April 30, 2020, Revised October 30, 2020, and December 10, 2020.*

38 *Chino Hills General Plan, Chapter 5 Safety Element, Figure 5-10, Fire Hazard Overlay District, accessed June 2021.*

4.10 HYDROLOGY/WATER QUALITY.
Would the project:

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater?	☐	☐	☒	☐
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☒	☐
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:				
i) result in substantial erosion or siltation on-or off-site;	☐	☐	☒	☐
ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on-or offsite;	☐	☐	☒	☐
iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	☐	☐	☒	☐
iv) impede or redirect flood flows?	☐	☐	☒	☐
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☒	☐
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☒	☐

The following analysis is based on the findings of the *Preliminary Hydraulics & Hydrological Study, Paradise Ranch Residential Development Tract Map # 20286* prepared by *Blue Engineering & Consulting, Inc.* on May 2021. The *Preliminary Hydraulics & Hydrological Study* (Hydrology Study) is available as **Appendix IS-D** to this document.

SETTING

The City is located in the 275-square-mile Zone 1 of the County of San Bernardino Flood Control District (SBCFCD). SBCFCD owns and maintains flood control channels in the City, including Los Serranos, English, and Carbon Canyon Channels. These facilities are designed and located to control flooding along streams and to move flood waters through and away from developed lands and the streets and highway network.

The City owns and maintains storm drainage facilities throughout the City's street network, to collect runoff from adjacent developed and undeveloped land. The City's drainage system consists of approximately 83 miles of underground pipelines, inlet and outlet structures, a variety of filtering mechanisms and detention basins. Drainage facilities in the oldest parts of the City, were constructed prior to development of the first large master plans and prior to City incorporation, when more comprehensive and improved standards for drainage systems were enacted.

The City of Chino Hills Storm Drain Master Plan, identifies current storm drain deficiencies and plans to remedy these deficiencies.[39] To assess deficiencies, the Storm Drain Master Plan divided the City into 12 drainage basins (Puente Hills, Boys Republic, English Channel, Little Chino Creek, Los Serranos Lake, Lower Serranos, Slaughter Canyon, Aliso Canyon, Southeast Chino Hills, Tonner Canyon, Carbon Canyon, and Soquel Canyon) and analyzed each area to determine estimated stormwater run-off based on 10-, 25-, and 100-year storm events, and assessed the capacity of 200 of the City's existing storm drain facilities.

Based on this run-off information, the Storm Drain Master Plan outlines a storm drain system improvement plan that identifies preliminary sizing for future storm drains that will be constructed either by development projects or through the City Capital Improvement Program. Most of the planned storm drain facilities are designed to provide capacity for 100-year events.

INFRASTRUCTURE

The City's 12 drainage basins have a combined area of 21,053 acres (32.90 square miles). The Project Site is located within Basin No. 11: Carbon Canyon.[40] This drainage basin totals approximately 2,587 acres and consists of some low-density residential developments. The basin is predominantly undisturbed rolling hills. Natural rills, gullies and washes convey the flow from north to south with an outlet point located that the City limits.[41] There are no existing City-owned drainage facilities in this basin.[42]

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[39] *City of Chino Hills General Plan, February 2015.*

[40] *City of Chino Hills Storm Drain Master Plan, Carbon Canyon Hydrology Model, Prepared by Lim & Nascimento Engineering Corp, August 2009.*

[41] *City of Chino Hills Storm Drain Master Plan, Carbon Canyon Hydrology Model, Prepared by Lim & Nascimento Engineering Corp, August 2009.*

[42] *City of Chino Hills Storm Drain Master Plan, Carbon Canyon Hydrology Model, Prepared by Lim & Nascimento Engineering Corp, August 2009.*

HYDROLOGY

Stormwater run-off currently sheet flows on the surface of the Project Site or percolates into the subsurface. Due to the size of the parcel, off-site drainage does occur at multiple locations along the perimeter of the site. Majority of those locations happen outside of the limits of where grading will occur. The location where the most off-site drainage does occur, near the limits of grading, is along Canyon Hills Road. This area drains on-site and into the existing channel and through the existing channel.

DISCUSSION OF IMPACTS

a) **Would the project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater? Less Than Significant Impact.**

CONSTRUCTION

Construction activities would include grading, excavation, and vegetation removal, which would disturb and expose soils to water erosion, potentially increasing the amount of silt and debris entering downstream waterways. In addition, refueling and parking construction equipment and other vehicles on-site could result in oil, grease, and other related pollutant leaks and spills that could enter runoff. The project applicant would be required to prepare and comply with a stormwater pollution prevention plan (SWPPP) that would include pollution prevention measures (erosion and sediment control measures and measures to control non-stormwater discharges and hazardous spills), demonstrate compliance with all applicable local and regional erosion and sediment control standards, identify responsible parties, and include a detailed construction timeline. The SWPPP must also include BMPs to reduce construction effects on receiving water quality by implementing erosion control measures and reducing or eliminating non-stormwater discharges.

Examples of typical construction BMPs include, but are not limited to, using temporary mulching, seeding, or other suitable stabilization measures to protect uncovered soils; storing materials and equipment to ensure that spills or leaks cannot enter the storm drain system or surface water; developing and implementing a spill prevention and cleanup plan; and installing sediment control devices such as gravel bags, inlet filters, fiber rolls, or silt fences to reduce or eliminate sediment and other pollutants from discharging to the drainage system or receiving waters. BMPs are recognized as effective methods to prevent or minimize the potential releases of pollutants into drainages, surface water, or groundwater.

The project applicant would be required to comply with the project's SWPPP. Therefore, the project would have a less than significant impact on water quality standards and discharge requirements during construction.

OPERATION

The project would connect to the City's existing storm drainage facilities. Project operation could also contribute pollutants, such as oil, grease, and debris, to stormwater drainage flowing over the driveways.

As is typical of most nonindustrial urban development, stormwater runoff from the proposed Project has the potential to introduce small amounts of pollutants into the stormwater system.

Pollutants would be associated with runoff from landscaped areas (pesticides and fertilizers) and paved surfaces (ordinary household cleaners). Thus, the Proposed Project would be required to comply with the NPDES standards and the

San Bernardino County Municipal NPDES Storm Water Permit and the Municipal Separate Storm Sewer System (MS4) Permits administered by the Santa Ana Regional Water Quality Control Board (RWQCB) to ensure pollutant loads from the Project Site are minimized for downstream receiving waters.

Title 13, Chapter 13.16, Storm Drain Systems contain requirements for construction activities and operation of development and redevelopment projects to integrate BMPs, to prevent or reduce the discharge of pollutants directly or indirectly to waters of the United States. BMP shall also include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, sludge or waste disposal or drainage from raw material storage. Conformance would be ensured during the permitting process with the Department of Building and Safety. Therefore, the Project would not violate water quality standards, waste discharge requirements, or stormwater NPDES permits or otherwise substantially degrade water quality, and project impacts would be less than significant.

The Project includes the construction of new sidewalks, driveways, along with residences. The Project is also proposing to retain flow within three detention basins that will be located along the westerly limits of the Project. Outflow from the detention basins drain into the existing culvert.

Hydrologic calculations for the Project were performed using CIVILCADD/CIVIL DESIGN Engineering Software, Version 7.1. Peak Flow and Time of Concentration values for each storm event were obtained for the pre-developed and post-developed condition using the "San Bernardino County Rational Hydrology Program option within the software, as preferred by the City of Chino Hills.

The run-off index, time of concentration, previous fraction and other pertinent information obtained from the rational analysis was then used to generate a post-development Unit Hydrograph for each respective drainage area, as applicable. This was done to compare the existing and proposed condition hydrology mitigation requirements for the 2-year 24-hour, 10-year 24-hour and 100-year 24-hour design storms. The Unit Hydrograph Analysis was performed using the CIVILCADD/CIVILDESIGN Engineering Software previously mentioned.

As appropriate, the resulting Unit Hydrograph was then imported into the CIVILCADD/CIVIL DESIGN Routing Software to perform basin routing and outflow analysis of each detention basin. The final outflow rate from the detention basins was then compared to the existing condition rational method calculation for the 100-year storm event to ensure the project complies with the mitigation requirements for the project.

Design Parameters:

- The drainage area is located in Soil Group D according to the USDA NRCS Soil Survey.

- Antecedent Moisture Content (AMC) of I was used for 2-year, II was used for 10-year and III was used for 100-year return frequency storm calculation.

- The on-site drainage area was analyzed for a 10-year and 100-year storm event using Rational Method Analysis per San Bernardino County Hydrology Manual and CIVILCADD/CIVILDESIGN.

- The drainage area is located within a valley area and is assumed to have an Intensity-Duration slope of 0.60 according to section B.8 of the Hydrology Manual.

- The rainfall depth of a 10-year 1-hour storm event is 0.95 inches according to NOAA Atlas 14 Precipitation Frequency Estimates.

- The rainfall depth of a 100-year 1-hour storm event is 1.38 inches according to NOAA Atlas 14 Point Precipitation Frequency Estimates.

- The impervious are assumed to be 50% of the total on-site area, representative of the Residential (5-7 dwl/acre) subarea type.

As shown in **Table 4.1, San Bernardino County Rational Hydrology Summary** the results from this hydrology analysis demonstrates that the drainage design for the site meets the County of San Bernardino Flood Control standards.

Table 4.1
San Bernardino County Rational Hydrology Summary

	Acres	2 year	10 year	100 year
Pre-Development	72.32	51.213	113.326	193.08
Post-Development	72.26	65.147	124.124	205.908
Mitigated Flow		13.934	10.798	12.828
Source: Preliminary Hydraulics & Hydrological Study, Paradise Ranch Residential Development Tract Map# 20286 Chino Hills, CA. Blue Engineering & Consulting, Inc. May 2021.				

Drainage areas that will be directed to each of the detention basins will be used to run the required Unit Hydrograph. For Detention Basin BMP-1, information from node 224 will be used, Detention basin BMP-2 node 225 and Detention Basin BMP-3 node 226 will be used.

As shown in **Table 4.2, Hydrological Results**, the Project will increase the post Q amount. To mitigate the increase of flow coming from the project, three detention basins with the capacity to store up to a volume of 59,067 c.f. are being proposed. Routing of the flow through the two basins did show a reduction of 0.3 cfs for the 2 year event, 8.671 cfs for the 10 year event and 13.644 cfs for the 100 year event leaving the Project Site into the existing culvert under Chino Hills Road.

Table 4.2
Hydrological Results

Event	Pre	Post Mitigation	Decrease	Percent Change
2 year	51.213	50.913	0.3	-1%
10 year	113.326	104.655	8.671	-7.65%
100 year	193.08	179.436	13.644	-7.07%
Source: Preliminary Hydraulics & Hydrological Study, Paradise Ranch Residential Development Tract Map# 20286 Chino Hills, CA. Blue Engineering & Consulting, Inc. May 2021.				

Project development would constitute a significant increase in impervious area on the Project Site. Roadway drainage typically generates quick runoff, which has the potential to carry pollutants into waterways and the stormwater system. The Project would direct this runoff down the roadway and discharge it into the existing sewer system. As such, stormwater runoff from the new residences may be untreated, this runoff would not impact water quality or waste discharge requirements. As a condition of approval of this Project, a SWPPP and NPDES compliance will be required for construction of the Project prior to the approval of a grading permit. In addition, as a condition of approval for the Project, the applicant shall submit the grading, drainage, erosion/sediment control plan for the Project. With implementation of the project's stormwater treatment design measures and compliance with existing regulations, the Project would have a less than significant impact on water quality standards and waste discharge requirements during operation.

b) **Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin)? Less Than Significant Impact**. The Project would not require the use of groundwater at the Project Site. Potable water would be supplied by the City of Chino Hills, which draws its water supplies from surface water, supplied by the Metropolitan Water District (MWD) via the Water Facilities Authority (WFA) and the Monte Vista Water District (MVWD); and groundwater that is pumped through City-owned wells, MVWD wells, and Chino Basin Desalter Authority (CDA) wells. Recycled water is also provided by the Inland Empire Utilities Agency (IEUA). Therefore, the Project would not require direct additions or withdrawals of groundwater. Excavation to accommodate utilities is not proposed at a depth that would result in the interception of existing aquifers or penetration of the existing water table. In addition, the City's Title 13, Chapter 13.16, Storm Drain Systems contain requirements for construction activities and operation of development and redevelopment projects to integrate BMPs, to prevent or reduce the discharge of pollutants directly or indirectly to waters of the United States. BMP shall also include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, sludge or waste disposal or drainage from raw material storage. Conformance would be ensured during the permitting process with the Department of Building and Safety. Therefore, the Project would not impact groundwater supplies or groundwater recharge, and project impacts would be less than significant and no mitigation measures would be required. No further evaluation of this topic is required in the EIR.

c) **Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or through the addition of impervious surfaces, in a manner which would:**

i. **Result in substantial erosion or siltation on-or off-site? Less Than Significant Impact.** The Project Site has two existing residences, a barn, and a stable and fenced pasture on approximately 85.2 acres of land. The rest of the land is currently vacant covered with mostly bare soil, grass, bushes, trees, and other native vegetation. The Project would involve the demolition of an existing uses, the construction of new residential uses, and the installation of new landscaped areas, which would have the potential to alter the direction of runoff from the Project Site.

Construction activities for the Project would include demolition of existing uses and the excavation and removal of soil for grading. These activities have the potential to temporarily alter existing drainage patterns and flows on the Project Site by exposing the underlying soils, modifying flow direction, and making the Project Site temporarily more permeable. Exposed and stockpiled soils could also be subject to erosion and conveyance into nearby storm drains during storm events. In addition, on-site watering activities to reduce airborne dust could contribute to pollutant loading in runoff. However, as the construction site would be greater than one acre, the Project would be required to obtain coverage under the NPDES Construction General Permit. In accordance with the requirements of this permit, the Project would implement a SWPPP that specifies BMPs and erosion control measures to be used during construction to manage runoff flows. These BMPs are designed to contain stormwater or construction watering on the Project Site such that runoff does not impact off-site drainage facilities or receiving waters. Thus, through compliance with all NPDES Construction General Permit requirements, including preparation of a SWPPP and implementation of BMPs, as well as compliance with applicable City grading permit regulations, construction activities for the Project would not substantially alter the Project Site drainage patterns in a manner that would result in substantial erosion, siltation, or flooding on- or off-site. As such, construction-related impacts to hydrology would be less than significant, and no mitigation measures are required. No further evaluation of this topic in an EIR is required.

As discussed in the Hydrology and Water Quality Report, at buildout of the Project, the Project Site would be comprised of impervious areas. The Project Site would consist of a drainage area, which would drain into three catch basins on-site. While there would be an increase in imperviousness of the Project Site, this increase would not significantly increase the amount of runoff from the Project Site due to the stormwater infrastructure and catch basins incorporated to the Project. As a condition of approval of this Project, a SWPPP and NPDES compliance will be required for construction of the Project prior to the approval of a grading permit. In addition, as a condition of approval for the Project, the applicant shall submit the grading, drainage, erosion/sediment control plan for the Project.

As shown in **Table 4.2, Hydrological Results**, the Project will increase the post Q amount. To mitigate the increase of flow coming from the project, three detention basins with the capacity to store up to a volume of 59,067 c.f. are being proposed. Routing of the flow through the two basins did show a reduction of 0.3 cfs for the 2 year event, 8.671 cfs for the 10 year event and 13.644 cfs for the 100 year event leaving the Project Site into the existing culvert under Chino Hills Road.

Project development would constitute a significant increase in impervious area on the Project Site. Roadway drainage typically generates quick runoff, which has the potential to carry pollutants into waterways and the stormwater system. The Project would direct this runoff down the roadway and discharge it into the existing sewer system. As such, stormwater runoff from the new residences may be untreated, this runoff would not impact water quality or waste discharge requirements. With implementation of the project's stormwater treatment design measures and compliance with existing regulations, the Project would not substantially alter the existing drainage pattern of the Project Site or surrounding area such that substantial erosion, siltation, or on-site or off-site flooding would occur. Operational impacts to hydrology would be less than significant, and no mitigation measures are required. No further evaluation of this topic is required in the EIR.

ii. **Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on-or offsite? Less Than Significant Impact.** As stated above in Question 4.10(i) above, the Project has the potential to affect drainage patterns. No streams or rivers cross the Project Site. While there would be an increase in imperviousness of the Project Site, this increase would not substantially increase the amount of runoff from the Project Site. As discussed above, the Project would increase the post Q amount. To mitigate the increase of flow coming from the Project, three detention basins with the capacity to store up to a volume of 59,067 c.f. are being proposed. Routing of the flow through the two basins did show a reduction of 0.3 cfs for the 2-year event, 8.671 cfs for the 10 year event and 13.644 cfs for the 100 year event leaving the Project Site into the existing culvert under Chino Hills Road.

Project development would constitute a significant increase in impervious area on the Project Site. Roadway drainage typically generates quick runoff, which has the potential to carry pollutants into waterways and the stormwater system. The Project would direct this runoff down the roadway and discharge it into the existing sewer system. As such, stormwater runoff from the new residences may be untreated, this runoff would not impact water quality or waste discharge requirements. With implementation of the project's stormwater treatment design measures and compliance with existing regulations, the Project would not substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- and off-site. Project impacts would be less than significant, and no mitigation measures would be required. No further evaluation of this topic in an EIR is required.

iii. **Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff? Less Than Significant Impact.** As discussed above, while there would be an increase in imperviousness of the Project Site, this increase would not substantially increase the amount of runoff from the Project Site. Flows would be accommodated by the proposed catch basins and stormwater treatment and conveyance system. In addition, the implementation of BMPs required by the City would target the pollutants that could potentially be carried in stormwater runoff. Therefore, with the incorporation of BMPs, operation of the Project would not result in discharges that would violate any surface water quality standards or waste discharge requirements. Thus, the Project would not create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial sources of polluted runoff. Project impacts would be less than significant, and no mitigation measures would be required. No further evaluation of this topic in an EIR is required.

iv. **Impede or redirect flood flows? Less Than Significant Impact.** The Project Site is not located within a designated 100-year flood hazard area as mapped by the Federal Emergency Management Agency (FEMA).[43] According to the FEMA Flood Insurance Rate Map, the Project Site is within Zone D – Area with Flood risk due to Levee.[44] There are no rivers or steams, or other water ways that could flood flow on or through the Project Site.

Thus, the Project Site would not place structures that would impede or redirect flood flows. Project impacts would be less than significant, and no mitigation measures would be required. No further evaluation of this topic in an EIR is required.

d) **Would the project in flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation? Less Than Significant Impact.** As discussed above, according to the FEMA Flood Insurance Rate Map, the Project Site is within Zone D – Area with Flood risk due to Levee.[45] As the Project Site is not located in a flood risk area, the Project would may increase the risk of pollutants release due to inundation.

Tsunamis are large waves generated at sea by significant disturbance of the ocean flow, causing the water column above the point of disturbance to displace rapidly. According to the City of Chino Hills General Plan, the Project Site is not located within an area potentially affected by a tsunami. Seiches are large waves generated in enclosed bodies of water, such as lakes, induced by ground shaking. There are two reservoirs within the City limits, Arnold Reservoir (Chino Ranch No. 1 Dam) and Los Serranos Lake, and two reservoirs adjacent to or upstream from the City.[46] Due to the size of the parcel, off-site drainage does occur at multiple locations along the perimeter of the site. Majority of those locations happen outside of the limits of grading will occur. The location where the most off-site drainage does occur, near the limits of grading, is along Canyon Hills Road. This area drains on-site and into the existing channel and through the existing channel.

The Project is proposing to retain flow within three detention basins that will be located along the westerly limits of the project. Outflow from the detention basins drain into the existing culvert. Thus, Project impacts related to release of pollutants due to Project inundation by tsunami or seiche would be less than significant, and no mitigation measures would be required. No further evaluation of this topic in an EIR is required.

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[43] *Federal Emergency Management Agency, Flood Insurance Rate Map, City of Chino Hills, California, FEMA Map Number 06071C9325H. Refreshed October 2020.*

[44] *Federal Emergency Management Agency, Flood Insurance Rate Map, City of Chino Hills, California, FEMA Map Number 06071C9325H. Refreshed October 2020.*

[45] *Federal Emergency Management Agency, Flood Insurance Rate Map, City of Chino Hills, California, FEMA Map Number 06071C9325H, effective August 28, 2008, refreshed October 2020.*

[46] *City of Chino Hills General Plan, February 2015.*

e) **Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan? Less Than Significant Impact.** Under Section 303(d) of the Clean Water Act, states are required to identify water bodies that do not meet their water quality standards. Biennially, the Santa Ana Regional Water Quality Control Board prepares a list of impaired waterbodies in the region, referred to as the 303(d) list. The 303(d) list outlines the impaired waterbody and the specific pollutant(s) for which it is impaired. All waterbodies on the 303(d) list are subject to the development of a Total Maximum Daily Load (TMDL).

The project would connect to the City's existing storm drainage facilities. Project operation could also contribute pollutants, such as oil, grease, and debris, to stormwater drainage flowing over the driveways.

As is typical of most nonindustrial urban development, stormwater runoff from the proposed Project has the potential to introduce small amounts of pollutants into the stormwater system. Pollutants would be associated with runoff from landscaped areas (pesticides and fertilizers) and paved surfaces (ordinary household cleaners). Thus, the Proposed Project would be required to comply with the NPDES standards and the

San Bernardino County Municipal NPDES Storm Water Permit and the MS4 Permits administered by the Santa Ana RWQCB to ensure pollutant loads from the Project Site are minimized for downstream receiving waters.

Title 13, Chapter 13.16, Storm Drain Systems contain requirements for construction activities and operation of development and redevelopment projects to integrate BMPs, to prevent or reduce the discharge of pollutants directly or indirectly to waters of the United States. BMP shall also include treatment requirements, operating procedures, and practices to control site runoff, spillage or leaks, sludge or waste disposal or drainage from raw material storage. Conformance would be ensured during the permitting process with the Department of Building and Safety. As a condition of approval of this Project, a SWPPP and NPDES compliance will be required for construction of the Project prior to the approval of a grading permit. In addition, as a condition of approval for the Project, the applicant shall submit the grading, drainage, erosion/sediment control plan for the Project. Therefore, the Project would not violate water quality standards, waste discharge requirements, or stormwater NPDES permits or otherwise substantially degrade water quality, and with compliance with existing regulatory requirements and implementation of BMPs, the Project would not conflict with or obstruct implementation of a water quality control plan or a sustainable groundwater management plan. Impacts would be less than significant, and no mitigation measures would be required. No further evaluation of this topic in an EIR is required.

4.11 LAND USE/PLANNING.
Would the project:

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Physically divide an established community?	☐	☐	☐	☒
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☒	☐

SETTING

The basis for land use and planning in the city is the Chino Hills General Plan, adopted on February 24, 2015. The General Plan Land Use Element provides the primary guidance on issues related to land use, land use intensity, and design. In concert with the General Plan, CHMC Chapter 16.04 establishes zoning districts in the city and specifies allowable uses and development standards for each district. The Project Site is currently zoned R-R (Rural Residential) in the City, which designates the land use of the property as Rural Residential. The Project is proposing to develop under the City's Clustering Ordinance No. 298, and the City of Chino Hills Municipal Code (CHMC) Section 16.10.030. Per Ordinance No. 298, a cluster development is a means of preserving open space while permitting residential development by clustering homes on only a portion of the development parcel, thereby preserving the remainder of the parcel in open space. The clustering of residential homes into a small area is made possible by reducing the individual lot sizes and corresponding development standards. This Ordinance is intended to allow the City to establish development standards, regulations, and review procedures for clustering single-family residential development in the Agriculture-Ranch (R-A) and Rural Residential (R-R) zoning districts.

Per CHMC Section 16.10.030, clustering is permitted for certain designated properties to protect environmental and visual resources. As an alternative to the development standards set forth in Exhibit "A" Table 20-1(A), designated properties within the R-A and R-R zone may apply to have the clustering standards set forth in Exhibit "B" Table 20-1(B) of CHMC Section 16.10.030. Applications for clustering apply through and comply with the requirements of the site plan review process (Chapter 16.76) and the additional following requirements.

1. Applications to cluster must clearly demonstrate that clustering results in:

i. Reduced grading;

ii. Reduced roadways and driveway intrusions into sensitive habitat areas, open space, and the Chino Hills State Park;

v. iii. Protection of increased amounts of open space; iv. Protection of environmental and visual resources.

The R-R Clustering Development Standards are provided in **Table 3.3, R-R Residential Zone District Clustering Development Standards** in **Section 3.0 Project Description**.

The Project Site is surrounded by residential development on the north, south, and east. To the west, the adjacent parcel is undeveloped. To the north and east of the Project Site is the Oak Tree Downs Community, which includes single-family homes. To the west of the Project Site is undeveloped land, further to the west is the Saint Joseph Hill of Hope. To the south of the Project Site is the Hillcrest development, which includes single-family homes.

DISCUSSION OF IMPACTS

a) **Would the project physically divide an established community? No Impact**. The Project Site currently has two residences and is surrounded by residential neighborhoods and undeveloped land. The Project Site is currently zoned R-R (Rural Residential) in the City, which designates the land use of the property as Rural Residential. The project would be consistent with the City's General Plan land use designation and would provide more residential housing in the city. The project would be consistent with surrounding uses because it would match the existing residential community. The project would also not create physical divisions in the community. As such, the project would have no impact on an established community. No further evaluation of this topic is required in the EIR.

b) **Would the project cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect? Less Than Significant Impact**. The Project Site is currently zoned R-R (Rural Residential) in the City, which designates the land use of the property as Rural Residential. The Project is proposing to develop under the City's Clustering Ordinance No. 298, and the City of Chino Hills Municipal Code (CHMC) Section 16.10.030. Per Ordinance No. 298, a cluster development is a means of preserving open space while permitting residential development by clustering homes on only a portion of the development parcel, thereby preserving the remainder of the parcel in open space. The clustering of residential homes into a small area is made possible by reducing the individual lot sizes and corresponding development standards. This Ordinance is intended to allow the City to establish development standards, regulations, and review procedures for clustering single-family residential development in the Agriculture -Ranch (R -A) and Rural Residential (R -R) zoning districts.

As stated above, per CHMC Section 16.10.030, clustering is permitted for certain designated properties to protect environmental and visual resources. As an alternative to the development standards set forth in Exhibit "A" Table 20-1(A), designated properties within the R-A and R-R zone may apply to have the clustering standards set forth in Exhibit "B" Table 20-1(B) of CHMC Section 16.10.030. Applications for clustering apply through and comply with the requirements of the site plan review process (Chapter 16.76) and the additional following requirements.

1. Applications to cluster must clearly demonstrate that clustering results in:

i. Reduced grading;

ii. Reduced roadways and driveway intrusions into sensitive habitat areas, open space, and the Chino Hills State Park;

iii. Protection of increased amounts of open space; and

iv. Protection of environmental and visual resources.

The R-R Clustering Development Standards are provided in Project **Table 3.3, R-R Residential Zone District Clustering Development Standards**, **Section 3.0 Project Description**. As shown, in **Table 3.3**, Zoning District R-R Clustering includes but is not limited to the following: a maximum building height of 35 feet, maximum project site size of 10 acres, maximum lot coverage of 40 percent, minimum lot size of 7,200 sq.ft., and minimum setbacks of 20 feet for the primary structure and the garage. The Applicant has requested a Tentative Tract Map, and Site Plan Review for Clustered development and Tract Design Review.

The Project Site is currently split into two lots, one located at 16200 Canyon Hills Road in the northeastern portion of the Project Site, and one located at 16220 in the western portion of the Project Site. The 10.71-acre lot located at 16200 Canyon Hills Road was developed in the 1920's with an approximately 1,250-square foot, three-bedroom residential home, a barn, stables, and fenced pasture.[47] The 71.9-acre lot located at 16220 Canyon Hills Road was developed in 1915 with an approximately 1,180-square foot, two-bedroom residential home.[48] This residential home at 16220 Canyon Hills Road will remain on-site as Lot Number 51. The rest of the area is undeveloped, hillside slopes, and is covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant. Elevations range from a low of approximately 959 feet to a high of approximately 1,256 feet.

The Project would demolish the 1,250 square foot, three-bedroom residential use, barn, and stables. The applicant is proposing to subdivide the 85.2-acre property into a total of 51 lots. Lots 1 through 50 will include the development of a single-family residential homes. The Project includes the development of six architectural styles with a total of four different floor plans for each style. The six architectural styles include: Adobe Ranch, Cottage Farmhouse, Monterey Andalusian, Santa Barbara, Agrarian Traditional, and Tuscan Farmhouse. The design of the residential homes also includes three enhanced elevations: Front Enhanced, Side Enhanced, and Rear Enhanced. There are a total of four different floor plans for the residential homes, each of which are two-story and range between four and five bedrooms. Floor Plan 1 is approximately 3,970 square feet (including garage), Floor Plan 2 is approximately 3,946 square feet (including garage), Floor Plan 3 is approximately 4,373 square feet (including garage), and Floor Plan 4 is approximately 4,616 square feet (including garage). See **Figures 3.4 through 3.9**, in **Section 3.0 Project Description**, for site plan, elevations, and floor plans.

Lots 1 through 50 will range from a lot size of 7,200 square feet to 12,412 square feet. Lot 51 will maintain the existing single-family home on-site and Lot A will remain vacant native land.

The following is a list of applicable land use plans, policies, and regulations:

- SCAG Regional Transportation Plan (RTP)

47 *San Bernardino County Property Information Management System for Assessor Parcel Number 1000-051-09-0-000.*

48 *San Bernardino County Property Information Management System for Assessor Parcel Number 1000-051-19-0-000.*

- City of Chino Hills General Plan
- Chino Hills Municipal Code

CONSISTENCY WITH REGIONAL PLANS

SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS REGIONAL TRANSPORTATION PLAN

On September 3, 2020, the Southern California Association of Governments (SCAG) Regional Council adopted the 2020-2045 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS), also known as Connect SoCal. The 2020-2045 RTP/SCS presents a long-term transportation vision through the year 2045 for the six-county region of Imperial, Los Angeles, Orange, Riverside, San Bernardino, and Ventura counties. The 2020-2045 RTP/SCS contains baseline socioeconomic projections that are used as the basis for SCAG's transportation planning, and the provision of services by other regional agencies. SCAG's overarching strategy for achieving its goals is integrating land use and transportation. SCAG policies are directed towards the development of regional land use patterns that contribute to reductions in vehicle miles and improvements to the transportation system. Rooted in past RTP/SCS plans, Connect SoCal's "Core Vision" centers on maintaining and better managing the region's transportation network, expanding mobility choices by co-locating housing, jobs, and transit, and increasing investment in transit and complete streets. The plans "Key Connections" augment the "Core Vision" to address challenges related to the intensification of core planning strategies and increasingly aggressive greenhouse gas reduction goals, and include but are not limited to, Housing Supportive Infrastructure, Go Zones, and Shared Mobility. Connect SoCal intends to create benefits for the SCAG region by achieving regional goals for sustainability, transportation equity, improved public health and safety, and enhancement of the regions' overall quality of life. These benefits include but are not limited to a five percent reduction in VMT per capita and vehicle hours traveled by nine percent, increase in work-related transit trips by two percent, create more than 264,500 new jobs, reduce greenfield development by 29 percent, and, building off of the 2019-2040 RTP/SCS, increase the share of new regional household growth occurring in HQTA's by six percent and the share of new job growth in HQTAs by 15 percent.

Conflicts and consistency of the Project with the RTP/SCS are addressed in **Table 4.3, Applicable Goals and Strategies of 2020-2045 RTP/SCS**. Based on the analysis presented in **Table 4.3**, the Project would not be in conflict with applicable 2020-2045 RTP/SCS goals and strategies. The Project is located in an area served by the OmniRide microtransit service which serves residents, visitors, students, and employees in the Chino and Chino Hills area and provides local service to the Project Site.

Table 4.3
Applicable Goals and Strategies of 2020-2045 RTP/SCS

Goals and Strategies	Would the Project Conflict?
G1: Encourage regional economic prosperity and global competitiveness.	**No conflict.** Although this goal is a plan-level goal, the Project would be consistent with this goal by developing additional housing in an area designated for housing. The addition of housing units to the Project Site will create

Table 4.3
Applicable Goals and Strategies of 2020-2045 RTP/SCS

Goals and Strategies	Would the Project Conflict?
	additional customers and visitors to local City businesses, promoting economic prosperity in the area.
G3: Enhance the preservation, security, and resilience of the regional transportation system.	**No conflict.** Although this goal is a plan-level goal, the Project would be consistent with this goal by providing additional housing units with access to the OmniRide microtransit service which serves residents, visitors, students, and employees in the Chino and Chino Hills area and provides local service to the Project Site. The additional ridership for the OmniRide microtransit service created by the Project would encourage the economic viability of the transit.
G5: Reduce greenhouse gas emissions and improve air quality.	**No conflict.** Although this goal is a plan-level goal, the Project would incorporate building technologies and design features that would save energy (which would also reduce air emissions associated with electricity generation). Therefore, the Project would reduce potential GHG emissions, improve air quality.
G6: Support healthy and equitable communities.	**No conflict.** Although this goal is a plan-level goal, the Project would be consistent with this goal by providing an increase in the number of housing units available on the Project Site, in an area with access to the OmniRide microtransit service which serves residents, visitors, students, and employees in the Chino and Chino Hills area and provides local service to the Project Site. The Project is located proximate to a transit service, thereby reducing vehicle emissions, and would incorporate building technologies and design features that would save energy (which would also reduce air emissions associated with electricity generation).
G7: Adapt to a changing climate and support an integrated regional development pattern and transportation network.	**No conflict.** Although this goal is a plan-level goal, the Project would be consistent with this goal. As detailed in **Section 3.0, Project Description**, of this Initial Study, the Project residences would be designed to meet the requirements of the most current California Green Building Code and CHMC Section 16.09.090. The Project would include the following water conservation techniques: • Water conserving plants, and plants native to hot, dry summers, utilized in 95 percent of the total plant area, • Irrigation zones separated by plant material, • Use of hydro zones with plants grouped based on the amount of water needed to sustain them, • Soil amendments utilized to improve water holding capacity of the soil,

Table 4.3
Applicable Goals and Strategies of 2020-2045 RTP/SCS

Goals and Strategies	Would the Project Conflict?
	• Automatic irrigation system adjusted seasonably add with watering hours between 9:00 p.m. and 9:00 a.m., • Irrigation system design to water different areas of the landscape based on watering need; and • Recommendations given for an annual irrigation schedule.
Focus Growth Near Destinations & Mobility Options	
• Focus on regional jobs/housing balance to reduce commute ties and distances and expand job opportunities near transit and along center -focused main streets.	**No conflict.** The Project would be consistent with this strategy by providing additional housing units in an area with access to the OmniRide microtransit service which serves residents, visitors, students, and employees in the Chino and Chino Hills area and provides local service to the Project Site. The transit will provide future Project residents with reliable and safe transportation. The additional ridership created by the Project would encourage the economic viability of the transit.
Source: Southern California Association of Governments, Connect SoCal - The 2020-2045 Regional Transportation Plan/Sustainable Communities Strategy, adopted for federal transportation conformity purposes only on May 7, 2020; EcoTierra Consulting, 2021.	

The Project Site is located adjacent to a mature network of streets that include vehicular facilities. Development of the Project within this established community would promote a variety of travel choices and housing opportunities in the area. The Project would not conflict with RTP/SCS goals to maximize mobility and accessibility for all people and goods in the region, ensure travel safety and reliability, preserve and ensure a sustainable regional transportation system, protect the environment, encourage energy efficiency and facilitate the use of alternative modes of transportation, and the Project would not conflict with the RTP/SCS strategies to focus growth near destination and mobility options. Therefore, the Project would result in a less than significant impact as it would not conflict with the RTP/SCS.

CONSISTENCY WITH LOCAL PLANS

CITY OF CHINO HILLS GENERAL PLAN

The City's General Plan is a dynamic document consisting of eight elements (Land Use Element, Circulation Element, Housing Element, Conservation Element, Safety Element, Parks, Recreation, and Open Space Element, Noise Element, and Economic Development Element).

LAND USE ELEMENT

The Land Use Element designates all lands within the City for specific uses such as housing, commercial, industrial, and open space uses. The Land Use Element also provides development regulations for each land use category, and overall land use policies for the City.

The Land Use Element describes the proposed general distribution, location, and extent of land uses within the City, including housing, business, industry, open space, recreation facilities, educational facilities, public buildings and grounds, solid and liquid waste facilities, flood hazard areas, agricultural land, and other categories of public and private uses of land. The element also describes standards of population density and building intensity for the land use designations.

CIRCULATION ELEMENT

The Circulation Element specifies the general location and extent of existing and proposed major streets and other transportation facilities. It also specifies infrastructure facilities that carry water, wastewater, and storm water. The Circulation Element addresses the provision of roadways, transit, bikeways, and other local public infrastructure in the City.

The Circulation Element establishes standards for the design and operation of the City's roadway system, and defines the transportation system needed to meet those standards. The Circulation Element also defines transit services and bikeways to meet the needs of the Chino Hills community. Public infrastructure is also discussed, including water, sewer and storm drainage infrastructure (wet utilities); and electricity, natural gas, and telecommunications infrastructure (dry utilities).

HOUSING ELEMENT

The Housing Element requires separate review by the California Department of Housing and Community Development (HCD). Housing Elements are required to be updated every eight years. The role of the Housing Element is to identify and plan for the City of Chino Hills' existing and projected housing needs. The Housing Element accomplishes this role by establishing a coordinated and comprehensive plan that promotes quality places to live for all households.

CONSERVATION ELEMENT

The Conservation Element addresses the natural resources within the City, which include ridgelines, natural open space, native trees and vegetation, wildlife, soils, natural waterways, water supply, wastewater, minerals, and clean air. The Conservation Element also addresses the identification and protection of cultural resources within the City.

The Conservation Element works in concert with the Parks, Recreation and Open Space Element to address the comprehensive and long-range preservation and conservation of open space lands, consistent with §65302(e) of the California Government Code.

SAFETY ELEMENT

The Safety Element addresses earthquakes and related ground failure hazards; subsidence; flooding; slope hazards; release of hazardous materials; aircraft hazards; wildland and urban fires;

emergency planning (including hazard identification and risk assessment, hazard mitigation, and emergency response and action); and fire, police, and medical services.

PARKS, RECREATION AND OPEN SPACE ELEMENT

The Parks, Recreation and Open Space Element for Chino Hills will assist in guiding the development of future park and recreation facilities and programs, and the preservation, acquisition, management, and use of open space in the City.

NOISE ELEMENT

The Noise Element is intended to limit exposure of the community to excessive noise levels. The Noise Element identifies and assesses current and expected future noise problems in the community, and establishes a plan to minimize noise concerns in the City of Chino Hills (City).

The Noise Element provides a systematic approach to identifying and appraising excessive noise in the City, quantifying noise levels, and addressing excessive noise exposure, and community planning for the regulation of noise.

ECONOMIC DEVELOPMENT ELEMENT

The Economic Development Element defines the City of Chino Hills' (City) primary policies related to the creation and maintenance of a diversified economic base.

The Project's consistency with applicable goals, objectives, and policies in the General Plan adopted for the purpose of avoiding or mitigating an environmental effect is discussed in the impact analysis below. A detailed list of the goals, objectives, and policies of the General Plan applicable to the Project is included in **Table 4.4, Applicable Goals, Policies, and Actions of the General Plan** along with a discussion of whether or not the Project does or does not conflict with that particular goal, policy, or action. As shown, the Project will be consistent with the applicable goals, policies, and actions.

Table 4.4
Applicable Goals, Policies and Actions of the General Plan

Goals/Policies/Actions	Would the Project Conflict?
Land Use Element	
Goal LU-1: Protect Chino Hills' Natural Environment	**No conflict.** Although this goal is a plan-level goal, the Project would be consistent with this goal by developing a housing subdivision where the rest of the area is undeveloped, hillside slopes, and is covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.
Policy LU-1.1: Preserve Chino Hills' Rural Character by Limiting Intrusion of Development into Natural Open Spaces.	**No conflict.** The Project would be consistent with this policy by developing a housing subdivision where the rest of the area is undeveloped, hillside slopes, and is covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.

Table 4.4
Applicable Goals, Policies and Actions of the General Plan

Goals/Policies/Actions	Would the Project Conflict?
Action LU-1.1.2: Discourage new development from obstructing public views of extremely prominent ridgelines, prominent ridgelines, knolls, significant open spaces, or important visual resources as identified in the Municipal Code.	**No conflict.** As discussed in **Section 4.1 Aesthetics** of the Initial Study the Project Site is not located in, or visible from, a designated scenic vista or protected viewshed in an adopted land use plan. Therefore, development of the Project Site would not have a substantial adverse effect on a scenic vista from a panoramic view. The proposed residences would be visible in the context of other existing hillside residences in northern views adjacent to the Project Site, and in the eastern views across Canyon Hills Road. The Project is similar in appearance to existing single-family residences in the vicinity and these focal viewpoints is not a designated scenic vista in an adopted land use plan.
Policy 3.1.3: Identify area for the establishment of new open space opportunities to serve the needs of existing and future residents. These opportunities may include a citywide linear network of parkland sand trails, neighborhood parks and urban open spaces.	**No conflict.** The Project would be consistent with this policy by developing a housing subdivision where the rest of the area is undeveloped, hillside slopes, and is covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.
Action LU-1.1.3: Ensure that new development conforms to the unique natural setting of each area and site, retaining the character of existing landforms and preserving significant native vegetation.	**No conflict.** The Project would be consistent with this action by developing a housing subdivision where the rest of the area is undeveloped, hillside slopes, and is covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.
Action LU-1.1.4: Continue to require ridgelines and natural slopes to be dedicated and maintained as open space as required by the Municipal Code.	**No conflict.** The Project would be consistent with this action by keeping the undeveloped area of the Project Site as hillside slopes, covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.
Action LU-1.1.6: Cluster development where appropriate to minimize grading, and roadway and driveway intrusions into sensitive habitat areas, open spaces, and Chino Hills State Park. Prohibit development in areas adjacent to Chino Hills State Park (for example, ridgelines), which would result in urban runoff to the watershed of the Park.	**No conflict.** The Project would be consistent with this action by keeping the undeveloped area of the Project Site as hillside slopes, covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.
Action LU-1.1.9: Promote preservation of natural features such as streams, rock outcroppings, and unique vegetative clusters.	**No conflict.** The Project would be consistent with this action by preserving the undeveloped area of the Project Site as hillside slopes, covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.
Action LU-1.1.10: Use dedicated open space, as opposed to built barriers, as a buffer between development areas, wherever possible.	**No conflict.** The Project would be consistent with this action by preserving the hillsides and undeveloped area to the west which make up Lot A.

Table 4.4
Applicable Goals, Policies and Actions of the General Plan

Goals/Policies/Actions	Would the Project Conflict?
Action LU-1.1.16: Use designated fuel modification zones to buffer natural areas and new residential development.	**No conflict.** As discussed in **Section 4.20 Wildfire** of the Initial Study the Fire Protection Plan contains detailed requirements for the Project's defensible space, ignition resistant building features, and key fuel modification/treatment strategies to ensure the Project meets the building safety standards for development within high fire hazard areas and does not exacerbate wildfire risks.
Policy LU-1.2: Preserve and enhance the aesthetics resources of Chino Hills, including the City's unique natural resources, roadside views, and scenic resources.	**No conflict.** The Project would be consistent with this policy by preserving the undeveloped area of the Project Site as hillside slopes, covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.
Action LU-1.2.1: Continue to protect City-designated extremely prominent ridgelines, prominent ridgelines, and knolls from intrusion by development.	**No conflict.** The Project would be consistent with this action by preserving the undeveloped area of the Project Site as hillside slopes, covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.
Action LU-1.2.2: Require buildings to be designed and to utilize materials and colors to blend with the natural terrain in hillside areas and adjacent to public open spaces, extremely prominent ridgelines, prominent ridgelines, knolls, or important visual resources as identified in the Municipal Code.	**No conflict.** The Project includes the development of six architectural styles with a total of four different floor plans for each style. The six architectural styles include: Adobe Ranch, Cottage Farmhouse, Monterey Andalusian, Santa Barbara, Agrarian Traditional, and Tuscan Farmhouse. The design of the residential homes also include three enhanced elevations: Front Enhanced, Side Enhanced, and Rear Enhanced. There are a total of four different floor plans for the residential homes, each of which are two-story and range between four and five bedrooms. Floor Plan 1 is approximately 3,970 square feet (including garage), Floor Plan 2 is approximately 3,946 square feet (including garage), Floor Plan 3 is approximately 4,373 square feet (including garage), and Floor Plan 4 is approximately 4,616 square feet (including garage). See **Figures 3.4 through 3.9**, in **Section 3.0 Project Description**, for site plan, elevations, and floor plans.
Action LU-1.2.3: In conjunction with project development, contour disturbed areas that are to be retained as open space to blend with natural slopes, and revegetate the open space with native plants.	**No conflict.** The Project would also provide landscaping to enhance the streetscape. As shown in **Figure 3.10, Conceptual Landscaping Plan**, in **Section 3.0 Project Description,** trees and other landscaping features such's as ground cover, shrubs, and vines would be planted throughout the Project Site and along "A" Street, "B" Street, and "C" Street. Front yard shade trees would be provided on each of the residential lots. In total, the Project would provide approximately 125 trees on the slope area of the Project Site (125 trees are required per City code), 48 front yard trees, and 112 street trees.
Action LU-1.2.6: Dedicate and maintain landscaped areas as required by the City.	**No conflict.** The Project would also provide landscaping to enhance the streetscape. As shown in **Figure 3.10,**

Table 4.4
Applicable Goals, Policies and Actions of the General Plan

Goals/Policies/Actions	Would the Project Conflict?
	Conceptual Landscaping Plan, in **Section 3.0 Project Description**, trees and other landscaping features such's as ground cover, shrubs, and vines would be planted throughout the Project Site and along "A" Street, "B" Street, and "C" Street. Front yard shade trees would be provided on each of the residential lots. In total, the Project would provide approximately 125 trees on the slope area of the Project Site (125 trees are required per City code), 48 front yard trees, and 112 street trees.
Policy LU-2.2: Ensure balanced residential development.	**No conflict.** The Project includes the development of six architectural styles with a total of four different floor plans for each style. The six architectural styles include: Adobe Ranch, Cottage Farmhouse, Monterey Andalusian, Santa Barbara, Agrarian Traditional, and Tuscan Farmhouse. The design of the residential homes also include three enhanced elevations: Front Enhanced, Side Enhanced, and Rear Enhanced. There are a total of four different floor plans for the residential homes, each of which are two-story and range between four and five bedrooms. Floor Plan 1 is approximately 3,970 square feet (including garage), Floor Plan 2 is approximately 3,946 square feet (including garage), Floor Plan 3 is approximately 4,373 square feet (including garage), and Floor Plan 4 is approximately 4,616 square feet (including garage). See **Figures 3.4 through 3.9**, in **Section 3.0 Project Description**, for site plan, elevations, and floor plans.
Action LU-2.2.1: To protect environmental and visual resources within Agriculture/Ranches and Rural Residential properties, residential lots may be clustered and minimum lot size reduced provided the overall residential density of the property is not increased.	**No conflict.** The Project includes the development of six architectural styles with a total of four different floor plans for each style. The six architectural styles include: Adobe Ranch, Cottage Farmhouse, Monterey Andalusian, Santa Barbara, Agrarian Traditional, and Tuscan Farmhouse. The design of the residential homes also include three enhanced elevations: Front Enhanced, Side Enhanced, and Rear Enhanced. There are a total of four different floor plans for the residential homes, each of which are two-story and range between four and five bedrooms. Floor Plan 1 is approximately 3,970 square feet (including garage), Floor Plan 2 is approximately 3,946 square feet (including garage), Floor Plan 3 is approximately 4,373 square feet (including garage), and Floor Plan 4 is approximately 4,616 square feet (including garage). See **Figures 3.4 through 3.9**, in **Section 3.0 Project Description**, for site plan, elevations, and floor plans.
Action LU-2.4.3: Establish minimum lot sizes for clustering in the Agriculture/Ranches and Rural Residential areas through subsequent Municipal Code amendments.	**No conflict.** The Project includes the development of six architectural styles with a total of four different floor plans for each style. The six architectural styles include: Adobe Ranch, Cottage Farmhouse, Monterey Andalusian, Santa Barbara, Agrarian Traditional, and Tuscan Farmhouse. The design of the residential homes also include three enhanced

Table 4.4
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Goals/Policies/Actions	Would the Project Conflict?
	elevations: Front Enhanced, Side Enhanced, and Rear Enhanced. There are a total of four different floor plans for the residential homes, each of which are two-story and range between four and five bedrooms. Floor Plan 1 is approximately 3,970 square feet (including garage), Floor Plan 2 is approximately 3,946 square feet (including garage), Floor Plan 3 is approximately 4,373 square feet (including garage), and Floor Plan 4 is approximately 4,616 square feet (including garage). See **Figures 3.4 through 3.9**, in **Section 3.0 Project Description**, for site plan, elevations, and floor plans.
Action LU-3.2.2: Provide sidewalks along all streets in residential neighborhoods; and where possible, provide sidewalks in internal green belts.	**No conflict.** Development of the Project includes the construction of three new streets with sidewalks, "A" Street, "B" Street, and "C" Street which provide access to the residential homes. Vehicle access to the Project Site would be provided via a new intersection between Canyon Hills and "A" Street, and a new intersection between Canyon Hills and "C" Street. The Project would also provide landscaping to enhance the streetscape. As shown in **Figure 3.10, Conceptual Landscaping Plan**, in **Section 3.0 Project Description**, trees and other landscaping features such's as ground cover, shrubs, and vines would be planted throughout the Project Site and along "A" Street, "B" Street, and "C" Street.
Policy LU-4.1: Promote high quality development.	**No conflict.** The Project includes the development of six architectural styles with a total of four different floor plans for each style. The six architectural styles include: Adobe Ranch, Cottage Farmhouse, Monterey Andalusian, Santa Barbara, Agrarian Traditional, and Tuscan Farmhouse. The design of the residential homes also include three enhanced elevations: Front Enhanced, Side Enhanced, and Rear Enhanced. There are a total of four different floor plans for the residential homes, each of which are two-story and range between four and five bedrooms. Floor Plan 1 is approximately 3,970 square feet (including garage), Floor Plan 2 is approximately 3,946 square feet (including garage), Floor Plan 3 is approximately 4,373 square feet (including garage), and Floor Plan 4 is approximately 4,616 square feet (including garage). See **Figures 3.4 through 3.9**, in **Section 3.0 Project Description**, for site plan, elevations, and floor plans.
Action LU-4.2.3: Promote landscape materials that consist of drought-resistant plant varieties complementary to the area.	**No conflict.** The Project would also provide landscaping to enhance the streetscape. As shown in **Figure 3.10, Conceptual Landscaping Plan**, in **Section 3.0 Project Description**, trees and other landscaping features such's as ground cover, shrubs, and vines would be planted throughout the Project Site and along "A" Street, "B" Street,

Table 4.4
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Goals/Policies/Actions	Would the Project Conflict?
	and "C" Street. These plants would be drought-resistant plant varieties complementary to the area.
Circulation Element	
Action C-1.1.3: Require traffic impact analyses or traffic studies for private and public projects to ensure that discretionary development projects do not cause roadway congestion in excess of acceptable levels of service within Chino Hills, or on CMP roadway links or intersections.	**No conflict.** As discussed in **Section 4.17 Transportation** of the Initial Study, the Traffic Assessment will be evaluated in the EIR.
Action C-1.1.4: Require new developments to provide for all roads within their boundaries and to pay their fair share of planned roadway improvement costs.	**No conflict.** Development of the Project includes the construction of three new streets with sidewalks, "A" Street, "B" Street, and "C" Street which provide access to the residential homes. Vehicle access to the Project Site would be provided via a new intersection between Canyon Hills and "A" Street, and a new intersection between Canyon Hills and "C" Street.
Policy C-1.2: Create a safe, efficient, and neighborhood-friendly street system.	**No conflict.** Development of the Project includes the construction of three new streets with sidewalks, "A" Street, "B" Street, and "C" Street which provide access to the residential homes. Vehicle access to the Project Site would be provided via a new intersection between Canyon Hills and "A" Street, and a new intersection between Canyon Hills and "C" Street.
Action C-1.2.3: Design collector streets to circulate traffic within the neighborhood but discourage through traffic.	**No conflict.** Development of the Project includes the construction of three new streets with sidewalks, "A" Street, "B" Street, and "C" Street which provide access to the residential homes. Vehicle access to the Project Site would be provided via a new intersection between Canyon Hills and "A" Street, and a new intersection between Canyon Hills and "C" Street.
Action C-1.2.4: Design local streets to primarily provide access to homes and other properties.	**No conflict.** Development of the Project includes the construction of three new streets with sidewalks, "A" Street, "B" Street, and "C" Street which provide access to the residential homes. Vehicle access to the Project Site would be provided via a new intersection between Canyon Hills and "A" Street, and a new intersection between Canyon Hills and "C" Street.
Action C-1.2.5: Require all development projects to meet mandatory standards with regard to vertical and horizontal alignments, access control, rights of way, cross-sections, intersections, sidewalks, curbs and gutters, cul de sacs, driveway widths and grades, right of way dedication and improvements, and curb cuts for the disabled.	**No conflict.** Development of the Project includes the construction of three new streets with sidewalks, "A" Street, "B" Street, and "C" Street which provide access to the residential homes. Vehicle access to the Project Site would be provided via a new intersection between Canyon Hills and "A" Street, and a new intersection between Canyon Hills and "C" Street.

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Goals/Policies/Actions	Would the Project Conflict?
	As discussed in **Section 4.17 Transportation** of the Initial Study, the Traffic Assessment will be evaluated in the EIR.
Action C-1.2.8: Prohibit direct driveway access from individual residences to major arterials, major highways, secondary highways, and collectors.	**No conflict.** Development of the Project includes the construction of three new streets with sidewalks, "A" Street, "B" Street, and "C" Street which provide access to the residential homes. Vehicle access to the Project Site would be provided via a new intersection between Canyon Hills and "A" Street, and a new intersection between Canyon Hills and "C" Street.
Action C-1.2.9: Require driveway placement to be primarily designed for safety and, secondarily, to enhance circulation.	**No conflict.** Development of the Project includes the construction of three new streets with sidewalks, "A" Street, "B" Street, and "C" Street which provide access to the residential homes. Vehicle access to the Project Site would be provided via a new intersection between Canyon Hills and "A" Street, and a new intersection between Canyon Hills and "C" Street.
Action C-1.2.10: Plan access and circulation of each development project to accommodate vehicles (including emergency vehicles and trash trucks), pedestrians, and bicycles.	**No conflict.** Development of the Project includes the construction of three new streets with sidewalks, "A" Street, "B" Street, and "C" Street which provide access to the residential homes. Vehicle access to the Project Site would be provided via a new intersection between Canyon Hills and "A" Street, and a new intersection between Canyon Hills and "C" Street.
Action C-1.2.11: Require adequate off-street parking for all developments.	**No conflict.** The Project is required to provide 150 covered (within garage) parking spaces and 100 uncovered parking spaces per CHMC Title 16, Chapter 16.34.060, Table 65-1, Number of Automobile Parking Spaces Required. The Project includes the development of 250 parking spaces: 150 private garage spaces, and 100 driveway spaces.
Goal C-3: Provide Safe and Adequate Pedestrian, Bicycle, and Public Transportation Systems to Provide Alternatives to Single Occupant Vehicular Travel and to Support Land Uses	**No conflict.** The OmniRide microtransit service serves residents, visitors, students, and employees in the Chino and Chino Hills area and provides local service to the Project Site.
Policy C-3.1: Encourage the use of public transportation for commute and local, and increase citywide transit ridership.	**No conflict.** The OmniRide microtransit service serves residents, visitors, students, and employees in the Chino and Chino Hills area and provides local service to the Project Site.
Action C-3.1.1: Work with OmniTrans and/or other bus providers to expand transit routes serving the City and the surrounding communities.	**No conflict.** The OmniRide microtransit service serves residents, visitors, students, and employees in the Chino and Chino Hills area and provides local service to the Project Site.
Action C-3.1.2: Work with OmniTrans and/or other bus providers to assess and provide paratransit services for low-income, elderly, disabled, and other residents in need of access assistance.	**No conflict.** The OmniRide microtransit service serves residents, visitors, students, and employees in the Chino and Chino Hills area and provides local service to the Project Site.
Action C-3.1.3: Require bus turn-outs in residential, commercial, and industrial public use areas.	**No conflict.** Development of the Project includes the construction of three new streets with sidewalks, "A" Street, "B" Street, and "C" Street which provide access to the

Table 4.4
Applicable Goals, Policies and Actions of the General Plan

Goals/Policies/Actions	Would the Project Conflict?
	residential homes. Vehicle access to the Project Site would be provided via a new intersection between Canyon Hills and "A" Street, and a new intersection between Canyon Hills and "C" Street.
Goal C-5: Ensure an Adequate and Well-Maintained Infrastructure System	**No conflict.** See **Section 4.19 Utilities/Service Systems** of the Initial Study, for a discussion of existing and proposed infrastructure.
Policy C-5.1: Provide adequate infrastructure improvements in conjunction with development.	**No conflict.** See **Section 4.19 Utilities/Service Systems** of the Initial Study, for a discussion of existing and proposed infrastructure.
Action C-5.1.1: Plan and design new roadways and expansion/completion of existing roadways to allow for co-location of water, sewer, storm drainage, communications, and energy facilities within the road right of way.	**No conflict.** Development of the Project includes the construction of three new streets with sidewalks, "A" Street, "B" Street, and "C" Street which provide access to the residential homes. Vehicle access to the Project Site would be provided via a new intersection between Canyon Hills and "A" Street, and a new intersection between Canyon Hills and "C" Street. See **Section 4.19 Utilities/Service Systems** of the Initial Study, for a discussion of existing and proposed infrastructure.
Action C-5.1.2: Require private and public development projects to be responsible for providing road improvements along all frontages abutting a public street right of way in accordance with the design specifications for that roadway.	**No conflict.** Development of the Project includes the construction of three new streets with sidewalks, "A" Street, "B" Street, and "C" Street which provide access to the residential homes. Vehicle access to the Project Site would be provided via a new intersection between Canyon Hills and "A" Street, and a new intersection between Canyon Hills and "C" Street.
Housing Element	
Goal H-1: Provide a range of housing types to meet the needs of existing and future residents.	**No conflict.** The Project includes the development of six architectural styles with a total of four different floor plans for each style. The six architectural styles include: Adobe Ranch, Cottage Farmhouse, Monterey Andalusian, Santa Barbara, Agrarian Traditional, and Tuscan Farmhouse. The design of the residential homes also include three enhanced elevations: Front Enhanced, Side Enhanced, and Rear Enhanced. There are a total of four different floor plans for the residential homes, each of which are two-story and range between four and five bedrooms. Floor Plan 1 is approximately 3,970 square feet (including garage), Floor Plan 2 is approximately 3,946 square feet (including garage), Floor Plan 3 is approximately 4,373 square feet (including garage), and Floor Plan 4 is approximately 4,616 square feet (including garage). See **Figures 3.4 through 3.9**, in **Section 3.0 Project Description**, for site plan, elevations, and floor plans.

Table 4.4
Applicable Goals, Policies and Actions of the General Plan

Goals/Policies/Actions	Would the Project Conflict?
Policy H-1.1: Encourage preservation of existing and provision of new housing to accommodate housing opportunities for all income levels.	**No conflict.** The Project includes the development of six architectural styles with a total of four different floor plans for each style. The six architectural styles include: Adobe Ranch, Cottage Farmhouse, Monterey Andalusian, Santa Barbara, Agrarian Traditional, and Tuscan Farmhouse. The design of the residential homes also include three enhanced elevations: Front Enhanced, Side Enhanced, and Rear Enhanced. There are a total of four different floor plans for the residential homes, each of which are two-story and range between four and five bedrooms. Floor Plan 1 is approximately 3,970 square feet (including garage), Floor Plan 2 is approximately 3,946 square feet (including garage), Floor Plan 3 is approximately 4,373 square feet (including garage), and Floor Plan 4 is approximately 4,616 square feet (including garage). See **Figures 3.4 through 3.9**, in **Section 3.0 Project Description**, for site plan, elevations, and floor plans.
Action H -1.1.1: Continue to work with residential developers and property owners to provide opportunities for housing at varied density, tenures, and unit types throughout the community.	**No conflict.** The Project includes the development of six architectural styles with a total of four different floor plans for each style. The six architectural styles include: Adobe Ranch, Cottage Farmhouse, Monterey Andalusian, Santa Barbara, Agrarian Traditional, and Tuscan Farmhouse. The design of the residential homes also include three enhanced elevations: Front Enhanced, Side Enhanced, and Rear Enhanced. There are a total of four different floor plans for the residential homes, each of which are two-story and range between four and five bedrooms. Floor Plan 1 is approximately 3,970 square feet (including garage), Floor Plan 2 is approximately 3,946 square feet (including garage), Floor Plan 3 is approximately 4,373 square feet (including garage), and Floor Plan 4 is approximately 4,616 square feet (including garage). See **Figures 3.4 through 3.9**, in **Section 3.0 Project Description**, for site plan, elevations, and floor plans.
Action H-1.1.3: Continue to apply objective residential design standards to provide high quality housing that is compatible with existing residential neighborhoods. Action H-1.2.2: Continue to provide high density residential development standards that achieve planned densities that are of a height and massing appropriate for the site and compatible with surrounding areas	**No conflict.** The Project includes the development of six architectural styles with a total of four different floor plans for each style. The six architectural styles include: Adobe Ranch, Cottage Farmhouse, Monterey Andalusian, Santa Barbara, Agrarian Traditional, and Tuscan Farmhouse. The design of the residential homes also include three enhanced elevations: Front Enhanced, Side Enhanced, and Rear Enhanced. There are a total of four different floor plans for the residential homes, each of which are two-story and range between four and five bedrooms. Floor Plan 1 is approximately 3,970 square feet (including garage), Floor Plan 2 is approximately 3,946 square feet (including garage), Floor Plan 3 is approximately 4,373 square feet (including garage), and Floor Plan 4 is approximately 4,616 square feet (including garage). See **Figures 3.4 through 3.9**, in **Section**

Table 4.4
Applicable Goals, Policies and Actions of the General Plan

Goals/Policies/Actions	Would the Project Conflict?
	3.0 Project Description, for site plan, elevations, and floor plans.
Goal H-3: Develop housing that is sensitive to environmental issues.	**No conflict.** The Project would demolish the 1,250 square foot, three-bedroom residential use, barn, and stables. The applicant is proposing to subdivide the 85.2-acre property into a total of 51 lots. Lots 1 through 50 will include the development of a single-family residential homes. This residential home at 16220 Canyon Hills Road will remain on-site as Lot Number 51. The rest of the area is undeveloped, hillside slopes, and is covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.
Policy H-3.2: Continue to encourage clustering of housing to preserve environmentally sensitive areas and open space corridors	**No conflict.** The applicant is proposing to subdivide the 85.2-acre property into a total of 51 lots. Lots 1 through 50 will include the development of a single-family residential homes. This residential home at 16220 Canyon Hills Road will remain on-site as Lot Number 51. The rest of the area is undeveloped, hillside slopes, and is covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant. The Project is proposing to develop under the City's Clustering Ordinance No. 298, and the City of Chino Hills Municipal Code (CHMC) Section 16.10.030. The R-R Clustering Development Standards are provided in Project **Table 3.3, R-R Residential Zone District Clustering Development Standards**, **Section 3.0 Project Description**. As shown, in **Table 3.3**, the Project is consistent with the development standards including but not limited to: the use of the Project as residential, the size of the Project Site (85.2 acres) which is required to be a minimum of 10 acres, the required minimum lot size of 7,200 sq.ft., the minimum setbacks, the lot coverage of 37.4 percent which is less than the maximum of 40 percent, and the maximum height of the Project of 33 feet which is less than the maximum height of 35 feet.
Policy H-3.2: Evaluate residential proposals within hillside areas in terms of potential impacts to landform and viewsheds.	**No conflict.** As discussed in **Section 4.1 Aesthetics** of the Initial Study the Project Site is not located in, or visible from, a designated scenic vista or protected viewshed in an adopted land use plan. Therefore, development of the Project Site would not have a substantial adverse effect on a scenic vista from a panoramic view. The proposed residences would be visible in the context of other existing hillside residences in northern views adjacent to the Project Site, and in the eastern views across Canyon Hills Road. The Project is similar in appearance to existing single-family residences in the vicinity and these focal viewpoints is not a designated scenic vista in an adopted land use plan.

Table 4.4
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Goals/Policies/Actions	Would the Project Conflict?
Policy H-3.3: Promote the use of green building practices in new and existing development to maximize energy efficiency and conservation	**No conflict.** As detailed in **Section 3.0, Project Description,** of this Initial Study, the Project residences would be designed to meet the requirements of the most current California Green Building Code and CHMC Section 16.09.090. The Project would include the following water conservation techniques: • Water conserving plants, and plants native to hot, dry summers, utilized in 95 percent of the total plant area, • Irrigation zones separated by plant material, • Use of hydro zones with plants grouped based on the amount of water needed to sustain them, • Soil amendments utilized to improve water holding capacity of the soil, • Automatic irrigation system adjusted seasonably add with watering hours between 9:00 p.m. and 9:00 a.m., • Irrigation system design to water different areas of the landscape based on watering need; and • Recommendations given for an annual irrigation schedule.
Conservation Element	
Goal CN-1: Preserve Chino Hills' Rural Character	**No conflict.** The applicant is proposing to subdivide the 85.2-acre property into a total of 51 lots. Lots 1 through 50 will include the development of a single-family residential homes. This residential home at 16220 Canyon Hills Road will remain on-site as Lot Number 51. The rest of the area is undeveloped, hillside slopes, and is covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.
Policy CN-1.1: Preserve and protect Chino Hills' rural and natural scenic qualities	**No conflict.** The applicant is proposing to subdivide the 85.2-acre property into a total of 51 lots. Lots 1 through 50 will include the development of a single-family residential homes. This residential home at 16220 Canyon Hills Road will remain on-site as Lot Number 51. The rest of the area is undeveloped, hillside slopes, and is covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.
Action CN-1.1.1: Protect identified extremely prominent ridgelines, prominent ridgelines, and knolls.	**No conflict.** The applicant is proposing to subdivide the 85.2-acre property into a total of 51 lots. Lots 1 through 50 will include the development of a single-family residential homes. This residential home at 16220 Canyon Hills Road will remain on-site as Lot Number 51. The rest of the area is undeveloped, hillside slopes, and is covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.
Action CN-1.1.2: Preserve the character of natural open spaces by integrating existing natural features into new development.	**No conflict.** The applicant is proposing to subdivide the 85.2-acre property into a total of 51 lots. Lots 1 through 50 will include the development of a single-family residential

Table 4.4
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Goals/Policies/Actions	Would the Project Conflict?
	homes. This residential home at 16220 Canyon Hills Road will remain on-site as Lot Number 51. The rest of the area is undeveloped, hillside slopes, and is covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.
Action CN-1.1.3: Preserve as much open space as possible along canyon roadways such as Carbon Canyon, Soquel Canyon, and the canyons adjacent to Chino Hills State Park.	**No conflict.** The applicant is proposing to subdivide the 85.2-acre property into a total of 51 lots. Lots 1 through 50 will include the development of a single-family residential homes. This residential home at 16220 Canyon Hills Road will remain on-site as Lot Number 51. The rest of the area is undeveloped, hillside slopes, and is covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.
Action CN-1.1.5: In canyon areas committed to development, emphasize the retention of natural topographic features, and require low visual profiles and dense vegetation for buildings.	**No conflict.** The applicant is proposing to subdivide the 85.2-acre property into a total of 51 lots. Lots 1 through 50 will include the development of a single-family residential homes. This residential home at 16220 Canyon Hills Road will remain on-site as Lot Number 51. The rest of the area is undeveloped, hillside slopes, and is covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.
Action CN-1.1.7: Use existing trees and additional tree planting to blend new development and manufactured slopes with the natural setting, especially in highly visible locations.	**No conflict.** The Project would also provide landscaping to enhance the streetscape. As shown in **Figure 3.10, Conceptual Landscaping Plan**, in **Section 3.0 Project Description,** trees and other landscaping features such's as ground cover, shrubs, and vines would be planted throughout the Project Site and along "A" Street, "B" Street, and "C" Street. Front yard shade trees would be provided on each of the residential lots. In total, the Project would provide approximately 125 trees on the slope area of the Project Site (125 trees are required per City code), 48 front yard trees, and 112 street trees.
Action CN-1.1.8: Preserve existing significant trees where feasible, and extensively plant new trees consistent with City tree policies.	**No conflict.** The Project would also provide landscaping to enhance the streetscape. As shown in **Figure 3.10, Conceptual Landscaping Plan**, in **Section 3.0 Project Description,** trees and other landscaping features such's as ground cover, shrubs, and vines would be planted throughout the Project Site and along "A" Street, "B" Street, and "C" Street. Front yard shade trees would be provided on each of the residential lots. In total, the Project would provide approximately 125 trees on the slope area of the Project Site (125 trees are required per City code), 48 front yard trees, and 112 street trees. The applicant is also proposing to remove protected oak trees and replant them on-site. Pursuant to CHMC 16.90.070, the Project's proposed removal of protected trees will be subject to a Tree Removal Permit.
Policy CN-1.2: Preserve and protect Chino Hills' biological resources.	**No conflict.** The Project would also provide landscaping to enhance the streetscape. As shown in **Figure 3.10,**

Table 4.4
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Goals/Policies/Actions	Would the Project Conflict?
	Conceptual Landscaping Plan, in **Section 3.0 Project Description,** trees and other landscaping features such's as ground cover, shrubs, and vines would be planted throughout the Project Site and along "A" Street, "B" Street, and "C" Street. Front yard shade trees would be provided on each of the residential lots. In total, the Project would provide approximately 125 trees on the slope area of the Project Site (125 trees are required per City code), 48 front yard trees, and 112 street trees. The applicant is also proposing to remove protected oak trees and replant them on-site. Pursuant to CHMC 16.90.070, the Project's proposed removal of protected trees will be subject to a Tree Removal Permit. As discussed in **Section 4.4 Biological Resources** of the Initial Study, the Biological Resources Assessment will be evaluated in the EIR.
Action CN-1.2.4: Require City approval to remove trees that in the opinion of the City function as an important part of the City's or a neighborhood's aesthetics character.	**No conflict.** The Project would also provide landscaping to enhance the streetscape. As shown in **Figure 3.10, Conceptual Landscaping Plan**, in **Section 3.0 Project Description,** trees and other landscaping features such's as ground cover, shrubs, and vines would be planted throughout the Project Site and along "A" Street, "B" Street, and "C" Street. Front yard shade trees would be provided on each of the residential lots. In total, the Project would provide approximately 125 trees on the slope area of the Project Site (125 trees are required per City code), 48 front yard trees, and 112 street trees. The applicant is also proposing to remove protected oak trees and replant them on-site. Pursuant to CHMC 16.90.070, the Project's proposed removal of protected trees will be subject to a Tree Removal Permit.
Goal CN-2: Protect Chino Hills' Cultural Resources	**No conflict.** As discussed in **Section 4.5 Cultural Resources** of the Initial Study, the Cultural Resources Assessment will be evaluated in the EIR.
Policy CN-2.1: Protect Chino Hills' archaeological resources.	**No conflict.** As discussed in **Section 4.5 Cultural Resources** of the Initial Study, the Cultural Resources Assessment will be evaluated in the EIR.
Action CN-2.1.1: Require appropriate archaeological surveys as part of the environmental review process where archaeological resources may be present.	**No conflict.** As discussed in **Section 4.5 Cultural Resources** of the Initial Study, the Cultural Resources Assessment will be evaluated in the EIR.
Action CN-2.1.2: Require on-site inspections by a qualified archaeologist during grading activities where archaeological resources may be present.	**No conflict.** As discussed in **Section 4.5 Cultural Resources** of the Initial Study, the Cultural Resources Assessment will be evaluated in the EIR.
Action CN-2.1.3: Where archaeological resources are found during development activities, require identified archaeological materials to be preserved, restored, cataloged, and/or transmitted to the	**No conflict.** As discussed in **Section 4.5 Cultural Resources** of the Initial Study, the Cultural Resources Assessment will be evaluated in the EIR.

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Goals/Policies/Actions	Would the Project Conflict?
appropriate repository or as otherwise directed by a qualified professional archaeologist.	
Action CN-2.1.4: Consult with local Native American tribes as required to avoid impacts on archaeological resources.	**No conflict.** As discussed in **Section 4.18 Tribal Cultural Resources**, consultation with local Native American tribes will be evaluated in the EIR.
Policy CN-2.2: Protect Chino Hills' paleontological resources.	**No conflict.** As discussed in **Section 4.7 Geology/Soils** of the Initial Study, the Paleontological Resources will be evaluated in the EIR.
Action CN-2.2.1: Require appropriate paleontological surveys as part of the environmental review process where paleontological resources may be present.	**No conflict.** As discussed in **Section 4.7 Geology/Soils** of the Initial Study, the Paleontological Resources will be evaluated in the EIR.
Action CN-2.2.2: Where paleontological resources are found during development activities, require on-site inspections by a qualified paleontologist during grading activities where paleontological resources may be present.	**No conflict.** As discussed in **Section 4.7 Geology/Soils** of the Initial Study, the Paleontological Resources will be evaluated in the EIR.
Action CN-2.2.3: Require identified paleontological materials to be preserved, restored, cataloged, and/or transmitted to the appropriate repository or as otherwise directed by a qualified professional paleontologist.	**No conflict.** As discussed in **Section 4.7 Geology/Soils** of the Initial Study, the Paleontological Resources will be evaluated in the EIR.
Policy CN-2.3: Protect Chino Hills' potential historical resources.	**No conflict.** As discussed in **Section 4.5 Cultural Resources** of the Initial Study, the Cultural Resources Assessment will be evaluated in the EIR.
Action CN-2.3.5: For structures over 45 years old, review available City building records and make a determination regarding the structure's potential historical significance prior to permitting its demolition or substantial alteration.	**No conflict.** As discussed in **Section 4.5 Cultural Resources** of the Initial Study, the Cultural Resources Assessment will be evaluated in the EIR.
Goal CN-3: Promote Sustainable Practices that Conserve Natural Resources and Reduce Greenhouse Gas Emissions	**No conflict.** As discussed in **Section 4.8 Greenhouse Gas Emissions** of the Initial Study, Greenhouse Gas Emission will be evaluated in the EIR.
Policy CN-3.1: Endorse green building design in new and existing construction.	**No conflict.** As detailed in **Section 3.0, Project Description**, of this Initial Study, the Project residences would be designed to meet the requirements of the most current California Green Building Code and CHMC Section 16.09.090. The Project would include the following water conservation techniques: • Water conserving plants, and plants native to hot, dry summers, utilized in 95 percent of the total plant area, • Irrigation zones separated by plant material, • Use of hydro zones with plants grouped based on the amount of water needed to sustain them, • Soil amendments utilized to improve water holding capacity of the soil,

Table 4.4
Applicable Goals, Policies and Actions of the General Plan

Goals/Policies/Actions	Would the Project Conflict?
	• Automatic irrigation system adjusted seasonably add with watering hours between 9:00 p.m. and 9:00 a.m., • Irrigation system design to water different areas of the landscape based on watering need; and • Recommendations given for an annual irrigation schedule.
Action CN-3.1.1: Implement green building policies that promote increased use of energy efficiency, alternative energy, recycled materials, renewable resources, local materials, water efficiency, and pollution reduction.	**No conflict.** As detailed in **Section 3.0, Project Description**, of this Initial Study, the Project residences would be designed to meet the requirements of the most current California Green Building Code and CHMC Section 16.09.090. The Project would include the following water conservation techniques: • Water conserving plants, and plants native to hot, dry summers, utilized in 95 percent of the total plant area, • Irrigation zones separated by plant material, • Use of hydro zones with plants grouped based on the amount of water needed to sustain them, • Soil amendments utilized to improve water holding capacity of the soil, • Automatic irrigation system adjusted seasonably add with watering hours between 9:00 p.m. and 9:00 a.m., • Irrigation system design to water different areas of the landscape based on watering need; and • Recommendations given for an annual irrigation schedule.
Action CN-3.1.2: Establish programs that encourage homeowners to reduce energy consumption.	**No conflict.** As detailed in **Section 3.0, Project Description**, of this Initial Study, the Project residences would be designed to meet the requirements of the most current California Green Building Code and CHMC Section 16.09.090.
Goal CN-4: Ensure Adequate Water Supply and Delivery	**No conflict.** See Section **4.19 Utilities/Service Systems** of the Initial Study, for a discussion of existing and proposed water supply.
Action CN-4.1.2: Promote use of drought-tolerant plant materials and low-water-usage irrigation systems.	**No conflict.** As detailed in **Section 3.0, Project Description**, of this Initial Study, the Project residences would be designed to meet the requirements of the most current California Green Building Code and CHMC Section 16.09.090. The Project would include the following water conservation techniques: • Water conserving plants, and plants native to hot, dry summers, utilized in 95 percent of the total plant area, • Irrigation zones separated by plant material, • Use of hydro zones with plants grouped based on the amount of water needed to sustain them,

Table 4.4
Applicable Goals, Policies and Actions of the General Plan

Goals/Policies/Actions	Would the Project Conflict?
	• Soil amendments utilized to improve water holding capacity of the soil, • Automatic irrigation system adjusted seasonably add with watering hours between 9:00 p.m. and 9:00 a.m., • Irrigation system design to water different areas of the landscape based on watering need; and • Recommendations given for an annual irrigation schedule.
Action CN-4.1.3: Promote low-water-use plantings and materials in City street medians and parkways.	**No conflict.** As detailed in **Section 3.0, Project Description**, of this Initial Study, the Project residences would be designed to meet the requirements of the most current California Green Building Code and CHMC Section 16.09.090. The Project would include the following water conservation techniques: • Water conserving plants, and plants native to hot, dry summers, utilized in 95 percent of the total plant area, • Irrigation zones separated by plant material, • Use of hydro zones with plants grouped based on the amount of water needed to sustain them, • Soil amendments utilized to improve water holding capacity of the soil, • Automatic irrigation system adjusted seasonably add with watering hours between 9:00 p.m. and 9:00 a.m., • Irrigation system design to water different areas of the landscape based on watering need; and • Recommendations given for an annual irrigation schedule.
Policy CN-4.3: Protect water quality.	**No conflict.** See Section **4.10 Hydrology/Water Quality** of the Initial Study, for a discussion of water quality.
Action CN-4.3.1: Protect water resources from urban runoff and other potential pollution sources through implementation of best management practices and area-wide Urban Storm Water Runoff Programs.	**No conflict.** See **Section 4.10 Hydrology/Water Quality** of the Initial Study, for a discussion of water quality.
Policy CN-6.3: Reduce air pollution emissions from construction activities.	**No conflict.** See Section **4.3 Air Quality** of the Initial Study. The Air Quality Section will be analyzed in the EIR.
Action CN-6.3.1: Require preparation of air quality analyses of construction-related air quality impacts using the latest available air emissions model or other analytical method determined in conjunction with SCAQMD for all projects subject to the California Environmental Quality Act (CEQA). If such analyses identify potentially significant regional or local air quality impacts, require the	**No conflict.** See **Section 4.3 Air Quality** of the Initial Study. The Air Quality Section will be analyzed in the EIR.

Table 4.4
Applicable Goals, Policies and Actions of the General Plan

Goals/Policies/Actions	Would the Project Conflict?
incorporation of appropriate mitigation to reduce such impacts	
Action CN-6.3:3: Require dust abatement actions for all new construction and redevelopment projects.	**No conflict.** See **Section 4.3 Air Quality** of the Initial Study. The Air Quality Section will be analyzed in the EIR.
Policy CN-6.4: Reduce air pollution emissions from new development.	**No conflict.** See **Section 4.3 Air Quality** of the Initial Study. The Air Quality Section will be analyzed in the EIR.
Action CN-6.4.1: Require preparation of air quality analyses that analyze operational air quality impacts using the latest available air emissions model or other analytical method determined in conjunction with SCAQMD for all projects subject to the California Environmental Quality Act (CEQA). If such analyses identify potentially significant regional or local air quality impacts, require the incorporation of appropriate mitigation to reduce such impacts.	**No conflict.** See **Section 4.3 Air Quality** of the Initial Study. The Air Quality Section will be analyzed in the EIR.
Safety Element	
Goal S-1: Protect the Community from Geologic Hazards	**No conflict.** As discussed in **Section 4.7 Geology/Soils** of the Initial Study, the Geologic Hazards will be evaluated in the EIR.
Policy S-1.1: Regulate development in high-risk seismic, landslide and liquefaction hazard areas to avoid exposure to hazards.	**No conflict.** As discussed in **Section 4.7 Geology/Soils** of the Initial Study, the Geologic Hazards will be evaluated in the EIR.
Action S-1.1.2: Conduct site-specific studies on soils, seismicity, and groundwater conditions to evaluate the potential for liquefaction and related ground failure phenomena in canyon floors and the alluvial flatlands.	**No conflict.** As discussed in **Section 4.7 Geology/Soils** of the Initial Study, the Geologic Hazards will be evaluated in the EIR.
Action S-1.1.6: Discourage any grading beyond that necessary to create adequate and stable building pads.	**No conflict.** As discussed in **Section 4.7 Geology/Soils** of the Initial Study, the Geologic Hazards will be evaluated in the EIR.
Action S-1.1.7: Require all development to conform to the grading guidelines contained in the City Development Code.	**No conflict.** As discussed in **Section 4.7 Geology/Soils** of the Initial Study, the Geologic Hazards will be evaluated in the EIR.
Action S-1.1.10: Require new development to minimize peak runoff as required by the Municipal Code.	**No conflict.** See **Section 4.10 Hydrology/Water Quality** of the Initial Study, for a discussion of runoff.
Goal S-2: Protect the Community from Flooding Hazards	**No conflict.** See **Section 4.10 Hydrology/Water Quality** of the Initial Study, for a discussion of flooding.
Action S-2.1.1: Prohibit development of residential, commercial, industrial, and emergency facilities in the 100-year flood plain and on canyon floors.	**No conflict.** See **Section 4.10 Hydrology/Water Quality** of the Initial Study, for a discussion of flooding.
Action S-2.2.2: Require that the potential environmental drainage impacts of new	**No conflict.** See **Section 4.10 Hydrology/Water Quality** of the Initial Study, for a discussion of drainage.

Table 4.4
Applicable Goals, Policies and Actions of the General Plan

Goals/Policies/Actions	Would the Project Conflict?
construction be assessed and mitigated, including impacts that privately owned and operated storm drains adjacent to slopes and canyon areas would have on City and County-maintained drains.	
Action S-2.2.3: Review individual project designs to ensure that proposed drainage facilities will be properly linked with community-wide drainage facilities.	**No conflict.** See **Section 4.10 Hydrology/Water Quality** of the Initial Study, for a discussion of drainage.
Action S-2.2.6: Require property owners to install and maintain storm drains on their properties as necessary to address drainage related to their property	**No conflict.** See **Section 4.10 Hydrology/Water Quality** of the Initial Study, for a discussion of drainage.
Action S-2.2.8: Require measures to be undertaken to control runoff from construction sites.	**No conflict.** See **Section 4.10 Hydrology/Water Quality** of the Initial Study, for a discussion of runoff.
Action S-2.2.9: Require prompt revegetation and/or construction of newly graded sites to control erosion.	**No conflict.** See **Section 4.10 Hydrology/Water Quality** of the Initial Study, for a discussion of erosion control.
Action S-2.2.10: Limit grading operations during the rainy season.	**No conflict.** See **Section 4.10 Hydrology/Water Quality** of the Initial Study, for a discussion of BMPs.
Action S-2.2.11: Review individual project designs to ensure the stability of slopes adjacent to flood control facilities, which could be blocked due to slope failures.	**No conflict.** See **Section 4.10 Hydrology/Water Quality** of the Initial Study, for a discussion of drainage.
Goal S-3: Achieve Adequate Emergency Service	**No conflict.** See **Section 4.15 Public Services** of the Initial Study, for a discussion of emergency services.
Policy S-3.1: Ensure that new development has sufficient fire protection, police, and emergency medical services available.	**No conflict.** See **Section 4.15 Public Services** of the Initial Study, for a discussion of emergency services
Action S-3.1.1: Require the review of development proposals to determine impacts on emergency services and ensure developments meet appropriate safety standards.	**No conflict.** See **Section 4.15 Public Services** of the Initial Study, for a discussion of emergency services
Action S-4.1.1: Ensure adequate fire flow capabilities in the Los Serranos and Carbon Canyon areas, and other sections of the City where deficiencies may occur.	**No conflict.** See **Section 4.15 Public Services** of the Initial Study, for a discussion of emergency services
Action S-4.2.1: Continue to implement and enforce fuel modification zones	**No conflict.** See **Section 4.20 Wildfire** of the Initial Study, for a discussion of fuel modification zones.
Action S-4.2.2: Encourage residents to plant and maintain fire-retardant slope cover to reduce the risk of brush fire in areas adjacent to canyons.	**No conflict.** See **Section 4.20 Wildfire** of the Initial Study, for a discussion of fuel modification zones.

Table 4.4
Applicable Goals, Policies and Actions of the General Plan

Goals/Policies/Actions	Would the Project Conflict?
Goal S-5: Minimize the Risk from Hazardous Materials	**No conflict.** See **Section 4.9 Hazards & Hazardous Materials** of the Initial Study, for a discussion of risk from hazardous materials.
Policy S-5.1: Minimize risk to life and property from production, use, and storage of hazardous materials and waste.	**No conflict.** See **Section 4.9 Hazards & Hazardous Materials** of the Initial Study, for a discussion of risk from storage of hazardous materials.
Action S-5.3.3: Confirm that existing toxics are contained, removed, and/or remediated as required by applicable federal and state standards.	**No conflict.** See **Section 4.9 Hazards & Hazardous Materials** of the Initial Study, for a discussion of risk from hazardous materials.
Parks, recreation and Open Space Element	
Major Goal #1: Preserve Rural Character	**No conflict.** The applicant is proposing to subdivide the 85.2-acre property into a total of 51 lots. Lots 1 through 50 will include the development of a single-family residential homes. This residential home at 16220 Canyon Hills Road will remain on-site as Lot Number 51. The rest of the area is undeveloped, hillside slopes, and is covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.
Focused Goal 1-1: Protect and preserve the natural features of Chino Hills' open space, such as the ridgelines, native vegetation, wild-life, springs and waterways.	**No conflict.** The applicant is proposing to subdivide the 85.2-acre property into a total of 51 lots. Lots 1 through 50 will include the development of a single-family residential homes. This residential home at 16220 Canyon Hills Road will remain on-site as Lot Number 51. The rest of the area is undeveloped, hillside slopes, and is covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.
Major Goal #2: Provide a high quality life for all residents.	**No conflict.** The applicant is proposing to subdivide the 85.2-acre property into a total of 51 lots. Lots 1 through 50 will include the development of a single-family residential homes. This residential home at 16220 Canyon Hills Road will remain on-site as Lot Number 51. The rest of the area is undeveloped, hillside slopes, and is covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.
Objective 1-1 Develop a plan that protects and preserves the natural features of the open space while providing for use of these areas by the community.	**No conflict.** The applicant is proposing to subdivide the 85.2-acre property into a total of 51 lots. Lots 1 through 50 will include the development of a single-family residential homes. This residential home at 16220 Canyon Hills Road will remain on-site as Lot Number 51. The rest of the area is undeveloped, hillside slopes, and is covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.
Policy 1-3 Protect prominent ridgelines and knolls in their natural condition.	**No conflict.** The applicant is proposing to subdivide the 85.2-acre property into a total of 51 lots. Lots 1 through 50 will include the development of a single-family residential homes. This residential home at 16220 Canyon Hills Road will remain on-site as Lot Number 51. The rest of the area is undeveloped, hillside slopes, and is covered with native and

Table 4.4
Applicable Goals, Policies and Actions of the General Plan

Goals/Policies/Actions	Would the Project Conflict?
	non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.
Policy 1-4 Protect native trees and cliffsides because they provide habitat for wildlife such as birds that keep the rodent population in check and add to the aesthetic value of the open space.	**No conflict.** As discussed in **Section 4.4 Biological Resources** of the Initial Study, the Biological Resources Assessment will be evaluated in the EIR.
Policy 1-6 Preserve large scale natural areas to protect biological diversity and enhance recreation opportunities.	**No conflict.** As discussed in **Section 4.4 Biological Resources** of the Initial Study, the Biological Resources Assessment will be evaluated in the EIR.
Policy 1-16 Provide adequate access for fire, emergency and maintenance equipment.	**No conflict.** See **Section 4.15 Public Services** of the Initial Study, for a discussion of emergency services
Objective 2-1 Provide at least 5 acres of improved public park land per 1000 residents (minimum 5 acres in size useable).	**No conflict.** The applicant is proposing to subdivide the 85.2-acre property into a total of 51 lots. Lots 1 through 50 will include the development of a single-family residential homes. This residential home at 16220 Canyon Hills Road will remain on-site as Lot Number 51. The rest of the area is undeveloped, hillside slopes, and is covered with native and non-native vegetation. The hillsides and undeveloped area to the west which make up Lot A will remain vacant.
Noise Element	
Goal N-2: Limit New Noise Conflicts	**No conflict.** See **Section 4.13 Noise** of the Initial Study, the Noise Analysis will be evaluated in the EIR.
Policy N-2.1: Minimize increases in noise levels due to new land use and transportation facility decisions.	**No conflict.** See **Section 4.13 Noise** of the Initial Study, the Noise Analysis will be evaluated in the EIR.
Action N-2.1.2: Continue to assess projects through the subdivision, site plan, conditional use permit, and other development review processes and incorporate conditions of approval and mitigation measures that ensure noise compatibility where appropriate.	**No conflict.** See **Section 4.13 Noise** of the Initial Study, the Noise Analysis will be evaluated in the EIR.
Action N-2.1.3: Require a noise study to be performed and appropriate noise attenuation to be incorporated to reduce interior noise levels to 45 dB CNEL or less prior to approving any multifamily or mixed-use residential development in an area with a CNEL of 65 dB or greater.	**No conflict.** See **Section 4.13 Noise** of the Initial Study, the Noise Analysis will be evaluated in the EIR.
Action N-2.1.5: Ensure all new developments provide adequate sound insulation or other protection from existing and projected noise sources.	**No conflict.** See **Section 4.13 Noise** of the Initial Study, the Noise Analysis will be evaluated in the EIR.

Table 4.4
Applicable Goals, Policies and Actions of the General Plan

Goals/Policies/Actions	Would the Project Conflict?
Economic Development Element	
Policy ED-1.2: Promote employment opportunities in Chino Hills.	**No conflict.** The Project would construct 50 new residences and associated improvements, such as roads and stormwater drainages, on approximately 85.2 acres. Lots 1 through 50 will range from a lot size of 7,200 square feet to 12,412 square feet. Lot 51 will maintain the existing residential structure on-site and Lot 52 will remain vacant native land. Development of the Project would provide temporary construction employment in the City, thus promoting employment opportunities in the City.
Source: City of Chino Hills General Plan, February 24, 2015. *Source Table: EcoTierra Consulting, 2021.*	

CITY OF CHINO HILLS MUNICIPAL CODE

The applicant is proposing to subdivide the 85.2-acre property into a total of 51 lots. Lots 1 through 50 will include the development of a single-family residential homes. Lot 51 will maintain the existing single-family home on-site and Lot A will remain vacant native land.

As stated above, the Project Site is currently zoned R-R (Rural Residential) in the City, which designates the land use of the property as Rural Residential. The Project is proposing to develop under the City's Clustering Ordinance No. 298, and the City of Chino Hills Municipal Code (CHMC) Section 16.10.030. The R-R Clustering Development Standards are provided in Project **Table 3.3, R-R Residential Zone District Clustering Development Standards**, **Section 3.0 Project Description**. As shown, in **Table 3.3**, the Project is consistent with the development standards including but not limited to: the use of the Project as residential, the size of the Project Site (85.2 acres) which is required to be a minimum of 10 acres, the required minimum lot size of 7,200 sq.ft., the minimum setbacks, the lot coverage of 37.4 percent which is less than the maximum of 40 percent, and the maximum height of the Project of 33 feet which is less than the maximum height of 35 feet.

Per CHMC Chapter 16.08.070, Open Space Requirements, in order to preserve open space areas and maintain the desired rural character of Chino Hills, a portion of each project is required to be set aside as open space as define in Table 15-1 in the CHMC. Per Table 15-1, the Project is required to provide a minimum percentage of open space and natural open space. Per CHMC Chapter 16.08.070, the Project would provide an equestrian trail along Canyon Hills Road on the Projects street frontage. This equestrian trail is a multi-use trail available to walkers, hikers, runners, bicyclists, and equestrians. In addition, Lot A of the Project Site which is approximately 2,189,796 square feet (50 acres) and includes approximately 1,629,570 square feet (40 acres) of natural open space and approximately 435,289 square feet (10 acres) of manufactured open space. Furthermore, the Tract Map will include a covenant written on the Tentative Tract Map and a condition of approval for open space use and an open space easement for the Homeowner's Association HOA to maintain.

As stated in **Section 4.20 Wildfire**, as the fire authority for the City, the CVIFD provides fire suppression and prevention services. CVIFD contracts with CALFIRE for wildland fire protection for the 12,257 acres within the City.[49] CVIFD participates in the State of California Master Mutual Aid System and has cooperative agreements with other local fire agencies. To reduce wildfire risk, the City adopted a Fire Hazard Overlay Zone and established and enforces policies that are carried over in the City's General Plan Safety Element Goals, Policies, and Actions. The Fire Hazard Overlay Zone identifies area subject to wildland fires as the Fire Hazard District. Approximately 75 percent of the City is located within the designated Fire Hazard District.[50] Within the Fire Hazard District, the City has established standards to protect structures and residents from the potential hazards associated with wildland fires. The standards require fire-fighting vehicles to have adequate access into areas between fire hazard areas or "fuel modified" areas and the development perimeter so that a wildland fire can be contained at the development perimeter and prevented from spreading to structures. In addition, the Safety Element includes actions for enforcing fuel modification zones, encouraging the planting and maintenance of fire-retardant slope cover, maintaining stringent site design and maintenance standards for areas with high fire hazard potential, and maintaining evacuation plans for areas in greatest danger of fire. The Project Site is located within the Fire Hazard District established by the City.[51]

Land development within the Fire Hazard District must meet stringent building safety standards as set forth in the California Building Code that are specifically designed to mitigate the high fire hazard in such areas. This includes standards for fire resistant building and roof materials, attic and opening protection, building sprinklers, water storage, vehicular access and street design, removal and replacement of flammable vegetation with non-flammable materials. The City also supplements these state standards in Chapter 16.22 of the City of Chino Hills Municipal Code, which includes provisions for construction requirements, building separation, and regulations for fuel modification areas. The City's existing development review process requires that all hazards, including wildland fire hazards, are thoroughly evaluated to identify site specific risks and to ensure that a project's design that mitigates those risks and achieves compliance with applicable building safety standards and local fire department regulations. Accordingly, the Project has prepared, and committed to the practices and design features contained within a Fire Protection Plan (FPP). The FPP (see **Appendix IS-E**) contains detailed requirements for the Project's defensible space, ignition resistant building features, and key fuel modification/treatment strategies to ensure the Project meets the building safety standards for development within high fire hazard areas and does not exacerbate wildfire risks. Pursuant to the requirements of the FPP, specific practices and design features that the Project would implement include the following:

- <u>Fuel Modification/Treatment</u>: Installation of Fuel Modification Zones (FMZ)s separating proposed residences and areas of wildfire fuel consisting of a combination of irrigated landscaped zones and non-irrigated, vegetation-thinning zones to provide defensible space between proposed structures and surrounding wildland vegetation. Landscaping and maintenance requirements would be in accordance with the requirements of the FPP. FMZs within residential lots would be maintained year-round by the individual property owners while the HOA would be responsible for the maintenance of FMZs in all other

49 City of Chino Hills, Hazard Mitigation Plan, July 2020, page 49.

50 City of Chino Hills, General Plan – Chapter 5. Safety Element, 2015, page 5-20.

51 City of Chino Hills, General Plan – Chapter 5. Safety Element, 2015, Figure 5-10: Fire Hazard Overlay District, page 5-26.

areas outside lot boundaries. The developer would maintain all undeveloped lots, under weed abatement regulations, until sold and should any lots be repossessed, the title holder of the lot would be responsible for the maintenance of that lot. Due to there being insufficient space within the Project Site to establish the necessary FMZ for Lots 27-32, a solid, non-combustible, 6-foot tall, 60-foot long wall would be installed behind these lots, wrapping around Lot 27. An agreement or easement from the property owner adjacent to the southeastern Project Site boundary would be obtained in order to access and thin the vegetation within a 40-foot wide, 300-foot long off-site non-irrigated thinning zone. All publicly accessible roads within the Paradise Ranch development shall be cleared of all combustible vegetation for a minimum of 20-feet on the uphill side or level ground and 30-feet on the downhill side of the roadway prism.

- Structure Construction Standards: All structures within the Paradise Ranch Project would meet all Wildland-Urban Interface Fire Areas Building Standards (7A) to the satisfaction of the CVIFD and would be designed and constructed with ignition resistant construction requirements meeting the current California Fire Code. These standards address roofing, venting, eave enclosure, windows, exterior doors, siding, and decking. All residences would have National Fire Protection Association (NFPA) 13D fire sprinkler systems. All non-habitable accessory structures such as decks, balconies, patio, covers, gazebos, and fences would be built from non-combustible materials.

- Additional Measures: Pursuant to Section 16.22.030(B)(a), in lieu of a 30-foot separation between structures, structures would be built with a 20-foot separation and the Project would implement the following measures developed through coordination with the City and the CVIFD to achieve the same level of protection as a 30-foot separation: FMZs would be increased to 150 feet; attic vents would be eliminated or ember-resistant baffled vents of 1/16-inch or less would be installed; all exterior doors that swing would have self-closing hardware; all vehicle garage doors would have automatic door closures that can be set to close after a certain period of inactivity; NFPA 13D fire sprinklers would be installed in all areas of the home, including areas not required by NFPA 13D such as walk-in closets, rooms in excess of 55 square-feet, attics, bathrooms, and garages; metal mesh bug screens would be installed on all operable windows; exterior wall construction would conform to 2-hour construction assembly as shown in Gypsum Association Fire Resistance Design Manual; fences and walls installed on lot lines between structures would be of non-combustible materials; all outside hinged entry doors would have a 90-minute fire rating; and the builder would deliver a copy of the FPP to each initial homeowner at the time of sale.

As a condition of approval, the Project shall implement the FPP specific practices and design features to reduce wildfire impacts.

Based on the analysis above, the Project would be substantially consistent with applicable goals, policies, and actions in local and regional plans that govern development on the Project Site. Therefore, the Project would not conflict with applicable land use plans adopted for the purpose of avoiding or mitigating an environmental effect. As such, impacts would be less than significant. No further evaluation of this topic is required in the EIR.

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4.12 MINERAL RESOURCES. Would the project:				
	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	☐	☐	☐	☒

SETTING

According to the USGS (2016b) mineral resources data, no mineral resources are located within several miles of the Project Site. As stated in the General Plan, according to the California Division of Mines and Geology, no significant mineral deposits are known to exist in the City.[52] Immediately outside the City limits in the extreme southeast corner, Mines and Geology has classified sand and gravel resources along the Santa Ana River wash as "MRZ-2," defined as "areas where adequate information indicates that significant mineral deposits are present ... or where it is judged that a high likelihood for their presence exists." Much of this area is within Chino Hills State Park.

Within the Chino Hills city limits, oil has been produced since the late 1800s. Minor oil production continues in the Chino-Soquel Oil Field and the Mahala Oil Field.

The existing oilfields within the City are within undeveloped lands designated "Agriculture/Ranches." Oil exploration, drilling, and production are conditionally permitted uses under the Agriculture/Ranches zoning designation.

DISCUSSION OF IMPACTS

a) **Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state? No Impact**. The project does not involve the loss of an available known mineral resource that would be of value to the region. Therefore, no impact would occur, and no mitigation measures are required. No further evaluation of this topic is required in the EIR.

b) **Would the project result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan? No Impact**. Immediately outside the City limits in the extreme southeast corner, Mines and Geology has classified sand and gravel resources along the Santa Ana River wash as "MRZ-2," defined as "areas where adequate information indicates that significant mineral deposits are present Much of this

52 *City of Chino Hills General Plan, February 24, 2015.*

area is within Chino Hills State Park. The Project would not impact this area due to the Project Site's distance from this area and the nature of the Project. Therefore, no impact would occur, and no mitigation measures are required. No further evaluation of this topic is required in the EIR.

4.13 NOISE. Would the project result in:	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☒	☐	☐	☐
b) Generation of excessive groundborne vibration or groundborne noise levels?	☒	☐	☐	☐
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

DISCUSSION OF IMPACTS

a) **Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies? Potentially Significant Impact.** The Project Site is currently developed with two existing residences, a barn, and a stable and fenced pasture on approximately 85.2 acres of land. The rest of the land is currently vacant covered with mostly bare soil, grass, bushes, trees, and other native vegetation. Existing sources of noise at the Project Site generally consist of traffic along area roadways. Construction and operation of the Project would have the potential to increase both temporary and long-term noise levels, which could exceed City noise standards. Additionally, the Project would introduce new permanent residential uses to the Project Site, and noise levels from on-site sources could increase during operation of the Project. Therefore, noise impacts may be potentially significant. Therefore, this topic will be further evaluated in the EIR.

b) **Would the project result in generation of excessive groundborne vibration or groundborne noise levels? Potentially Significant Impact**. Vibration is sound radiated through the ground. The rumbling sound caused by the vibration of room surfaces is called groundborne noise. Groundborne vibration and groundborne noise could be generated during short-term construction activities, including from excavation and grading. Therefore, noise vibration impacts may be potentially significant. Therefore, this topic will be further evaluated in the EIR.

c) **For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels? No Impact.** The Project Site is located more than 2 miles from any public or private airport. The closest airport to the Project Site is the Chino Airport, located approximately 11.1 miles northeast. Ontario International Airport is located further northeast of the Project Site, approximately 19.4 miles northeast. Accordingly, no impacts associated with excessive noise from proximate airports would occur and no mitigation measure would be required. No further evaluation of this topic is required in the EIR.

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4.14 POPULATION/HOUSING.
Would the project:

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☒	☐
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☒	☐

DISCUSSION OF IMPACTS

a) **Would the project induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)? Less Than Significant Impact**. The Project would construct 50 new residences and associated improvements, such as roads and stormwater drainages, on approximately 85.2 acres. Lots 1 through 50 will range from a lot size of 7,200 square feet to 12,412 square feet. Lot 51 will maintain the existing residential structure on-site and Lot 52 will remain vacant native land. The average household size in 2019 was 3.37, thus the Project would generate 169 residents.[53] This minimal increase is accommodated in the City's General Plan and Housing Element projections, and the Project would not induce substantial population growth. Further, project infrastructure would only serve the proposed lots and would therefore not induce growth in an indirect manner. Therefore, the Project would not induce substantial population growth in an area either directly or indirectly, impacts would be less than significant and no mitigation measures would be required. No further evaluation of this topic is required in the EIR.

b) **Would the project displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere? Less Than Significant Impact**. The Project Site contains two existing residences, one of which would not be demolished or impacted. The Project would consist of the construction of 50 residential units. It is likely that the existing unit would be vacant at the time the Project is approved therefore, temporary displacement of existing residents would not occur as residents would be relocated prior to demolition and construction. Thus the Project would not displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere and impacts would be less than

53 *City of Chino Hills Demographics. https://www.chinohills.org/94/Demographics, State Department of Finance - January 2019, accessed June 2021.*

significant impact and no mitigation measures are required. No further evaluation of this topic is required in the EIR.

4.15 PUBLIC SERVICES.

Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the following public services:

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
Fire protection?	☐	☐	☒	☐
Police protection?	☐	☐	☒	☐
Schools?	☐	☐	☒	☐
Parks?	☐	☐	☒	☐
Other public facilities?	☐	☐	☒	☐

DISCUSSION OF IMPACTS

Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

a) **Fire protection? Less Than Significant Impact.** The City of Chino Hills, Chino Valley Independent Fire District (CVIFD) is headquartered in Chino Hills and serves the Chino Valley, which includes the Cities of Chino Hills and Chino. The District provides emergency services including Emergency Medical and Paramedic, Hazardous Material Response, and Urban Search and Rescue Services. The CVIFD includes six fire stations housing 80 professional firefighters.

The Project Site is served primarily by Fire Station No. 64, located at 16231 Canon Lane, approximately 0.75 mile to the southeast of the Project Site, with a 2-4 minute initial response time.[54][55] Fire Station No. 64, a 4,000 square foot facility, houses a paramedic engine staffed by three personnel, a reserve engine and a reserve paramedic squad. Brea Fire Department Station No. 4 is the second closest engine, located at 170 Olinda Place, and is 3.2 miles and approximately six-minute response time. Fire Station No. 66 located at 13707 Peyton Drive is the next closest engine within 5.2 miles and a ten-minute initial response time.

The adequacy of fire protection is also based upon the required fire flow, equipment access, and CVIFD's safety requirements regarding needs and service for the area. The required fire flow

54 Chino Valley Independent Fire District, Facilities, https://www.chinovalleyfire.org/Facilities/Facility/Details/Station-64-4?&centerLat=33.98628438233&centerLng=-117.70928344723828&zoom=12, accessed: June 2021.

55 Fire Protection Plan, Paradise Ranch, Tracts No. 20286, 16200 & 16220, April 30, 2020 (Revised October 30, 2020 & December 10, 2020).

necessary for fire protection varies with the type of development, life hazard, occupancy, and the degree of fire hazard. Minimum fire flow required shall be determined using the Uniform Fire Code, current adopted edition, by The Chino Valley Fire District. The Fire District may modify fire flow due to the severity of the hazard.

The Project Site is located in a State and local Very High Fire Hazard Severity Zone. Therefore, building construction and occupancy would be required to comply with fire department codes and regulations. and is subject to compliance with the Fuel Modification Requirements of the Fire Code to protect against wildland fire.[56]

The Project design features the installation of required landscaping, sprinklers, hydrants, required irrigation systems, fire access roads shall meet the requirements of CVIFD.[57] In addition, the Project is consistent with the General Plan and therefore anticipated by public service agencies as part of City buildout. Also the CVIFD is a special district that directly receives a portion of the property tax from the City's development, which offsets increases in the fire district service and/or facilities as a result of the Project. Through Project design features and compliance with CVIFD and Fire Code requirements, impacts would be less-than-significant.

Emergency vehicle access to the Project Site would continue to be provided from Canyon Hills Road. All improvements proposed would comply with the Fire Code, including any additional access requirements of CVIFD. Additionally, emergency access to the Project Site would be maintained at all times during both construction and operation. Accordingly, the Project would not result in any significant impacts to emergency access. Furthermore, construction- or operation-related traffic generated by the Project would not significantly impact CVIFD access or response times within the Project vicinity as emergency vehicles normally have a variety of options for avoiding traffic, such as using sirens to clear a path of travel or driving in the lanes of opposing traffic, pursuant to California Vehicle Code (CVC) Section 21806.

As the fire authority for the City, the CVIFD provides fire suppression and prevention services. CVIFD contracts with CALFIRE for wildland fire protection for 12,257 acres within the City.[58] CVIFD participates in the State of California Master Mutual Aid System and has cooperative agreements with other local fire agencies. To reduce wildfire risk, the City adopted a Fire Hazard Overlay Zone and established and enforces policies that are carried over in the City's General Plan Safety Element Goals, Policies, and Actions. The Fire Hazard Overlay Zone identifies area subject to wildland fires as the Fire Hazard District. Approximately 75 percent of the City is located within the designated Fire Hazard District.[59] Within the Fire Hazard District, the City has established standards to protect structures and residents from the potential hazards associated with wildland fires. The standards require fire-fighting vehicles to have adequate access into areas between fire hazard areas or "fuel modified" areas and the development perimeter so that a wildland fire can be contained at the development perimeter and prevented from spreading to structures. In addition, the Safety Element includes actions for enforcing fuel modification zones, encouraging

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56 *Fire Protection Plan, Paradise Ranch, Tracts No. 20286, 16200 & 16220, April 30, 2020 (Revised October 30, 2020 & December 10, 2020).*

57 *Fire Protection Plan, Paradise Ranch, Tracts No. 20286, 16200 & 16220, April 30, 2020 (Revised October 30, 2020 & December 10, 2020).*

58 *City of Chino Hills, Hazard Mitigation Plan, July 2020, page 49.*

59 *City of Chino Hills, General Plan – Chapter 5. Safety Element, 2015, page 5-20.*

the planting and maintenance of fire-retardant slope cover, maintaining stringent site design and maintenance standards for areas with high fire hazard potential, and maintaining evacuation plans for areas in greatest danger of fire. The Project Site is located within the Fire Hazard District established by the City.[60]

Land development within the Fire Hazard District must meet stringent building safety standards as set forth in the California Building Code that are specifically designed to mitigate the high fire hazard in such areas. This includes standards for fire resistant building and roof materials, attic and opening protection, building sprinklers, water storage, vehicular access and street design, removal and replacement of flammable vegetation with non-flammable materials. The City also supplements these state standards in Chapter 16.22 of the City of Chino Hills Municipal Code, which includes provisions for construction requirements, building separation, and regulations for fuel modification areas. The City's existing development review process requires that all hazards, including wildland fire hazards, are thoroughly evaluated to identify site specific risks and to ensure that a project's design that mitigates those risks and achieves compliance with applicable building safety standards and local fire department regulations. Accordingly, the Project has prepared, and committed to the practices and design features contained within a Fire Protection Plan (FPP). The FPP (see **Appendix IS-E**) contains detailed requirements for the Project's defensible space, ignition resistant building features, and key fuel modification/treatment strategies to ensure the Project meets the building safety standards for development within high fire hazard areas and does not exacerbate wildfire risks. Pursuant to the requirements of the FPP, specific practices and design features that the Project would implement include the following:

- Fuel Modification/Treatment: Installation of Fuel Modification Zones (FMZ)s separating proposed residences and areas of wildfire fuel consisting of a combination of irrigated landscaped zones and non-irrigated, vegetation-thinning zones to provide defensible space between proposed structures and surrounding wildland vegetation. Landscaping and maintenance requirements would be in accordance with the requirements of the FPP. FMZs within residential lots would be maintained year-round by the individual property owners while the HOA would be responsible for the maintenance of FMZs in all other areas outside lot boundaries. The developer would maintain all undeveloped lots, under weed abatement regulations, until sold and should any lots be repossessed, the title holder of the lot would be responsible for the maintenance of that lot. Due to there being insufficient space within the Project Site to establish the necessary FMZ for Lots 27-32, a solid, non-combustible, 6-foot tall, 60-foot long wall would be installed behind these lots, wrapping around Lot 27. An agreement or easement from the property owner adjacent to the southeastern Project Site boundary would be obtained in order to access and thin the vegetation within a 40-foot wide, 300-foot long off-site non-irrigated thinning zone. All publicly accessible roads within the Paradise Ranch development shall be cleared of all combustible vegetation for a minimum of 20-feet on the uphill side or level ground and 30-feet on the downhill side of the roadway prism.

- Structure Construction Standards: All structures within the Paradise Ranch Project would meet all Wildland-Urban Interface Fire Areas Building Standards (7A) to the satisfaction of the CVIFD and would be designed and constructed with ignition resistant construction

60 *City of Chino Hills, General Plan – Chapter 5. Safety Element, 2015, Figure 5-10: Fire Hazard Overlay District, page 5-26.*

requirements meeting the current California Fire Code. These standards address roofing, venting, eave enclosure, windows, exterior doors, siding, and decking. All residences would have National Fire Protection Association (NFPA) 13D fire sprinkler systems. All non-habitable accessory structures such as decks, balconies, patio, covers, gazebos, and fences would be built from non-combustible materials.

- Additional Measures: Pursuant to Section 16.22.030(B)(a), in lieu of a 30-foot separation between structures, structures would be built with a 20-foot separation and the Project would implement the following measures developed through coordination with the City and the CVIFD to achieve the same level of protection as a 30-foot separation: FMZs would be increased to 150 feet; attic vents would be eliminated or ember-resistant baffled vents of 1/16-inch or less would be installed; all exterior doors that swing would have self-closing hardware; all vehicle garage doors would have automatic door closures that can be set to close after a certain period of inactivity; NFPA 13D fire sprinklers would be installed in all areas of the home, including areas not required by NFPA 13D such as walk-in closets, rooms in excess of 55 square-feet, attics, bathrooms, and garages; metal mesh bug screens would be installed on all operable windows; exterior wall construction would conform to 2-hour construction assembly as shown in Gypsum Association Fire Resistance Design Manual; fences and walls installed on lot lines between structures would be of non-combustible materials; all outside hinged entry doors would have a 90-minute fire rating; and the builder would deliver a copy of the FPP to each initial homeowner at the time of sale.

As a condition of approval, the Project shall implement the FPP specific practices and design features to reduce wildfire impacts.

CVIFD has not established response times standards for emergency response, nor adopted the National Fire Protection Association (NFPA) standard response time goal of six minutes to nearly all medical emergencies.[61] Fire Station No. 64 had an average response time of 2-4 minutes.[62] Although response time is considered in assessment of the adequacy of fire protection services, it is one factor among several that CVIFD utilizes in evaluating its ability to respond to fires and life and health safety emergencies, along with a variety of other criteria, including required fire flow, response distance from existing fire stations, and the CVIFD's judgement for needs in an area. Given the residential nature of the surrounding area, development of the Project is not expected to require the construction of a new or expanded fire station, the construction of which could cause significant environmental impacts. If the number of incidents in a given area increases, it is the CVIFD's responsibility to assign new staff and equipment and potentially build new or expanded facilities, as necessary, to maintain adequate levels of service. Accordingly, in conformance with the California Constitution Article XIII, Section 35(a)(2) and the *City of Hayward v. Board of Trustees of California State University* ruling, the City has and will continue to meet its

61 *National Fire Protection Association, NFPA 1710: Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments.*

62 *Fire Protection Plan, Paradise Ranch, Tracts No. 20286, 16200 & 16220, April 30, 2020 (Revised October 30, 2020 & December 10, 2020).*

legal constitutional obligations to provide adequate public safety services, including fire protection and emergency medical services.

As detailed above, the Project is consistent with the General Plan and therefore anticipated by public service agencies as part of City buildout. Also the CVIFD is a special district that directly receives a portion of the property tax from the City's development, which offsets increases in the fire district service and/or facilities as a result of the Project. Furthermore, prior to plan check review, the Project would be required to consult with the CVIFD regarding the installation of public and/or private fire hydrants, sprinklers, access, and/or other fire protection features within the Project Site. All required fire protection features would be installed to the satisfaction of the CVIFD. Therefore, for the reasons stated above, impacts related to the construction of new or expanded fire facilities to meet an increase in the demand for protection services would be less than significant and no mitigation measures would be required. No further evaluation of this topic is required in the EIR.

b) **Police protection? Less Than Significant Impact**. The City of Chino Hills has contracted with the San Bernardino County Sheriff's Department (SBSD) for law enforcement services. San Bernardino County Sheriff's Department is located at 14077 Peyton Drive, approximately 5.5 miles northeast of the Project Site.

Although the increase in daytime population at the Project Site during construction would be temporary, construction sites can be sources of attracting nuisances, providing hazards, and inviting theft and vandalism. When not properly secured, construction sites can become a distraction for local law enforcement from more pressing matters. Accordingly, developers typically take precautions to prevent trespassing through construction sites. Most commonly, temporary fencing is installed around the construction site. Temporary construction fencing would be placed along the periphery of the active construction areas to screen as much of the construction activity from view at the local street level and to keep unpermitted persons from entering the construction area. These security measures would ensure that valuable materials (e.g., building supplies, metals such as copper wiring) and construction equipment would not be easily stolen or abused and would minimize the need for SBSD services during construction.

With regard to operation, while current response times, crime statistics, and congestion at surrounding intersections are relevant background information, these data are not used to determine police protection impacts under CEQA. The adequacy of police protection is evaluated using the existing number of police officers in the Project's police service area, the number of residents currently served in the area, the adequacy of the existing officer-to-population ratio in the area, and the number of residents that the Project would introduce to the area.

The Project would construct approximately 50 residential units at a site currently occupied by two residential units. The average household size in 2019 was 3.37, thus the Project would generate 169 residents.[63] As detailed above, the Project is consistent with the General Plan and therefore anticipated by public service agencies as part of City buildout. In addition, the project would not substantially alter the existing officer-to-population ratio. Furthermore, the potential for crime can be reduced with site-specific designs and features. The Project would include standard

[63] *City of Chino Hills Demographics. https://www.chinohills.org/94/Demographics, State Department of Finance - January 2019, accessed June 2021.*

security measures such as adequate security lighting. In addition, the SBSD will require that they be provided a diagram of the property showing access routes, and any additional information that might facilitate sheriff response.

Given the residential nature of the surrounding area, development of the Project is not expected to require the construction of a new or expanded sheriff station, the construction of which could cause significant environmental impacts. Furthermore, as with fire services, if the demand for sheriff services in a given area increases, it is the SBSD's responsibility to assign new staff and equipment and potentially build new or expanded facilities, as necessary, to maintain adequate levels of service. Accordingly, in conformance with the California Constitution Article XIII, Section 35(a)(2) and the *City of Hayward v. Board of Trustees of California State University* ruling, the City has and will continue to meet its legal constitutional obligations to provide adequate public safety services, including police protection services.

Therefore impacts related to the construction of new or expanded police facilities to meet an increase in the demand for protection services would be less than significant and no mitigation measures would be required. No further evaluation of this topic is required in the EIR.

c) **Schools? Less Than Significant Impact**. The Project Site is located within the boundaries of the Chino Valley Unified School District (CVUSD). The nearest schools to the Project Site are Litel Elementary School (5.1 miles northeast of the Project Site), Hidden Trails Elementary School (4.8 miles northeast of the Project Site), Canyon Hills Junior High School (6.3 miles northeast of the Project Site), and Ayala High School (5.3 miles northeast of the Project Site).

The following CVUSD schools currently serve the Project Site:[64]

- **Litel Elementary School** – Grades K-6
  3425 Eucalyptus Avenue
  Chino Hills, Ca 91709
  Current Enrollment – 516
  Capacity – 900 +/-
  Planned Improvements or Additions – No, but fully modernized in 2019/2020
- **Canyon Hills Junior High School** – Grades 7-8
  2500 Madrugada Drive
  Chino Hills, CA 91709
  Current Enrollment – 1098
  Capacity – 1,150 +/-
  Planned Improvements or Additions – No, but fully modernized in 2020/2021
- **Ayala High School** – Grades 9-12
  14255 Peyton Drive
  Chino Hills, CA 91709
  Current Enrollment – 2,442

[64] *Correspondence Gregory Stachura, Assistant Superintendent, Facilities, Planning & Operations, Chino Valley Unified School District, May 28, 2021.*

Capacity – 2,800 +/-
Planned Improvements or Additions – No, but fully modernized in 2020/2021

The Project would construct approximately 50 residential units at a site currently occupied by two residential units. The average household size in 2019 was 3.37, thus the Project would generate 169 residents.[65]

To reduce any potential population growth impacts on public schools, the governing board of any school district is authorized to levy a fee, charge, dedication, or other requirement against any construction within the boundaries of the district for the purpose of funding the construction or reconstruction of facilities (pursuant to California Education Code Section 17620(a)(1)). The Project would be required to pay the appropriate fees, based on the square footage, to CVUSD.

The Leroy F. Greene School Facilities Act of 1998 (SB 50) sets a maximum level of fees a developer may be required to pay to mitigate a project's impacts on school facilities. The maximum fees authorized under SB 50 apply to zone changes, general plan amendments, zoning permits and subdivisions. Pursuant to Senate Bill 50, the Applicant would be required to pay development fees for schools to CVUSD prior to the issuance of the Project's building permit. The provisions of SB 50 are deemed to provide full and complete mitigation of school facilities impacts, notwithstanding any contrary provisions in CEQA or other state or local law. Thus the Project would not result in the need for new or altered school facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service. Therefore, impacts would be less than significant, and no mitigation measures are required. No further evaluation of this topic is required in the EIR.

d) **Parks? Less Than Significant Impact**. Parks and recreational facilities in the vicinity of the Project Site are primarily operated and maintained by the City of Chino Hills Department of Recreation. The City has adopted a standard of 5 acres of parkland per 1,000 residents.[66] The City of Chino Hills Recreation Department maintains a mixture of parks, trails, sports fields, and other city facilities throughout the City. The City of Chino Hills General Plan describes four park classifications for City facilities: Community Parks, Neighborhood Parks, Nature Parks, and Special Use Facilities. Currently the City includes 44 parks, and five community facilities. The closest park and recreational facility to the Project Site is the Western Hills Park located 0.9 mile southeast of the Project Site at 16239 Canon Lane. The Western Hills Park is 1.3 acres and includes: Tot Lot Playground, Picnic Areas, Horse Staging Area, and one Bike Rack.[67]

The Project would construct approximately 50 residential units at a site currently occupied by two residential units. The Project would increase the residential population within the Project area and, thus, would increase demand for public parkland. Per CHMC Chapter 16.08.070, Open Space Requirements, in order to preserve open space areas and maintain the desired rural character of Chino Hills, a portion of each project is required to be set aside as open space as define in Table 15-1 in the CHMC. Per Table 15-1, the Project is required to provide a minimum percentage of open space and natural open space. Per CHMC Chapter 16.08.070, the Project would provide an

65 City of Chino Hills Demographics. https://www.chinohills.org/94/Demographics, State Department of Finance - January 2019, accessed June 2021.

66 City of Chino Hills, Parks, Recreation and Open Space Element, June 10, 2008.

67 Department of Recreation, Western Hills Park, https://www.chinohills.org/390/Western-Hills, accessed: June 2021.

equestrian trail along Canyon Hills Road on the Projects street frontage. This equestrian trail is a multi-use trail available to walkers, hikers, runners, bicyclists, and equestrians. In addition, Lot A of the Project Site which is approximately 2,189,796 square feet (50 acres) and includes approximately 1,629,570 square feet (40 acres) of natural open space and approximately 435,289 square feet (10 acres) of manufactured open space. Furthermore, the Tract Map will include a covenant and a condition of approval for open space use and an open space easement for the Homeowner's Association HOA to maintain.

Although the Project is providing open space, the Project would result in an increase in the use of parks and recreational facilities that may not have the capacity to serve residents. As detailed above, the Project is consistent with the General Plan and therefore anticipated by public service agencies as part of City buildout. Also this impact may be reduced to a less than significant level through the required payment of the Park Fee to the City for the construction of a residential development. Monies collected as part of the Park Fee are placed in an in-lieu account and used exclusively for the acquisition and development of park and recreational sites and facilities.

Based on the payment of fees, the Project would not result in the substantial adverse physical impacts associated with the provision of new or physically altered parks or the need for new or physically altered parks. Therefore, impacts would be less than significant, and no mitigation measures are required. No further evaluation of this topic is required in the EIR.

e) **Other public facilities? Less Than Significant Impact**. Other public facilities available to the Project Site include libraries. The San Bernardino County Library System (SBCL) and is part of a dynamic network of 32 branch libraries that serves a diverse population over a vast geographic area including the City of Chino Hills. The Project Site would be served by the James S. Thalman Chino Hills Branch Library, which is located at 14020 City Center Drive.

The Project would construct approximately 50 residential units at a site currently occupied by two residential units. Implementation of the Project would generate new residents on site. The new residents could result in an increased demand for library materials and potentially result in the need for new or expanded library facilities, the construction of which could have an adverse significant impact.

This impact may be reduced through the required payment of the General City Facilities Fee to the City for the construction of a residential development. Monies collected as part of the General City Facilities Fee will be placed in an in-lieu account and used exclusively for the development of library facilities and the expansion of library collections.

Based on the payment of fees, the Project would not result in the substantial increase the demand for library facilities such that substantial deterioration of those facilities would occur or be accelerated. Therefore, impacts on library facilities would be less than significant, and no mitigation measures are required. No further evaluation of this topic is required in the EIR.

4.16 RECREATION.	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☒	☐
b) Does the project include recreational facilities, or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?	☐	☐	☒	☐

SETTING

The City has adopted a standard of 5 acres of parkland per 1,000 residents.[68] The City of Chino Hills Recreation Department maintains a mixture of parks, trails, sports fields, and other city facilities throughout the City. The City of Chino Hills General Plan describes four park classifications for City facilities: Community Parks, Neighborhood Parks, Nature Parks, and Special Use Facilities. Currently the City includes 44 parks, and five community facilities.

DISCUSSION OF IMPACTS

a) **Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated? Less Than Significant Impact.** The determination of whether the project results in a significant impact on recreation and parks shall be made considering the following factors: (1) the net population increase resulting from the project; (2) the demand for recreation and park services anticipated at the time of project build-out compared to the expected level of service available. Consider, as applicable, scheduled improvements to recreation and park services (renovation, expansion, or addition) and the project's proportional contribution to the demand; and (3) whether the project includes features that would reduce the demand for park services (e.g., on-site recreation facilities, land dedication, or direct financial support to the Department of Recreation and Parks).

Per CHMC Chapter 16.08.070, Open Space Requirements, in order to preserve open space areas and maintain the desired rural character of Chino Hills, a portion of each project is required to be set aside as open space as define in Table 15-1 in the CHMC. Per Table 15-1, the Project is required to provide a minimum percentage of open space and natural open space. Per CHMC Chapter 16.08.070, the Project would provide an equestrian trail along Canyon Hills Road on the Projects street frontage. This equestrian trail is a multi-use trail available to walkers, hikers, runners,

68 *City of Chino Hills, Parks, Recreation and Open Space Element, June 10, 2008.*

bicyclists, and equestrians. In addition, Lot A of the Project Site which is approximately 2,189,796 square feet (50 acres) and includes approximately 1,629,570 square feet (40 acres) of natural open space and approximately 435,289 square feet (10 acres) of manufactured open space. Furthermore, the Tract Map will include a covenant and a condition of approval for open space use and an open space easement for the Homeowner's Association HOA to maintain.

The average household size in 2019 was 3.37, thus the Project would generate 169 residents.[69] Although the Project is providing open space, the new residents associated with the Project could result in an increased demand for the existing public parks and recreational facilities that serve the Project Site, possibly resulting in the physical deterioration of those facilities. This impact may be reduced through the required payment of the Park Fee to the City for the construction of a residential development. Monies collected as part of the Park Fee will be placed in an in-lieu account and used exclusively for the acquisition and development of park and recreational sites and facilities.

Based on the payment of fees, the Project would not result in the substantial increase the demand for off-site public parks and recreational facilities such that substantial deterioration of those facilities would occur or be accelerated. Therefore, impacts on parks and recreational facilities would be less than significant, and no mitigation measures are required. No further evaluation of this topic is required in the EIR.

b) **Does the project include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment? Less Than Significant Impact.** Per CHMC Chapter 16.08.070, Open Space Requirements, in order to preserve open space areas and maintain the desired rural character of Chino Hills, a portion of each project is required to be set aside as open space as define in Table 15-1 in the CHMC. Per Table 15-1, the Project is required to provide a minimum percentage of open space and natural open space. Per CHMC Chapter 16.08.070, the Project would provide an equestrian trail along Canyon Hills Road on the Projects street frontage. In addition, Lot A of the Project Site which is approximately 2,189,796 square feet (50 acres) and includes approximately 1,629,570 square feet (40 acres) of natural open space and approximately 435,289 square feet (10 acres) of manufactured open space. Furthermore, the Tract Map will include a covenant and a condition of approval for open space use and an open space easement for the Homeowner's Association HOA to maintain.

The average household size in 2019 was 3.37, thus the Project would generate 169 residents.[70] The new residents associated with the Project could result in an increased demand for the existing recreational facilities that serve the Project Site, possibly resulting in the physical deterioration of those facilities.

As detailed above, the Project is consistent with the General Plan and therefore anticipated by public service agencies as part of City buildout. Also this impact may be reduced through the required payment of the Park Fee to the City for the construction of a residential development.

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[69] *City of Chino Hills Demographics. https://www.chinohills.org/94/Demographics, State Department of Finance - January 2019, accessed June 2021.*

[70] *City of Chino Hills Demographics. https://www.chinohills.org/94/Demographics, State Department of Finance - January 2019, accessed June 2021.*

Monies collected as part of the Park Fee will be placed in an in-lieu account and used exclusively for the acquisition and development of park and recreational sites and facilities.

Based on the payment of fees, the Project would not result in the construction or expansion of recreational facilities which might have an adverse physical effect on the environment. Therefore, impacts on recreational facilities would be less than significant, and no mitigation measures are required. No further evaluation of this topic is required in the EIR.

4.17 TRANSPORTATION.
Would the project:

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☒	☐	☐	☐
b) Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	☒	☐	☐	☐
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
e) Result in inadequate emergency access?	☒	☐	☐	☐

DISCUSSION OF IMPACTS

a) **Would the project conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities? Potentially Significant Impact.** The Project would require the use of a variety of construction vehicles throughout the Project construction. Typical construction schedules create trips outside of the traffic peak hours. It is anticipated that there would be no hauling during the PM peak hour and that construction workers would arrive at the Project Site prior to the AM peak hour, which is typical construction industry practice. Once construction is completed, operation of the Project would generate new residents that would, in turn, generate vehicle and transit trips throughout the day. The resulting increase in the use of the area's transportation facilities may conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities. Therefore, impacts may be potentially significant. Therefore, this topic will be further evaluated in the EIR.

b) **Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)? Potentially Significant Impact.** This Checklist Question has been modified by the Natural Resources Agency to address consistency with CEQA Guidelines Section 15064.3(b), which relates to the use of the vehicle miles traveled (VMT) as the methodology for evaluating traffic impacts. The Project would subdivide an 85-acre property into a total of 51 lots. The Project would include the development of 50 cluster lots ranging in size from 7,200 to 12,412 square feet. Each of the 50 lots would include the development of a two-story single family residential home. The dwelling units would range in size from 3,946 to 4,616 square feet of living area (including three-car garages). The residential uses would include six architectural styles, and four different floor plans for each style. Lot 51 will maintain the existing single-family home, and Lot A will remain as vacant native land. Total VMT associated with the Project would increase as a result of additional residents located on the Project Site. A VMT analysis will be included as additional information to address CEQA Guidelines Section 15064.3(b). Therefore, impacts may be potentially significant. Therefore, this topic will be further evaluated in the EIR.

c) **Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)? No Impact.** No hazardous design features or incompatible land uses would be introduced with the Project that would create significant hazards to the surrounding roadways. The Project proposes a land use that complements the surrounding development and utilizes the existing roadway network. The Project's driveways would conform to the City's design standards and would provide adequate sight distance, sidewalks, and pedestrian movement controls meeting the City's requirements to protect pedestrian safety. Therefore, no impacts would occur, and no mitigation measures are required. No further evaluation of this topic is required in the EIR. No further evaluation of this topic is required in the EIR.

d) **Would the project result in inadequate emergency access? Potentially Significant Impact***.* While it is expected that construction activities for the Project would primarily be confined on-site, the Project's construction activities may potentially cause the closure of travel lanes in adjacent off-site streets for the installation or upgrading of local infrastructure. Construction within these roadways has the potential to impede access to adjoining uses, as well as reduce the rate of flow of the affected roadway. The Project would also generate construction traffic, particularly haul trucks, which may affect the capacity of adjacent streets and highways. In addition, as part of the Project, existing site access would be modified. Therefore, this topic will be further evaluated in the EIR.

4.18 TRIBAL CULTURAL RESOURCES. Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
a.) Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is?				
i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1 (k)?	☒	☐	☐	☐
ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant, pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1? In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?	☒	☐	☐	☐

DISCUSSION OF IMPACTS

a) **Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural**

landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

i. **Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1 (k)?**

ii. **A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?**

Potentially Significant Impact. Approved by Governor Brown on September 25, 2014, Assembly Bill 52 (AB52) establishes a formal consultation process for California Native American Tribes to identify potential significant impacts to Tribal Cultural Resources (TCRs), as defined in Public Resources Code Section 21074, as part of CEQA. Effective July 1, 2015, AB 52 applies to projects that file a Notice of Preparation of an MND or EIR on or after July 1, 2015. PRC Section 21084.2 now establishes that a project with an effect that may cause a substantial adverse change in the significance of a TCR is a project that may have a significant effect on the environment. To help determine whether a project may have such an effect, PRC Section 21080.3.1 requires a lead agency to consult with any California Native American tribe that requests consultation and is traditionally and culturally affiliated with the geographic area of a proposed project. That consultation must take place prior to the release of a negative declaration, mitigated negative declaration, or environmental impact report for a project. As a result of AB 52, the following must take place: 1) prescribed notification and response timelines; 2) consultation on alternatives, resource identification, significance determinations, impact evaluation, and mitigation measures; and 3) documentation of all consultation efforts to support CEQA findings for the administrative record.

Under AB 52, if a lead agency determines that a project may cause a substantial adverse change to a TCR, the lead agency must consider measures to mitigate that impact. PRC Section 21074 provides a definition of a TCR. In brief, in order to be considered a TCR, a resource must be either: 1) listed, or determined to be eligible for listing, on the national, State, or local register of historic resources, or 2) a resource that the lead agency chooses, in its discretion supported by substantial evidence, to treat as a TCR. In the latter instance, the lead agency must determine that the resource meets the criteria for listing in the State register of historic resources or City Designated Cultural Resource. In applying those criteria, a lead agency shall consider the value of the resource to the tribe.

A Sacred Lands File Search was preformed, which indicated negative results.[71] As specified in AB 52, lead agencies must provide notice to tribes that are traditionally and culturally affiliated with the geographic area of a proposed project if the tribe has submitted a written request to be notified. The tribe must respond to the lead agency within 30 days of receipt of the notification if it wishes to engage in consultation on the project, and the lead agency must begin the consultation process within 30 days of receiving the request for consultation.

[71] *Correspondence from Andrew Green, Cultural Resources Analyst, Native American Heritage Commission, June 21, 2021.*

As lead agency, the City mailed letters to the two listed Native American tribes included on the City's consultation list. Letters were sent out to all contacts on June 8, 2021. To date, the City has received one response to the notification letters.

Consultation under AB 52 with the Gabrieleño Band of Mission Indians—Kizh Nation formally concluded on July 8, 2021. Mr. Andrew Salas, on behalf of the Gabrieleño Band of Mission Indians—Kizh Nation, has determined that the Project Site is considered sensitive for potential tribal cultural resources. Project grading activities may encounter these resources and impacts may be potentially significant. Therefore, this topic will be further evaluated in the EIR.

4.19 UTILITIES/SERVICE SYSTEMS. Would the project:	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction of which could cause significant environmental effects?	☐	☐	☒	☐
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☒	☐
c) Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand, in addition to the provider's existing commitments?	☐	☐	☒	☐
d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☒	☐
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☒	☐

SETTING

WATER

SOURCES

The City has access to a diverse portfolio of supply sources including imported water originating in the Sacramento-San Joaquin River Delta (Bay Delta), groundwater from the Chino Basin that is produced locally by the City and purchased from local wholesalers, and recycled water provided by the IEUA. Chino Hills' imported Bay Delta supply is conveyed to Southern California via the State Water Project (SWP) where it is purchased by MWD and wholesaled to IEUA. IEUA in turn sells and conveys the water to the

WFA who treats the water and sells it to its five member/agencies, including Chino Hills and MVWD. MVWD provides wholesale water to Chino Hills, which may consist of a portion of its allocation of water from WFA and/or groundwater pumping from the Chino Basin. Aside from purchases from MVWD, Chino Hills utilizes groundwater from the Chino Basin via a wholesale agreement with Chino Desalter Authority (CDA) and production from City-owned wells. Lastly, recycled water is available to Chino Hills through a contract with IEUA and is currently used for non-potable consumption.

SUPPLIES

Purchased/Imported: The City typically relies on imported or purchased water to meet about 60 percent of its annual average demand. The City of Chino Hills has purchase capacity rights from MVWD of 20.22 million gallons per day (MGD), or 22,2649 acre-feet per year (AF/yr), which includes 12.72 MGD (14,258 acre-feet/year ((AF/yr)) of capacity the City owns in the WFA. City of Chino Hills is subscribed to 3.75 MGD (4,200 AF/yr) with the CDA, which could provide more than 20 percent of the City's total water demand. In 2020, the City's actual purchased/imported water usage amount was 9,407 AF/yr from MVWD, including 1,700 AF/yr through the WFA, and 3,669 AF/yr from the CDA.[72]

Groundwater: The operation of the Chino Basin is governed by the 1978 court judgment and agreement among producers, whereby each is allotted a "Base Water Right" to a certain percentage of the natural or "safe" yield of the basin. As of FY 2020/21, Chino Hills' right to the Chino Basin is 4,158 AF/yr excluding carryover storage which may vary year to year. Due to 1,2,3-TCP contamination, in the last 5 years, local groundwater was not used as a supply source from January 2018 to the present. The City has been working on a solution that will restore reliable operation of its wells and is in the process of designing a granular activated carbon (GAC) water treatment facility. The treatment system is expected to go online by 2025, at which time the City will be able to use the wells as a supply source again.[73]

Recycled Water: According to IEUA's 2015 UWMP, future recycled water supplies are projected to reach 67,000 AF/yr in 2040. Conforming with the 1969 Santa Ana River Judgment, a minimum of approximately 16,000 AF/yr of water will be discharged to the Santa Ana River, leaving approximately 51,000 AF/yr of recycled water for beneficial reuse for IEUA members by 2040. The City is contracted with IEUA to receive up to 2,661 AF per year. The contract quantity is reliant on the wastewater IEUA receives from the City. In 2020, the City's actual recycled water usage was 1,417 AF/yr.[74]

Including all purchase/import, groundwater, and recycled sources, the City's total water usage in 2020 was 14,436 AF/yr out of a total right/safe yield available of 33,684 AF/yr.[75]

RELIABILITY

Chino Hills' water supply sources are considered to be highly reliable over the next 25 years. The overall availability of imported Bay Delta supplies to Southern California have been decreasing over time due to ecosystem decline and regulatory decisions limiting exports. Availability is expected to continue to decrease due to drought, climate change, and additional regulation. Despite this, Chino Hills expects that its full contract value of water to be available in the future. This reliability is due to the long-term

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72 *City of Chino Hills, Urban Water Management Plan 2020, June 2021, pages 6-3 to 6-4.*
73 *City of Chino Hills, Urban Water Management Plan 2020, June 2021, pages 6-5 to 6-6.*
74 *City of Chino Hills, Urban Water Management Plan 2020, June 2021, pages 6-7 to 6-11.*
75 *City of Chino Hills, Urban Water Management Plan 2020, June 2021, Table 6-2: 2020 Purchased Supply Volume, Water Supplies – Actual, page 6-3.*

investments that MWD has made as the primary regional wholesale supplier, which include storage, water transfers, water banking, flexible operations, conservation, and alternate supplies. Chino Hills' groundwater supplies from the local Chino Basin are also expected to be highly reliable into the future. Long-term management of the Basin by the Chino Basin Watermaster and the Optimum Basin Management Program has resulted in sustainable groundwater yields through active monitoring, management, accounting, and recharge. Currently, the Chino Basin has a "Very Low" prioritization under the Sustainable Groundwater Management Act (SGMA). Although the safe yield of the Basin may be recalculated from time to time, indications are that the source will continue to be reliable. The Watermaster expects to meet its recharge and replenishment goals through 2050. Similar to its groundwater and imported supplies, Chino Hills expects that its recycled supply provided by IEUA will be nearly 100 percent reliable into the future.[76]

As part of the 2020 UWMP, Chino Hills evaluated its water service reliability under three sets of hydrologic conditions; normal year, single dry year, and five consecutive dry years. Given these hydrologic scenarios, the City compared its total projected supplies against total forecasted demand between 2025-2045 in five-year increments. Total water supplies available to the City from all sources are projected to remain 33,684 AF/yr. For each five-year period and within each hydrologic condition, Chino Hills is expected to have surplus water available.[77] Specifically, the City is projected to have between 15,915 AF/yr and 16,564 AF/yr of surplus supply available during normal years; between 15,959 AF/yr and 20,007 AF/yr of surplus supply available during single dry years; and between 15,975 AF/yr and 16,624 AF/yr of surplus supply available during multiple dry years.[78]

The City also conducted a Drought Risk Assessment (DRA) for the 2021-2025 planning period. The City's DRA was conducted by estimating current supply availabilities (e.g., no availability of City-owned wells due to water quality condition) adjusted for five consecutive dry year conditions and comparing them to short-term projections of total system demand. Although short-term supply availability is expected to be lower due to water quality constraints (29,526 AF/yr), Chino Hills is still expected to have a surplus of available supply relative to demand.[79] Specifically, even with the City-owned groundwater supply offline, the City is projected to have between 12,213 AF/yr and 13,360 AF/yr of surplus supply available over the next five years assuming consecutive repetition of the driest years on record.[80]

INFRASTRUCTURE

There is an existing 16-inch, asbestos concrete, water supply main running beneath Canyon Hills Road to the east of the Project Site.[81,82]

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76 *City of Chino Hills, Urban Water Management Plan 2020, June 2021, pages ES-1 to ES-2.*

77 *City of Chino Hills, Urban Water Management Plan 2020, June 2021, page ES-2.*

78 *City of Chino Hills, Urban Water Management Plan 2020, June 2021, Table 7-5: Normal Year Supply and Demand Comparison, Table 7-6: Single Dry Year Supply and Demand Comparison, Table 7-7: Multiple Dry Years Supply and Demand, pages 7-9 to 7-10.*

79 *City of Chino Hills, Urban Water Management Plan 2020, June 2021, page ES-2.*

80 *City of Chino Hills, Urban Water Management Plan 2020, June 2021, Table 7-9: Five-Year Drought Risk Assessment, page 7-12.*

81 *Email communication from Mark Wiley, Water and Sewer Manager, Public Works Department, Chino Hills, June 9, 2021.*

82 *City of Chino Hills, Utilities Map, Canyon Hills Road, June 9, 2021.*

WASTEWATER

<u>SYSTEM</u>

Wastewater collection and conveyance within the City is provided by the City's Sewer Division. The northern portion of the City is served by lateral and trunk sewers that are predominantly gravity-fed to the IEUA interceptor, for conveyance to IEUA's regional wastewater treatment plant No. 5 (RP-5), located at 6063 Kimball Avenue in Chino. The southern portion of the City is served by IEUA Carbon Canyon Water Recycling Facility (CCWRF), located at 14950 Telephone Avenue in Chino. While RP-5 and CCWRF treat liquid wastewater flow, biosolid flow streams from both RP-5 and CCWRF are sent to Regional Plant No. 2 (RP-2) for treatment. The western, hilly side of the City, which includes Tonner and Carbon Canyons, is served by on-site septic systems.

CCWRF has been in operation since 1992 and has a design treatment capacity of 11.4 MGD but receives an average influent flow of approximately 7 MGD. Wastewater liquid is treated to California Department of Public Health Title 22 Code of Regulations standards for disinfected tertiary recycled water. Currently, the solids removed from CCWRF are pumped to RP-2 for thickening, anaerobic digestion, and dewatering.[83]

RP-5 has been in operation since 2004 and has a capacity of 16.3 MGD but receives an average influent flow of approximately 9 MGD. Wastewater liquid treated at RP-5 is either discharged to Chino Creek, delivered to industrial users, or pumped to basins for groundwater recharge. As with CCWRF, the solids removed from RP-5 are pumped to RP-2 for thickening, anaerobic digestion, and dewatering.[84] RP-5 is currently undergoing an expansion project that will expand RP-5's liquid treatment capacity to 22.5 MGD. The project will include infrastructure for RP-5's ultimate buildout to treat an average flow of 30 MGD and a peak flow of 60 MGD.[85]

Regional Water Recycling Plant No. 2 (RP-2) has been in operation since 1960 and operated liquids and solids treatment sections until RP-5 was constructed to handle the liquids treatment section portion of RP-2. Currently, solids removed from CCWRF and RP-5 are treated at RP-2 and after treatment and dewatering at RP-2, the biosolids are hauled to the Inland Empire Regional Composting Facility in the city of Rancho Cucamonga for further treatment to produce Class A compost. However, IEUA has planned a new solids treatment facility for RP-5 to allow the decommissioning of RP-2.[86]

Historically, wastewater production within the City has been approximately 50 percent of the City's water usage.[87]

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83 *Inland Empire Utilities Agency, Carbon Canyon Water Recycling Facility website, available at: https://www.ieua.org/facilities/carbon-canyon-water-recycling-facility/, accessed August 27, 2021.*

84 *Inland Empire Utilities Agency, Regional Water Recycling Plant No. 5 website, available at: https://www.ieua.org/facilities/regional-water-recycling-plant-no-5/, accessed August 27, 2021.*

85 *Inland Empire Utilities Agency, Regional Water Recycling Plant No. 5 Expansion Project website, available at: https://www.ieua.org/regional-water-recycling-plant-no-5-expansion-project/, accessed August 27, 2021.*

86 *Inland Empire Utilities Agency, Regional Water Recycling Plant No. 5 Expansion Project website, available at: https://www.ieua.org/regional-water-recycling-plant-no-5-expansion-project/, accessed August 27, 2021.*

87 *City of Chino Hills, Urban Water Management Plan 2020, June 2021, page 7-7.*

INFRASTRUCTURE

The existing on-site residences are currently served by a septic system with no connection to the municipal wastewater system. An existing gravity sewer main is located beneath Summer Canyon Road to the south of the Project Site.[88] Wastewater flow through this main is conveyed to the southwest to a lift station[89] at the southern terminus of Canyon Hills Road.[90] From the lift station, wastewater is pumped to Pine Valley Lift Station located at 15898 Canon Lane. From there it is pumped to CCWRF or is bypassed to RP-5 where it is treated and recycled for use as landscape irrigation and groundwater recharge.[91]

STORMWATER DRAINAGE

SYSTEM

The City is located in the 275-square-mile Zone 1 of the County of San Bernardino Flood Control District (SBCFCD). SBCFCD owns and maintains flood control channels in the City, including Los Serranos, English, and Carbon Canyon Channels. These facilities are designed and located to control flooding along streams and to move flood waters through and away from developed lands and the streets and highway network.

The City owns and maintains storm drainage facilities throughout the City's street network, to collect runoff from adjacent developed and undeveloped land. The City's drainage system consists of approximately 83 miles of underground pipelines, inlet and outlet structures, a variety of filtering mechanisms and detention basins. Drainage facilities in the oldest parts of the City, were constructed prior to development of the first large master plans and prior to City incorporation, when more comprehensive and improved standards for drainage systems were enacted.

The City of Chino Hills Storm Drain Master Plan, identifies current storm drain deficiencies and plans to remedy these deficiencies.[92] To assess deficiencies, the Storm Drain Master Plan divided the City into 12 drainage basins (Puente Hills, Boys Republic, English Channel, Little Chino Creek, Los Serranos Lake, Lower Serranos, Slaughter Canyon, Aliso Canyon, Southeast Chino Hills, Tonner Canyon, Carbon Canyon, and Soquel Canyon) and analyzed each area to determine estimated stormwater run-off based on 10-, 25-, and 100-year storm events, and assessed the capacity of 200 of the City's existing storm drain facilities.

Based on this run-off information, the Storm Drain Master Plan outlines a storm drain system improvement plan that identifies preliminary sizing for future storm drains that will be constructed either by development projects or through the City Capital Improvement Program. Most of the planned storm drain facilities are designed to provide capacity for 100-year events.

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[88] *City of Chino Hills, Utilities Map, Canyon Hills Road, June 9, 2021.*

[89] *A wastewater lift station helps move wastewater from a lower elevation to a higher elevation.*

[90] *Email communication from Mark Wiley, Water and Sewer Manager, Public Works Department, Chino Hills, June 9, 2021.*

[91] *Email communication from Mark Wiley, Water and Sewer Manager, Public Works Department, Chino Hills, December 5, 2021.*

[92] *City of Chino Hills General Plan, February 2015.*

INFRASTRUCTURE

The City's 12 drainage basins have a combined area of 21,053 acres (32.90 square miles). The Project Site is located within Basin No. 11: Carbon Canyon.[93] This drainage basin totals approximately 2,587 acres and consists of some low-density residential developments. The basin is predominantly undisturbed rolling hills. Natural rills, gullies and washes convey the flow from north to south with an outlet point located that the City limits.[94] There are no existing City-owned drainage facilities in this basin.[95] Stormwater run-off currently sheet flows on the surface of the Project Site or percolates into the subsurface. The Project Site drains in multiple directions, as the Site contains several ridgelines with decreasing elevation on each side.

Due to the size of the parcel, off-site drainage does occur at multiple locations along the perimeter of the site. Majority of those locations happen outside of the limits of grading will occur. The location where the most off-site drainage does occur, near the limits of grading, is along Canyon Hills Road. This area drains on-site and into the existing channel and through the existing channel.

ELECTRIC POWER

Electric power within the City is provided by Southern California Edison (SCE). SCE provides electricity to approximately 15 million people, 180 incorporated cities, 15 counties, 5,000 large businesses, and 280,000 small businesses throughout its 50,000-square-mile service area.[96] In 2020, SCE's total electricity sales in the SCE service area was estimated to be 83,533 Gigawatt-hours (GWh).[97] SCE reports that approximately 204 GWh of electricity were consumed by residential uses within the City of Chino Hills in 2020.[98]

SCE generates power from a variety of energy sources, including large hydroelectric, natural gas, nuclear, and renewable resources such as biomass and biowaste, geothermal, small hydroelectric, solar, and wind. SCE was required by the Renewables Portfolio Standard (RPS) to procure at least 33 percent of its energy portfolio from renewable sources by 2020. In addition, SB 350 (Chapter 547, Statues of 2015) further increased the RPS to 50 percent by 2030. The legislation also includes interim targets of 40 percent by 2024 and 45 percent by 2027. Eligible renewable resources are defined in the Renewable Portfolio Standard to include biodiesel; biomass; hydroelectric and small hydro (30 Mega Watts [MW] or less); aqueduct hydro power plants; digester gas; fuel cells; geothermal; landfill gas; municipal solid waste; ocean thermal, ocean wave, and tidal current technologies; renewable derived biogas; multi-fuel facilities using renewable fuels; solar photovoltaic (PV); solar thermal electric; wind; and other renewables that

93 *City of Chino Hills Storm Drain Master Plan, Carbon Canyon Hydrology Model, Prepared by Lim & Nascimento Engineering Corp, August 2009.*

94 *City of Chino Hills Storm Drain Master Plan, Carbon Canyon Hydrology Model, Prepared by Lim & Nascimento Engineering Corp, August 2009.*

95 *City of Chino Hills Storm Drain Master Plan, Carbon Canyon Hydrology Model, Prepared by Lim & Nascimento Engineering Corp, August 2009.*

96 *Southern California Edison, "Who We Are" website, available at: https://www.sce.com/about-us/who-we-are, accessed September 2, 2021.*

97 *Southern California Edison, Energy Resource Recovery Account, 2022 Forecast of Operations, Application A.21-06-003, June 1, 2021, page 10.*

98 *Southern California Edison, Energy Data – Reports and Compliance, Quarterly Customer Data Reports, available at: https://www.sce.com/regulatory/energy-data---reports-and-compliances, accessed September 3, 2021. For the most accurate representation of the City's consumption, data was limited to the 91709 postal code.*

may be defined later. SCE provided approximately 35 percent of its 2019 electric supply from renewable power under its standard Power Mix option, approximately 68 percent under its Green Rate 50% option, and 100 percent under its Green Rate 100% option.[99]

NATURAL GAS

Chino Hills receives natural gas from the Southern California Gas Company (SoCalGas). SoCalGas is the principal distributor of natural gas in Southern California, serving residential, commercial, and industrial markets. SoCalGas serves approximately 21.8 million customers in more than 500 communities encompassing approximately 24,000 square-miles throughout Central and Southern California from Visalia to the Mexican border.[100] Natural Gas Transmission lines in the City of Chino Hills are located to the North and South of the 142. [101]

SoCalGas receives gas supplies from several sedimentary basins in the western United States and Canada, including supply basins located in New Mexico (San Juan Basin), West Texas (Permian Basin), the Rocky Mountains, and Western Canada, as well as local California supplies.[102] The traditional, southwestern United States sources of natural gas will gas will continue to supply most of SoCalGas's natural gas demand. The Rocky Mountain supply is available but is used as an alternative supplementary supply source, and the use of Canadian sources provide only a small share of SoCalGas supplies due to the high cost of transport.[103] Gas supply available to SoCalGas from California sources averaged 87 million cubic feet (cf) per day in 2020 (the latest year for which data are available).[104] SoCalGas reports that residential uses in the City of Chino Hills consumed a total of 1 billion cubic feet of natural gas in 2020.[105]

TELECOMMUNICATIONS

Telecommunication services (landline phone, cellular phone, cable television, and cable television) within Chino Hills is provided by private utility companies contracted with individual or group customers. Telecommunication facilities likely include underground fiber optic cable, telephone transmission lines, and cellular towers owned or leased by telecommunications service providers. In the vicinity of the Project

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99 *Southern California Edison, 2019 Power Content Label, October 2020, available at: https://www.sce.com/sites/default/files/inline-files/SCE_2019PowerContentLabel.pdf, accessed September 2, 2021.*

100 *SoCalGas, Company Profile, https://www.socalgas.com/about-us/company-profile, accessed September 2, 2021.*

101 *Gas Transmission Pipeline Interactive Map -San Bernardino, Website: https://socalgas.maps.arcgis.com/apps/webappviewer/index.html?id=faeed481312f4e5fb056f739ff169e02 December 4, 2021.*

102 *California Gas and Electric Utilities, 2020 California Gas Report, page 111.*

103 *California Gas and Electric Utilities, 2020 California Gas Report, page 111.*

104 *California Gas and Electric Utilities, 2021 Supplemental California Gas Report, page 16.*

105 *SoCalGas, Energy Data Request Program, Quarterly Gas Usage by Zip Code, available at: https://energydatarequest.socalgas.com/?_ga=2.41108198.550358859.1625788998-434574650.1582066028, accessed September 3, 2021. For the most accurate representation of the City's consumption, data was limited to the 91709 postal code.*

Site, telephone service is provided by Verizon and cable television service is provided by Century Communications.[106]

SOLID WASTE

SERVICE

No solid waste facilities are currently located within the City limits of Chino Hills. The City contracts with Republic Services for all trash and recyclable collection services in the City. Residential customers are provided with containers for dispensing trash, recyclables, and yard waste for separating waste. The City implements local waste reduction, recycling, and reuse programs to reduce total waste disposal at landfills. Construction and demolition waste within the City are required to be recycled or reused by Chapter 13.40 of the City's Municipal Code. Republic Services also offers other services, including the pick-up of bulky and hard-to-bundle items (e.g. water heaters, furnaces, and dryers). In 2019, Chino Hills disposed of 41,313 tons of waste.[107]

The City of Chino Hills is in the process of changing its solid waste contractor from Republic to Waste Management. Solid waste from the City is hauled by Waste Management to the Waste Transfer & Recycling Facility, a material recovery facility in Los Angeles, remaining waste from the City after the recycling recovery is taken to the El Sobrante Landfill in Corona. Currently the landfill is scheduled to reach capacity by 2051. At that time, the City will have a number of alternative sites to which to transfer their waste, including the Orange County TS-USCAC, Carson Transfer Station, Moreno Valley Transfer and MRF, and Palmdale Landfill.

The El Sobrante Landfill located at 10910 Dawson Canyon Road in Corona accepts non-hazardous municipal solid waste from municipals, construction/demolition, and self-haulers, and contaminated soil (Class III Sanitary Landfill). Maximum permitted daily refuse is 16,054 tons.

DISCUSSION OF IMPACTS

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:

a) **Would the project require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction of which could cause significant environmental effects? Less Than Significant Impact**.

WATER

Based on the City's population and water consumption for 2020, the City has a water demand value of 157 gallons per capita per day (GPCD).[108] As detailed in response to Checklist Question

[106] *Forma Engineering, Inc., Tentative Tract Map No. 20286, Paradise Ranch in the City of Chino Hills, 16200 & 16220 Canyon Hills Road.*

[107] *CalRecycle, Disposal Reporting System, Single-Year Countywide Origin Detail, available at: https://www2.calrecycle.ca.gov/LGCentral/DisposalReporting/Origin/CountywideDetail, accessed September 2, 2021.*

[108] *City of Chino Hills, Urban Water Management Plan 2020, June 2021, page 5-2.*

4.14(a), the Project would generate an additional 169 residents within the City. This increase in population would result in a corresponding increase in water consumption within the City by 26,533 gallons per day (GPD), or 29.72 AF/yr. As presented in the setting above, through 2045, total water supplies available to the City from all sources are projected to remain 33,684 AF/yr and the City is projected to have between 15,915 AF/yr and 16,564 AF/yr of surplus supply available during normal years; between 15,959 AF/yr and 20,007 AF/yr of surplus supply available during single dry years; and between 15,975 AF/yr and 16,624 AF/yr of surplus supply available during multiple dry years.[109] Accordingly, the Project's the estimated increase in water consumption of 29.72 AF/yr would represent between 0.19 and 0.18 percent of the surplus supply available during normal years; between 0.19 and 0.15 percent of the surplus supply available during dry years; and between 0.19 and 0.18 percent of the surplus supply available during multiple dry years.

As detailed above, the Project is consistent with the General Plan and therefore anticipated by utility service agencies as part of City buildout. According to the City's 2020 UWMP, Chino Hills' water supply sources are considered to be highly reliable over the next 25 years, therefore, the Project's nominal increase in water demand would not result in the need to identify additional sources of water supply. In addition, even with the City-owned groundwater supply offline and during a five-year consecutive repetition of the driest year on record, the DRA conducted as part of the 2020 UWMP determined that the City would have between 12,213 AF/yr and 13,360 AF/yr of surplus supply available. The Project's water demand would represent 0.24 and 0.22 percent of the surplus supply available under drought risk conditions. Furthermore, given that the Project is consistent with the Project Site's underlying General Plan land use designation and the General Plan's Land Use Element/Map, the Project's water demand has already been accounted for in the General Plan EIR.

As part of normal development, the Project would install on-site water conveyance infrastructure and connections to the existing water supply main beneath Canyon Hills Road. New infrastructure and connections would be installed under permit and through coordination with the City's Public Works Department to ensure proper sizing and siting and to prevent service disruption to existing customers. With regard to Citywide and regional infrastructure, the City and IEUA will continue to update and implement their water system master plans to identify deficiencies and needs for system expansion, and to design and construct improvements in a timely and cost-effective manner. The regional water supply entities that provide most of the City's water resources also conduct their own master planning programs to identify locations, timing, and scope of water facility upgrades that are needed to increase the amounts of water delivered to the City. At the time that specific water system improvements are being designed, the City and IEUA will evaluate the environmental impacts associated with the particular improvements being proposed, consistent with CEQA, and will identify specific project mitigation measures to reduce impacts to acceptable levels.

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[109] *City of Chino Hills, Urban Water Management Plan 2020, June 2021, Table 7-5: Normal Year Supply and Demand Comparison, Table 7-6: Single Dry Year Supply and Demand Comparison, Table 7-7: Multiple Dry Years Supply and Demand, pages 7-9 to 7-10.*

Based on the above, the Project would not require or result in the relocation or construction of new or expanded water supply facilities and impacts associated with the construction of new and expanded water conveyance infrastructure would be less than significant.

WASTEWATER

Based on the City's wastewater generation rate of 50 percent of its water demand,[110] assuming the Project's projected water consumption of 26,533 GPD as determined in the water analysis above, the Project would generate approximately 13,267 GPD of wastewater. As presented in the setting above, CCWRF has a design treatment capacity of 11.4 MGD but receives an average influent flow of approximately 7 MGD, resulting in a remaining daily capacity of 4.4 MGD. RP-5 has a capacity of 16.3 MGD but receives an average influent flow of approximately 9 MGD, resulting in a remaining daily capacity of 7.3 MGD. Accordingly, the additional wastewater flow within the City as a result of the Project would represent 0.6 percent of the remaining daily capacity at CCWRF and 0.4 percent of the remaining daily capacity at RP-5. In addition, RP-5 is undergoing short-term expansion to 22.5 MGD and has a long-term planned capacity of 30 MGD for average flows and 60 MGD for peak flows. The Project's projected wastewater generation would account for 0.2 percent of the short-term remaining capacity and 0.1 percent and 0.05 percent of the long-term remaining capacity for average flows and peak flows, respectively, at RP-5.

As detailed above, the Project is consistent with the General Plan and therefore anticipated by utility service agencies as part of City buildout. The nominal increase in wastewater generation from the Project would not result in a need for new or expanded wastewater treatment facilities. Furthermore, the Project would generate the same types of wastewater that are currently generated throughout the City of Chino Hills. The Project does not include new uses or activities that would require unique wastewater treatment processes. Given that the Project is consistent with the Project Site's underlying General Plan land use designation and the General Plan's Land Use Element/Map, wastewater that would be generated on-site has already been accounted for in the projections published in the General Plan EIR.

As part of the normal development process, the Project would be required to install on-site wastewater collection and conveyance infrastructure and connections to the existing sewer main beneath Summer Canyon Road. Preliminary information from the City's Public Works Department indicates that, at a minimum, the Project would be required to install variable frequency drives and upgrade the sizing of pumps at the lift station at the bottom of Canyon Hills Road.[111] The design and installation of on-site wastewater infrastructure as well as any off-site connections and upgrades would be conducted under permit and through coordination with the City's Public Works Department to ensure proper sizing and siting of facilities as well as identify any improvements required in order for existing infrastructure in the vicinity of the Project Site to handle the Project's projected wastewater flows. Increases in wastewater flows from the City of Chino Hills into the IEUA system would occur gradually and incrementally over the next 20 to 25 years as additional growth occurs in accordance with the updated General Plan's Land Use Element/Map. Flows from the City of Chino Hills, along with flows from other areas served by

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[110] *City of Chino Hills, Urban Water Management Plan 2020, June 2021, page 7-7.*

[111] *Email communication from Mark Wiley, Water and Sewer Manager, Public Works Department, Chino Hills, June 9, 2021.*

IEUA, would eventually require upgrades and expansions of IEUA's wastewater conveyance and treatment facilities. However, each new development project in the City, and in other jurisdictions within IEUA's service area, is required to pay a sewer system connection fee that helps fund maintenance and expansion of IEUA's conveyance and treatment facilities. In addition, IEUA's master planning program will continue to monitor inflows and treatment levels, monitor continuing growth throughout its service area, and develop plans for construction of treatment plant and interceptor sewer expansions in a timely and cost-effective manner. IEUA examines environmental impacts associated with facilities upgrades through the CEQA process, and through that process it can identify the specific range and level of impacts associated with the particular wastewater facilities that are being designed at the time.

Based on the above, the Project would not require or result in the relocation or construction of new or expanded wastewater treatment facilities and impacts associated with the construction of new wastewater collection facilities would be less than significant.

STORMWATER DRAINAGE

The Project Site is currently developed with two existing residences, a barn, and a stable and fenced pasture on approximately 85.2 acres of land. The rest of the land is currently vacant covered with mostly bare soil, grass, bushes, trees, and other native vegetation.

The site topography varies dramatically throughout the property. The site contains a ridgeline along the south portion of the Project Site. There is an estimate 300 feet of elevation differential across the site. Most of the site's existing flow drains into an existing culvert that goes underneath Canyon Hills Road. South of the ridgeline drains south to Summer Canyon Road.

The Project Site will be developed into 50 individual lots for single family homes. As part of the Project, an engineered storm drain system would be installed on the Project Site. The Project is proposing to retain water flow within three detention basins that will be located along the westerly limits of the Project. Outflow from the detention basins drain into the existing culvert.[112]

Consistent with Section 16.54.060, Runoff Control, of the Chino Hills Municipal Code, the new storm drain system would be designed and maintained to control runoff from a 10-year storm event. This would be accomplished through various means, which may include the use of on-site infiltration basins, vegetated swales, and/or dispersing runoff over non-erodible vegetated surfaces to the nearest drainage course so that the runoff rate does not exceed the pre-development levels.

Based on the above, impacts associated with the construction of new stormwater drainage facilities would be less than significant.

ELECTRIC POWER

As detailed in response to Checklist Question 4.6(a), the Project's annual electricity consumption would represent an insignificant portion of SCE's projected supplies. As detailed above, the Project is consistent with the General Plan and therefore anticipated by utility service agencies as

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[112] *Preliminary Hydraulic & Hydrology Study, Paradise Ranch Residential Development Tract Map # 20286, Chino Hills, CA. Prepared by Blue Engineering & Consulting, Inc. May 2021.*

part of City buildout. In addition, the Project's electricity consumption would be included in the projected growth associated with the City's overall demand, which SCE would review as part of regulatory requirements in order to ensure that the estimated power requirement would be part of the total load growth forecast for their service area and accounted for in the planned growth of the power system. Based on these factors, it is anticipated that SCE's existing and planned electricity capacity and electricity supplies would be sufficient to serve the Project's electricity demand.

As part of the normal development process, the Project would be required to install on-site electricity supply lines and transformers and implement any necessary off-site connections and upgrades required by SCE to ensure that SCE would be able to adequately serve the Project. The Project Applicant would be required to coordinate electrical infrastructure connections with SCE and comply with site-specific requirements set forth, which would ensure that service disruptions and potential impacts associated with grading, construction, and development within SCE easements are minimized. As such, construction of the Project is not anticipated to adversely affect the existing electrical infrastructure serving the surrounding uses or utility system capacity.

Based on the above, the Project would not require or result in the need for relocation or construction of new or expanded electrical supplies and impacts associated with construction of electricity distribution facilities would be less than significant.

NATURAL GAS

As detailed in response to Checklist Question 4.6(a), the Project's annual natural gas consumption would represent an insignificant portion of SoCalGas's projected supplies. As detailed above, the Project is consistent with the General Plan and therefore anticipated by utility service agencies as part of City buildout. Based on the Project's small fraction of total natural gas consumption for the region, ongoing SoCalGas long-range planning efforts to provide natural gas for this service region, and sufficient existing infrastructure, SoCalGas' existing and planned natural gas supplies and infrastructure would be sufficient to meet the Project's demand for natural gas.

As part of the normal development process, the Project would be required to install on-site natural gas supply lines and implement any necessary off-site connections and upgrades required by SoCalGas to ensure that SoCalGas would be able to adequately serve the Project. Construction impacts associated with the installation of natural gas connections are expected to be confined to trenching in order to place the lines below surface and connection to existing local supply lines. Prior to ground disturbance, contractors would notify and coordinate with SoCalGas to identify the locations and depth of all existing gas lines and avoid disruption of gas service to other properties

Based on the above, the Project would not require or result in the need for relocation or construction of new or expanded natural gas supplies and impacts associated with construction of natural gas facilities would be less than significant.

TELECOMMUNICATIONS

Telecommunication services are provided to users through contracts on an as-requested basis. As part of the Project, telecommunications facilities would be installed on the Project Site. The determination of the type, sizing, and siting of telecommunications facilities that would provide service for the Project would be determined by the Applicant at the time service contracts are prepared. Electrical plans reflecting the estimated loads and recommended location for the Telecommunications/Data facilities would be submitted by the Applicant to the respective telephone and cable TV companies, each company would determine the most cost-effective communications/data cable system to provide their service to the Site. The telephone company and the cable TV company would work with the Owner's Project team to design conduit and cable systems to bring the necessary Communications/Data facilities to the Project in a timely manner.

Before construction begins, the Project Applicant would coordinate with applicable regulatory agencies and telecommunication providers to implement orderly connection to existing telecommunication facilities. This would involve establishing new connections to the proposed new structures. Such improvements would be localized in nature and would involve trenching to place facilities such as fiber optic cables and phone lines underground.

Based on the above, impacts associated with construction of telecommunications facilities would be less than significant.

The Project would result in less than significant impacts to water, wastewater treatment, stormwater drainage, electric power, natural gas, and/or telecommunication facilities and no mitigation is required. No further evaluation of this topic is required in the EIR.

b) **Would the project have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years? Less than Significant Impact.** As detailed in response to Checklist Question 4.19(a), the Project's water demand would be insignificant relative to available surplus supplies through 2045 as projected by the City's UWMP during average, single-dry, and multiple-dry years, as well as during drought conditions during years where supplies are reduced due to the temporary elimination of the City-owned groundwater supply as a water source. Surplus supplies under all conditions were determined based on anticipated supplies and the demand associated with future growth anticipated for the City. Therefore, the Project would have sufficient water supplies available to serve the Project and reasonably foreseeable future development during normal, dry, and multiple dry years and impacts would be less than significant and no mitigation measures are required. No further evaluation of this topic is required in the EIR.

c) **Would the project result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand, in addition to the provider's existing commitments? Less Than Significant Impact.** As detailed in response to Checklist Question 4.19(a), the projected wastewater flows from the Project would represent a nominal percentage of the remaining treatment capacities of CCWRF and RP-5 under both existing and planned future conditions. Therefore, the Project would result in a determination by the wastewater treatment provider that serves the Project that is has adequate capacity to serve the Project's projected demand in addition to its existing commitments. No further evaluation of this topic is required in the EIR.

d) **Would the project generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals? Less than Significant Impact.**

CONSTRUCTION

Implementation of the Project would generate construction and demolition (C&D) waste. Typical C&D waste includes concrete, asphalt, wood, drywall, metals, and other miscellaneous and composite materials. Demolition waste would consist primarily of debris from the demolition of the 1,250-square-foot residence, barn, and stables that would be disposed of as inert waste. Construction activities generate a variety of recyclable scraps and wastes, with the majority of recyclables being wood waste, drywall, metal, paper, and cardboard. In compliance with the requirements of SB 1374 and Chino Hills Ordinance No. 240, the Project would be required to recycle and/or salvage a minimum of 50 percent of non-hazardous C&D waste.

The construction of the Project is estimated to generate a total of approximately 427 tons of solid waste[113] over the entire construction period from 2022 to 2024, and approximately 108 tons of demolition debris.[114] In addition, the Project would require export and disposal of 59,075 cubic yards of soil. Project construction waste would be hauled by permitted haulers and taken to facilities permitted to accept C&D waste and are monitored for compliance with recycling regulations. The Project's C&D waste and soil would be disposed of by Republic Services to the Anaheim Transfer Station/Recycling Facility, a material recovery facility in Anaheim, remaining waste after the recycling recovery is taken to the Olinda Alpha Landfill in Brea. Olinda Alpha Landfill in Brea is permitted to accept inert C&D waste. The Project's exported soil would also be disposed of by Republics Services. The Olinda Alpha Landfill located at 1942 N. Valencia Avenue in Brea accepts non-hazardous municipal solid waste from commercial and self-haulers (Class III Sanitary Landfill). Maximum permitted daily refuse is 8,000 tons. The Project would generate a total of 535 tons or 6.7 percent of the maximum permitted 8,000 tons by the Olinda Alpha Landfill.

Accordingly, construction of the Project would not generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals and impacts would be less than significant.

OPERATION

According to a list of residential solid waste generation rates compiled by CalRecycle, single-family residences can generate up to 11.4 pounds of solid waste per residence per day.[115] Accordingly, the Project's 50 proposed new single-family residences are estimated to generate approximately 570 pounds of solid waste per day. All solid waste-generating activities within the City, including the Project, are subject to the 50 percent diversion requirements set forth in AB 939. However, it is conservatively assumed that all 570 pounds per day of the Project's solid waste would be disposed of by Waste Management to the Waste Transfer & Recycling Facility, a material recovery facility in Los Angeles, remaining waste from the City after the recycling recovery is taken to the

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113 *A construction waste generation rate of 4.02 pounds per square foot was used. 212,495 square feet of construction multiplied by 4.02 pounds is 854,230 pounds (427.01 tons). Source: U.S. EPA, Characterization of Building-Related Construction and Demolition Debris in the United States, Table A-2, June 1998.*

114 *A demolition waste generation rate of 173.00 pounds per square foot was used. 1,250 square feet of demolition multiplied by 173.00 pounds is 216,250 pounds (108.1 tons). Source: U.S. EPA, Characterization of Building-Related Construction and Demolition Debris in the United States, Table A-4, June 1998.*

115 *CalRecycle, Estimated Solid Waste Generation Rates, Residential Sector Generation Rates, available at: https://www2.calrecycle.ca.gov/wastecharacterization/general/rates#Residential, accessed September 3, 2021.*

El Sobrante Landfill in Corona. Currently the landfill is scheduled to reach capacity by 2051. At that time, the City will have a number of alternative sites to which to transfer their waste, including the Orange County TS-USCAC, Carson Transfer Station, Moreno Valley Transfer and MRF, and Palmdale Landfill.

The El Sobrante Landfill located at 10910 Dawson Canyon Road in Corona accepts non-hazardous municipal solid waste from commercial and self-haulers (Class III Sanitary Landfill). Maximum permitted daily refuse is 16,054 tons. The Project would generate a total of 0.285 tons or 0.00177 percent of the maximum permitted 16,054 tons by the El Sobrante Landfill.

The Project would generate solid waste that is typical of a residential development and would be serviced by Republic Services, a private waste management company subject to state permits and oversight regarding the transportation and disposal of non-hazardous waste. Accordingly, operation of the Project would not generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals and impacts would be less than significant. No further evaluation of this topic is required in the EIR.

e) **Would the project comply with federal, state, and local management and reduction statutes and regulations related to solid waste? Less Than Significant Impact.** The Project would be required to comply with applicable state and local (City and county) waste reduction programs. Additionally, the Project would comply with City requirements for receptacles, solid waste collection, and provisions regarding service rates, fees, and charges. In compliance with the requirements of SB 1374 and Chino Hills Ordinance No. 240, the Project would be required to recycle and/or salvage a minimum of 50 percent of non-hazardous C&D waste. Consistent with Chino Hills Ordinance No. 240, the Applicant would submit for approval a properly completed Waste Reduction and Recycling Plan as a requirement of the building or demolition permit process. The Waste Reduction and Recycling Plan would identify all Project materials to be recycled, reused, diverted, or disposed of in a landfill and no building or demolition permit would be issued prior to its approval. In addition, all solid waste-generating activities within the City, including the Project, are subject to the 50 percent diversion requirements set forth in AB 939. According to the City's General Plan EIR, the City's landfill diversion rate was 62 percent in 2015 and is expected to be at least maintained over time. This represents a diversion rate 12 percent higher than the requirements set forth in SB 1374 and AB 939. The Project's compliance with these waste reduction requirements would also help the City meet the requirements of AB 341, which increases AB 939's mandate to divert solid waste generated by a jurisdiction from landfill disposal to 75 percent. Therefore, the Project would not conflict with federal, state, and local management and reduction statutes and regulations related to solid waste and impacts would be less than significant. No further evaluation of this topic is required in the EIR.

4.20 WILDFIRE.
If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:

	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☒	☐
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☒	☐
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☒	☐

The following analysis is based on the findings of the *Fire Protection Plan (FPP), Paradise Ranch, Tracts No. 20286, 16200 & 16220, Chino Hills, California* prepared by *Fire*Wise 2000, LLC on April 30, 2020. The Fire Protection Plan is available as **Appendix IS-E** to this document.

SETTING

According to the General Plan Final EIR, the wildland areas of Chino Hills present a severe magnitude fire problem. With over 14,000 acres of grass, brush, and oak trees, seasonal fires pose a threat to the residential interface within the City. Between 1947 and 2008, eleven major wildfires (defined as a wildfire that consumes more than 30 acres) affected the City, consuming a total of 50,557 acres. In November 2008, the Freeway Complex Fire burned over 13,000 acres in the City.[116] There have been numerous additional wildfires within the canyon in the surrounding wildland urban interface bordering the City, including the Blue Ridge wildfire, which burned nearly 14,000 acres in the hills north of SR 91 in late October and early November 2020.

Open space and canyon areas in the City are covered with chaparral, coastal sage scrub, deciduous woodlands, and grasslands. Introduced vegetation includes landscaping plants and agricultural species.

[116] *City of Chino Hills, Hazard Mitigation Plan, July 2020, page 52.*

The chaparral and coastal sage plant communities are highly combustible due to the volatile oils contained in the plant tissues. Wildfires in the City pose a high threat to natural resources, structures, and human safety. The high risk posed by fires in the City is due to the combined effects of climate (dry summers with Santa Ana wind conditions); steep, rugged terrain (limiting accessibility to fire-suppression vehicles and personnel); vegetation (highly flammable chaparral and similar plant communities that contain high concentrations of volatile oils); and development patterns (wildland and urban areas intermixed in the foothills and near canyon bottoms where development is located adjacent to highly flammable native vegetation).[117]

The City is located in a Local Responsibility Area. Government Code 51175-89 directs the California Department of Forestry and Fire Protection (CALFIRE) to identify areas of very high fire hazard severity zones (VHFHSZ) within Local Responsibility Areas. Mapping of the areas is based on data and models of potential fuels over a 30 to 50-year time horizon and their associated expected fire behavior and expected burn probabilities to quantify the likelihood and nature of vegetation fire exposure to buildings. The Project Site is located within a VHFHSZ as recommended by CALFIRE.[118]

As the fire authority for the City, the Chino Valley Independent Fire District (CVIFD) provides fire suppression and prevention services. CVIFD contracts with CALFIRE for wildland fire protection for 12,257 acres within the City.[119] CVIFD participates in the State of California Master Mutual Aid System and has cooperative agreements with other local fire agencies. To reduce wildfire risk, the City adopted a Fire Hazard Overlay Zone and established and enforces policies that are carried over in the City's General Plan Safety Element Goals, Policies, and Actions. The Fire Hazard Overlay Zone identifies area subject to wildland fires as the Fire Hazard District. Approximately 75 percent of the City is located within the designated Fire Hazard District.[120] Within the Fire Hazard District, the City has established standards to protect structures and residents from the potential hazards associated with wildland fires. The standards require fire-fighting vehicles to have adequate access into areas between fire hazard areas or "fuel modified" areas and the development perimeter so that a wildland fire can be contained at the development perimeter and prevented from spreading to structures. In addition, the Safety Element includes actions for enforcing fuel modification zones, encouraging the planting and maintenance of fire-retardant slope cover, maintaining stringent site design and maintenance standards for areas with high fire hazard potential, and maintaining evacuation plans for areas in greatest danger of fire. The Project Site is located within the Fire Hazard District established by the City.[121]

The following discussion and analysis of potential wildfire impacts is based in part on a Fire Protection Plan (FPP) prepared for the Project by FIREWISE 2000, LLC, a Certified CEQA Wildland Fire Consultant.[122] The FPP includes: a wildland fire hazard rating assessment and calculations of the expected fire behavior within the on- and off-site vegetation; a long-term perimeter vegetative fuel modification treatment and maintenance plan; a long-term interior open space fuel modification treatment plan and "firewise landscaping" criteria; building construction and design criteria for perimeter lots adjacent to high fire

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[117] *City of Chino Hills, General Plan – Chapter 5. Safety Element, 2015, pages 5-19 and 5-20.*

[118] *State of California, Department of Forestry and Fire Protection, FHSZ Map Viewer, available at: https://egis.fire.ca.gov/FHSZ/, accessed August 17, 2021.*

[119] *City of Chino Hills, Hazard Mitigation Plan, July 2020, page 49.*

[120] *City of Chino Hills, General Plan – Chapter 5. Safety Element, 2015, page 5-20.*

[121] *City of Chino Hills, General Plan – Chapter 5. Safety Element, 2015, Figure 5-10: Fire Hazard Overlay District, page 5-26.*

[122] *FIREWISE 2000, LLC, Fire Protection Plan, Paradise Ranch, Tracts No. 20286, 16200 & 16220, Chino Hills, California, April 30, 2020 (Revised 10/30 & 12/10, 2020).*

hazard wildland fuels; and specifications to ensure that architectural plans, ignition-resistant building features, and community protection systems (e.g. water and emergency access) adequately protect life and property. The FPP is based upon requirements listed in the San Bernardino County Fire Agency Urban Wildland Interface Requirements; City of Chino Hills Ordinance No. 306 adopted 12/16/2016; CVIFD Fire Protection Standard - Fuel Modification Zones, Standard #130 established 04/01/2019; and the criteria identified in the most current versions of the following documents including the National Fire Protection Association (NFPA) 1144 – Standard for Reducing Structure Ignition Hazard from Wildland Fire; the California Fire Code California Code of Regulations Title 24, Part 9; Chapter 7A (SFM) Materials and Construction Methods for Exterior Wildfire Exposure; California Public Resources Codes sections 4201 through 4204; and NFPA Standard 13-D, Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes.

PROJECT DESIGN FEATURES

PDF WF-1 As a condition of approval, in conjunction with building plan check, the Project will submit the final Fire Protection Plan (**Appendix IS-E**) for approval by the Chino Valley Independent Fire District and the Chino Hills Public Works.

PDF WF-2 As a condition of approval, the Project will comply with and implement all requirements for fuel modification and site/building design contained in the final Fire Protection Plan **(Appendix IS-E**) during construction and operation.

DISCUSSION OF IMPACTS

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:

a) **Would the project substantially impair an adopted emergency response plan or emergency evacuation plan? Less Than Significant Impact**. The City of Chino Hills updated the Hazard Mitigation Plan in 2020.[123] This plan seeks to reduce the loss of life, personal injury, and property damage that can result from a disaster through long- and short-term strategies. The City's Emergency Preparedness Program enhances the City's ability to respond to and recover from the effects of natural or manmade disasters; administers the Federal and State Disaster Assistance Programs; and serves as the liaison to these, and other agencies in San Bernardino County. Additionally, the City maintains an Emergency Operations Plan that addresses the City's planned response to large-scale emergencies associated with natural disasters and technological incidents, and provides guidance on the response to emergencies, including wildfires. The Project would comply with the goals, objectives, and mitigation measures outlined in the plans and programs designed to reduce risk in the City of Chino Hills.

Impairment of emergency response plans or emergency evacuation plans would occur if the Project would introduce an undue or extraordinary burden on emergency responders as they respond to a wildfire incident. Common examples of such a situation include placement and/or design of a project that could preclude access by emergency responders or the orderly evacuation of a site in the event of a wildfire incident. Undersized roadways, underrated bridges and culverts, steep grades and pinch points, remoteness, and inadequate points of ingress and egress to and

[123] *City of Chino Hills, Hazard Mitigation Plan, July 2020.*

from a site are examples of the difficulties that firefighters can experience when responding to a wildfire.

During construction of the Project, a temporary increase in traffic on roadways surrounding the project site may occur due to increased truck loads or the transport of construction equipment to and from the Project Site during the construction period. However, all construction activities including staging would occur within the boundaries of the Project Site, ensuring that surrounding streets remain free and clear during construction, which would ensure that adequate emergency access to the Project Site and vicinity in the event of an emergency or evacuation order would be provided during construction of the Project.

Development of the Project includes the construction of three new streets, "A" Street, "B" Street, and "C" Street which provide access to the residential homes. Vehicle access to the Project Site would be provided via a new intersection between Canyon Hills and "A" Street, and a new intersection between Canyon Hills and "C" Street. The Project has prepared and committed to the practices and design features contained within, an FPP to ensure that development of the Project does not impair emergency response to the Project Site or vicinity. Pursuant to the requirements of the FPP (see **Appendix IS-E**), all the roads, gates, and related infrastructure would be built with the most current fire protection standards and maintained by the HOA. All streets would be a minimum of 42 feet in width. Parking would be allowed on both sides as long as 26 feet of fire access is maintained clear of any obstruction. Cul-de-sacs would be designed to the City of Chino Hills Development Code standards. Road surfaces would be limited to concrete and asphalt. Access to all portions of each structure would be within 150 feet of the available fire department access. All publicly accessible roads would be cleared of all combustible vegetation for a minimum of 20-feet on the uphill side or level ground and 30-feet on the downhill side of the roadway prism. Any access gates to be installed would meet CVIFD standards and would be approved by the CVIFD prior to fabrication and installation. A 'Knox' override key switch or similar device would be installed outside the gate in an approved, readily visible, and unobstructed location at or near the gate to provide emergency access. Gates accessing more than four residences or residential lots would also be equipped with approved emergency traffic control-activating strobe light sensor(s), or other devices approved by the Fire Chief, which would activate the gate on the approach of emergency apparatus with a battery back-up or manual mechanical disconnect in case of a power failure.

Section 16.22.010 of the City of Chino Hills Municipal Code requires access for fire fighting vehicles into areas between fire hazardous areas or "fuel modified" areas and the development perimeter, so that a wildland fire can be contained at the development perimeter and prevented from spreading to structures. Accordingly, between lots 30-31, a 12-foot-wide, 12-percent-maximum grade, fuel modification access would be provided from the street to the fuel modification at the rear of lots 27-34. At the end of the access, a pipe gate or Fire Department approved gate that is non-combustible would be installed with a Knox pad lock for Fire Department access. All fire access roads would meet the requirements of the CVIFD and would be capable of supporting loads of 75,000 pounds of gross vehicle weight.

Pursuant to PDF WF-2, the Project would implement all required design features contained within the FPP, including those pertaining to emergency access detailed above. These design features would be reviewed and approved by CVIFD and the Chino Hills Public Works Department during building plan check, prior to the start of construction (see PDF WF-1). The purpose of these design features is to minimize the cutting-off of the homeowners egress due to a wildland fire occurrence and for safe ingress by emergency responders. Accordingly, through compliance with existing regulations and implementation of PDF WF-1 and PDF WF-2 as a condition of approval, the Project would not substantially impair an adopted emergency response plan or emergency evacuation plan and impacts would be less than significant. No further evaluation of this topic is required in the EIR.

b) **Due to the slope, prevailing winds, and other factors, would a project exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire? Less than Significant Impact.** As previously discussed, the Project Site is located within in a VHFHSZ/Fire Hazard District. As such, the Project could result in an impact related to exacerbating wildfire risk that exposes Project occupants to pollutant concentrations from a wildfire or the uncontrollable spread of a wildfire if it would increase the risk of a wildfire occurring and the climatic, topographic, vegetation, weather conditions, and other factors that aid in increasing the severity of such an occurrence.

Construction of the Project would introduce potential ignition sources to the Project Site, including the use of heavy machinery and the potential for sparks during welding activities or other work that uses fire- or spark- producing tools. However, the Project would be required to comply with City and state requirements for activities in hazardous fire areas, including fire safety practices, to reduce the possibility of fires during construction activities. As required by the FPP prepared for the Project (see **Appendix IS-E**), prior to bringing lumber or combustible materials onto the Site, all life safety utilities would be installed and approved by the appropriate inspecting department or agency and approved vegetation-thinning zone fuel treatments would be provided. These features would be completed to the satisfaction of the CVIFD prior to combustibles being brought on site. In addition, pursuant to the requirements of the FPP, vegetation-thinning zone fuel treatments would be maintained throughout the construction phase as there may be periods of time where structures are exposed to wildland fuels. Furthermore, construction activities that would potentially introduce potential ignition sources would be temporary.

Land development within the Fire Hazard District must meet stringent building safety standards as set forth in the California Building Code that are specifically designed to mitigate the high fire hazard in such areas. This includes standards for fire resistant building and roof materials, attic and opening protection, building sprinklers, water storage, vehicular access and street design, removal and replacement of flammable vegetation with non-flammable materials. The City also supplements these state standards in Chapter 16.22 of the City of Chino Hills Municipal Code, which includes provisions for construction requirements, building separation, and regulations for fuel modification areas. The City's existing development review process requires that all hazards, including wildland fire hazards, are thoroughly evaluated to identify site specific risks and to ensure that a project's design that mitigates those risks and achieves compliance with applicable building safety standards and local fire department regulations. Accordingly, the Project has prepared, and committed to the practices and design features contained within, an FPP. The FPP contains detailed requirements for the Project's defensible space, ignition resistant building features, and key fuel modification/treatment strategies to ensure the Project meets the building safety standards for development within high fire hazard areas and does not exacerbate wildfire risks. Pursuant to the requirements of the FPP, specific practices and design features that the Project would implement include the following:

- Fuel Modification/Treatment: Installation of Fuel Modification Zones (FMZ)s separating proposed residences and areas of wildfire fuel consisting of a combination of irrigated landscaped zones and non-irrigated, vegetation-thinning zones to provide defensible space between proposed structures and surrounding wildland vegetation. Landscaping and maintenance requirements would be in accordance with the requirements of the FPP. FMZs within residential lots would be maintained year-round by the individual property owners while the HOA would be responsible for the maintenance of FMZs in all other areas outside lot boundaries. The developer would maintain all undeveloped lots, under weed abatement regulations, until sold and should any lots be repossessed, the title holder of the lot would be responsible for the maintenance of that lot. Due to there being insufficient space within the Project Site to establish the necessary FMZ for Lots 27-32, a solid, non-combustible, 6-foot tall, 60-foot long wall would be installed behind these lots, wrapping around Lot 27. An agreement or easement from the property owner adjacent to the southeastern Project Site boundary would be obtained in order to access and thin the vegetation within a 40-foot wide, 300-foot long off-site non-irrigated thinning zone. All publicly accessible roads within the Paradise Ranch development shall be cleared of all combustible vegetation for a minimum of 20-feet on the uphill side or level ground and 30-feet on the downhill side of the roadway prism.

- Structure Construction Standards: All structures within the Paradise Ranch Project would meet all Wildland-Urban Interface Fire Areas Building Standards (7A) to the satisfaction of the CVIFD and would be designed and constructed with ignition resistant construction requirements meeting the current California Fire Code. These standards address roofing, venting, eave enclosure, windows, exterior doors, siding, and decking. All residences would have National Fire Protection Association (NFPA) 13D fire sprinkler systems. All non-habitable accessory structures such as decks, balconies, patio, covers, gazebos, and fences would be built from non-combustible materials.

- Additional Measures: Pursuant to Section 16.22.030(B)(a), in lieu of a 30-foot separation between structures, structures would be built with a 20-foot separation and the Project would implement the following measures developed through coordination with the City and the CVIFD to achieve the same level of protection as a 30-foot separation: FMZs would be increased to 150 feet; attic vents would be eliminated or ember-resistant baffled vents of 1/16-inch or less would be installed; all exterior doors that swing would have self-closing hardware; all vehicle garage doors would have automatic door closures that can be set to close after a certain period of inactivity; NFPA 13D fire sprinklers would be installed in all areas of the home, including areas not required by NFPA 13D such as walk-in closets, rooms in excess of 55 square-feet, attics, bathrooms, and garages; metal mesh bug screens would be installed on all operable windows; exterior wall construction would conform to 2-hour construction assembly as shown in Gypsum Association Fire Resistance Design Manual; fences and walls installed on lot lines between structures would be of non-combustible materials; all outside hinged entry doors would have a 90-minute fire rating; and the builder would deliver a copy of the FPP to each initial homeowner at the time of sale.

Pursuant to PDF WF-1, as a condition of approval, the Project's FPP would be submitted for review and approval by CVIFD and the Chino Hills Public Works Department during building plan check. Furthermore, as a condition of approval, the Project would be required to implement all measures and design features contained within the FPP (see PDF WF-2), as approved by CVIFD and the Chino Hills Public Works Department and as detailed above. The required fuel reductions and operational features of the Project, as determined by the FPP, were developed based on site-specific attributes such as slope, prevailing winds, and fuel loads, and would represent an improvement over current conditions, since the wildfire risks associated with the Project Site's existing conditions would be substantially reduced. Accordingly, through compliance with existing regulations and implementation of PDF WF-1 and PDF WF-2, development of the Project would not exacerbate wildfire risks, nor would it substantially increase the likelihood that the Project would expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire and impacts would be less than significant. No further evaluation of this topic is required in the EIR.

c) **Would the project require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risks or that may result in temporary or ongoing impacts to the environment? Less Than Significant Impact.** The Project would develop 50 detached, single-family residences on a Project Site that has previously undergone minimal disturbance and development in a VHFHSZ/Fire Hazard District. As such, the project would include installation and maintenance of associated infrastructure including driveways and roadways, service utilities (e.g., water, wastewater, electric power, natural gas, and telecommunications services), and fuel breaks (e.g., fuel modification and treatments).

ROADS

Development of the Project includes the construction of three new streets, "A" Street, "B" Street, and "C" Street which provide access to the residential homes. Vehicle access to the Project Site would be provided via a new intersection between Canyon Hills and "A" Street, and a new intersection between Canyon Hills and "C" Street. Pursuant to the requirements of the FPP (see **Appendix IS-E**), all the roads, gates, and related infrastructure would be built with the most current fire protection standards and maintained by the HOA. All streets would be a minimum of 42 feet in width. Parking would be allowed on both sides as long as 26 feet of fire access is maintained clear of any obstruction. Cul-de-sacs would be designed to the City of Chino Hills Development Code standards. All fire access roads would meet the requirements of the CVIFD, and would be capable of supporting loads of 75,000 pounds of gross vehicle weight. Road surfaces would be limited to concrete and asphalt. Access to all portions of each structure would be within 150 feet of the available fire department access. All publicly accessible roads would be cleared of all combustible vegetation for a minimum of 20-feet on the uphill side or level ground and 30-feet on the downhill side of the roadway prism. Accordingly, Project roads would not exacerbate fire risks or result in risks to the environment.

FUEL MODIFICATION/TREATMENTS

As previously discussed, the Project Site is located within both the Fire Hazard District established by the City and a VHFHSZ as recommended by CALFIRE. Accordingly, the Project would be required to ensure defensible space (e.g. FMZs) around proposed structures in accordance with CALFIRE requirements. Pursuant to the requirements of the FPP (see **Appendix IS-E**), FMZ fuel treatments would include a combination of irrigated landscaped zones and non-irrigated, vegetation-thinning zones. To prevent erosion, irrigation within irrigated landscape zones would be prohibited where it would cause erosion and root systems within vegetation-thinning zones would be retained. In addition, allowances for the needs of protected species and habitats within the vegetation-thinning zones would be considered. Due to there being insufficient space within the Project Site to establish the necessary fuel modification zones for Lots 27-32, a solid, non-combustible, 6-foot tall, 60-foot long wall would be installed behind these lots, wrapping around Lot 27. The wall would be installed pursuant to all state and local regulations with respect to geologic conditions and materials. Accordingly, Project fuel modification/treatment would serve to reduce potential impacts from wildfire and would not exacerbate fire risks or result in risks to the environment.

UTILITIES

As part of development of the Project Site, the Project proposes to install: on-site water conveyance infrastructure, on-site wastewater collection and conveyance infrastructure and connections, engineered storm drain system and three detention basins, on-site electricity supply lines and transformers, on-site natural gas supply lines; and connection to existing telecommunication facilities. Installation of new utility facilities and connection to existing utility facilities would be conducted by or under the supervision of applicable service providers. Hydrants, water mains, and water pressure would be designed to comply with the Chino Hills Water Department and CVIFD requirements and required irrigation systems for fuel modification/treatment would be periodically inspected each month to ensure their proper function and any repairs would be performed immediately.

Furthermore, as detailed in Checklist **Sections 4.6, Energy**, and **4.19, Utilities/Service Systems**, of this IS, impacts associated with construction and operation of Project utility infrastructure would be less than significant. Accordingly, Project utilities would not exacerbate fire risks or result in risks to the environment.

SUMMARY

As discussed above, the Project and associated improvements would result in an improved condition with respect to wildfire preparedness/response and the ability to lessen the overall severity of future wildfires in the area. Therefore, the Project would not exacerbate fire risk, but would instead improve conditions related to wildfire risk. With respect to these improvements' effect on the environment, all roads, fuel modification/treatment, and utilities would be designed and installed in accordance with applicable state and local regulations under the supervision of the City and service providers as applicable. As evaluated above and throughout this IS/MND, the environmental effects of the Project's improvements were determined to be less than significant. Therefore, through compliance with existing regulations and implementation of PDF WF-1 and PDF WF-2, the Project would not exacerbate fire risks or result in temporary or ongoing impacts to the environment related to the installation or maintenance of fire hazard reduction infrastructure and impacts would be less than significant. No further evaluation of this topic is required in the EIR.

d) **Would the project expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope stability, or drainage changes? Less than Significant Impact.** Many of the soils in Chino Hills have a high erosion potential, which can destabilize adjacent slopes.[124] In addition, significant hillside erosion can also occur following a wildland fire. The Project Site is located within Flood Zone D, an area of unknown but potentially moderate to high risk of flooding. Furthermore, the Project Site is considered highly susceptible to landslides.[125,126]

The Project would develop 50 detached, single-family residences within the 85.2-acre Project Site on a Project Site that has previously undergone minimal disturbance and development. Accordingly, the Project would increase the amount of impervious surface, which would result in more surface runoff. Furthermore, the portion of the Project Site proposed for residential development is located downslope from the surrounding area. However, as part of Project Site improvements, the Project would include a new on-site wastewater collection and conveyance infrastructure and connections to the existing sewer main beneath Summer Canyon Road, which includes three detention basins that will be located along the westerly limits of the Project. Outflow from the detention basins drain into the existing culvert.[127]

Preliminary information from the City's Public Works Department indicates that, at a minimum, the Project would be required to install variable frequency drives and upgrade the sizing of pumps at the lift station at the bottom of Canyon Hills Road.[128] The design and installation of on-site wastewater infrastructure as well as any off-site connections and upgrades would be conducted under permit and through coordination with the City's Public Works Department to ensure proper sizing and siting of facilities as well as identify any improvements required in order for existing infrastructure in the vicinity of the Project Site to handle the Project's projected wastewater flows. Increases in wastewater flows from the City of Chino Hills into the IEUA system would occur gradually and incrementally over the next 20 to 25 years as additional growth occurs in accordance with the updated General Plan's Land Use Element/Map. Flows from the City of Chino Hills, along with flows from other areas served by IEUA, would eventually require upgrades and expansions of IEUA's wastewater conveyance and treatment facilities. However, each new development project in the City, and in other jurisdictions within IEUA's service area, is required to pay a sewer system connection fee that helps fund maintenance and expansion of IEUA's conveyance and treatment facilities. In addition, IEUA's master planning program will continue to monitor inflows and treatment levels, monitor continuing growth throughout its service area, and develop plans for construction of treatment plant and interceptor sewer expansions in a timely and cost-effective manner. IEUA examines environmental impacts associated with facilities upgrades through the CEQA process, and through that process it can identify the specific range and level of impacts associated with the particular wastewater facilities that are being designed at the time.

In the event of a fire, the Project Site would potentially experience physical changes to the landscape which could result in increased risk of flooding or landslides. However, the proposed detention basin(s) would assist in reducing runoff velocities generated by the Project Site and fuel

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124 *City of Chino Hills, Hazard Mitigation Plan, July 2020, page 70.*

125 *City of Chino Hills, Hazard Mitigation Plan, July 2020, page 41.*

126 *California Geological Survey, Earthquake Zones of Required Investigation, Interactive Map Viewer available at: https://maps.conservation.ca.gov/cgs/EQZApp/app/, accessed August 18, 2021.*

127 *Preliminary Hydraulic & Hydrology Study, Paradise Ranch Residential Development Tract Map # 20286, Chino Hills, CA. Prepared by Blue Engineering & Consulting, Inc. May 2021.*

128 *Email communication from Mark Wiley, Water and Sewer Manager, Public Works Department, Chino Hills, June 9, 2021.*

treatment measures contained in the FPP (see **Appendix IS-E**) also require that root systems of vegetation that is to be removed are left in place to protect hillsides from erosion. Although internal drainage patterns would be somewhat altered as a result of Project development, the Project would maintain adequate stormwater conveyance as to not result in an increase of surface runoff that would result in flooding. In addition, compliance with erosion and grading requirements of the City of Chino Hills Public Works Department, current seismic design specifications, current California Building Code standards, and other regulatory requirements, the potential for impacts associated with landslides would be minimized. In general, development of the Project and its associated treatments would decrease fire hazards on the Project Site, resulting in decreased effects related to post-fire hazards should a fire occur. Therefore, through compliance with existing regulations and implementation of PDF WF-1 and PDF WF-2, impacts associated with downslope or downstream flooding or landslides, as a result of runoff, post- fire slope instability, or drainage changes would be less than significant. No further evaluation of this topic is required in the EIR.

4.21 MANDATORY FINDINGS OF SIGNIFICANCE.	Potentially Significant Impact	Less Than Significant Impact With Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of rare or endangered plants or animals, or eliminate important examples of the major periods of California history or prehistory?	☒	☐	☐	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? "Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.	☒	☐	☐	☐
c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	☒	☐	☐	☐

DISCUSSION OF IMPACTS

a) **Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of rare or endangered plants or animals, or eliminate important examples of the major periods of California history or prehistory? Potentially Significant Impact**. The Project may substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, or reduce the number or restrict the range of a rare or endangered plant or animal. As noted in the foregoing analysis, significant impacts may result related to historic resources. Therefore, the Project's potential to eliminate a plant or animal community or reduce the number or restrict the range of a rare or endangered plant or animal and or eliminate important examples of the major periods of California history or prehistory will be further evaluated in the EIR.

b) **Does the project have impacts that are individually limited, but cumulatively considerable? Potentially Significant Impact**. The impacts of the Project could potentially combine with the impacts of related projects. For those environmental issues discussed above that are to be analyzed in the EIR, the EIR will include an analysis of the cumulative impacts associated with those environmental issues. The following is a list of the cumulative impacts analyses to be included in the EIR:

- Air Quality
- Biological Resources
- Cultural Resources
- Geology/Soils
- Greenhouse Gas Emissions
- Noise
- Transportation
- Tribal Cultural Resources

For those environmental issues that this Initial Study determined do not need additional analysis in the EIR, the cumulative impacts analysis is provided below.

There are 24 Related Projects as shown in **Table 4.5, List of Related Projects**, in the general vicinity of the Project Site and the City of Chino Hills and the City of Chino that were identified in the Project's Traffic Assessment. None of these are within direct vicinity of the Project Site (i.e., within 500 feet). The nearest Related Projects include: No. 7 and 17 which are residential uses located on Carbon Canyon Road. The rest of the Related Projects are greater than 1,000 feet away, distances which ensure that any other localized impacts of the Related Projects would not combine with the Project.

Table 4.5
List of Related Projects

No.	Project Location	Location	Description
1	Country Club Villas	On Pomona Rincon Road between Wallace Ave and Los Serranos Road	70 DU condominium project <u>*Built/Occupied:*</u> Phase 1: 24 DU condominiums <u>*Under Construction/partially occupied:*</u> Phase 2: 28 DU condominiums <u>*Entitled/To Be Constructed:*</u> Phase 3: 18 DU Condominiums
2	Lago Los Serranos	Southwest corner of Ramona Avenue and Bird Farm Road	95 DU condominium project <u>*Built/Partially Occupied:*</u> 35 DU condominiums <u>*Under Construction:*</u> 60 DU condominiums
3	Vila Borba	West and east of Butterfield Ranch Road near Pine Avenue	<u>*Under Construction:*</u> Tract 15989- 6 DU single family

			<u>*Entitled:*</u> Tract 16413 19 DU single family <u>*Entitled:*</u> Tract 16414 – 228 DU multifamily units and 5-acres commercial center
4	The Reserve at Chino Hills	Reserve at Chino Hills Apartment Complex	<u>*Proposed/Under Review*</u> :42 DU multifamily
5	The Commons	South of Chino Hills Parkway, east of Ramona Avenue and north of SR-71	533,675 SF existing shopping center <u>*Built/Unoccupied:*</u> 63,300 SF of floor area for Anchor tenant <u>*Entitled/Unbuilt:*</u> 53,500 SF of floor area
6.	Crossroads Entertainment Center	Northwest of Chino Avenue and SR-71	<u>*Entitled:*</u>4,050 SF multi-tenant building consisting of 2,258 SF Burger King with drive thru and 1,792 SF retail/restaurant tenant space
7.	Woodbridge Pacific Group (Canyon Hills/Hillcrest)	Northwest of Carbon Canyon Road and west of Canyon Hills Road	76 DU single family development <u>*Built/Occupied:*</u> 58 DU single family <u>*Entitled/To Be Constructed:*</u> 18 DU single family
8	Stonefield Development	Northwest of Carbon Canyon Road and east of Fairway Drive	<u>*Entitled:*</u> 28 DU single-family
9	Morningfield Estates and Loving Savior of the Hills Lutheran Church and School Master Plan Addendum	South of Morningfield Drive, west of Peyton Drive, north of Chino Hills Parkway, adjacent to San Bernardino County Flood Channel	<u>*Entitled:*</u> 7-Lot Subdivision with semi-custom single-family homes, plus 3 classrooms/71 student addition to the Lutheran School
10	Coptic Orthodox Church	East side of Peyton Drive, north of the Chino Creek Drainage Channel and south of the Chino Valley Community Church property	<u>*Entitled:*</u> 14,695 SF multi-purpose room, 8,645 SF Sanctuary and 555 SF Bookstore
11	Buddhist Temple of Chino Hills	Northeast of Chino Hills Parkway and Rustic Drive	<u>*Entitled:*</u> 23,400 SF Buddhist temple expansion
12	Goddard School	South of Pomona Rincon Road and east of Picasso Drive	Entitled/Under Construction: 10,587 SF childcare facility/pre-school with two outdoor play areas;9 classrooms with a capacity of 180 students and 22 employees
13	Biz Park (formerly Heritage Professional Center)	Pomona Rincon Road (south of The Rincon)	<u>*Proposed/Under Review:*</u> 141,650 sq. ft. office/retail, 46,000 sq. ft. warehouse – 187,650 sq. ft. of Building
14	Rancho Cielito	48.37 acres is generally located north of Los Serranos Boulevard, south of Lakeview Drive and east of Pipeline Avenue	<u>*Proposed/Under Review:*</u> 354 residential apartment units, consisting of seven (7) two-story and seven (7) three-story residential carriage buildings, ten (10) three-story residential buildings and two (2) clubhouses.

15	The Rincon	Southwest corner of Soquel Canyon Parkway and State Route 71	_Entitled:_ 70,000 SF, 4-story, 119-room Hotel (Holiday Inn Express) - Construction plans submitted for City review _Under Construction:_ 30,000 SF, 3-story medical office building and 6,500 SF, single story medical office building (Spectrum MRI) and 10,000 SF of retail/restaurant (2 total buildings)
16	Storage District	Vacant pad in Fairfield Ranch Business Park (to the northeast of the Chino Hills Hotel	_Entitled/Under Construction:_ 130,139-square foot self-storage facility, including a 2,000- square foot guest lobby and business service area; Construction to start in late 2019/early 2020
17	Hidden Oaks	East of Carbon Canyon Road at Canyon Hills Road	_Proposed:_ 53 DU Single Family
18	Shady View	Terminus of Shady View Drive	_Proposed:_ 159 DU Single Family
19	PL10-0726	Southeast corner of Shaefer Avenue and Central Avenue	13,672 sq. ft. Offices
20	Chaffey College Expansion	Generally located south of College Park Avenue and west of Eucalyptus Avenue	93.5 acres Junior/Community College
21	College Park Commercial	Generally located south of College Park Avenue and west of Eucalyptus Avenue	7.5 acres Commercial Park
22	Kamway (PL 14-0929)	Northeast corner of Shaefer Avenue and Central Avenue	21,572 sq. ft. Industrial building
23	Henry Hong (PL 15-0490)	Northeast corner of Shaefer Avenue and Central Avenue	62,200 sq. ft. Industrial building
24	Fairfield Inn & Suites	Southwest corner of Yorba Avenue and Eucalyptus Avenue	111 room Hotel
Source: Linscott Law & Greenspan, Paradise Ranch Traffic Study, original date August 31, 2021, revised March 21, 2022.			

AESTHETICS

Development of the Project, in combination with other Related Projects in the Project area, would likely result in an intensification of existing prevailing land uses in an already urbanized area of the City. Development of any Related Projects is expected to generally occur in accordance with adopted plans. Furthermore, Related Projects would be reviewed on a case-by-case basis by the City to comply with CHMC requirements regarding building heights, setbacks, massing and lighting, or for those projects that require discretionary actions, to undergo site-specific review regarding building density, design, and light and glare effects. With respect to the overall visual quality of the surrounding neighborhood, similar to the Project, any Related Projects would be required to submit an architectural plan, a landscape plan and signage plan (if proposed) to the City for review and approval prior to the issuance of building permits. Any approvals granted to Related Projects are expected to allow landscape and signage that would be aesthetically compatible with the surrounding neighborhood.

With respect to aesthetics and views, and shade and shadow impacts, none of the Related Projects including the entitled Related Projects are located in proximity to the Project Site such that their development would cumulatively affect the aesthetic character of the Project Site or its immediate surroundings. There are no scenic resources or protected views in the area. Views in the immediate area would not be affected by the Project or the nearest related project. In addition, the Project and the closest related project would not create a new source of substantial light or glare which would cumulatively adversely affect day or nighttime views in the area. Furthermore, development of the Related Projects is expected to occur in accordance with adopted plans and regulations. Thus, the Project would not be cumulatively considerable. Therefore, cumulative aesthetic impacts would be less than significant.

AGRICULTURE/FORESTRY RESOURCES

Development of the Project, in combination with other Related Projects in the Project area, would not result in the conversion of State-designated Farmland or existing agricultural activities or zoning to non-agricultural uses. The Project Site and surrounding area are also not under a Williamson Act contract. Moreover, the Project Site is not zoned for forest land, timberland, or timberland production. Thus, the Project would not contribute to a cumulative loss of farmland or forest land to non-farmland or non-forest land uses. Therefore, no cumulative impacts to agricultural or forestry resources would occur

ENERGY

Each of the Related Projects would be evaluated within its own context with consideration of energy conservation features that could alleviate electrical demand. Each Related Projects would be required to be in compliance with Title 24 of the California Code of Regulations (CCR) (CalGreen) requiring building energy efficiency standards, and would also be in compliance with the City's Green Building Code. Further, each Related Projects would need to be consistent with the building energy efficiency requirements of Title 24 as well as how SCG serves each location with its existing distribution infrastructure. Finally, each Related Projects would need to be consistent with how the City Public Works Department and Department of Building and Safety serves each location with its existing distribution infrastructure.

The City Public Works Department and SCG undertake system expansions and secure the capacity to serve their service areas and take into consideration general growth and development. Operation would result in the irreversible consumption use of non-renewable natural gas and would thus limit the availability of this resource. However, the continued use of natural gas would be on a relatively small scale and consistent with regional and local growth expectations for the area. The Related Projects would be in compliance with the California's Green Building Standards Code and would thus exceed the standards in Title 24 of the CCR requiring building energy efficiency standards.

All forecasted growth would incorporate design features and energy conservation measures, as required by Title 24 of the CCR (CalGreen) requiring building energy efficiency standards, and would also be in compliance with the Green Building Code, which would reduce the impact on natural gas demand. It is also anticipated that future developments would upgrade distribution facilities, commensurate with their demand, in accordance with all established policies and procedures. There would be sufficient statewide supplies to accommodate the statewide requirements from 2018-2030. Thus, there is a plan to secure natural gas supplies to meet demand. Therefore, the Project would not make a cumulatively considerable contribution to any potential cumulative impacts, and cumulative energy impacts would be less than significant.

HAZARDS & HAZARDOUS MATERIALS

Hazards are site-specific and there is little, if any, cumulative hazardous relationship between the Project and any of the Related Projects. Similar to the Project, potential impacts related to hazards would be assessed on a case-by-case basis and, if necessary, the applicants of the Related Projects would be required to implement the appropriate mitigation measures. Furthermore, the analysis of the Project's hazards and hazardous materials impact concluded that Project impacts would be less than significant levels. Therefore, the Project would not make a cumulatively considerable contribution to any potential cumulative impacts, and cumulative hazard and hazardous materials impacts would be less than significant.

HYDROLOGY/WATER QUALITY

The Project Site and the surrounding areas are served by the existing City storm drain system. Runoff from the Project Site and adjacent urban uses is typically directed into the adjacent streets, where it flows to the nearest drainage improvements. It is likely that most, if not all, of the Related Projects would also drain to the surrounding street system. However, little if any additional cumulative runoff is expected from the Project Site and the Related Projects, since this part of the City is already fully developed with impervious surfaces. The Project and Related Projects will require the implementation of mandatory structural BMPs in accordance with the NPDES water quality program and will therefore result in a cumulative reduction to surface water runoff, as the development in the surrounding area is limited to infill developments and redevelopment of existing areas. Therefore, the Project would not make a cumulatively considerable contribution to impacting the volume or quality of surface water runoff, and cumulative impacts to the existing or planned stormwater drainage systems would be less than significant. Therefore, the Project would not make a cumulatively considerable contribution to any potential cumulative impacts, and cumulative water quality impacts would be less than significant.

LAND USE/PLANNING

Compliance with City's land use standards would ensure that any cumulative impacts related to land use would be less than significant. Further, all Related Projects would be individually evaluated for consistency with applicable land use standards. None of the Related Projects would physically divide an established community or conflict with a habitat conservation plan. The Project would not make a cumulatively considerable contribution to land use planning, and cumulative land use impacts would be less than significant.

MINERAL RESOURCES

The Project would have no impact on mineral resources, on or off-site. It is not known if any other Related Projects in the vicinity would result in the loss of availability of known mineral resources. Regardless, the Project would not contribute to a potential cumulative impact on mineral resources. Therefore, the Project would not result in any cumulative impact, and no cumulative impacts to mineral resources would occur.

POPULATION/HOUSING

The Related Projects would introduce an additional 1,137 residential uses and other related uses to the City of Chino Hills. Any residential Related Projects would result in direct population growth of 3,832 residents.[129] The Project would generate a total of 169 residents.[130] This minimal increase of the Project and Related Projects is accommodated in the City's General Plan and Housing Element projections. Further, Project infrastructure would only serve its proposed lots and would therefore not induce growth in an indirect manner. Similarly, the development of the Related Projects is expected to occur in accordance with adopted plans and regulations. Therefore, the Project and Related Projects would not induce substantial cumulative population growth in an area either directly or indirectly. Thus, the Project's residential and population growth would not be cumulatively considerable.

The Project is not creating any jobs, thus would not be cumulatively considerable. Furthermore, because the Project would not displace any residents, the displacement of residents would not be a cumulative impact, and would thus not be cumulatively considerable. Therefore, the Project's cumulative impacts to population and housing would be less than significant.

PUBLIC SERVICES

FIRE

Given the geographic range of the Related Projects, would be served by multiple fire stations including Fire Station No. 64, located at 16231 Canon Lane, approximately 0.75 mile to the southeast of the Project Site, with a 2-4 minute initial response time.[131,132]

The Project, in combination with the Related Projects, could increase the demand for fire protection services in the Project area. Specifically, there could be increased demands for additional Chino Valley Fire District staffing, equipment, and facilities over time. This need would be funded via existing mechanisms (e.g., property taxes, government funding, and developer fees) to which the Project and Related Projects would contribute. Similar to the Project, each of the Related Projects in the City of Chino Hills would be individually subject to Chino Valley Fire District

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129 *City of Chino Hills Demographics. https://www.chinohills.org/94/Demographics, State Department of Finance - January 2019, accessed June 2021. The average household size in 2019 was 3.37.*

130 *City of Chino Hills Demographics. https://www.chinohills.org/94/Demographics, State Department of Finance - January 2019, accessed June 2021.*

131 *Chino Valley Fire District, Facilities, https://www.chinovalleyfire.org/Facilities/Facility/Details/Station-64-4?&centerLat=33.98628438233&centerLng=-117.70928344723828&zoom=12, accessed: June 2021.*

132 *Fire Protection Plan, Paradise Ranch, Tracts No. 20286, 16200 & 16220, April 30, 2020 (Revised October 30, 2020 & December 10, 2020).*

review and would be required to comply with all applicable fire safety requirements of the Chino Valley Fire District in order to adequately mitigate fire protection impacts. Specifically, any Related Projects that exceeded the applicable response distance standards described above would be required to install automatic fire sprinkler systems in order to mitigate the additional response distance. To the extent cumulative development causes the need for additional fire stations to be built throughout the City, the development of such stations would be on small infill lots within existing developed areas. Nevertheless, the development of any new fire stations would be subject to further CEQA review and evaluated on a case-by-case basis. However, as the Chino Valley Fire District does not currently have any plans for new fire stations to be developed in proximity to the Project Site, no impacts are currently anticipated to occur.

Furthermore, many of the Related Projects are already entitled and therefore, have gone through the CVFD review. In addition, during CVFD's review process, the agency is aware of the recent Related Projects that have been recently entitled. So as part of the agencies process it is assessing the cumulative impacts as part of its regular review process.

In addition, the Project and Related Projects would be consistent with the General Plan and therefore anticipated by public service agencies as part of City buildout. Also the CVIFD is a special district that directly receives a portion of the property tax from the City's development, which offsets increases in the fire district service and/or facilities as a result of the Project and the development of the Related Projects.

On this basis, the Project would not make a cumulatively considerable contribution to fire protection services impacts, and as such cumulative impacts on fire protection would be less than significant.

<u>POLICE</u>

The Project, in combination with the Related Projects, would increase the demand for police protection services in the Project area. Specifically, there would be an increased demand for additional San Bernardino County Sheriff's Department staffing, equipment, and facilities over time. This need would be funded via existing mechanisms (e.g., sales taxes, government funding, and developer fees), to which the Project and Related Projects would contribute. In addition, each of the Related Projects would be individually subject to San Bernardino County Sheriff's Department review and would be required to comply with all applicable safety requirements of the San Bernardino County Sheriff's Department and the City of Chino Hills in order to adequately address police protection service demands. Furthermore, each of the Related Projects would likely install and/or incorporate adequate crime prevention design features in consultation with the San Bernardino County Sheriff's Department, as necessary, to further decrease the demand for police protection services. To the extent cumulative development causes the need for additional police stations to be built throughout the City, the development of such stations would be on small infill lots within existing developed areas. Nevertheless, the siting and development of any new police stations would be subject to further CEQA review and evaluated on a case-by-case basis. However, as the San Bernardino County Sheriff's Department does not currently have any plans for new police stations to be developed in proximity to the Project Site, no impacts are currently anticipated to occur.

Furthermore, many of the Related Projects are already entitled and therefore, have gone through the San Bernardino County Sheriff's Department review. In addition, during San Bernardino County Sheriff's Department review process, the agency is aware of the recent Related Projects that have been recently entitled. So as part of the agencies process it is assessing the cumulative impacts as part of its regular review process.

In addition, the Project and Related Projects would be consistent with the General Plan and therefore anticipated by public service agencies as part of City buildout.

On this basis, the Project would not make a cumulatively considerable contribution to police protection services impacts, and cumulative impacts on police protection would be less than significant.

SCHOOLS

Given the geographic range of the Related Projects, they would be served by a variety of public schools depending on the location and service boundaries. The Project, in combination with the Related Projects is expected to result in a cumulative increase in the demand for school services. The Related Projects would introduce an additional 1,137 residential uses and other related uses to the City of Chino Hills. Any residential Related Projects would result in direct population growth of 3,832 residents.[133] The Project would generate a total of 169 residents.[134]

These Related Projects would have the potential to generate students that would attend the same schools as students associated with the Project. The Project Site is located within the boundaries of the Chino Valley Unified School District (CVUSD). The nearest schools to the Project Site are Litel Elementary School (5.1 miles northeast of the Project Site), Hidden Trails Elementary School (4.8 miles northeast of the Project Site), Canyon Hills Junior High School (6.3 miles northeast of the Project Site), and Ayala High School (5.3 miles northeast of the Project Site).

The following CVUSD schools currently serve the Project Site:[135]

- **Litel Elementary School** – Grades K-6
  3425 Eucalyptus Avenue
  Chino Hills, Ca 91709
  Current Enrollment – 516
  Capacity – 900 +/-
  Planned Improvements or Additions – No, but fully modernized in 2019/2020
- **Canyon Hills Junior High School** – Grades 7-8
  2500 Madrugada Drive
  Chino Hills, CA 91709
  Current Enrollment – 1098

133 *City of Chino Hills Demographics. https://www.chinohills.org/94/Demographics, State Department of Finance - January 2019, accessed June 2021. The average household size in 2019 was 3.37.*

134 *City of Chino Hills Demographics. https://www.chinohills.org/94/Demographics, State Department of Finance - January 2019, accessed June 2021.*

135 *Correspondence Gregory Stachura, Assistant Superintendent, Facilities, Planning & Operations, Chino Valley Unified School District, May 28, 2021.*

Capacity – 1,150 +/-
Planned Improvements or Additions – No, but fully modernized in 2020/2021

- **Ayala High School** – Grades 9-12
  14255 Peyton Drive
  Chino Hills, CA 91709
  Current Enrollment – 2,442
  Capacity – 2,800 +/-
  Planned Improvements or Additions – No, but fully modernized in 2020/2021

Currently there is an enrollment availability at each of the above schools, as the schools are not at capacity. Furthermore, each of the Related Projects would be responsible for paying mandatory school fees to mitigate the increased demands for school services. Overall, the payment of school fees in compliance with SB 50 would provide full and complete mitigation of school impacts for the purposes of CEQA. Therefore, the Project's school impacts would not be cumulatively considerable, and cumulative impacts on schools would be less than significant.

PARKS AND RECREATION

Development of the Project in conjunction with the Related Projects could result in an increase in permanent residents residing in the Project area. Additional cumulative development would contribute to lowering the City's existing parkland to population ratio, which is currently below the preferred standard. However, each of the residential Related Projects is required to comply with payment of Quimby (for residential units). Each residential Related Projects would also be required to comply with the on-site open space requirements of the CHMC. Therefore, with payment of the applicable recreation fees on a project-by-project basis, the Project would not make a cumulatively considerable impact to parks and recreational facilities and cumulative impacts would be less than significant.

LIBRARY

Given the geographic range of the Related Projects, they would be served by multiple libraries with the San Bernardino County Library System including the James S. Thalman Chino Hills Branch Library, which is located at 14020 City Center Drive which serves the Project Site. Development of the Related Projects would likely generate additional demands upon library services. The San Bernardino County Library System has no plans for new or expanded libraries; however, the Related Projects, like the Project, would contribute to the City General Fund, which goes to, among other things, library services. Therefore, the Project would not make a cumulatively considerable contribution to any potential cumulative impacts, and impacts related to library facilities would be less than significant.

UTILITIES /SERVICES SYSTEMS

Individual sewer and water infrastructure is location and site-specific and made on a case by case basis. Through the 2015 Urban Water Management Plan, the Chino Hills Public Works Department has demonstrated that it can provide adequate water supplies for the City through the year 2040. Demands on water consumption, wastewater generation, and solid waste generation resulting from the Project would be less than significant. Ultimately, the wastewater and water facilities and Republic Services Transfer Facility and landfills have adequate capacity to accommodate the project and Related Projects along with the general growth within the City. It is anticipated that existing and planned electricity capacity and electricity supplies would be sufficient to support the Related Projects like Project, electricity demand. It is expected that SoCalGas' existing and planned natural gas capacity and supplies will be sufficient to serve the Project's demand**.** Furthermore, telecommunication services are provided by private companies, the selection of which is at the discretion of the Applicant and/or the successor on an ongoing basis. Upgrades to existing telecommunication facilities and construction of new facilities to meet the demand of users is determined by providers and is subject to its own environmental review. Therefore, the Project's contribution to cumulative wastewater, water, solid waste, electricity, natural gas, and telecommunications impacts will not be cumulatively considerable and cumulative impacts would be less than significant.

WILDFIRE

No Related Project is located within 500 feet of the Project Site and do not share access to Canyon Hills Road. If lane closures are necessary to local streets adjacent to Related Project sites, travel lanes would be maintained in accordance with standard construction management plans that would be implemented to ensure adequate emergency access and circulation. Regarding operations, the Related Projects, like the Project, would comply with access requirements from the Chino Valley Fire District and would not impede emergency access within the vicinity of each Related Project Site. Therefore, the Project would not cause an impediment along the City's designated disaster routes or impair the implementation of the City's emergency response plan. Cumulative impacts related to the implementation of the City's emergency response plan would be less than significant.

All of the Related Project Sites and the Project Site are within both rural and urbanized areas of the City. Some of which are located in both wildlands or fire hazard terrain or vegetation. Similar to the Project, the Related Projects could result in an impact related to exacerbating wildfire risk that exposes Project occupants to pollutant concentrations from a wildfire or the uncontrollable spread of a wildfire if it would increase the risk of a wildfire occurring and the climatic, topographic, vegetation, weather conditions, and other factors that aid in increasing the severity of such an occurrence.

Land development within the Fire Hazard District must meet stringent building safety standards as set forth in the California Building Code that are specifically designed to mitigate the high fire hazard in such areas. This includes standards for fire resistant building and roof materials, attic and opening protection, building sprinklers, water storage, vehicular access and street design, removal and replacement of flammable vegetation with non-flammable materials. The City also supplements these state standards in Chapter 16.22 of the City of Chino Hills Municipal Code, which includes provisions for construction requirements, building separation, and regulations for fuel modification areas. The City's existing development review process requires that all hazards, including wildland fire hazards, are thoroughly evaluated to identify site specific risks and to ensure that a project's design that mitigates those risks and achieves compliance with applicable building safety standards and local fire department regulations. Accordingly, similar to the Project, the Related Projects would prepare a Fire Protection Plan. With the development of individual Fire Protection Plans, the Project and the Related Projects would not exacerbate wildfire risks, nor would it substantially increase the likelihood that the Project would expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire. Therefore, the Project would not make a cumulatively considerable contribution to any potential cumulative impacts, and no cumulative wildfire impact would occur.

c) **Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly? Potentially Significant Impact.** Based on the analysis contained in this Initial Study, the Project could result in significant impacts with regard to the following topics: Air Quality, Biological Resources, Cultural Resources, Geology/Soils, Greenhouse Gas Emissions, Hazards & Hazardous Materials, Hydrology/Water Quality, Noise, Transportation, and Tribal Cultural Resources. As a result, this potential effect will be analyzed further in the EIR.

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CITY OF CHINO HILLS

PARADISE RANCH

INITIAL STUDY APPENDICES

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MARCH 30, 2022

APPENDICES

Paradise Ranch Project
Air Quality and Greenhouse Gas Impact Study
City of Chino Hills

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Date: 12/1/2021

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Appendix C:
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GLOSSARY OF TERMS

AQMP	Air Quality Management Plan
CAAQS	California Ambient Air Quality Standards
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CFCs	Chlorofluorocarbons
CH_4	Methane
CNG	Compressed natural gas
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DPM	Diesel particulate matter
GHG	Greenhouse gas
HFCs	Hydrofluorocarbons
LST	Localized Significant Thresholds
$MTCO_2e$	Metric tons of carbon dioxide equivalent
$MMTCO_2e$	Million metric tons of carbon dioxide equivalent
NAAQS	National Ambient Air Quality Standards
NOx	Nitrogen Oxides
NO_2	Nitrogen dioxide
N_2O	Nitrous oxide
O_3	Ozone
PFCs	Perfluorocarbons
PM	Particle matter
PM10	Particles that are less than 10 micrometers in diameter
PM2.5	Particles that are less than 2.5 micrometers in diameter
PMI	Point of maximum impact
PPM	Parts per million
PPB	Parts per billion
RTIP	Regional Transportation Improvement Plan
RTP	Regional Transportation Plan
SCAB	South Coast Air Basin
SCAQMD	South Coast Air Quality Management District
SF_6	Sulfur hexafluoride
SIP	State Implementation Plan
SOx	Sulfur Oxides
SRA	Source/Receptor Area
TAC	Toxic air contaminants
VOC	Volatile organic compounds
WRCC	Western Regional Climate Center

1.0 Introduction

1.1 Purpose of Analysis and Study Objectives

This air quality and greenhouse gas (GHG) analysis was prepared to evaluate whether the estimated criteria pollutants and GHG emissions generated from the Project would cause a significant impact to the air resources in the Project area. This assessment was conducted within the context of the California Environmental Quality Act (CEQA, California Public Resources Code Sections 21000, et seq.). The assessment is consistent with the methodology and emission factors endorsed by South Coast Air Quality Management District (SCAQMD), California Air Resource Board (CARB), and the United States Environmental Protection Agency (US EPA).

1.2 Project Summary

1.2.1 Site Location

The Project site is located at 16200 and 16220 Canyon Hills Road in the City of Chino Hills, California, as shown in Exhibit A. The Project site is currently designated as Rural Residential on the City of Chino Hills General Plan Land Use Map. The proposed use is a single-family residential community with 51 lots. Land uses surrounding the site include single-family residential to the north, south and east, and undeveloped land to the west.

1.2.2 Project Description

The Proposed Paradise Ranch Project (Project) would subdivide an 85.2-acre property into a total of 51 lots. The Project would include the development of 50 cluster lots ranging in size from 7,200 to 12,412 square feet. Each of the 50 lots would include the development of a two-story single family residential home. The dwelling units would range in size from 3,946 to 4,616 square feet of living area (including three-car garages). The residential uses would include six architectural styles, and four different floor plans for each style. Lot 51 will maintain the existing single-family home, and Lot A will remain as vacant native land. Exhibit B demonstrates the site plan for the Project.

Construction activities within the Project area will consist of demolition of the existing 1,250 square foot residential use, site preparation, on-site grading, net export of approximately 59,075 cubic yards of soil, import of approximately 41,410 cubic yards of soil, building, paving, and architectural coating. Table 1 summarizes the land use description for the Project Site.

Table 1: Land Use Summary

Land Use	Unit Amount	Size Metric
Single Family Housing[1]	50	Units
Other Asphalt Surfaces[2]	8.80	Acre
Other Non-Asphalt Surfaces	10.00	Acre

Notes:
[1] Units cover 8.8 acres.
[2] Street paving approx. 25% of total 35.2 acres of housing.

1.2.3 Sensitive Receptors

Sensitive receptors are considered land uses or other types of population groups that are more sensitive to air pollution than others due to their exposure. Sensitive population groups include children, the elderly, the acutely and chronically ill, and those with cardio-respiratory diseases. For CEQA purposes, a sensitive receptor would be a location where a sensitive individual could remain for 24-hours or longer, such as residencies, hospitals, and schools (etc).

The closest existing sensitive receptors (to the site area) are residential land uses located adjacent and to the north of the Project site.

1.3 Executive Summary of Findings and Mitigation Measures

The following is a summary of the analysis results:

Construction-Source Emissions
Project construction-source emissions would not exceed applicable regional thresholds of significance established by the SCAQMD. For localized emissions, the Project will not exceed applicable Localized Significance Thresholds (LSTs) established by the SCAQMD.

Project construction-source emissions would not conflict with the Basin Air Quality Management Plan (AQMP). As discussed herein, the Project will comply with all applicable SCAQMD construction-source emission reduction rules and guidelines. Project construction source emissions would not cause or substantively contribute to violation of the California Ambient Air Quality Standards (CAAQS) or National Ambient Air Quality Standards (NAAQS).

Established requirements addressing construction equipment operations, and construction material use, storage, and disposal requirements act to minimize odor impacts that may result from construction activities. Moreover, construction-source odor emissions would be temporary, short-term, and intermittent in nature and would not result in persistent impacts that would affect substantial numbers of people. Potential construction-source odor impacts are therefore considered less-than-significant.

Operational-Source Emissions
The Project operational-sourced emissions would not exceed applicable regional thresholds of significance established by the SCAQMD. Project operational-source emissions would not result in or cause a significant localized air quality impact as discussed in the Operations-Related Local Air Quality Impacts section of this report. Additionally, Project-related traffic will not cause or result in carbon dioxide (CO) concentrations exceeding applicable state and/or federal standards (CO "hotspots). Project operational-source emissions would therefore not adversely affect sensitive receptors within the vicinity of the Project.

Project operational-source emissions would not conflict with the Basin Air Quality Management Plan (AQMP). The Project's emissions meet SCAQMD regional thresholds and will not result in a significant cumulative impact. The Project does not propose any such uses or activities that would result in potentially significant operational-source odor impacts. Potential operational-source odor impacts are therefore considered less-than-significant.

Project-related GHG emissions meet the San Bernardino County and SCAQMD draft threshold. Therefore, Project emissions are considered to be less than significant. The Project also complies with the goals of the CARB Scoping Plan, Assembly Bill (AB) 32, Senate Bill (SB) 32, County of San Bernardino Greenhouse Gas Emissions Reduction Plan, the County of San Bernardino Climate Action Plan, and the City of Chino Hills General Plan.

Mitigation Measures

A. Construction Measures

No construction mitigation required.

B. Operational Measures

No operational mitigation required.

Exhibit A

Location Map

Exhibit B
Site Plan

PROJECT SUMMARY - SITE

BUILDING AND ZONING CODE SUMMARY

TYPE OF CONSTRUCTION		V
EXISTING OCCUPANCY		R-A
PROPOSED OCCUPANCY		R-A
LAND USE DESIGNATION		
	EXISTING	RURAL RESIDENTIAL
	PROPOSED	RURAL RESIDENTIAL

ZONING REQUIREMENT

MIN. PROJECT SIZE		10 ACRES
MIN. LOT SIZE		7,200 SF
MIN. LOT WIDTH		50 FT./60 FT. AVG.
MIN. LOT DEPTH		NA
MAX. LOT COVERAGE/HOUSE		40%
MAX. FRONT YARD COVERAGE OF IMPERVIOUS SURFACE AREAS		50%
MAX. DENSITY PER SITE		2 DU PER 1 AC.
MAX. BUILDING HEIGHT		35 FT.
MIN. FRONT YARD SETBACK		20 FT.
MIN. SIDE YARD SETBACK		
	LOCAL STREET	15 FT.
	TYPICAL SIDE YARD	10 FT.
MIN. REAR YARD SETBACK		15 FT.
	PORCHES ALLOWED TO ENCROACH 5 FT.	
MIN PRIVATE OPEN SPACE REQUIRED		NA

SITE SUMMARY

ACRES	85.2 Acres (Net)	3,711,312 SF (Net)
TOTAL UNITS PROPOSED	58 UNITS	
DENSITY PROPOSED	1.9 DU/AC	
LOT COVERAGE	REFER TO CIVIL DWGS.	

UNIT PLAN SUMMARY

	PLAN 1	PLAN 2	PLAN 3	PLAN 4
DESCRIPTION	2-STORY 4BD/LOFT/4.5 BA	2-STORY 5BD/4.5 BA	2-STORY 5BD/4.5BA	2-STORY 5BD/LOFT/4.5 BA
# OF UNITS	11	12	13	14
TOTAL LIVING PER PLAN (GROSS)	3336 SF (±) (36,696 SF)	3311 SF (±) (39,232 SF)	3734 SF (±) (48,542 SF)	3984 SF (±) (55,776 SF)
GARAGE (GROSS)	434 SF (±)	635 SF (±)	639 SF (±)	432 SF (±)
TOTAL LIVING AREA (GROSS)	(180,246 SF) (±)			

PARKING SUMMARY (Per table 65-1 of Chapter 16.34.040)

REQUIRED TOTAL	250
PROVIDED	
PRIVATE GARAGE SPACES	150
DRIVE WAY SPACES	100
OPEN PARALLEL STREET SPACES	181
TOTAL PARKING SPACES PROVIDED	431
RATIOS	8.62 PER HOUSE

OPEN SPACE SUMMARY (PER Exhibit "B" Table20-1(B) of Chapter 16.08.070)

MIN. PRIVATE OPEN SPACE NOT REQUIRED

COMMON OPEN SPACE IS BASED ON THE LOT COVERAGE AND FRONT YARD NON-IMPERVIOUS AREAS*

NOTE: REFER TO CIVIL DRAWINGS FOR CALCULATIONS

ELEVATIONS STYLE LEGEND

- A - ADOBE RANCH
- B - COTTAGE FARMHOUSE
- C - MONTEREY ANDALUSIAN
- D - SANTA BARBARA
- E - AGRARIAN TRADITIONAL
- F - TUSCAN FARMHOUSE

ENHANCED ELEVATION LEGEND

- FRONT ENHANCED
- SIDE ENHANCED
- REAR ENHANCED

NOTES:

THIS SITE PLAN IS TO BE USED ONLY FOR REFERENCING FLOOR PLAN TYPES AND ARCHITECTURAL STYLES. REFER TO CIVIL DRAWINGS FOR GRADING AND SITE SPECIFIC ITEMS.

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TRUE LIFE COMPANIES

PARADISE RANCH
CHINO HILLS, CA # 20190088

PARCEL
4th PLANNING SUBMITTAL
CHINO HILLS, CA
PLOT DATE - February 9, 2021

Scale: 1"=80'-0"
0 40 80 160

SITE FLOOR PLAN SUMMARY & STYLE PLOTTING EXHIBIT

A1.0

2.0 Regulatory Framework and Background

2.1 Air Quality Regulatory Setting

Air pollutants are regulated at the national, state, and air basin level; each agency has a different level of regulatory responsibility. The United States EPA regulates at the national level. CARB regulates at the state level. SCAQMD regulates at the air basin level.

2.1.1 National and State

The EPA is responsible for global, international, and interstate air pollution issues and policies. The EPA sets national vehicle and stationary source emission standards, oversees approval of all State Implementation Plans, provides research and guidance for air pollution programs, and sets National Air Quality Standards, also known as federal standards. There are six common air pollutants, called criteria pollutants, which were identified from the provisions of the Clean Air Act of 1970.

- Ozone
- Nitrogen Dioxide
- Lead
- Particulate Matter (PM10 and PM2.5)
- Carbon Monoxide
- Particulate Matter
- Sulfur Dioxide

The federal standards were set to protect public health, including that of sensitive individuals; thus, the standards continue to change as more medical research is available regarding the health effects of the criteria pollutants. Primary federal standards are the levels of air quality necessary, with an adequate margin of safety, to protect the public health.

A State Implementation Plan is a document prepared by each state describing existing air quality conditions and measures that will be followed to attain and maintain federal standards. The State Implementation Plan for the State of California is administered by CARB, which has overall responsibility for statewide air quality maintenance and air pollution prevention. California's State Implementation Plan incorporates individual federal attainment plans for regional air districts—air district prepares their federal attainment plan, which sent to CARB to be approved and incorporated into the California State Implementation Plan. Federal attainment plans include the technical foundation for understanding air quality (e.g., emission inventories and air quality monitoring), control measures and strategies, and enforcement mechanisms. See http://www.arb.ca.gov/research/aaqs/aaqs.htm for additional information on criteria pollutants and air quality standards.

The federal and state ambient air quality standards are summarized in Table 2 and can also be found at http://www.arb.ca.gov/research/aaqs/aaqs2.pdf.

Table 2: Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards[1]		National Standards[2]		
		Concentrations[3]	Method[4]	Primary[3,5]	Secondary[3,6]	Method[7]
Ozone (O3)	1-Hour	0.09 ppm	Ultraviolet Photometry	- -	Same as Primary Standard	Ultraviolet Photometry
	8-Hour	0.070 ppm		0.070 ppm (147 μg/m^3)		
Respirable Particulate Matter (PM10)[8]	24-Hour	50 μg/m^3	Gravimetric or Beta Attenuation	150 μ/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 μg/m^3		- -		
Fine Particulate Matter (PM2.5)[8]	24-Hour	- -	- -	35 μg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 μg/m^3	Gravimetric or Beta Attenuation	12 μg/m^3	15 μg/m^3	
Carbon Monoxide (CO)	1-Hour	20 ppm (23 μg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 μg/m^3)	- -	Non-Dispersive Infrared Photometry (NDIR)
	8-Hour	9.0 ppm (10 μg/m^3)		9 ppm (10 μg/m^3)	- -	
Nitrogen Dioxide (NO_2)[9]	1-Hour	0.18 ppm (339 μg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 μg/m^3)	- -	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (357 μg/m^3)		0.053 ppm (100 μg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[10]	1-Hour	0.25 ppm (655 μg/m^3)	Ultraviolet Fluorescence	75 ppb (196 μg/m^3)	- -	Ultraviolet Fluorescence; Spectrophotometry (Pararosaniline Method)
	3-Hour	- -		- -	0.5 ppm (1300 mg/m^3)	
	24-Hour	0.04 ppm (105 μg/m^3)		0.14 ppm (for certain areas)[10]	- -	
	Annual Arithmetic Mean	- -		0.130ppm (for certain areas)[10]	- -	
Lead[11,12]	30 Day Average	1.5 μg/m^3	Atomic Absorption	- -		
	Calendar Qrtr	- -		1.5 μg/m^3 (for certain areas)[12]	Same as Primary Standard	High Volume Sampler and Atomic Absorption
	Rolling 3-Month Average	- -		0.15 μg/m^3		
Visibility Reducing Particles[13]	8-Hour	See footnote 13	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24-Hour	25 μg/m^3	Ion Chromatography			
Hydrogen Sulfide	1-Hour	0.03 ppm (42 μg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[11]	24-Hour	0.01 ppm (26 μg/m^3)	Gas Chromatography			

Notes:

1. California standards for ozone, carbon monoxide, sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 μg/m^3 is equal to or less than one. For PM2.5, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.

3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

4. Any equivalent measurement method which can be shown to the satisfaction of CARB to give equivalent results at or near the level of the air quality standard may be used.

5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

7. Reference method as described by the U.S. EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the U.S. EPA.

8. On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 μg/m^3 to 12.0 μg/m^3. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 μg/m^3, as was the annual secondary standard of 15 μg/m^3. The existing 24-hour PM10 standards (primary and secondary) of 150 μg/m^3 also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

9. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.

10. On June 2, 2010, a new 1-hour SO2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

    Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

11. CARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

12. The national standard for lead was revised on October 15, 2008, to a rolling 3-month average. The 1978 lead standard (1.5 μg/m^3 as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.

13. In 1989, CARB converted the general statewide 10-mile visibility standard to an instrumental equivalent of "extinction of 0.23 per kilometer."

Several pollutants listed in Table 2 are not addressed in this analysis. Analysis of lead is not included in this report because the Project is not anticipated to emit lead. Visibility-reducing particles are not explicitly addressed in this analysis because particulate matter is addressed. The Project is not expected to generate or be exposed to vinyl chloride because proposed Project uses do not utilize the chemical processes that create this pollutant and there are no such uses in the Project vicinity. The proposed Project is not expected to cause exposure to hydrogen sulfide because it would not generate hydrogen sulfide in any substantial quantity.

2.1.2 South Coast Air Quality Management District

The agency for air pollution control for the South Coast Air Basin (basin) is SCAQMD. SCAQMD is responsible for controlling emissions primarily from stationary sources. SCAQMD maintains air quality monitoring stations throughout the basin. SCAQMD, in coordination with the Southern California Association of Governments, is also responsible for developing, updating, and implementing the Air Quality Management Plan (AQMP) for the basin. An AQMP is a plan prepared and implemented by an air pollution district for a county or region designated as nonattainment of the federal and/or California ambient air quality standards. The term nonattainment area is used to refer to an air basin where one or more ambient air quality standards are exceeded.

Every three (3) years the SCAQMD prepares a new AQMP, updating the previous plan and having a 20-year horizon.

On March 23, 2017, CARB approved the 2016 AQMP. The 2016 AQMP is a regional blueprint for achieving the federal air quality standards and healthful air.

The 2016 AQMP includes both stationary and mobile source strategies to ensure that rapidly approaching attainment deadlines are met, that public health is protected to the maximum extent feasible, and that the region is not faced with burdensome sanctions if the Plan is not approved or if the NAAQS are not met on time. As with every AQMP, a comprehensive analysis of emissions, meteorology, atmospheric chemistry, regional growth projections, and the impact of existing control measures is updated with the latest data and methods. The most significant air quality challenge in the Basin is to reduce nitrogen oxide (NOx) emissions sufficiently to meet the upcoming ozone standard deadlines. The primary goal of the 2016 AQMP is to meet clean air standards and protect public health, including ensuring benefits to environmental justice and disadvantaged communities. Now that the plan has been approved by CARB, it has been forwarded to the U.S. Environmental Protection Agency for its review. If approved by EPA, the plan becomes federally enforceable.

South Coast AQMD has initiated the development of the 2022 AQMP to address the attainment of the 2015 8-hour ozone standard (70 ppb) for South Coast Air Basin and Coachella Valley. To support the development of mobile source strategies for the 2022 AQMP, South Coast AQMD, in conjunction with California Air Resources Board, has established Mobile Source Working Groups which are open to all interested parties.

South Coast Air Quality Management District Rules

The AQMP for the basin establishes a program of rules and regulations administered by SCAQMD to obtain attainment of the state and federal standards. Some of the rules and regulations that apply to this Project include, but are not limited to, the following:

SCAQMD Rule 402 prohibits a person from discharging from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which endanger the comfort, repose, health or safety of any such persons or the public, or which cause, or have a natural tendency to cause, injury or damage to business or property.

SCAQMD Rule 403 governs emissions of fugitive dust during construction and operation activities. Compliance with this rule is achieved through application of standard Best Management Practices, such as application of water or chemical stabilizers to disturbed soils, covering haul vehicles, restricting vehicle speeds on unpaved roads to 15 miles per hour, sweeping loose dirt from paved site access roadways, cessation of construction activity when winds exceed 25 mph, and establishing a permanent ground cover on finished sites.

Rule 403 requires that fugitive dust be controlled with best available control measures so that the presence of such dust does not remain visible in the atmosphere beyond the property line of the emission source. In addition, Rule 403 requires implementation of dust suppression techniques to prevent fugitive dust from creating a nuisance off site. Applicable suppression techniques are indicated below and include but are not limited to the following:

- Apply nontoxic chemical soil stabilizers according to manufacturers' specifications to all inactive construction areas (previously graded areas in active for 10 days or more).
- Water active sites at least three times daily.
- Cover all trucks hauling dirt, sand, soil, or other loose materials, or maintain at least 2 feet of freeboard in accordance with the requirements of California Vehicle Code (CVC) section 23114.
- Pave construction access roads at least 100 feet onto the site from the main road.
- Reduce traffic speeds on all unpaved roads to 15 mph or less.
- Suspension of all grading activities when wind speeds (including instantaneous wind gusts) exceed 25 mph.
- Bumper strips or similar best management practices shall be provided where vehicles enter and exit the construction site onto paved roads or wash off trucks and any equipment leaving the site each trip.
- Replanting disturbed areas as soon as practical.
- During all construction activities, construction contractors shall sweep on-site and off-site streets if silt is carried to adjacent public thoroughfares, to reduce the amount of particulate matter on public streets.

SCAQMD Rule 1113 governs the sale, use, and manufacturing of architectural coating and limits the VOC content in paints and paint solvents. This rule regulates the VOC content of paints available during construction. Therefore, all paints and solvents used during construction and operation of Project must comply with Rule 1113.

Idling Diesel Vehicle Trucks – Idling for more than 5 minutes in any one location is prohibited within California borders.

Rule 2702. The SCAQMD adopted Rule 2702 on February 6, 2009, which establishes a voluntary air quality investment program from which SCAQMD can collect funds from parties that desire certified GHG emission reductions, pool those funds, and use them to purchase or fund GHG emission reduction projects within two years, unless extended by the Governing Board. Priority will be given to projects that result in co-benefit emission reductions of GHG emissions and criteria or toxic air pollutants within environmental justice areas. Further, this voluntary program may compete with the cap-and-trade program identified for implementation in CARB's Scoping Plan, or a Federal cap and trade program.

2.2 Greenhouse Gas Regulatory Setting

2.2.1 International

Many countries around the globe have made an effort to reduce GHGs since climate change is a global issue.

Intergovernmental Panel on Climate Change. In 1988, the United Nations and the World Meteorological Organization established the Intergovernmental Panel on Climate Change to assess the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts, and options for adaptation and mitigation.

United Nations. The United States participates in the United Nations Framework Convention on Climate Change (UNFCCC) (signed on March 21, 1994). Under the Convention, governments gather and share information on greenhouse gas emissions, national policies, and best practices; launch national strategies for addressing greenhouse gas emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and cooperate in preparing for adaptation to the impacts of climate change.

The 2014 UN Climate Change Conference in Lima Peru provided a unique opportunity to engage all countries to assess how developed countries are implementing actions to reduce emissions.

Kyoto Protocol. The Kyoto Protocol is a treaty made under the UNFCCC and was the first international agreement to regulate GHG emissions. It has been estimated that if the commitments outlined in the Kyoto Protocol are met, global GHG emissions could be reduced by an estimated 5 percent from 1990 levels during the first commitment period of 2008 – 2012 (UNFCCC 1997). On December 8, 2012, the Doha Amendment to the Kyoto Protocol was adopted. The amendment includes: New commitments for Annex I Parties to the Kyoto Protocol who agreed to take on commitments in a second commitment period from 2013 – 2020; a revised list of greenhouse gases (GHG) to be reported on by Parties in the second commitment period; and Amendments to several articles of the Kyoto Protocol which specifically referenced issues pertaining to the first commitment period and which needed to be updated for the second commitment period.

2.2.2 National

Greenhouse Gas Endangerment. On December 2, 2009, the EPA announced that GHGs threaten the public health and welfare of the American people. The EPA also states that GHG emissions from on-road vehicles contribute to that threat. The decision was based on *Massachusetts v. EPA* (Supreme Court Case 05-1120) which argued that GHGs are air pollutants covered by the Clean Air Act and that the EPA has authority to regulate those emissions.

Clean Vehicles. Congress first passed the Corporate Average Fuel Economy law in 1975 to increase the fuel economy of cars and light duty trucks. The law has become more stringent over time. On May 19, 2009, President Obama put in motion a new national policy to increase fuel economy for all new cars and trucks sold in the United States. On April 1, 2010, the EPA and the Department of Transportation's National Highway Safety Administration announced a joint final rule establishing a national program that would reduce greenhouse gas emissions and improve fuel economy for new cars and trucks sold in the United States.

The first phase of the national program would apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016. They require these vehicles to meet an estimated combined average emissions level of 250 grams of carbon dioxide per mile, equivalent to 35.5 miles per gallon if the automobile industry were to meet this carbon dioxide level solely through fuel economy improvements. Together, these standards would cut carbon dioxide emissions by an estimated 960 million metric tons and 1.8 billion barrels of oil over the lifetime of the vehicles sold under the program (model years 2012-2016). The second phase of the national program would involve proposing new fuel economy and greenhouse gas standards for model years 2017 – 2025 by September 1, 2011.

On October 25, 2010, the EPA and the U.S. Department of Transportation proposed the first national standards to reduce greenhouse gas emissions and improve fuel efficiency of heavy-duty trucks and buses. For combination tractors, the agencies are proposing engine and vehicle standards that begin in the 2014 model year and achieve up to a 20 percent reduction in carbon dioxide emissions and fuel consumption by the 2018 model year. For heavy-duty pickup trucks and vans, the agencies are proposing separate gasoline and diesel truck standards, which phase in starting in the 2014 model year and achieve up to a 10 percent reduction for gasoline vehicles and 15 percent reduction for diesel vehicles by 2018 model year (12 and 17 percent respectively if accounting for air conditioning leakage). Lastly, for vocational vehicles, the agencies are proposing engine and vehicle standards starting in the 2014 model year which would achieve up to a 10 percent reduction in fuel consumption and carbon dioxide emissions by 2018 model year.

Issued by the National Highway Traffic Safety Administration (NHTSA) and EPA in March 2020 (published on April 30, 2020, and effective after June 29, 2020), the Safer Affordable Fuel-Efficient Vehicles Rule would maintain the Corporate Average Fuel Economy (CAFE) and CO2 standards applicable in model year 2020 for model years 2021 through 2026. The estimated CAFE and CO2 standards for model year 2020 are 43.7 mpg and 204 grams of CO2 per mile for passenger cars and 31.3 mpg and 284 grams of CO2 per mile for light trucks, projecting an overall industry average of 37 mpg, as compared to 46.7 mpg under the standards issued in 2012. This Rule also excludes CO2- equivalent emission improvements associated with air conditioning refrigerants and leakage (and, optionally, offsets for nitrous oxide and methane emissions) after model year 2020.[1]

Mandatory Reporting of Greenhouse Gases. On January 1, 2010, the EPA started requiring large emitters of heat-trapping emissions to begin collecting GHG data under a new reporting system. Under the rule, suppliers of fossil fuels or industrial greenhouse gases, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of greenhouse gas emissions are required to submit annual reports to the EPA.

Climate Adaption Plan. The EPA Plan identifies priority actions the Agency will take to incorporate considerations of climate change into its programs, policies, rules and operations to ensure they are effective under future climatic conditions. The following link provides more information on the EPA Plan: https://www.epa.gov/arc-x/planning-climate-change-adaptation

[1] National Highway Traffic Safety Administration (NHTSA) and U.S. Environmental Protection Agency (USEPA), 2018. Federal Register / Vol. 83, No. 165 / Friday, August 24, 2018 / Proposed Rules, The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule for Model Years 2021–2026 Passenger Cars and Light Trucks 2018. Available at: https://www.gpo.gov/fdsys/pkg/FR-2018-08-24/pdf/2018-16820.pdf.

2.2.3 California

California Code of Regulations (CCR) Title 24, Part 6. CCR Title 24, Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings (Title 24) were first established in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficiency technologies and methods. Although it was not originally intended to reduce GHG emissions, electricity production by fossil fuels results in GHG emissions and energy efficient buildings require less electricity. Therefore, increased energy efficiency results in decreased GHG emissions.

The Energy Commission adopted 2008 Standards on April 23, 2008, and Building Standards Commission approved them for publication on September 11, 2008. These updates became effective on August 1, 2009. 2013, 2016, and 2019 standards have been approved and became effective July 1, 2014, January 1, 2016, and January 1, 2020, respectively.

California Code of Regulations (CCR) Title 24, Part 11.
All buildings for which an application for a building permit is submitted on or after January 1, 2020, must follow the 2019 standards. Energy efficient buildings require less electricity; therefore, increased energy efficiency reduces fossil fuel consumption and decreases greenhouse gas emissions. The following links provide more information on Title 24, Part 11:
https://www.dgs.ca.gov/BSC/Codeshttps://www.energy.ca.gov/sites/default/files/2020-03/Title_24_2019_Building_Standards_FAQ_ada.pdf

California Green Building Standards.
On January 12, 2010, the State Building Standards Commission unanimously adopted updates to the California Green Building Standards Code, which went into effect on January 1, 2011. The Housing and Community Development (HCD) updated CALGreen through the 2015 Triennial Code Adoption Cycle, during the 2016 to 2017 fiscal year. During the 2019-2020 fiscal year, the Department of Housing and Community Development (HCD) updated CALGreen through the 2019 Triennial Code Adoption Cycle.

The Code is a comprehensive and uniform regulatory code for all residential, commercial and school buildings. CCR Title 24, Part 11: California Green Building Standards (Title 24) became effective in 2001 in response to continued efforts to reduce GHG emissions associated with energy consumption. CCR Title 24, Part 11 now require that new buildings reduce water consumption, employ building commissioning to increase building system efficiencies, divert construction waste from landfills, and install low pollutant-emitting finish materials. One focus of CCR Title 24, Part 11 is water conservation measures, which reduce GHG emissions by reducing electrical consumption associated with pumping and treating water. CCR Title 24, Part 11 has approximately 52 nonresidential mandatory measures and an additional 130 provisions for optional use. Some key mandatory measures for commercial occupancies include specified parking for clean air vehicles, a 20 percent reduction of potable water use within buildings, a 50 percent construction waste diversion from landfills, use of building finish materials that emit low levels of volatile organic compounds, and commissioning for new, nonresidential buildings over 10,000 square feet.

The 2019 CalGreen Code includes the following changes and/or additional regulations:

Single-family homes built with the 2019 standards will use about 7 percent less energy due to energy efficiency measures versus those built under the 2016 standards. Once rooftop solar electricity generation is factored in, homes built under the 2019 standards will use about 53 percent less energy than those under the 2016 standards. Nonresidential buildings will use about 30 percent less energy due mainly to lighting upgrades[2].

HCD modified the best management practices for stormwater pollution prevention adding Section 5.106.2 for projects that disturb one or more acres of land. This section requires projects that disturb one acre or more of land or less than one acre of land but are part of a larger common plan of development or sale must comply with the post-construction requirement detailed in the applicable National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities issued by the State Water Resources Control Board. The NPDES permits require post-construction runoff (post-project hydrology) to match the preconstruction runoff (pre-project hydrology) with installation of post-construction stormwater management measures.

HCD added sections 5.106.4.1.3 and 5.106.4.1.5 in regard to bicycle parking. Section 5.106.4.1.3 requires new buildings with tenant spaces that have 10 or more tenant-occupants, provide secure bicycle parking for 5 percent of the tenant-occupant vehicular parking spaces with a minimum of one bicycle parking facility. In addition, Section 5.106.4.1.5 states that acceptable bicycle parking facility for Sections 5.106.4.1.2 through 5.106.4.1.4 shall be convenient from the street and shall meeting one of the following: (1) covered, lockable enclosures with permanently anchored racks for bicycles; (2) lockable bicycle rooms with permanently anchored racks; or (3) lockable, permanently anchored bicycle lockers.

HCD amended section 5.106.5.3.5 allowing future charging spaces to qualify as designated parking for clean air vehicles.

HCD updated section 5.303.3.3 in regard to showerhead flow rates. This update reduced the flow rate to 1.8 GPM.

HCD amended section 5.304.1 for outdoor potable water use in landscape areas and repealed sections 5.304.2 and 5.304.3. The update requires nonresidential developments to comply with a local water efficient landscape ordinance or the current California Department of Water Resource's' Model Water

[2] https://ww2.energy.ca.gov/title24/2019standards/documents/2018_Title_24_2019_Building_Standards_FAQ.pdf

Efficient Landscape Ordinance (MWELO), whichever is more stringent. Some updates were also made in regard to the outdoor potable water use in landscape areas for public schools and community colleges.

HCD updated Section 5.504.5.3 in regard to the use of MERV filters in mechanically ventilated buildings. This update changed the filter use from MERV 8 to MERV 13.

The California Green Building Standards Code does not prevent a local jurisdiction from adopting a more stringent code as state law provides methods for local enhancements. The Code recognizes that many jurisdictions have developed existing construction and demolition ordinances, and defers to them as the ruling guidance provided, they provide a minimum 50-percent diversion requirement. The code also provides exemptions for areas not served by construction and demolition recycling infrastructure. State building code provides the minimum standard that buildings need to meet in order to be certified for occupancy. Enforcement is generally through the local building official. The following link provides more on CalGreen Building Standards:
http://www.bsc.ca.gov/Home/CALGreen.aspx

Executive Order S-3-05. California Governor issued Executive Order S-3-05, GHG Emission, in June 2005, which established the following targets:

- By 2010, California shall reduce greenhouse gas emissions to 2000 levels;
- By 2020, California shall reduce greenhouse gas emissions to 1990 levels; and
- By 2050, California shall reduce greenhouse gas emissions to 80 percent below 1990 levels.

The executive order directed the secretary of the California Environmental Protection Agency (CalEPA) to coordinate a multi-agency effort to reduce GHG emissions to the target levels. To comply with the Executive Order, the secretary of CalEPA created the California Climate Action Team (CAT), made up of members from various state agencies and commissions. The team released its first report in March 2006. The report proposed to achieve the targets by building on the voluntary actions of businesses, local governments, and communities and through State incentive and regulatory programs.

Executive Order S-01-07. Executive Order S-1-07 was issued in 2007 and proclaims that the transportation sector is the main source of GHG emissions in the State, since it generates more than 40 percent of the State's GHG emissions. It establishes a goal to reduce the carbon intensity of transportation fuels sold in the State by at least ten percent by 2020. This Order also directs CARB to determine whether this Low Carbon Fuel Standard (LCFS) could be adopted as a discrete early-action measure as part of the effort to meet the mandates in AB 32.

On April 23, 2009 CARB approved the proposed regulation to implement the low carbon fuel standard and began implementation on January 1, 2011. The low carbon fuel standard is anticipated to reduce GHG emissions by about 16 MMT per year by 2020. CARB approved some amendments to the LCFS in December 2011, which were implemented on January 1, 2013. In September 2015, the Board approved the re-adoption of the LCFS, which became effective on January 1, 2016, to address procedural deficiencies in the way the original regulation was adopted. In 2018, the Board approved amendments to the regulation, which included strengthening and smoothing the carbon intensity benchmarks through 2030 in-line with California's 2030 GHG emission reduction target enacted through SB 32, adding new crediting opportunities to promote zero emission vehicle adoption, alternative jet fuel, carbon capture and sequestration, and advanced technologies to achieve deep decarbonization in the transportation sector.

The LCFS is designed to encourage the use of cleaner low-carbon transportation fuels in California, encourage the production of those fuels, and therefore, reduce GHG emissions and decrease petroleum dependence in the transportation sector. Separate standards are established for gasoline and diesel fuels and the alternative fuels that can replace each. The standards are "back-loaded", with more reductions required in the last five years, than the first five years. This schedule allows for the development of advanced fuels that are lower in carbon than today's fuels and the market penetration of plug-in hybrid electric vehicles, battery electric vehicles, fuel cell vehicles, and flexible fuel vehicles. It is anticipated that compliance with the low carbon fuel standard will be based on a combination of both lower carbon fuels and more efficient vehicles.

Reformulated gasoline mixed with corn-derived ethanol at ten percent by volume and low sulfur diesel fuel represent the baseline fuels. Lower carbon fuels may be ethanol, biodiesel, renewable diesel, or blends of these fuels with gasoline or diesel as appropriate. Compressed natural gas and liquefied natural gas also may be low carbon fuels. Hydrogen and electricity, when used in fuel cells or electric vehicles are also considered as low carbon fuels for the low carbon fuel standard.

SB 97. Senate Bill 97 (SB 97) was adopted August 2007 and acknowledges that climate change is a prominent environmental issue that requires analysis under CEQA. SB 97 directed the Governor's Office of Planning and Research (OPR), which is part of the State Resource Agency, to prepare, develop, and transmit to CARB guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions, as required by CEQA, by July 1, 2009. The Resources Agency was required to certify and adopt those guidelines by January 1, 2010.

Pursuant to the requirements of SB 97 as stated above, on December 30, 2009, the Natural Resources Agency adopted amendments to the state CEQA guidelines that address GHG emissions. The CEQA Guidelines Amendments changed 14 sections of the CEQA Guidelines and incorporate GHG language throughout the Guidelines. However, no GHG emissions thresholds of significance are provided and no specific mitigation measures are identified. The GHG emission reduction amendments went into effect on March 18, 2010, and are summarized below:

- Climate action plans and other greenhouse gas reduction plans can be used to determine whether a project has significant impacts, based upon its compliance with the plan.
- Local governments are encouraged to quantify the greenhouse gas emissions of proposed projects, noting that they have the freedom to select the models and methodologies that best meet their needs and circumstances. The section also recommends consideration of several qualitative factors that may be used in the determination of significance, such as the extent to which the given Project complies with state, regional, or local GHG reduction plans and policies. OPR does not set or dictate

specific thresholds of significance. Consistent with existing CEQA Guidelines, OPR encourages local governments to develop and publish their own thresholds of significance for GHG impacts assessment.

- When creating their own thresholds of significance, local governments may consider the thresholds of significance adopted or recommended by other public agencies, or recommended by experts.
- New amendments include guidelines for determining methods to mitigate the effects of greenhouse gas emissions in Appendix F of the CEQA Guidelines.
- OPR is clear to state that "to qualify as mitigation, specific measures from an existing plan must be identified and incorporated into the Project; general compliance with a plan, by itself, is not mitigation."
- OPR's emphasizes the advantages of analyzing GHG impacts on an institutional, programmatic level. OPR therefore approves tiering of environmental analyses and highlights some benefits of such an approach.
- Environmental impact reports (EIRs) must specifically consider a project's energy use and energy efficiency potential.

AB 32. The California State Legislature enacted AB 32, the California Global Warming Solutions Act of 2006. AB 32 requires that greenhouse gases emitted in California be reduced to 1990 levels by the year 2020. "Greenhouse gases" as defined under AB 32 include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. CARB is the state agency charged with monitoring and regulating sources of greenhouse gases. AB 32 states the following:

> Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems.

The CARB Board approved the 1990 greenhouse gas emissions level of 427 million metric tons of carbon dioxide equivalent (MMTCO2e) on December 6, 2007 (California Air Resources Board 2007). Therefore, emissions generated in California in 2020 are required to be equal to or less than 427 MMTCO2e. Emissions in 2020 in a "business as usual" scenario are estimated to be 596 MMTCO2e.

Under AB 32, CARB published its Final Expanded List of Early Action Measures to Reduce Greenhouse Gas Emissions in California. Discrete early action measures are currently underway or are enforceable by January 1, 2010. CARB has 44 early action measures that apply to the transportation, commercial, forestry, agriculture, cement, oil and gas, fire suppression, fuels, education, energy efficiency, electricity, and waste sectors. Of these early action measures, nine are considered discrete early action measures, as they are regulatory and enforceable by January 1, 2010. CARB estimates that the 44 recommendations are expected to result in reductions of at least 42 MMTCO2e by 2020, representing approximately 25 percent of the 2020 target.

CARB's Climate Change Scoping Plan (Scoping Plan) contains measures designed to reduce the State's emissions to 1990 levels by the year 2020 (California Air Resources Board 2008). The Scoping Plan identifies recommended measures for multiple greenhouse gas emission sectors and the associated emission reductions needed to achieve the year 2020 emissions target—each sector has a different emission reduction target. Most of the measures target the transportation and electricity sectors. As stated in the Scoping Plan, the key elements of the strategy for achieving the 2020 greenhouse gas target include:

- Expanding and strengthening existing energy efficiency programs as well as building and appliance standards;
- Achieving a statewide renewables energy mix of 33 percent;
- Developing a California cap-and-trade program that links with other Western Climate Initiative partner programs to create a regional market system;
- Establishing targets for transportation-related greenhouse gas emissions for regions throughout California and pursuing policies and incentives to achieve those targets;
- Adopting and implementing measures pursuant to existing State laws and policies, Including California's clean car standards, goods movement measures, and the Low Carbon Fuel Standard; and
- Creating targeted fees, including a public goods charge on water use, fees on high global warming potential gases, and a fee to fund the administrative costs of the State's long-term commitment to AB 32 implementation.

In addition, the Scoping Plan differentiates between "capped" and "uncapped" strategies. "Capped" strategies are subject to the proposed cap-and-trade program. The Scoping Plan states that the inclusion of these emissions within the cap-and trade program will help ensure that the year 2020 emission targets are met despite some degree of uncertainty in the emission reduction estimates for any individual measure. Implementation of the capped strategies is calculated to achieve a sufficient amount of reductions by 2020 to achieve the emission target contained in AB 32. "Uncapped" strategies that will not be subject to the cap-and-trade emissions caps and requirements are provided as a margin of safety by accounting for additional greenhouse gas emission reductions.[4]

Senate Bill 100. Senate Bill 100 (SB 100) requires 100 percent of total retail sales of electricity in California to come from eligible renewable energy resources and zero-carbon resources by December 31, 2045. SB 100 was adopted September 2018.

The interim thresholds from prior Senate Bills and Executive Orders would also remain in effect. These include Senate Bill 1078 (SB 1078), which requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 20 percent of their supply from renewable sources by 2017. Senate Bill 107 (SB 107) which changed the target date to 2010. Executive Order S-14-08, which was signed on November 2008 and expanded the State's Renewable Energy Standard to 33 percent renewable energy by 2020. Executive Order S-21-09 directed CARB to adopt regulations by July 31, 2010 to enforce S-14-08. Senate Bill X1-2 codifies the 33 percent renewable energy requirement by 2020.

SB 375. Senate Bill 375 (SB 375) was adopted September 2008 and aligns regional transportation planning efforts, regional GHG emission reduction targets, and land use and housing allocation. SB 375 requires Metropolitan Planning Organizations (MPO) to adopt a sustainable communities strategy (SCS) or alternate planning strategy (APS) that will prescribe land use allocation in that MPOs Regional Transportation Plan (RTP). CARB, in consultation with each MPO, will provide each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in the region for the years 2020 and 2035. These reduction targets will be updated every eight years but can be updated every four years if advancements in emissions technologies affect the reduction strategies to achieve the targets. CARB is also charged with reviewing each MPO's sustainable communities strategy or alternate planning strategy for consistency with its assigned targets.

The proposed Project is located within the Southern California Association of Governments (SCAG), which has authority to develop the SCS or APS. For the SCAG region, the targets set by CARB are at eight percent below 2005 per capita GHG emissions levels by 2020 and 13 percent below 2005 per capita GHG emissions levels by 2035. On April 4, 2012, SCAG adopted the 2012-2035 Regional Transportation Plan / Sustainable Communities Strategy (RTP/SCS), which meets the CARB emission reduction requirements.

On September 3, 2020, SCAG's Regional Council approved and fully adopted the Connect SoCal (2020–2045 Regional Transportation Plan/Sustainable Communities Strategy), and the addendum to the Connect SoCal Program Environmental Impact Report. Connect SoCal is a long-range visioning plan that builds upon and expands land use and transportation strategies established over several planning cycles to increase mobility options and achieve a more sustainable growth pattern. Connect SoCal outlines more than $638 billion in transportation system investments through 2045. Connect SoCal is supported by a combination of transportation and land use strategies that help the region achieve state greenhouse gas emission reduction goals and federal Clean Air Act requirements, preserve open space areas, improve public health and roadway safety, support our vital goods movement industry and utilize resources more efficiently. By integrating the Forecasted Development Pattern with a suite of financially constrained transportation investments, Connect SoCal can reach the regional target of reducing greenhouse gases, or GHGs, from autos and light-duty trucks by 8 percent per capita by 2020, and 19 percent by 2035 (compared to 2005 levels).

City and County land use policies, including General Plans, are not required to be consistent with the RTP and associated SCS or APS. However, new provisions of CEQA would incentivize, through streamlining and other provisions, qualified projects that are consistent with an approved SCS or APS and categorized as "transit priority projects."

Assembly Bill 939, Assembly Bill, and Senate Bill 1374. Assembly Bill 939 (AB 939) requires that each jurisdiction in California to divert at least 50 percent of its waste away from landfills, whether through waste reduction, recycling or other means. AB 341 requires at least 75 percent of generated waste be source reduced, recycled, or composted by the year 2020. Senate Bill 1374 (SB 1374) requires the California Integrated Waste Management Board to adopt a model ordinance by March 1, 2004 suitable for adoption by any local agency to require 50 to 75 percent diversion of construction and demolition of waste materials from landfills.

Executive Order S-13-08. Executive Order S-13-08 indicates that "climate change in California during the next century is expected to shift precipitation patterns, accelerate sea level rise and increase temperatures, thereby posing a serious threat to California's economy, to the health and welfare of its population and to its natural resources." Pursuant to the requirements in the order, the 2009 California Climate Adaptation Strategy (California Natural Resource Agency 2009) was adopted, which is the "… first statewide, multi-sector, region-specific, and information-based climate change in California, identifying and exploring strategies to adapt to climate change, and specifying a direction for future research.

Executive Order B-30-15. Executive Order B-30-15, establishing a new interim statewide greenhouse gas emission reduction target to reduce greenhouse gas emissions to 40 percent below 1990 levels by 2030, was signed by Governor Brown in April 2015.

Executive Order B-29-15. Executive Order B-29-15, mandates a statewide 25% reduction in potable water usage and was signed into law on April 1, 2015.

Executive Order B-37-16. Executive Order B-37-16, continuing the State's adopted water reduction, was signed into law on May 9, 2016. The water reduction builds off the mandatory 25% reduction called for in EO B-29-15.

Executive Order N-79-20. Executive Order N-79-20 was signed into law on September 23, 2020 and mandates 100 percent of in-state sales of new passenger cars and trucks be zero-emission by 2035; 100 percent of medium- and heavy-duty vehicles in the state be zero-emission vehicles by 2045 for all operations where feasible and by 2035 for drayage trucks; and to transition to 100 percent zero-emission off-road vehicles and equipment by 2035 where feasible.

2.2.4 South Coast Air Quality Management District

The Project is within the South Coast Air Basin, which is under the jurisdiction of SCAQMD. SCAQMD Regulation XXVII currently includes three rules:

- The purpose of Rule 2700 is to define terms and post global warming potentials.
- The purpose of Rule 2701, SoCal Climate Solutions Exchange, is to establish a voluntary program to encourage, quantify, and certify voluntary, high quality certified greenhouse gas emission reductions in the SCAQMD.
- Rule 2702, Greenhouse Gas Reduction Program, was adopted on February 6, 2009. The purpose of this rule is to create a Greenhouse Gas Reduction Program for greenhouse gas emission reductions in the SCAQMD. The SCAQMD will fund projects through contracts in response to requests for proposals or purchase reductions from other parties.

SCAQMD Threshold Development

The SCAQMD has established recommended significance thresholds for greenhouse gases for local lead agency consideration (“SCAQMD draft local agency threshold”). SCAQMD has published a five-tiered draft GHG threshold which includes a 10,000 metric ton of CO_2e per year for stationary/industrial sources and 3,000 metric tons of CO_2e per year significance threshold for residential/commercial projects (South Coast Air Quality Management District 2010c). Tier 3 is anticipated to be the primary tier by which the SCAQMD will determine significance for projects. The Tier 3 screening level for stationary sources is based on an emission capture rate of 90 percent for all new or modified projects. A 90-precent emission capture rate means that 90 percent of total emissions from all new or modified stationary source projects would be subject to CEQA analysis. The 90-percent capture rate GHG significance screening level in Tier 3 for stationary sources was derived using the SCAQMD’s annual Emissions Reporting Program.

The current draft thresholds consist of the following tiered approach:

- Tier 1 consists of evaluating whether or not the Project qualifies for any applicable exemption under CEQA.
- Tier 2 consists of determining whether or not the Project is consistent with a greenhouse gas reduction plan. If a project is consistent with a qualifying local greenhouse gas reduction plan, it does not have significant greenhouse gas emissions.
- Tier 3 consists of screening values, which the lead agency can choose but must be consistent. A project’s construction emissions are averaged over 30 years and are added to a project’s operational emissions. If a project’s emissions are under one of the following screening thresholds, then the project is less than significant:
    - All land use types: 3,000 MTCO2e per year; and
    - Based on land use types: residential is 3,500 MTCO2e per year; commercial is 1,400 MTCO2e per year; and mixed use is 3,000 MTCO2e per year
- Tier 4 has the following options:
    - Option 1: Reduce emissions from business as usual by a certain percentage; this percentage is currently undefined;
    - Option 2: Early implementation of applicable AB 32 Scoping Plan measures;
    - Option 3: Year 2020 target for service populations (SP), which includes residents and employees: 4.8 MTCO2e/SP/year for projects and 6.6 MTCO2e/SP/year for plans; or
    - Option 3, 2035 target: 3.0 MTCO2e/SP/year for projects and 4.1 MTCO2e/SP/year for plans
- Tier 5 involves mitigation offsets to achieve target significance threshold.

2.2.5 County of San Bernardino

County of San Bernardino Climate Action Plan

The County of San Bernardino adopted its “Greenhouse Gas Emissions Reduction Plan” in December in 2011. An update to the GHG Emissions Development Review Process was made in 2015. The purpose of the GHG Plan is to reduce the County's internal and external GHG emissions by 15 percent below current (2011) levels by year 2020. The GHG Plan includes a two-tiered development review procedure to determine if a project could result in a significant impact related greenhouse gas emissions or otherwise comply with the Plan pursuant to Section 15183.5 of the state CEQA Guidelines.

The initial screening procedure is to determine if a project will emit 3,000 metric tons of carbon dioxide equivalent (MTCO2e) per year or more. Projects that do not exceed this threshold require no further climate change analysis. Projects exceeding this threshold must meet a minimum 31 percent emissions reduction in order to garner a less than significant determination. This can be met by either (1) achieving 100 points from a menu of mitigation options provided in the GHG Plan or (2) quantifying proposed reduction measures. Projects failing to meet the 31 percent reduction threshold would have a potentially significant impact related to climate change and greenhouse gas emissions. An update to the GHG Emissions Development Review Process was made in March 2015 to both improve upon the menu of options available in the screening tables and to bring performance standards up to current code.

Therefore, to determine whether the Project's GHG emissions are significant, this analysis uses the County of San Bernardino and SCAQMD draft local agency tier 3 threshold screening threshold of 3,000 MTCO2e per year for all land use types.

The Project will be subject to the latest requirements of the California Green Building and Title 24 Energy Efficiency Standards (currently 2019) which would reduce Project-related greenhouse gas emissions.

2.2.6 City of Chino Hills

City of Chino Hills General Plan

The City's General Plan includes various policies related to reducing greenhouse gas emissions. The applicable policies to the Project are listed below.

Goal CN-3 Promote Sustainable Practices that Conserve Natural Resources and Reduce Greenhouse Gas Emissions.

Policies

Policy CN-3.1: Endorse green building design in new and existing construction.

Action CN-3.1.1: Implement green building policies that promote increased use of energy efficiency, alternative energy, recycled materials, renewable resources, local materials, water efficiency, and pollution reduction.

Action CN-3.1.2: Establish programs that encourage homeowners to reduce energy consumption.

Action CN-3.1.3: Seek available funding sources that can be applied toward green building programs.

Action CN-3.1.4: Coordinate with state and regional agencies to ensure that alternative energy facilities are compatible with Chino Hills' natural and built environment.

Policy CN-3.2: Develop and implement a Climate Action Plan.

Action CN-3.2.1: Reduce greenhouse gas emissions in City operations.

Action CN-3.2.2: Power City vehicles and equipment with reduced carbon dioxide emission fuels.

Action CN-3.2.3: Provide Climate Action Plan information and resources to the Chino Hills community.

Goal CN-6 Promote Clean Air to Reduce Adverse Effects on Human Health and the Environment.

Policies

Policy CN-6.1: Reduce air pollution through coordinated land use, transportation, and energy use planning.

Action CN-6.1.1: Endorse regional air quality and transportation management plans in order to reduce air pollution emissions and vehicle trips.

Action CN-6.1.2: Encourage multifamily development to develop close to existing/planned transit and commercial areas to encourage pedestrian and nonautomobile traffic.

Action CN-6.1.3: Promote transit that serves the City and links to adjacent cities and counties.

Action CN-6.1.4: Provide commercial areas that are conducive to pedestrian and bicycle circulation.

Policy CN-6.2: Reduce air pollution impacts on health.

Action CN-6.2.1: Encourage compliance with CARB "Air Quality and Land Use Handbook: A Community Health Perspective," which provides guidelines for siting new sensitive land uses in proximity to air pollutant emitting sources.

Action CN-6.2.2: Require businesses to limit air pollution emissions in compliance with state and regional regulations and to reduce health impacts on sensitive land uses.

Action CN-6.2.3: Require businesses to limit odor emissions to eliminate or reduce nuisance impacts on sensitive land uses.

Policy CN-6.3: Reduce air pollution emissions from construction activities.

Action CN-6.3.1: Require preparation of air quality analyses of construction-related air quality impacts using the latest available air emissions model or other analytical method determined in conjunction with SCAQMD for all projects subject to the California Environmental Quality Act (CEQA). If such analyses identify potentially significant regional or local air quality impacts, require the incorporation of appropriate mitigation to reduce such impacts.

Action CN-6.3.2: Encourage large construction projects to mitigate diesel exhaust emissions through the use of alternative fuels and control devices.

Action CN-6.3:3: Require dust abatement actions for all new construction and redevelopment projects.

Policy CN-6.4: Reduce air pollution emissions from new development.

Action CN-6.4.1: Require preparation of air quality analyses that analyze operational air quality impacts using the latest available air emissions model or other analytical method determined in conjunction with SCAQMD for all projects subject to the California Environmental Quality Act (CEQA). If such analyses identify potentially significant regional or local air quality impacts, require the incorporation of appropriate mitigation to reduce such impacts.

3.0 Setting

3.1 Existing Physical Setting

The Project site is located in the City of Chino Hills within the southwestern portion of County of San Bernardino, which is part of the South Coast Air Basin (SCAB) that includes all of Orange County as well as the non-desert portions of Los Angeles, Riverside, and San Bernardino Counties. The South Coast Air Basin is located on a coastal plain with connecting broad valleys and low hills to the east. Regionally, the South Coast Air Basin is bounded by the Pacific Ocean to the southwest and high mountains to the east forming the inland perimeter.

3.1.1 Local Climate and Meteorology

Dominant airflows provide the driving mechanism for transport and dispersion of air pollution. The mountains surrounding the region form natural horizontal barriers to the dispersion of air contaminants. Air pollution created in the coastal areas and around the Los Angeles area is transported inland until it reaches the mountains where the combination of mountains and inversion layers generally prevent further dispersion. This poor ventilation results in a gradual degradation of air quality from the coastal areas to inland areas. Air stagnation may occur during the early evening and early morning periods of transition between day and nighttime flows. The region also experiences periods of hot, dry winds from the desert, known as Santa Ana winds. If the Santa Ana winds are strong, they can surpass the sea breeze, which blows from the ocean to the land, and carry the suspended dust and pollutants out to the ocean. If the winds are weak, they are opposed by the sea breeze and cause stagnation, resulting in high pollution events.

The annual average temperature varies little throughout much of the basin, ranging from the low to middle 60s, measured in degrees Fahrenheit (°F). With more pronounced oceanic influence, coastal areas show less variability in annual minimum and maximum temperatures than inland areas where the Project site is located. The majority of the annual rainfall in the basin occurs between November and April. Summer rainfall is minimal and is generally limited to scattered thunderstorms in the coastal regions and slightly heavier showers in the eastern portion of the basin along the coastal side of the mountains. Year-to-year patterns in rainfall are unpredictable because of fluctuations in the weather.

Temperature inversions limit the vertical depth through which pollution can be mixed. Among the most common temperature inversions in the basin are radiation inversions, which form on clear winter nights when cold air off mountains sink to the valley floor while the air aloft over the valley remains warm. These inversions, in conjunction with calm winds, trap pollutants near the source. Other types of temperature inversions that affect the basin include marine, subsidence, and high-pressure inversions.

Summers are often periods of hazy visibility and occasionally unhealthful air. Strong temperature inversions may occur that limit the vertical depth through which air pollution can be dispersed. Air pollutants concentrate because they cannot rise through the inversion layer and disperse. These inversions are more common and persistent during the summer months. Over time, sunlight produces photochemical reactions within this inversion layer that creates ozone, a particularly harmful air pollutant. Occasionally, strong thermal convections occur which allows the air pollutants to rise high enough to pass over the mountains and ultimately dilute the smog cloudtrap pollutants such as automobile exhaust near their source. While these inversions may lead to air pollution "hot spots" in heavily developed coastal areas of the basin, there is not enough traffic in inland valleys to cause any winter air pollution problems. Despite light wind conditions, especially at night and in the early morning, winter is generally a period of good air quality in the Project vicinity.

In the winter, light nocturnal winds result mainly from the drainage of cool air off of the mountains toward the valley floor while the air aloft over the valley remains warm. This forms a type of inversion known as a radiation inversion. Such winds are characterized by stagnation and poor local mixing and trap pollutants such as automobile exhaust near their source. While these inversions may lead to air pollution "hot spots" in heavily developed coastal areas of the basin, there is not enough traffic to cause any winter air pollution problems. Despite light wind conditions, especially at night and in the early morning, winter is generally a period of good air quality in the Project vicinity.

The temperature and precipitation levels for the City of Yorba Linda, the closest monitoring station to the Project site with available meteorological data, are in Table 3. Table 3 shows that August is typically the warmest month and January is typically the coolest month. Rainfall in the Project area varies considerably in both time and space. Almost all the annual rainfall comes from the fringes of mid-latitude storms from late November to early April, with summers being almost completely dry.

Table 3: Meteorological Summary

Month	Temperature (˚F)		Average Precipitation (inches)
	Average High	Average Low	
January	66.9	41.7	2.99
February	68.4	43.3	3.10
March	70.6	44.2	2.37
April	73.5	46.7	1.11
May	76.5	51.0	0.30
June	81.3	54.6	0.04
July	87.9	58.2	0.01
August	88.4	58.5	0.10
September	86.5	56.2	0.31
October	80.6	52.2	0.53
November	74.6	46.8	1.31
December	68.6	42.7	2.21
Annual Average	**77.0**	**49.7**	**14.4**

Notes:
[1] Source: https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca9847

3.1.2 Local Air Quality

The SCAQMD is divided into 38 air-monitoring areas with a designated ambient air monitoring station representative of each area. The Project site is located in the City of Chino Hills in the Southwest San Bernardino Valley (Area 33). The nearest air monitoring station to the Project site with available air quality data is the Upland Station located approximately 13 miles northeast of the Project site; however, this location does not provide all ambient weather data. Therefore, additional data was pulled from the SCAQMD historical data for the Southwest San Bernardino Valley (Area 33) for both sulfur dioxide and carbon monoxide to provide the existing levels. Table 4 presents the monitored pollutant levels within the vicinity. However, it should be noted that due to the air monitoring station distance from the Project site, recorded air pollution levels at the air monitoring station reflect with varying degrees of accuracy, local air quality conditions at the Project site.

Table 4: Local Area Air Quality Levels from the Upland Monitoring Station

Pollutant (Standard)[2]	Year		
	2018	**2019**	**2020**
Ozone:			
Maximum 1-Hour Concentration (ppm)	0.133	0.131	0.158
Days > CAAQS (0.09 ppm)	**25**	**31**	**82**
Maximum 8-Hour Concentration (ppm)	0.112	0.107	0.124
Days > NAAQS (0.07 ppm)	**52**	**52**	**116**
Days > CAAQS (0.070 ppm)	**54**	**54**	**118**
Carbon Monoxide:			
Maximum 1-Hour Concentration (ppm)	1.2	1.5	1.5
Days > NAAQS (20 ppm)	0	0	0
Maximum 8-Hour Concentration (ppm)	1.6	1.1	1.2
Days > NAAQS (9 ppm)	0	0	0
Nitrogen Dioxide:			
Maximum 1-Hour Concentration (ppm)	0.059	0.058	0.055
Days > NAAQS (0.25 ppm)	0	0	0
Sulfur Dioxide:			
Maximum 1-Hour Concentration (ppm)[3]	*	*	*
Days > CAAQS (0.04 ppm)[3]	*	*	*
Inhalable Particulates (PM10):			
Maximum 24-Hour Concentration (ug/m^3)	156.6	125.9	174.8
Days > NAAQS (150 ug/m^3)	1	0	1
Days > CAAQS (50 ug/m^3) [3]	*	*	*
Annual Average (ug/m^3)	33.4	29.0	33.5
Annual > NAAQS (50 ug/m^3)	No	No	No
Annual > CAAQS (20 ug/m^3)	**Yes**	**Yes**	**Yes**
Ultra-Fine Particulates (PM2.5):			
Maximum 24-Hour Concentration (ug/m^3)	47.9	91.1	74.0
Days > NAAQS (35 ug/m^3) [3]	*	*	*
Annual Average (ug/m^3) [3]	*	*	*
Annual > NAAQS (15 ug/m^3) [3]	*	*	*
Annual > CAAQS (12 ug/m^3) [3]	*	*	*

1. Source: obtained from https://www.aqmd.gov/home/air-quality/air-quality-data-studies/historical-data-by-year and /or https://www.arb.ca.gov/adam/topfour/topfour1.php

[2] CAAQS = California Ambient Air Quality Standard; NAAQS = National Ambient Air Quality Standard; ppm = parts per million

[3] No data available.

The monitoring data presented in Table 4 shows that ozone and particulate matter (PM10 and PM2.5) are the air pollutants of primary concern in the Project area, which are detailed below.

Ozone

During the 2018 to 2020 monitoring period, the State 1-hour concentration standard for ozone has been exceeded between 31 and 82 days each year at the Upland Station. The State 8-hour concentration standard for ozone has been exceeded between 38 and 47 days each year over the past three years at the Upland Station. The Federal 8-hour concentration standard for ozone has been exceeded between 54 and 118 days each year over the past three years at the Upland Station.

Ozone is a secondary pollutant as it is not directly emitted. Ozone is the result of chemical reactions between other pollutants, most importantly hydrocarbons and NO_2, which occur only in the presence of bright sunlight. Pollutants emitted from upwind cities react during transport downwind to produce the oxidant concentrations experienced in the area. Many areas of the SCAQMD contribute to the ozone levels experienced at the monitoring station, with the more significant areas being those directly upwind.

Carbon Monoxide

CO is another important pollutant that is due mainly to motor vehicles. The Southwest San Bernardino Valley Area did not record an exceedance of the state or federal 1-hour or 8-hour CO standards for the last three years.

Nitrogen Dioxide

The Upland Station did not record an exceedance of the State or Federal NO_2 standards for the last three years.

Sulfur Dioxide

The Southwest San Bernardino Valley area did not record an exceedance of the State SO_2 standards for the last three years.

Particulate Matter

During the 2018 to 2020 monitoring period, the Upland Station did not record an exceedance of the State 24-hour concentration standard for PM10. Over the same time period the Federal 24-hour standard for PM10 was exceeded one day each in 2018 and 2020 at the Upland Station.

During the 2018 to 2020 monitoring period, the Upland Station did not record an exceedance of the Federal 24-hour standard for PM2.5.

According to the EPA, some people are much more sensitive than others to breathing fine particles (PM10 and PM2.5). People with influenza, chronic respiratory and cardiovascular diseases, and the elderly may suffer worsening illness and premature death due to breathing these fine particles. People with bronchitis can expect aggravated symptoms from breathing in fine particles. Children may experience decline in lung function due to breathing in PM10 and PM2.5. Other groups considered sensitive are smokers and people who cannot breathe well through their noses. Exercising athletes are also considered sensitive because many breathe through their mouths during exercise.

3.1.3 Attainment Status

The EPA and CARB designate air basins where ambient air quality standards are exceeded as "nonattainment" areas. If standards are met, the area is designated as an "attainment" area. If there is inadequate or inconclusive data to make a definitive attainment designation, they are considered "unclassified." National nonattainment areas are further designated as marginal, moderate, serious, severe, or extreme as a function of deviation from standards. Each standard has a different definition, or 'form' of what constitutes attainment, based on specific air quality statistics. For example, the Federal 8-hour CO standard is not to be exceeded more than once per year; therefore, an area is in attainment of the CO standard if no more than one 8-hour ambient air monitoring values exceeds the threshold per year. In contrast, the federal annual PM2.5 standard is met if the three-year average of the annual average PM2.5 concentration is less than or equal to the standard. Table 5 lists the attainment status for the criteria pollutants in the basin.

Table 5: South Coast Air Basin Attainment Status

Pollutant	Standard[1]	Averaging Time	Designation[2]	Attainment Date[3]
1-Hour Ozone	NAAQS	1979 1-Hour (0.12 ppm)	Nonattainment (Extreme)	2/6/2023 (not attained)[4]
	CAAQS	1-Hour (0.09 ppm)	Nonattainment	N/A
8-Hour Ozone[5]	NAAQS	1997 8-Hour (0.08 ppm)	Nonattainment (Extreme)	6/15/2024
	NAAQS	2008 8-Hour (0.075 ppm)	Nonattainment (Extreme)	7/20/2032
	NAAQS	2015 8-Hour (0.070 ppm)	Nonattainment (Extreme)	8/3/2038
	CAAQS	8-Hour (0.070 ppm)	Nonattainment	Beyond 2032
CO	NAAQS	1-Hour (35 ppm)	Attainment (Maintenance)	6/11/2007 (attained)
	CAAQS	8-Hour (9 ppm)	Attainment	6/11/2007 (attained)
NO_2 [6]	NAAQS	1-Hour (0.1 ppm)	Unclassifiable/Attainment	N/A (attained)
	NAAQS	Annual (0.053 ppm)	Attainment (Maintenance)	9/22/1998 (attained)
	CAAQS	1-hour (0.18 ppm) Annual (0.030 ppm)	Attainment	-
SO_2[7]	NAAQS	1-Hour (75 ppb)	Designations Pending (expect Uncl./Attainment)	N/A (attained)
	NAAQS	24-Hour (0.14 ppm) Annual (0.03 ppm)	Unclassifiable/Attainment	3/19/1979 (attained)
PM10	NAAQS	1987 24-Hour (150 µg/m^3)	Attainment (Maintenance)[8]	7/26/2013 (attained)
	CAAQS	24-Hour (50 µg/m^3) Annual (20 µg/m^3)	Nonattainment	N/A
PM2.5 [9]	NAAQS	2006 24-Hour (35 µg/m^3)	Nonattainment (Serious)	12/31/2019

	NAAQS	1997 Annual ($15.0 \mu g/m^3$)	Attainment	8/24/2016
	NAAQS	2021 Annual ($12.0 \mu g/m^3$)	Nonattainment (Serious)	12/31/2025
	CAAQS	Annual ($12.0 \mu g/m^3$)	Nonattainment	N/A
Lead	NAAQS	3-Months Rolling ($0.15 \mu g/m^3$)	Nonattainment (Partial)[10]	12/31/2015

Notes:
Source: http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/naaqs-caaqs-feb2016.pdf
[1] NAAQS = National Ambient Air Quality Standards, CAAQS = California Ambient Air Quality Standards
[2] U.S. EPA often only declares Nonattainment areas; everywhere else is listed as Unclassifiable/Attainment or Unclassifiable.
[3] A design value below the NAAQS for data through the full year or smog season prior to the attainment date is typically required for attainment demonstration.
[4] 1-hour O3 standard (0.12 ppm) was revoked, effective June 15, 2005; however, the Basin has not attained this standard based on 2008-2010 data and is still subject to anti-backsliding requirements.
[5] 1997 8-hour O3 standard (0.08 ppm) was reduced (0.075 ppm), effective May 27, 2008; the revoked 1997 O3 standard is still subject to anti-backsliding requirements.
[6] New NO2 1-hour standard, effective August 2, 2010; attainment designations January 20, 2012; annual NO2 standard retained.
[7] The 1971 annual and 24-hour SO2 standards were revoked, effective August 23, 2010; however, these 1971 standards will remain in effect until one year after U.S. EPA promulgates area designations for the 2010 SO2 1-hour standard. Area designations are still pending, with Basin expected to be designated Unclassifiable /Attainment.
[8] Annual PM10 standard was revoked, effective December 18, 2006; 24-hour PM10 NAAQS deadline was 12/31/2006; SCAQMD request for attainment redesignation and PM10 maintenance plan was approved by U.S. EPA on June 26, 2013, effective July 26, 2013.
[9] Attainment deadline for the 2006 24-Hour PM2.5 NAAQS (designation effective December 14, 2009) is December 31, 2019 (end of the 10th calendar year after effective date of designations for Serious nonattainment areas). Annual PM2.5 standard was revised on January 15, 2013, effective March 18, 2013, from 15 to 12 µg/m3. Designations effective April 15, 2015, so Serious area attainment deadline is December 31, 2025.
[10] Partial Nonattainment designation – Los Angeles County portion of Basin only for near-source monitors. Expect redesignation to attainment based on current monitoring data.

3.2 Greenhouse Gases

Constituent gases of the Earth's atmosphere, called atmospheric greenhouse gases (GHG), play a critical role in the Earth's radiation amount by trapping infrared radiation emitted from the Earth's surface, which otherwise would have escaped to space. Prominent greenhouse gases contributing to this process include carbon dioxide (CO_2), methane (CH_4), ozone, water vapor, nitrous oxide (N_2O), and chlorofluorocarbons (CFCs). This phenomenon, known as the Greenhouse Effect, is responsible for maintaining a habitable climate. Anthropogenic (caused or produced by humans) emissions of these greenhouse gases in excess of natural ambient concentrations are responsible for the enhancement of the Greenhouse Effect and have led to a trend of unnatural warming of the Earth's natural climate, known as global warming or climate change. Emissions of gases that induce global warming are attributable to human activities associated with industrial/manufacturing, agriculture, utilities, transportation, and residential land uses. Transportation is responsible for 41 percent of the State's greenhouse gas emissions, followed by electricity generation. Emissions of CO_2 and nitrous oxide (NO_2) are byproducts of fossil fuel combustion. Methane, a potent greenhouse gas, results from off-gassing associated with agricultural practices and landfills. Sinks of CO_2, where CO_2 is stored outside of the atmosphere, include uptake by vegetation and dissolution into the ocean. Table 6 provides a description of each of the greenhouse gases and their global warming potential.

Additional information is available: https://www.arb.ca.gov/cc/inventory/data/data.htm

Table 6: Description of Greenhouse Gases

Greenhouse Gas	Description and Physical Properties	Sources
Nitrous oxide	Nitrous oxide (N_20),also known as laughing gas is a colorless gas. It has a lifetime of 114 years. Its global warming potential is 298.	Microbial processes in soil and water, fuel combustion, and industrial processes. In addition to agricultural sources, some industrial processes (nylon production, nitric acid production) also emit N_20.
Methane	Methane (CH_4) is a flammable gas and is the main component of natural gas. It has a lifetime of 12 years. Its global warming potential is 25.	A natural source of CH_4 is from the decay of organic matter. Methane is extracted from geological deposits (natural gas fields). Other sources are from the decay of organic material in landfills, fermentation of manure, and cattle farming.
Carbon dioxide	Carbon dioxide (CO_2) is an odorless, colorless, natural greenhouse gas. Carbon dioxide's global warming potential is 1. The concentration in 2005 was 379 parts per million (ppm), which is an increase of about 1.4 ppm per year since 1960.	Natural sources include decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; evaporation from oceans; and volcanic outgassing. Anthropogenic sources are from burning coal, oil, natural gas, and wood.
Chlorofluorocarbons	CFCs are nontoxic, nonflammable, insoluble, and chemically unreactive in the troposphere (the level of air at the earth's surface). They are gases formed synthetically by replacing all hydrogen atoms in methane or methane with chlorine and/or fluorine atoms. Global warming potentials range from 3,800 to 8,100.	Chlorofluorocarbons were synthesized in 1928 for use as refrigerants, aerosol propellants, and cleaning solvents. They destroy stratospheric ozone, therefore their production was stopped as required by the Montreal Protocol.
Hydrofluorocarbons	Hydrofluorocarbons (HFCs) are a group of greenhouse gases containing carbon, chlorine, and at least one hydrogen atom. Global warming potentials range from 140 to 11,700.	Hydrofluorocarbons are synthetic manmade chemicals used as a substitute for chlorofluorocarbons in applications such as automobile air conditioners and refrigerants.
Perfluorocarbons	Perfluorocarbons (PFCs) have stable molecular structures and only break down by ultraviolet rays about 60 kilometers above the Earth's surface. They have a lifetime 10,000 to 50,000 years. They have a global warming potential range of 6,200 to 9,500.	Two main sources of perfluorocarbons are primary aluminum production and semiconductor manufacturing.
Sulfur hexafluoride	Sulfur hexafluoride (SF_6) is an inorganic, odorless, colorless, and nontoxic, nonflammable gas. It has a lifetime of 3,200 years. It has a high global warming potential, 23,900.	This gas is manmade and used for insulation in electric power transmission equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas for leak detection.

Notes:

1. Sources: Intergovernmental Panel on Climate Change 2014a and Intergovernmental Panel on Climate Change 2014b. https://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html

4.0 Modeling Parameters and Assumptions

4.1 Construction

Typical emission rates from construction activities were obtained from CalEEMod Version 2020.4.0 CalEEMod is a computer model published by the SCAQMD for estimating air pollutant emissions. The CalEEMod program uses the EMFAC2017 computer program to calculate the emission rates specific for the southwestern portion of San Bernardino County for construction-related employee vehicle trips and the OFFROAD2011 computer program to calculate emission rates for heavy truck operations. EMFAC2017 and OFFROAD2011 are computer programs generated by CARB that calculates composite emission rates for vehicles. Emission rates are reported by the program in grams per trip and grams per mile or grams per running hour. Using CalEEMod, the peak daily air pollutant emissions were calculated and presented below. These emissions represent the highest level of emissions for each of the construction phases in terms of air pollutant emissions.

The analysis assesses the emissions associated with the construction of the proposed Project as indicated in Table 1. Per the Project owner, construction is anticipated to begin in May 2022 and finish in December 2024. The phases of the construction activities which have been analyzed below are: 1) demolition, 2) site preparation, 3) grading, 4) building, 5) paving, and 6) architectural coating. For details on construction modeling and construction equipment for each phase, please see Appendix A.

The Project will be required to comply with existing SCAQMD rules for the reduction of fugitive dust emissions. SCAQMD Rule 403 establishes these procedures. Compliance with this rule is achieved through application of standard best management practices in construction and operation activities, such as application of water or chemical stabilizers to disturbed soils, managing haul road dust by application of water, covering haul vehicles, restricting vehicle speeds on unpaved roads to 15 mph, sweeping loose dirt from paved site access roadways, cessation of construction activity when winds exceed 25 mph and establishing a permanent, stabilizing ground cover on finished sites. In addition, projects that disturb 50 acres or more of soil or move 5,000 cubic yards of materials per day are required to submit a Fugitive Dust Control Plan or a Large Operation Notification Form to SCAQMD. Based on the size of the Project area (approximately 85.2 acres) and the fact that the Project won’t export more than 5,000 cubic yards of material a day a Fugitive Dust Control Plan or Large Operation Notification would not be required.

SCAQMD’s Rule 403 minimum requirements require that the application of the best available dust control measures are used for all grading operations and include the application of water or other soil stabilizers in sufficient quantity to prevent the generation of visible dust plumes. Compliance with Rule 403 would require the use of water trucks during all phases where earth moving operations would occur. Compliance with Rule 403 is required. Compliance is shown in the CalEEMod model as application of water three times daily, which is included in the model as a mitigation measure.

4.2 Operations

Operational or long-term emissions occur over the life of the Project. Both mobile and area sources generate operational emissions. Area source emissions arise from consumer product usage, heaters that consume natural gas, gasoline-powered landscape equipment, and architectural coatings (painting). Mobile source emissions from motor vehicles are the largest single long-term source of air pollutants from the operation of the Project. Small amounts of emissions would also occur from area sources such as the consumption of natural gas for heating, from landscaping emissions, and consumer product usage. The operational emissions were estimated using the latest version of CalEEMod.

Mobile Sources
Mobile sources include emissions from the additional vehicle miles generated from the proposed Project. The vehicle trips associated with the proposed Project are based upon the trip generation rates give in the Project-specific trip generation analysis (Linscott, Law & Greenspan, Engineers) which uses the Highway Capacity Manual 6th Edition (HCM 6). The trip generation analysis shows a net trip generation rate of 481 trips per day for the proposed Project.

The program then applies the emission factors for each trip which is provided by the EMFAC2017 model to determine the vehicular traffic pollutant emissions. The CalEEMod default trip lengths were used in this analysis. Please see CalEEMod output comments sections in Appendix A and B for details.

Area Sources
Area sources include emissions from consumer products, landscape equipment and architectural coatings. Landscape maintenance includes fuel combustion emissions from equipment such as lawn mowers, rototillers, shredders/grinders, blowers, trimmers, chain saws, and hedge trimmers, as well as air compressors, generators, and pumps. As specifics were not known about the landscaping equipment fleet, CalEEMod defaults were used to estimate emissions from landscaping equipment.

Per SCAQMD Rule 1113 as amended on June 3, 2011, the architectural coatings that would be applied after January 1, 2014 will be limited to an average of 50 grams per liter or less for buildings and 100 grams per liter or less for parking lot striping. No changes were made to the CalEEMod architectural coating default values.

Per AB 341, at least 75 percent of generated waste will be source reduced, recycled, or composted. This is shown in the CalEEMod model as a mitigation measure; however, it is required.

Energy Usage

2020.4.0 CalEEMod defaults were utilized.

4.3 Localized Construction Analysis

The SCAQMD has published a “Fact Sheet for Applying CalEEMod to Localized Significance Thresholds” (South Coast Air Quality Management District 2011b). CalEEMod calculates construction emissions based on the number of equipment hours and the maximum daily disturbance activity possible for each piece of equipment. In order to compare CalEEMod reported emissions against the localized significance threshold lookup tables, the CEQA document should contain in its project design features or its mitigation measures the following parameters:

1. The off-road equipment list (including type of equipment, horsepower, and hours of operation) assumed for the day of construction activity with maximum emissions.
2. The maximum number of acres disturbed on the peak day.
3. Any emission control devices added onto off-road equipment.
4. Specific dust suppression techniques used on the day of construction activity with maximum emissions.

The construction equipment showing the equipment associated with the maximum area of disturbance is shown in Table 7.

Table 7: Construction Equipment Assumptions[1]

Activity	Equipment	Number	Acres/8hr-day	Total Acres
Demolition	Excavators	3	0.5	1.5
	Rubber Tired Dozers	2	0.5	1.0
Total Per Phase				2.5
Site Preparation	Rubber Tired Dozers	3	0.5	1.5
	Tractors/Loaders/Backhoes	4	0.5	2.0
Total Per Phase				3.5
Grading	Excavators	2	0.5	1.0
	Graders	1	0.5	0.5
	Rubber Tired Dozers	1	0.5	0.5
	Scrapers	2	0.5	1.0
Total Per Phase				4.0

Notes:
1. Source: South Coast AQMD, Fact Sheet for Applying CalEEMod to Localized Significance Thresholds. http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/caleemod-guidance.pdf?sfvrsn=2

As shown in Table 7, the maximum number of acres disturbed in a day would be 4 acres during demolition and grading.

The local air quality emissions from construction were analyzed using the SCAQMD's Mass Rate Localized Significant Threshold Look-up Tables and the methodology described in Localized Significance Threshold Methodology, prepared by SCAQMD, revised July 2008. The Look-up Tables were developed by the SCAQMD in order to readily determine if the daily emissions of CO, NOx, PM10, and PM2.5 from the proposed Project could result in a significant impact to the local air quality. The emission thresholds were based on the Southwest San Bernardino Valley source receptor area (SRA 33) and a disturbance of 2 acres per day at a distance of 50 meters (164 feet).

4.4 Localized Operational Analysis

For operational emissions, the screening tables for a disturbance area of 2 acres per day, to be conservative, and a distance of 50 meters were used to determine significance. The tables were compared to the Project's onsite operational emissions.

5.0 Thresholds of Significance

5.1 Air Quality Thresholds of Significance

5.1.1 CEQA Guidelines for Air Quality

The CEQA Guidelines define a significant effect on the environment as "a substantial, or potentially substantial, adverse change in the environment." To determine if a project would have a significant impact on air quality, the type, level, and impact of emissions generated by the project must be evaluated.

The following air quality significance thresholds are contained in Appendix G of the CEQA Guidelines. A significant impact would occur if the project would:

a) Conflict with or obstruct implementation of the applicable air quality plan;

b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable national or state ambient air quality standard;

c) Expose sensitive receptors to substantial pollutant concentrations; or

d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

While the final determination of whether a project is significant is within the purview of the Lead Agency pursuant to Section 15064(b) of the CEQA Guidelines, SCAQMD recommends that its quantitative air pollution thresholds be used to determine the significance of project emissions. If the Lead Agency finds that the project has the potential to exceed these air pollution thresholds, the project should be considered to have significant air quality impacts. There are daily emission thresholds for construction and operation of a proposed project in the basin.

5.1.2 Regional Significance Thresholds for Construction Emissions

The following CEQA significance thresholds for construction emissions are established for the Basin:

- 75 pounds per day (lbs/day) of VOC
- 100 lbs/day of NO_x
- 550 lbs/day of CO
- 150 lbs/day of PM10
- 55 lbs/day of PM2.5
- 150 lbs/day of SO_2

Projects in the basin with construction-related emissions that exceed any of the emission thresholds are considered to be significant under SCAQMD guidelines.

5.1.3 Regional Significance Thresholds for Operational Emissions

The daily operational emissions significance thresholds for the basin are as follows:

- 55 pounds per day (lbs/day) of VOC
- 55 lbs/day of NO_x
- 550 lbs/day of CO
- 150 lbs/day of PM10
- 55 lbs/day of PM2.5
- 150 lbs/day of SO_2

Local Microscale Concentration Standards The significance of localized project impacts under CEQA depends on whether ambient CO levels in the vicinity of the project are above or below State and federal CO standards. If ambient levels are below the standards, a project is considered to have a significant impact if project emissions result in an exceedance of one or more of these standards. If ambient levels already exceed a State or federal standard, project emissions are considered significant if they increase 1-hour CO concentrations by 1.0 ppm or more or 8-hour CO concentrations by 0.45 ppm or more. The following are applicable local emission concentration standards for CO:

- California State 1-hour CO standard of 20.0 ppm
- California State 8-hour CO standard of 9.0 ppm

5.1.4 Thresholds for Localized Significance

Project-related construction air emissions may have the potential to exceed the State and Federal air quality standards in the project vicinity, even though these pollutant emissions may not be significant enough to create a regional impact to the South Coast Air Basin. In order to assess local air quality impacts the SCAQMD has developed Localized Significant Thresholds (LSTs) to assess the project-related air emissions in the project vicinity. The SCAQMD has also provided Final Localized Significant Threshold Methodology (LST Methodology), June 2003, which details the methodology to analyze local air emission impacts. The Localized Significant Threshold Methodology found that the primary emissions of concern are NO2, CO, PM10, and PM2.5.

The emission thresholds were calculated based on the Southwestern San Bernardino Valley source receptor area (SRA 33) and a disturbance of 2 acres per day (to be conservative) at a distance of 50 meters (164 feet), for construction.

5.2 Greenhouse Gas Thresholds of Significance

5.2.1 CEQA Guidelines for Greenhouse Gas

CEQA Guidelines define a significant effect on the environment as “a substantial, or potentially substantial, adverse change in the environment.” To determine if a project would have a significant impact on greenhouse gases, the type, level, and impact of emissions generated by the project must be evaluated.

The following greenhouse gas significance thresholds are contained in Appendix G of the CEQA Guidelines, which were amendments adopted into the Guidelines on March 18, 2010, pursuant to SB 97. A significant impact would occur if the project would:

(a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or

(b) Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.

However, despite this, currently neither the CEQA statutes, OPR guidelines, nor the draft proposed changes to the CEQA Guidelines prescribe thresholds of significance or a particular methodology for performing an impact analysis; as with most environmental topics, significance criteria are left to the judgment and discretion of the Lead Agency. As previously discussed (Section 2.2.4 of this report), SCAQMD has drafted interim thresholds. The screening threshold of 3,000 MTCO2e per year for all land uses was used in this analysis.

5.3 Toxic Air Contaminants

The threshold for toxic air contaminants (TACs) has a maximum incremental cancer risk of 10 per million and a non-cancer (acute and chronic) hazard index of 1.0 or greater. An exceedance to these values would be considered a significant impact.

6.0 Air Quality Emissions Impact

6.1 Construction Air Quality Emissions Impact

The latest version of CalEEMod was used to estimate the onsite and offsite construction emissions. The emissions incorporate Rule 402 and 403. Rule 402 and 403 (fugitive dust) are not considered mitigation measures as the Project by default is required to incorporate these rules during construction.

6.1.1 Regional Construction Emissions

The construction emissions for the Project would not exceed the SCAQMD's daily emission thresholds at the regional level as demonstrated in Table 8, and therefore would be considered less than significant.

Table 8: Regional Significance - Construction Emissions (pounds/day)

Activity	Pollutant Emissions (pounds/day)					
	VOC	NOx	CO	SO_2	PM10	PM2.5
Demolition						
On-Site[2]	2.64	25.72	20.59	0.04	1.25	1.16
Off-Site[3]	0.06	0.06	0.62	0.00	0.17	0.05
Total	**2.70**	**25.78**	**21.22**	**0.04**	**1.42**	**1.20**
Site Preparation						
On-Site[2]	3.17	33.08	19.70	0.04	9.28	5.42
Off-Site[3]	0.08	0.05	0.74	0.00	0.20	0.05
Total	**3.25**	**33.13**	**20.44**	**0.04**	**9.48**	**5.48**
Grading						
On-Site[2]	3.62	38.84	29.04	0.06	5.28	2.94
Off-Site[3]	0.72	24.02	6.78	0.10	3.40	1.09
Total	**4.34**	**62.87**	**35.82**	**0.16**	**8.68**	**4.03**
Building Construction						
On-Site[2]	1.71	15.62	16.36	0.03	0.81	0.76
Off-Site[3]	1.78	7.46	17.16	0.06	5.04	1.42
Total	**3.48**	**23.07**	**33.53**	**0.09**	**5.85**	**2.18**
Paving						
On-Site[2]	1.41	9.52	14.63	0.02	0.47	0.43
Off-Site[3]	0.55	0.03	0.53	0.00	0.17	0.05
Total	**1.95**	**9.56**	**15.15**	**0.02**	**0.64**	**0.48**
Architectural Coating						
On-Site[2]	14.56	1.22	1.81	0.00	0.06	0.06
Off-Site[3]	0.26	0.16	2.53	0.01	0.81	0.22
Total	**14.82**	**1.38**	**4.34**	**0.01**	**0.87**	**0.28**
Total of overlapping phases[4]	**20.26**	**34.01**	**53.02**	**0.12**	**7.35**	**2.94**
SCAQMD Thresholds	75	100	550	150	150	55
Exceeds Thresholds	No	No	No	No	No	No

Notes:
[1] Source: CalEEMod Version 2020.4.0
[2] On-site emissions from equipment operated on-site that is not operated on public roads
[3] Off-site emissions from equipment operated on public roads.
[4] Construction, architectural coatings and paving phases may overlap.
[2] On-site emissions from equipment operated on-site that is not operated on public roads

6.1.2 Localized Construction Emissions

The data provided in Table 9 shows that none of the analyzed criteria pollutants would exceed the local emissions thresholds at the nearest sensitive receptors. Therefore, a less than significant local air quality impact would occur from construction of the proposed Project.

Table 9: Localized Significance – Construction

Phase	On-Site Pollutant Emissions (pounds/day)[1]			
	NOx	CO	PM10	PM2.5
Demolition	25.78	21.22	1.42	1.20
Site Preparation	33.13	20.44	9.48	5.48
Grading	38.84	29.04	5.28	2.94
Building Construction	15.62	16.36	0.81	0.76
Paving	9.52	14.63	0.47	0.43
Architectural Coating	1.22	1.81	0.06	0.06
Total of overlapping phases	26.36	32.80	1.34	1.25
SCAQMD Threshold for 50 meters (164 feet) or less[2]	**200**	**1,877**	**19**	**8**
Exceeds Threshold?	No	No	No	No

Notes:
[1] Source: Calculated from CalEEMod and SCAQMD's Mass Rate Look-up Tables for two-acres, to be conservative, in Southwest San Bernardino Valley Source Receptor Area (SRA 33). Project will disturb a maximum of 4.0 acres per day (see Table 7).
[2] The nearest sensitive receptor is located 27 meters north of the property line; therefore, assuming an additional 25 meters between the border and start of construction equipment, the 50-meter threshold has been used.

6.1.3 Construction-Related Human Health Impacts

Regarding health effects related to criteria pollutant emissions, the applicable significance thresholds are established for regional compliance with the state and federal ambient air quality standards, which are intended to protect public health from both acute and long-term health impacts, depending on the potential effects of the pollutant. Because regional and local emissions of criteria pollutants during construction of the Project would be below the applicable thresholds, it would not contribute to long-term health impacts related to nonattainment of the ambient air quality standards. Therefore, significant adverse acute health impacts as a result of Project construction are not anticipated.

6.1.4 Odors

Potential sources that may emit odors during construction activities include the application of materials such as asphalt pavement. The objectionable odors that may be produced during the construction process are of short-term in nature and the odor emissions are expected cease upon the drying or hardening of the odor producing materials. Diesel exhaust and VOCs would be emitted during construction of the Project, which are objectionable to some; however, emissions would disperse rapidly from the Project site and therefore should not reach an objectionable level at the nearest sensitive receptors. Due to the short-term nature and limited amounts of odor producing materials being utilized, no significant impact related to odors would occur during construction of the proposed Project.

The SCAQMD recommends that odor impacts be addressed in a qualitative manner. Such an analysis shall determine whether the Project would result in excessive nuisance odors, as defined under the California Code of Regulations and Section 41700 of the California Health and Safety Code, and thus would constitute a public nuisance related to air quality.

Potential sources that may emit odors during the on-going operations of the proposed Project would include odor emissions from trash storage areas. Due to the distance of the nearest receptors from the Project site and through compliance with SCAQMD's Rule 402 no significant impact related to odors would occur during the on-going operations of the proposed Project.

6.1.5 Construction-Related Toxic Air Contaminant Impact

The greatest potential for toxic air contaminant emissions would be related to diesel particulate emissions associated with heavy equipment operations during construction of the proposed Project. The Office of Environmental Health Hazard Assessment (OEHHA) has issued the Air Toxic Hot Spots Program Risk Assessment Guidelines and Guidance Manual for the Preparation of Health Risk Assessments, February 2015 to provide a description of the algorithms, recommended exposure variates, cancer and noncancer health values, and the air modeling protocols needed to perform a health risk assessment (HRA) under the Air Toxics Hot Spots Information and Assessment Act of 1987. Hazard identification includes identifying all substances that are evaluated for cancer risk and/or non-cancer acute, 8-hour, and chronic health impacts. In addition, identifying any multi-pathway substances that present a cancer risk or chronic non-cancer hazard via non-inhalation routes of exposure.

Given the relatively limited number of heavy-duty construction equipment and construction schedule, the proposed Project would not result in a long-term substantial source of toxic air containment emissions and corresponding individual cancer risk. Furthermore, construction-based particulate matter (PM) emissions (including diesel exhaust emissions) do not exceed any local or regional thresholds. Therefore, no significant short-term toxic air contaminant impacts would occur during construction of the proposed Project.

6.2 Operational Air Quality Emissions Impact

6.2.1 Regional Operational Emissions

The operations-related criteria air quality impacts created by the proposed Project have been analyzed through the use of CalEEMod model. The operating emissions were based on year 2024, which is the anticipated opening year for the Project per the Traffic Study (Linscott, Law & Greenspan, Engineers). The summer and winter emissions created by the proposed Project's long-term operations were calculated and the highest emissions from either summer or winter are summarized in Table 10.

Table 10: Regional Significance - Unmitigated Operational Emissions (lbs/day)

Activity	Pollutant Emissions (pounds/day)[1]					
	VOC	NOx	CO	SO2	PM10	PM2.5
Area Sources[2]	2.50	0.75	4.43	0.00	0.08	0.08
Energy Usage[3]	0.04	0.36	0.15	0.00	0.03	0.03
Mobile Sources[4]	1.59	2.17	15.57	0.03	3.50	0.95
Total Emissions	**4.13**	**3.28**	**20.15**	**0.04**	**3.61**	**1.06**
SCAQMD Thresholds	**55**	**55**	**550**	**150**	**150**	**55**
Exceeds Threshold?	No	No	No	No	No	No

Notes:
[1] Source: CalEEMod Version 2020.4.0
[2] Area sources consist of emissions from consumer products, architectural coatings, and landscaping equipment.
[3] Energy usage consists of emissions from on-site natural gas usage.
[4] Mobile sources consist of emissions from vehicles and road dust.

Table 10 provides the Project's unmitigated operational emissions. Table 10 shows that the Project does not exceed the SCAQMD daily emission threshold and regional operational emissions are considered to be less than significant.

6.2.2 Localized Operational Emissions

Table 11 shows the calculated emissions for the proposed operational activities compared with appropriate LSTs. The LST analysis only includes on-site sources; however, the CalEEMod software outputs do not separate on-site and off-site emissions for mobile sources. For a worst-case scenario assessment, the emissions shown in Table 11 include all on-site Project-related stationary sources and 10% of the Project-related new mobile sources.[3] This percentage is an estimate of the amount of Project-related new vehicle traffic that will occur on-site.

[3] The project site is approximately 0.45 miles in length at its longest point; therefore the on-site mobile source emissions represent approximately 1/15th of the shortest CalEEMod default distance of 6.9 miles. Therefore, to be conservative, 1/10th the distance (dividing the mobile source emissions by 10) was used to represent the portion of the overall mobile source emissions that would occur on-site.

Table 11: Localized Significance - Unmitigated Operational Emissions

On-Site Emission Source	On-Site Pollutant Emissions (pounds/day)[1]			
	NOx	CO	PM10	PM2.5
Area Sources[2]	0.75	4.43	0.08	0.08
Energy Usage[3]	0.36	0.15	0.03	0.03
On-Site Vehicle Emissions[4]	0.22	1.56	0.35	0.10
Total Emissions	**1.33**	**6.13**	**0.46**	**0.20**
SCAQMD Threshold for 50 meters (164 feet)[5]	**200**	**1,262**	**5**	**2**
Exceeds Threshold?	No	No	No	No

Notes:
[1] Source: Calculated from CalEEMod and SCAQMD's Mass Rate Look-up Tables for two acres, to be conservative, in Southwest San Bernardino Valley Source Receptor Area (SRA 33). Project will disturb a maximum of 4.0 acres per day (see Table 7).
[2] Area sources consist of emissions from consumer products, architectural coatings, and landscaping equipment.
[3] Energy usage consists of emissions from generation of electricity and on-site natural gas usage.
[4] On-site vehicular emissions based on 1/10 of the gross vehicular emissions and road dust.
[5] The nearest sensitive receptor is located 27 meters north of the property line; therefore, assuming an additional 25 meters between the border and start of construction equipment, the 50-meter threshold has been used.

6.2.3 Operations-Related Human Health Impacts

As stated previously, regarding health effects related to criteria pollutant emissions, the applicable significance thresholds are established for regional compliance with the state and federal ambient air quality standards, which are intended to protect public health from both acute and long-term health impacts, depending on the potential effects of the pollutant. Because regional and local emissions of criteria pollutants during operation of the Project would be below the applicable thresholds, it would not contribute to long-term health impacts related to nonattainment of the ambient air quality standards. Therefore, significant adverse acute health impacts as a result of Project operation are not anticipated.

6.3 CO Hot Spot Emissions

CO is the pollutant of major concern along roadways because the most notable source of CO is motor vehicles. For this reason, CO concentrations are usually indicative of the local air quality generated by a roadway network and are used as an indicator of potential local air quality impacts. Local air quality impacts can be assessed by comparing future without and with Project CO levels to the State and Federal CO standards which were presented in above in Section 5.0.

To determine if the proposed Project could cause emission levels in excess of the CO standards discussed above in Section 5.0, a sensitivity analysis is typically conducted to determine the potential for CO "hot spots" at a number of intersections in the general Project vicinity. Because of reduced speeds and vehicle queuing, "hot spots" potentially can occur at high traffic volume intersections with a Level of Service E or worse.

Micro-scale air quality emissions have traditionally been analyzed in environmental documents where the air basin was a non-attainment area for CO. However, the SCAQMD has demonstrated in the CO attainment redesignation request to EPA that there are no "hot spots" anywhere in the air basin, even at intersections with much higher volumes, much worse congestion, and much higher background CO levels than anywhere in San Bernardino County. If the worst-case intersections in the air basin have no "hot spot" potential, any local impacts will be below thresholds.

The Project-specific trip generation analysis showed that the Project is only anticipated to generate 481 daily vehicle trips (Linscott, Law & Greenspan, Engineers). The 1992 Federal Attainment Plan for Carbon Monoxide (1992 CO Plan) showed that an intersection which has a daily traffic volume of approximately 100,000 vehicles per day would not violate the CO standard. The volume of traffic at Project buildout would be well below 100,000 vehicles and below the necessary volume to even get close to causing a violation of the CO standard. Therefore, no CO "hot spot" modeling was performed and no significant long-term air quality impact is anticipated to local air quality with the on-going use of the proposed Project.

6.4 Cumulative Regional Air Quality Impacts

Cumulative projects include local development as well as general growth within the project area. However, as with most development, the greatest source of emissions is from mobile sources, which travel well out of the local area. Therefore, from an air quality standpoint, the cumulative analysis would extend beyond any local projects and when wind patterns are considered, would cover an even larger area. Accordingly, the cumulative analysis for the Project's air quality must be generic by nature.

The Project area is out of attainment for both ozone and PM10 particulate matter. Construction and operation of cumulative projects will further degrade the local air quality, as well as the air quality of the South Coast Air Basin. The greatest cumulative impact on the quality of regional air cell will be the incremental addition of pollutants mainly from increased traffic from residential, commercial, and industrial development and the use of heavy equipment and trucks associated with the construction of these projects. Air quality will be temporarily degraded during construction activities that occur separately or simultaneously. However, in accordance with the SCAQMD methodology, projects that do not exceed the SCAQMD criteria or can be mitigated to less than criteria levels are not significant and do not add to the overall cumulative impact. The Project does not exceed any of the thresholds of significance and therefore is considered less than significant.

6.5 Air Quality Compliance

The California Environmental Quality Act (CEQA) requires a discussion of any inconsistencies between a proposed project and applicable General Plans and Regional Plans (CEQA Guidelines Section 15125). The regional plan that applies to the proposed Project includes the SCAQMD Air Quality Management Plan (AQMP). Therefore, this section discusses any potential inconsistencies of the proposed Project with the AQMP.

The purpose of this discussion is to set forth the issues regarding consistency with the assumptions and objectives of the AQMP and discuss whether the proposed Project would interfere with the region's ability to comply with Federal and State air quality standards. If the decision-makers determine that the proposed Project is inconsistent, the lead agency may consider Project modifications or inclusion of mitigation to eliminate the inconsistency.

The SCAQMD CEQA Handbook states that "New or amended General Plan Elements (including land use zoning and density amendments), Specific Plans, and significant projects must be analyzed for consistency with the AQMP." Strict consistency with all aspects of the plan is usually not required. A proposed Project should be considered to be consistent with the AQMP if it furthers one or more policies and does not obstruct other policies. The SCAQMD CEQA Handbook identifies two key indicators of consistency:

(1) Whether the Project will result in an increase in the frequency or severity of existing air quality violations or cause or contribute to new violations or delay timely attainment of air quality standards or the interim emission reductions specified in the AQMP.

(2) Whether the Project will exceed the assumptions in the AQMP in 2016 or increments based on the year of Project buildout and phase.

Both of these criteria are evaluated in the following sections.

A. Criterion 1 - Increase in the Frequency or Severity of Violations?

Based on the air quality modeling analysis contained in this Air Analysis, neither short-term construction impacts, nor long-term operations will result in significant impacts based on the SCAQMD regional and local thresholds of significance.

Therefore, the proposed Project is not projected to contribute to the exceedance of any air pollutant concentration standards and is found to be consistent with the AQMP for the first criterion.

B. Criterion 2 - Exceed Assumptions in the AQMP?

Consistency with the AQMP assumptions is determined by performing an analysis of the proposed Project with the assumptions in the AQMP. The emphasis of this criterion is to ensure that the analyses conducted for the proposed Project are based on the same forecasts as the AQMP. The 2016-2040 Regional Transportation/Sustainable Communities Strategy, prepared by SCAG, 2016, includes chapters on: the challenges in a changing region, creating a plan for our future, and the road to greater mobility and sustainable growth. These chapters currently respond directly to federal and state requirements placed on SCAG. Local governments are required to use these as the basis of their plans for purposes of consistency with applicable regional plans under CEQA. For this Project, the County of San Bernardino Land Use Plan defines the assumptions that are represented in the AQMP.

The Project site is currently designated as Rural Residential on the City of Chino Hills General Plan Land Use Plan Map. The proposed Project is consistent with the County of San Bernardino current land use designation. Therefore, it is not anticipated that the Project would exceed the AQMP assumptions for the Project site and is found to be consistent with the AQMP for the second criterion.

Based on the above, the proposed Project will not result in an inconsistency with the SCAQMD AQMP. Therefore, a less than significant impact will occur.

7.0 Greenhouse Gas Impact Analysis

7.1 Construction Greenhouse Gas Emissions Impact

The greenhouse gas emissions from Project construction equipment and worker vehicles are shown in Table 12. The emissions are from all phases of construction. The total construction emissions amortized over a period of 30 years are estimated at 59.07 metric tons of CO_2e per year. Annual CalEEMod output calculations are provided in Appendix B.

Table 12: Construction Greenhouse Gas Emissions

Activity	Emissions ($MTCO_2e$)[1]		
	Onsite	Offsite	Total
Demolition	85.57	3.51	89.08
Site Preparation	50.56	2.40	52.96
Grading	206.16	389.31	595.47
Building Construction	303.14	737.90	1,041.03
Paving	55.52	3.49	59.00
Coating	7.03	16.73	23.76
Total	622.41	1149.82	1,772.23
Averaged over 30 years[2]	20.75	38.33	59.07

Notes:
1. $MTCO_2e$=metric tons of carbon dioxide equivalents (includes carbon dioxide, methane and nitrous oxide).
2. The emissions are averaged over 30 years because the average is added to the operational emissions, pursuant to SCAQMD.
* CalEEMod output (Appendix B)

7.2 Operational Greenhouse Gas Emissions Impact

Operational emissions occur over the life of the Project. The operational emissions for the Project are 828.16 metric tons of CO_2e per year (see Table 13). Furthermore, as shown in Table 13, the Project's total emissions (with incorporation of construction related GHG emissions) would be 828.16 metric tons of CO_2e per year. These emissions do not exceed the City of Chino Hills CAP Update and SCAQMD screening threshold of 3,000 metric tons of CO_2e per year. Therefore, the Project's GHG emissions are considered to be less than significant.

Table 13: Opening Year Unmitigated Project-Related Greenhouse Gas Emissions

Category	Greenhouse Gas Emissions (Metric Tons/Year)[1]					
	Bio-CO2	NonBio-CO_2	CO_2	CH_4	N_2O	CO_2e
Area Sources[2]	0.00	11.05	11.05	0.00	0.00	11.13
Energy Usage[3]	0.00	146.10	146.10	0.01	0.00	146.91
Mobile Sources[4]	0.00	556.47	556.47	0.03	0.03	565.49
Solid Waste[5]	11.90	0.00	11.90	0.70	0.00	29.49
Water[6]	1.03	11.57	12.60	0.11	0.00	16.06
Construction[7]	0.00	34.05	34.05	0.00	0.00	59.07
Total Emissions	12.93	759.24	772.17	0.85	0.03	**828.16**
SCAQMD Draft and San Bernardino County Screening Threshold						**3,000**
Exceeds Threshold?						**No**

Notes:
[1] Source: CalEEMod Version 2020.4.0
[2] Area sources consist of GHG emissions from consumer products, architectural coatings, and landscape equipment.
[3] Energy usage consist of GHG emissions from electricity and natural gas usage.
[4] Mobile sources consist of GHG emissions from vehicles.
[5] Solid waste includes the CO_2 and CH_4 emissions created from the solid waste placed in landfills.
[6] Water includes GHG emissions from electricity used for transport of water and processing of wastewater.
[7] Construction GHG emissions based on a 30-year amortization rate.

7.3 Greenhouse Gas Plan Consistency

The proposed Project would have the potential to conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.

According to the *County of San Bernardino Greenhouse Gas Emissions Reduction Plan*, "all development projects, including those otherwise determined to be exempt from CEQA will be subject to applicable Development Code provisions, including the GHG performance standards, and state requirements, such as the California Building Code requirements for energy efficiency. With the application of the GHG performance standards, projects that are exempt from CEQA and small projects that do not exceed 3,000 MTCO2e per year will be considered to be consistent with the Plan and determined to have a less than significant individual and cumulative impact for GHG emissions." The Project’s operational GHG emissions do not exceed the County's screening threshold of 3,000 MTCO2e per year. Therefore, the proposed Project is consistent with the GHG Plan pursuant to Section 15183.5 of the State CEQA Guidelines. The Project will not result in substantial emissions of greenhouse gases and will not conflict with the County of San Bernardino CAP or the goals of AB-32 or SB-32.

7.4 Cumulative Regional Greenhouse Gas Impacts

Cumulative projects include local development as well as general growth within the project area. However, as with most development, the greatest source of emissions is from mobile sources, which travel well out of the local area. Therefore, from a greenhouse gas standpoint, the cumulative analysis would extend beyond any local projects and when wind patterns are considered, would cover an even larger area. Accordingly, the cumulative analysis for the Project’s greenhouse gas impacts must be generic by nature.

Construction and operation of cumulative projects will add to greenhouse gas emissions. The greatest cumulative impact will be the incremental addition of pollutants mainly from increased traffic from residential, commercial, and industrial development and the use of heavy equipment and trucks associated with the construction of these projects. Greenhouse gas emissions will temporarily increase during construction activities that occur separately or simultaneously. However, in accordance with the SCAQMD methodology, projects that do not exceed the SCAQMD criteria or can be mitigated to less than criteria levels are not significant and do not add to the overall cumulative impact. The Project does not exceed any of the thresholds of significance and therefore is considered less than significant.

8.0 Energy Analysis

Information from the CalEEMod 2020.4.0 Daily and Annual Outputs contained in the air quality and greenhouse gas analyses above was utilized for this analysis. The CalEEMod outputs detail Project related construction equipment, transportation energy demands, and facility energy demands.

8.1 Construction Energy Demand

8.1.1 Construction Equipment Electricity Usage Estimates

Electrical service will be provided by Southern California Edison (SCE). Based on the 2017 National Construction Estimator, Richard Pray (2017)[4], the typical power cost per 1,000 square feet of building construction per month is estimated to be $2.32. The Project plans to develop the site with 130,000 square feet of new single-family houses over the course of approximately 32 months.[5] Based on Table 14, the total power cost of the on-site electricity usage during the construction of the proposed Project is estimated to be approximately $9,628.26. As shown in Table 14, the total electricity usage from Project construction related activities is estimated to be approximately 175,059 kWh.[6]

Table 14: Project Construction Power Cost and Electricity Usage

Power Cost (per 1,000 square foot of building per month of construction)	Total Building Size (1,000 Square Foot)[1]	Construction Duration (months)	Total Project Construction Power Cost
$2.32	130	32	$9,628.26

Cost per kWh	Total Project Construction Electricity Usage (kWh)
$0.06	175,059

* Assumes the Project will be under the GS-1 General Service rate under SCE.

8.1.2 Construction Equipment Fuel Estimates

Using the CalEEMod data input, the Project's construction phase would consume electricity and fossil fuels as a single energy demand, that is, once construction is completed their use would cease. CARB's 2017 Emissions Factors Tables show that on average aggregate fuel consumption (gasoline and diesel

[4] Pray, Richard. 2017 National Construction Estimator. Carlsbad: Craftsman Book Company, 2017.
[5] As stated in the project description, the project involves the demolition of approximately 1,250 square feet of existing residences.
[6] LADWP's Small Commercial & Multi-Family Service (A-1) is approximately $0.06 per kWh of electricity Southern California Edison (SCE). Rates & Pricing Choices: General Service/Industrial Rates. https://library.sce.com/content/dam/sce-doclib/public/regulatory/historical/electric/2020/schedules/general-service-&-industrial-rates/ELECTRIC_SCHEDULES_GS-1_2020.pdf

fuel) would be approximately 18.5 hp-hr-gal.[7] As presented in Table 15 below, Project construction activities would consume an estimated 99,219 gallons of diesel fuel.

Table 15: Construction Equipment Fuel Consumption Estimates

Phase	Number of Days	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor	HP hrs/ day	Total Fuel Consumption (gal diesel fuel)[1]
Demolition	50	Concrete/Industrial Saws	1	8	81	0.73	473	1278
	50	Excavators	3	8	158	0.38	1441	3894
	50	Rubber Tired Dozers	2	8	247	0.4	1581	4272
Site Preparation	30	Rubber Tired Dozers	3	8	247	0.4	2371	3845
	30	Tractors/Loaders/Backhoes	4	8	97	0.37	1148	1862
Grading	75	Excavators	2	8	158	0.38	961	3,894
	75	Graders	1	8	187	0.41	613	2,487
	75	Rubber Tired Dozers	1	8	247	0.4	790	3,204
	75	Scrapers	2	8	367	0.48	2,819	11,427
	75	Tractors/Loaders/Backhoes	2	8	97	0.37	574	2,328
Building Construction	430	Cranes	1	7	231	0.29	469	10,899
	430	Forklifts	3	8	89	0.2	427	9,930
	430	Generator Sets	1	8	84	0.74	497	11,558
	430	Tractors/Loaders/Backhoes	3	7	97	0.37	754	17,518
	430	Welders	1	8	46	0.45	166	3,849
Paving	55	Pavers	2	8	130	0.42	874	2,597
	55	Paving Equipment	2	8	132	0.36	760	2,260
	55	Rollers	2	8	80	0.38	486	1,446
Architectural Coating	55	Air Compressors	1	6	78	0.48	225	668
CONSTRUCTION FUEL DEMAND (gallons of diesel fuel)								**99,219**

Notes:
[1]Using Carl Moyer Guidelines Table D-21 Fuel consumption rate factors (bhp-hr/gal) for engines less than 750 hp.
(Source: https://www.arb.ca.gov/msprog/moyer/guidelines/2017gl/2017_gl_appendix_d.pdf)

[7] Aggregate fuel consumption rate for all equipment was estimated at 18.5 hp-hr/day (from CARB's 2017 Emissions Factors Tables and fuel consumption rate factors as shown in Table D-21 of the Moyer Guidelines: (https://www.arb.ca.gov/msprog/moyer/guidelines/2017gl/2017_gl_appendix_d.pdf).

8.1.3 Construction Worker Fuel Estimates

It is assumed that all construction worker trips are from light duty autos (LDA) along area roadways. With respect to estimated VMT, the construction worker trips would generate an estimated 2,399,555 VMT. Vehicle fuel efficiencies for construction workers were estimated in the air quality and greenhouse gas analysis using information generated using CARB's EMFAC model (see Appendix C for details). Table 16 shows that an estimated 77,530 gallons of fuel would be consumed for construction worker trips.

Table 16: Construction Worker Fuel Consumption Estimates

Phase	Number of Days	Worker Trips/Day	Trip Length (miles)	Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
Demolition	50	15	14.7	11025	30.95	356
Site Preparation	30	18	14.7	7938	30.95	256
Grading	75	20	14.7	22,050	30.95	712
Building Construction	430	362	14.7	2,288,202	30.95	73,932
Paving	55	15	14.7	12,128	30.95	392
Architectural Coating	55	72	14.7	58,212	30.95	1,881
Total Construction Worker Fuel Consumption						**77,530**

Notes:
[1]Assumptions for the worker trip length and vehicle miles traveled are consistent with CalEEMod 2020.4.0 defaults.

8.1.4 Construction Vendor/Hauling Fuel Estimates

Tables 17 and 18 show the estimated fuel consumption for vendor and hauling during building construction and architectural coating. With respect to estimated VMT, the vendor and hauling trips would generate an estimated 666,720 VMT. For the architectural coatings it is assumed that the contractors would be responsible for bringing coatings and equipment with them in their light duty vehicles.[8] Tables 17 and 18 show that an estimated 82,291 gallons of fuel would be consumed for vendor and hauling trips.

[8] Vendors delivering construction material or hauling debris from the site during grading would use medium to heavy duty vehicles with an average fuel consumption of 9.22 mpg for medium heavy-duty trucks and 6.74 mpg for heavy heavy-duty trucks (see Appendix C for details).

Table 17: Construction Vendor Fuel Consumption Estimates (MHD Trucks)[1]

Phase	Number of Days	Vendor Trips/Day	Trip Length (miles)	Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
Demolition	50	0	6.9	0	9.22	0
Site Preparation	30	0	6.9	0	9.22	0
Grading	75	0	6.9	0	9.22	0
Building Construction	430	140	6.9	415,380	9.22	45,052
Paving	55	0	6.9	0	9.22	0
Architectural Coating	55	0	6.9	0	9.22	0
Total Vendor Fuel Consumption						**45,052**

Notes:
[1] Assumptions for the vendor trip length and vehicle miles traveled are consistent with CalEEMod 2020.4.0 defaults.

Table 18: Construction Hauling Fuel Consumption Estimates (HHD Trucks)[1]

Phase	Number of Days	Hauling Trips/Day	Trip Length (miles)	Vehicle Miles Traveled	Average Vehicle Fuel Economy (mpg)	Estimated Fuel Consumption (gallons)
Demolition	50	0.12	20	120	6.74	18
Site Preparation	30	0	20	0	6.74	0
Grading	75	167	20	251,220	6.74	37,273
Building Construction	430	0	20	0	6.74	0
Paving	55	0	20	0	6.74	0
Architectural Coating	55	0	20	0	6.74	0
Total Construction Hauling Fuel Consumption						**37,291**

Notes:
[1]Assumptions for the hauling trip length and vehicle miles traveled are consistent with CalEEMod 2020.40 defaults.

8.1.5 Construction Energy Efficiency/Conservation Measures

Construction equipment used over the approximately 32-month construction phase would conform to CARB regulations and California emissions standards and is evidence of related fuel efficiencies. In addition, the CARB Airborne Toxic Control Measure limits idling times of construction vehicles to no more than five minutes, thereby minimizing unnecessary and wasteful consumption of fuel due to unproductive idling of construction equipment. Furthermore, the Project has been designed in compliance with California's Energy Efficiency Standards and 2019 CALGreen Standards.

Construction of the proposed residential development would require the typical use of energy resources. There are no unusual Project characteristics or construction processes that would require the use of equipment that would be more energy intensive than is used for comparable activities; or equipment that would not conform to current emissions standards (and related fuel efficiencies). Equipment employed in construction of the Project would therefore not result in inefficient wasteful, or unnecessary consumption of fuel.

8.2 Operational Energy Demand

Energy consumption in support of or related to Project operations would include transportation energy demands (energy consumed by employee and patron vehicles accessing the Project site) and facilities energy demands (energy consumed by building operations and site maintenance activities).

8.2.1 Transportation Fuel Consumption

The largest source of operational energy use would be vehicle operation of customers. The site is located in a rural area. Using the CalEEMod output, it is assumed that an average trip for autos were assumed to be 16.6 miles, light trucks were assumed to travel an average of 6.9 miles, and 3- 4-axle trucks were assumed to travel an average of 8.4 miles[9]. To show a worst-case analysis, as the proposed Project is a residential project, it was assumed that vehicles would operate 365 days per year. Table 19 shows the worst-case estimated annual fuel consumption for all classes of vehicles from autos to heavy-heavy trucks.[10] Table 19 shows that an estimated 76,511 gallons of fuel would be consumed per year for the operation of the proposed Project.

Table 19: Estimated Vehicle Operations Fuel Consumption

Vehicle Type	Vehicle Mix	Number of Vehicles	Average Trip (miles)[1]	Daily VMT	Average Fuel Economy (mpg)	Total Gallons per Day	Total Annual Fuel Consumption (gallons)
Light Auto	Automobile	260	16.6	4,316	31.82	135.64	49,510
Light Truck	Automobile	27	6.69	180	27.16	6.64	2,424
Light Truck	Automobile	83	6.69	556	25.6	21.71	7,923
Medium Truck	Automobile	66	6.69	439	20.81	21.11	7,704
Light Heavy Truck	2-Axle Truck	13	8.4	106	13.81	7.70	2,809
Light Heavy Truck 10,000 lbs +	2-Axle Truck	3	8.4	29	14.18	2.02	739
Medium Heavy Truck	3-Axle Truck	6	8.4	47	9.58	4.93	1,798
Heavy Heavy Truck	4-Axle Truck	8	8.4	71	7.14	9.87	3,604
Total		823	466	8.7838	5,744	18.76	209.62
Total Annual Fuel Consumption							**76,511**

Notes:
'[1] The trip generation assessment, the Project is to generate 832 total net new trips after reduction of existing uses. Default CalEEMod vehicle fleet mix utilized.
[1]Based on the size of the site and relative location, trips were assumed to be local rather than regional.

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[9] CalEEMod default distance for H-W (home-work) or C-W (commercial-work) is 16.6 miles; 6.9 miles for H-S (home-shop) or C-C (commercial-customer); and 8.4 miles for H-O (home-other) or C-O (commercial-other).
[10] Average fuel economy based on aggregate mileage calculated in EMFAC 2017 for opening year (2023). See Appendix C for EMFAC output.

Trip generation generated by the proposed Project are consistent with other similar residential uses of similar scale and configuration as reflected in the Traffic Study (Linscott, Law & Greenspan, Engineers, August 31, 2021). That is, the proposed Project does not propose uses or operations that would inherently result in excessive and wasteful vehicle trips, nor associated excess and wasteful vehicle energy consumption. Therefore, Project transportation energy consumption would not be considered inefficient, wasteful, or otherwise unnecessary.

8.2.2 Facility Energy Demands (Electricity and Natural Gas)

The annual natural gas and electricity demands were provided per the CalEEMod output and are provided in Table 20.

Table 20: Project Unmitigated Annual Operational Energy Demand Summary[1]

Natural Gas Demand	kBTU/year
Single Family Housing	1,414,350
Total	1,414,350
Electricity Demand	**kWh/year**
Single Family Housing	398,233
Total	398,233

Notes:
[1]Taken from the CalEEMod 2020.4.0 annual output.

As shown in Table 20, the estimated electricity demand for the proposed Project is approximately 398,233 kWh per year. In 2019, the residential sector of the County of San Bernardino consumed approximately 5,054 million kWh of electricity.[11] In addition, the estimated natural gas consumption for the proposed Project is approximately 1,414,350 kBTU per year. In 2019, the non-residential sector of the County of San Bernardino consumed approximately 275 million therms of gas.[12] Therefore, the increase in both electricity and natural gas demand from the proposed Project is insignificant compared to the County's 2019 demand.

8.3 Renewable Energy and Energy Efficiency Plan Consistency

Regarding federal transportation regulations, the Project site is located in an already developed area. Access to/from the Project site is from existing roads. These roads are already in place so the Project would not interfere with, nor otherwise obstruct intermodal transportation plans or projects that may be proposed pursuant to the ISTEA because SCAG is not planning for intermodal facilities in the Project area.

[11] California Energy Commission, Electricity Consumption by County. https://ecdms.energy.ca.gov/elecbycounty.aspx
[12] California Energy Commission, Gas Consumption by County. http://ecdms.energy.ca.gov/gasbycounty.aspx

Regarding the State's Energy Plan and compliance with Title 24 CCR energy efficiency standards, the applicant is required to comply with the California Green Building Standard Code requirements for energy efficient buildings and appliances as well as utility energy efficiency programs implemented by the SCE and Southern California Gas Company.

Regarding the State's Renewable Energy Portfolio Standards, the Project would be required to meet or exceed the energy standards established in the California Green Building Standards Code, Title 24, Part 11 (CALGreen). CalGreen Standards require that new buildings reduce water consumption, employ building commissioning to increase building system efficiencies, divert construction waste from landfills, and install low pollutant-emitting finish materials.

8.4 Cumulative Regional Energy Impacts

Cumulative projects include local development as well as general growth within the project area. However, as with most development, the greatest source of energy usage is from mobile sources, which travel well out of the local area. Therefore, from an energy standpoint, the cumulative analysis would extend beyond any local projects and when wind patterns are considered, would cover an even larger area. Accordingly, the cumulative analysis for the Project's energy must be generic by nature.

The greatest cumulative impact on the regional energy usage will be from increased traffic from residential, commercial, and industrial development and the use of heavy equipment and trucks associated with the construction of these projects. Energy usage will temporarily increase during construction activities that occur separately or simultaneously. However, as the Project's natural gas and electricity usage will both be under 0.01% of the County of San Bernardino's 2019 usage, the Project is considered less than significant.

9.0 References

The following references were used in the preparing this analysis.

California Air Pollution Control Officers Association
2009 Health Risk Assessments for Proposed Land Use Projects

California Air Resources Board
2008 Resolution 08-43

2008 Recommended Approaches for Setting Interim Significance Thresholds for Greenhouse Gases under the California Environmental Quality Act

2008 ARB Recommended Interim Risk Management Policy for Inhalation-Based Residential Cancer Risk – Frequently Asked Questions

2008 Climate Change Scoping Plan, a framework for change.

2011 Supplement to the AB 32 Scoping Plan Functional Equivalent Document

2013 Revised Emission Factors for Gasoline Marketing Operations at California Gasoline Dispensing Facilities

2014 First Update to the Climate Change Scoping Plan, Building on the Framework Pursuant to AB32, the California Global Warming Solutions Act of 2006. May.

2018 Historical Air Quality, Top 4 Summary

City of Chino Hills
2015 City of Chino Hills General Plan, February 24.

County of San Bernardino
2007 County of San Bernardino 2007 General Plan, March 13 (amended April 24, 2014).

2011 County of San Bernardino Greenhouse Gas Emissions Reduction Plan.

Governor's Office of Planning and Research
2008 CEQA and Climate: Addressing Climate Change Through California Environmental Quality Act (CEQA) Review

2009 CEQA Guideline Sections to be Added or Amended

Linscott, Law & Greenspan, Engineers
2021 Traffic Study - Paradise Ranch. August 31, 2021.

Office of Environmental Health Hazard Assessment
2015 Air Toxics Hot Spots Program Risk Assessment Guidelines

South Coast Air Quality Management District
1993 CEQA Air Quality Handbook

2005 Rule 403 Fugitive Dust

2007 2007 Air Quality Management Plan

2008 Final Localized Significance Threshold Methodology, Revised

2011 Appendix A Calculation Details for CalEEMod

2012 Final 2012 Air Quality Management Plan

2016 Final 2016 Air Quality Management Plan

Appendix A:

CalEEMod Daily Emission Output

Chino Hills Paradise Ranch

San Bernardino-South Coast County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	8.80	Acre	8.80	383,328.00	0
Other Non-Asphalt Surfaces	10.00	Acre	10.00	435,600.00	0
Single Family Housing	50.00	Dwelling Unit	26.40	90,000.00	143

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 2.2 **Precipitation Freq (Days)** 32

Climate Zone 10 **Operational Year** 2024

Utility Company Southern California Edison

CO2 Intensity (lb/MWhr) 390.98 **CH4 Intensity (lb/MWhr)** 0.033 **N2O Intensity (lb/MWhr)** 0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Per project applicant, 85.2 acre site with 50 two-story single family residential homes, 8.8 acres of paving (assumed 25% of residential area) and 10 acres of open space. There is an additional 40 acres of natural open space.

Construction Phase - Building construction schedule condensed to fit timeline proposed by applicant.

Grading -

Demolition - Per project applicant, the Project would demolish the 1,250 square foot, three-bedroom residential use, barn, and stables currently on-site.

Vehicle Trips - Per traffic study, 481 daily trips generated (9.62 trips per day per unit for 50 units)

Woodstoves - No woodstoves

Sequestration - Per project description, the Project would provide approximately 125 trees on the slope area of the Project Site (125 trees are required per City code), 48 front yard trees, and 112 street trees.

Construction Off-road Equipment Mitigation -

Mobile Land Use Mitigation -

Waste Mitigation - AB 341 requires each jurisdiction in CA to divert at least 75% of their waste away from landfills by 2020.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	740.00	430.00
tblConstructionPhase	PhaseEndDate	3/6/2026	12/27/2024
tblConstructionPhase	PhaseEndDate	10/3/2025	7/26/2024
tblConstructionPhase	PhaseEndDate	12/19/2025	10/11/2024
tblConstructionPhase	PhaseStartDate	12/20/2025	10/12/2024
tblConstructionPhase	PhaseStartDate	10/4/2025	7/27/2024
tblFireplaces	NumberWood	2.50	0.00
tblGrading	MaterialExported	0.00	59,075.00
tblGrading	MaterialImported	0.00	41,410.00
tblLandUse	LotAcreage	16.23	26.40
tblSequestration	NumberOfNewTrees	0.00	285.00
tblVehicleTrips	ST_TR	9.54	9.62
tblVehicleTrips	SU_TR	8.55	9.62
tblVehicleTrips	WD_TR	9.44	9.62
tblWoodstoves	NumberCatalytic	2.50	0.00
tblWoodstoves	NumberNoncatalytic	2.50	0.00
tblWoodstoves	WoodstoveDayYear	25.00	0.00
tblWoodstoves	WoodstoveWoodMass	999.60	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	4.3428	61.7233	35.8211	0.1627	19.8582	1.8758	21.4718	10.1558	1.7346	11.6404	0.0000	16,947.8334	16,947.8334	2.4090	1.7050	17,516.1568
2023	3.1521	20.1496	31.9559	0.0881	4.9433	0.7566	5.6999	1.3314	0.7121	2.0435	0.0000	8,940.5046	8,940.5046	0.7664	0.4837	9,103.8203
2024	14.8223	19.1563	30.9058	0.0867	4.9433	0.6689	5.6121	1.3314	0.6293	1.9607	0.0000	8,824.6341	8,824.6341	0.7524	0.4719	8,984.0627
Maximum	**14.8223**	**61.7233**	**35.8211**	**0.1627**	**19.8582**	**1.8758**	**21.4718**	**10.1558**	**1.7346**	**11.6404**	**0.0000**	**16,947.8334**	**16,947.8334**	**2.4090**	**1.7050**	**17,516.1568**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	4.3428	61.7233	35.8211	0.1627	7.8674	1.8758	9.4811	3.9933	1.7346	5.4779	0.0000	16,947.8334	16,947.8334	2.4090	1.7050	17,516.1568
2023	3.1521	20.1496	31.9559	0.0881	4.9433	0.7566	5.6999	1.3314	0.7121	2.0435	0.0000	8,940.5046	8,940.5046	0.7664	0.4837	9,103.8203
2024	14.8223	19.1563	30.9058	0.0867	4.9433	0.6689	5.6121	1.3314	0.6293	1.9607	0.0000	8,824.6341	8,824.6341	0.7524	0.4719	8,984.0627
Maximum	**14.8223**	**61.7233**	**35.8211**	**0.1627**	**7.8674**	**1.8758**	**9.4811**	**3.9933**	**1.7346**	**5.4779**	**0.0000**	**16,947.8334**	**16,947.8334**	**2.4090**	**1.7050**	**17,516.1568**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	40.31	0.00	36.58	48.07	0.00	39.39	0.00	0.00	0.00	0.00	0.00	0.00

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	2.4954	0.7525	4.4253	4.7200e-003		0.0799	0.0799		0.0799	0.0799	0.0000	907.4317	907.4317	0.0244	0.0165	912.9584
Energy	0.0418	0.3571	0.1520	2.2800e-003		0.0289	0.0289		0.0289	0.0289		455.8733	455.8733	8.7400e-003	8.3600e-003	458.5824
Mobile	1.5902	2.0417	15.5690	0.0346	3.4707	0.0261	3.4968	0.9257	0.0245	0.9501		3,583.4704	3,583.4704	0.1833	0.1613	3,636.1038
Total	**4.1273**	**3.1514**	**20.1462**	**0.0416**	**3.4707**	**0.1349**	**3.6055**	**0.9257**	**0.1332**	**1.0588**	**0.0000**	**4,946.7755**	**4,946.7755**	**0.2164**	**0.1861**	**5,007.6446**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	2.4954	0.7525	4.4253	4.7200e-003		0.0799	0.0799		0.0799	0.0799	0.0000	907.4317	907.4317	0.0244	0.0165	912.9584
Energy	0.0418	0.3571	0.1520	2.2800e-003		0.0289	0.0289		0.0289	0.0289		455.8733	455.8733	8.7400e-003	8.3600e-003	458.5824
Mobile	1.5902	2.0417	15.5690	0.0346	3.4707	0.0261	3.4968	0.9257	0.0245	0.9501		3,583.4704	3,583.4704	0.1833	0.1613	3,636.1038
Total	**4.1273**	**3.1514**	**20.1462**	**0.0416**	**3.4707**	**0.1349**	**3.6055**	**0.9257**	**0.1332**	**1.0588**	**0.0000**	**4,946.7755**	**4,946.7755**	**0.2164**	**0.1861**	**5,007.6446**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	5/1/2022	7/8/2022	5	50	
2	Site Preparation	Site Preparation	7/9/2022	8/19/2022	5	30	
3	Grading	Grading	8/20/2022	12/2/2022	5	75	
4	Building Construction	Building Construction	12/3/2022	7/26/2024	5	430	
5	Paving	Paving	7/27/2024	10/11/2024	5	55	
6	Architectural Coating	Architectural Coating	10/12/2024	12/27/2024	5	55	

Acres of Grading (Site Preparation Phase): 45

Acres of Grading (Grading Phase): 225

Acres of Paving: 18.8

Residential Indoor: 182,250; Residential Outdoor: 60,750; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 49,136 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Cranes	1	7.00	231	0.29
Demolition	Excavators	3	8.00	158	0.38
Grading	Excavators	2	8.00	158	0.38

Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Grading	Graders	1	8.00	187	0.41
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	6.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	12,561.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	362.00	140.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	72.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Demolition - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0246	0.0000	0.0246	3.7300e-003	0.0000	3.7300e-003			0.0000			0.0000
Off-Road	2.6392	25.7194	20.5941	0.0388		1.2427	1.2427		1.1553	1.1553		3,746.781 2	3,746.781 2	1.0524		3,773.092 0
Total	**2.6392**	**25.7194**	**20.5941**	**0.0388**	**0.0246**	**1.2427**	**1.2673**	**3.7300e-003**	**1.1553**	**1.1590**		**3,746.781 2**	**3,746.781 2**	**1.0524**		**3,773.092 0**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	4.5000e-004	0.0164	4.2700e-003	7.0000e-005	2.1000e-003	1.7000e-004	2.2700e-003	5.8000e-004	1.6000e-004	7.4000e-004		7.6856	7.6856	3.3000e-004	1.2200e-003	8.0568
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0635	0.0402	0.6179	1.5500e-003	0.1677	8.8000e-004	0.1685	0.0445	8.1000e-004	0.0453		157.4352	157.4352	4.0900e-003	3.9200e-003	158.7050
Total	**0.0640**	**0.0566**	**0.6222**	**1.6200e-003**	**0.1698**	**1.0500e-003**	**0.1708**	**0.0451**	**9.7000e-004**	**0.0460**		**165.1208**	**165.1208**	**4.4200e-003**	**5.1400e-003**	**166.7618**

3.2 Demolition - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					9.6000e-003	0.0000	9.6000e-003	1.4500e-003	0.0000	1.4500e-003			0.0000			0.0000
Off-Road	2.6392	25.7194	20.5941	0.0388		1.2427	1.2427		1.1553	1.1553	0.0000	3,746.781 2	3,746.781 2	1.0524		3,773.092 0
Total	**2.6392**	**25.7194**	**20.5941**	**0.0388**	**9.6000e-003**	**1.2427**	**1.2523**	**1.4500e-003**	**1.1553**	**1.1567**	**0.0000**	**3,746.781 2**	**3,746.781 2**	**1.0524**		**3,773.092 0**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	4.5000e-004	0.0164	4.2700e-003	7.0000e-005	2.1000e-003	1.7000e-004	2.2700e-003	5.8000e-004	1.6000e-004	7.4000e-004		7.6856	7.6856	3.3000e-004	1.2200e-003	8.0568
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0635	0.0402	0.6179	1.5500e-003	0.1677	8.8000e-004	0.1685	0.0445	8.1000e-004	0.0453		157.4352	157.4352	4.0900e-003	3.9200e-003	158.7050
Total	**0.0640**	**0.0566**	**0.6222**	**1.6200e-003**	**0.1698**	**1.0500e-003**	**0.1708**	**0.0451**	**9.7000e-004**	**0.0460**		**165.1208**	**165.1208**	**4.4200e-003**	**5.1400e-003**	**166.7618**

3.3 Site Preparation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					19.6570	0.0000	19.6570	10.1025	0.0000	10.1025			0.0000			0.0000
Off-Road	3.1701	33.0835	19.6978	0.0380		1.6126	1.6126		1.4836	1.4836		3,686.0619	3,686.0619	1.1922		3,715.8655
Total	**3.1701**	**33.0835**	**19.6978**	**0.0380**	**19.6570**	**1.6126**	**21.2696**	**10.1025**	**1.4836**	**11.5860**		**3,686.0619**	**3,686.0619**	**1.1922**		**3,715.8655**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0762	0.0483	0.7415	1.8600e-003	0.2012	1.0600e-003	0.2023	0.0534	9.7000e-004	0.0543		188.9222	188.9222	4.9100e-003	4.7000e-003	190.4461
Total	**0.0762**	**0.0483**	**0.7415**	**1.8600e-003**	**0.2012**	**1.0600e-003**	**0.2023**	**0.0534**	**9.7000e-004**	**0.0543**		**188.9222**	**188.9222**	**4.9100e-003**	**4.7000e-003**	**190.4461**

3.3 Site Preparation - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					7.6662	0.0000	7.6662	3.9400	0.0000	3.9400			0.0000			0.0000
Off-Road	3.1701	33.0835	19.6978	0.0380		1.6126	1.6126		1.4836	1.4836	0.0000	3,686.0619	3,686.0619	1.1922		3,715.8655
Total	**3.1701**	**33.0835**	**19.6978**	**0.0380**	**7.6662**	**1.6126**	**9.2788**	**3.9400**	**1.4836**	**5.4235**	**0.0000**	**3,686.0619**	**3,686.0619**	**1.1922**		**3,715.8655**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0762	0.0483	0.7415	1.8600e-003	0.2012	1.0600e-003	0.2023	0.0534	9.7000e-004	0.0543		188.9222	188.9222	4.9100e-003	4.7000e-003	190.4461
Total	**0.0762**	**0.0483**	**0.7415**	**1.8600e-003**	**0.2012**	**1.0600e-003**	**0.2023**	**0.0534**	**9.7000e-004**	**0.0543**		**188.9222**	**188.9222**	**4.9100e-003**	**4.7000e-003**	**190.4461**

3.4 Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					9.3551	0.0000	9.3551	3.6767	0.0000	3.6767			0.0000			0.0000
Off-Road	3.6248	38.8435	29.0415	0.0621		1.6349	1.6349		1.5041	1.5041		6,011.4105	6,011.4105	1.9442		6,060.0158
Total	**3.6248**	**38.8435**	**29.0415**	**0.0621**	**9.3551**	**1.6349**	**10.9900**	**3.6767**	**1.5041**	**5.1808**		**6,011.4105**	**6,011.4105**	**1.9442**		**6,060.0158**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.6333	22.8262	5.9557	0.0985	2.9330	0.2398	3.1728	0.8043	0.2294	1.0337		10,726.5092	10,726.5092	0.4593	1.6998	11,244.5342
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0847	0.0537	0.8239	2.0600e-003	0.2236	1.1700e-003	0.2247	0.0593	1.0800e-003	0.0604		209.9136	209.9136	5.4600e-003	5.2200e-003	211.6067
Total	**0.7180**	**22.8798**	**6.7796**	**0.1006**	**3.1565**	**0.2409**	**3.3975**	**0.8635**	**0.2305**	**1.0940**		**10,936.4228**	**10,936.4228**	**0.4648**	**1.7050**	**11,456.1409**

3.4 Grading - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.6485	0.0000	3.6485	1.4339	0.0000	1.4339			0.0000			0.0000
Off-Road	3.6248	38.8435	29.0415	0.0621		1.6349	1.6349		1.5041	1.5041	0.0000	6,011.4105	6,011.4105	1.9442		6,060.0158
Total	**3.6248**	**38.8435**	**29.0415**	**0.0621**	**3.6485**	**1.6349**	**5.2834**	**1.4339**	**1.5041**	**2.9380**	**0.0000**	**6,011.4105**	**6,011.4105**	**1.9442**		**6,060.0158**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.6333	22.8262	5.9557	0.0985	2.9330	0.2398	3.1728	0.8043	0.2294	1.0337		10,726.5092	10,726.5092	0.4593	1.6998	11,244.5342
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0847	0.0537	0.8239	2.0600e-003	0.2236	1.1700e-003	0.2247	0.0593	1.0800e-003	0.0604		209.9136	209.9136	5.4600e-003	5.2200e-003	211.6067
Total	**0.7180**	**22.8798**	**6.7796**	**0.1006**	**3.1565**	**0.2409**	**3.3975**	**0.8635**	**0.2305**	**1.0940**		**10,936.4228**	**10,936.4228**	**0.4648**	**1.7050**	**11,456.1409**

3.5 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7062	15.6156	16.3634	0.0269		0.8090	0.8090		0.7612	0.7612		2,554.3336	2,554.3336	0.6120		2,569.6322
Total	**1.7062**	**15.6156**	**16.3634**	**0.0269**		**0.8090**	**0.8090**		**0.7612**	**0.7612**		**2,554.3336**	**2,554.3336**	**0.6120**		**2,569.6322**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.2440	6.1306	2.2499	0.0261	0.8970	0.0729	0.9699	0.2583	0.0698	0.3281		2,800.9637	2,800.9637	0.0757	0.4145	2,926.3760
Worker	1.5332	0.9710	14.9129	0.0374	4.0463	0.0212	4.0676	1.0731	0.0196	1.0927		3,799.4359	3,799.4359	0.0988	0.0946	3,830.0817
Total	**1.7771**	**7.1016**	**17.1629**	**0.0635**	**4.9433**	**0.0942**	**5.0375**	**1.3314**	**0.0893**	**1.4207**		**6,600.3996**	**6,600.3996**	**0.1745**	**0.5091**	**6,756.4577**

3.5 Building Construction - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7062	15.6156	16.3634	0.0269		0.8090	0.8090		0.7612	0.7612	0.0000	2,554.333 6	2,554.333 6	0.6120		2,569.632 2
Total	**1.7062**	**15.6156**	**16.3634**	**0.0269**		**0.8090**	**0.8090**		**0.7612**	**0.7612**	**0.0000**	**2,554.333 6**	**2,554.333 6**	**0.6120**		**2,569.632 2**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.2440	6.1306	2.2499	0.0261	0.8970	0.0729	0.9699	0.2583	0.0698	0.3281		2,800.963 7	2,800.963 7	0.0757	0.4145	2,926.376 0
Worker	1.5332	0.9710	14.9129	0.0374	4.0463	0.0212	4.0676	1.0731	0.0196	1.0927		3,799.435 9	3,799.435 9	0.0988	0.0946	3,830.081 7
Total	**1.7771**	**7.1016**	**17.1629**	**0.0635**	**4.9433**	**0.0942**	**5.0375**	**1.3314**	**0.0893**	**1.4207**		**6,600.399 6**	**6,600.399 6**	**0.1745**	**0.5091**	**6,756.457 7**

3.5 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5728	14.3849	16.2440	0.0269		0.6997	0.6997		0.6584	0.6584		2,555.209 9	2,555.209 9	0.6079		2,570.406 1
Total	**1.5728**	**14.3849**	**16.2440**	**0.0269**		**0.6997**	**0.6997**		**0.6584**	**0.6584**		**2,555.209 9**	**2,555.209 9**	**0.6079**		**2,570.406 1**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1639	4.9106	2.0606	0.0251	0.8970	0.0369	0.9339	0.2583	0.0353	0.2936		2,686.854 5	2,686.854 5	0.0702	0.3968	2,806.849 0
Worker	1.4155	0.8541	13.6514	0.0361	4.0463	0.0200	4.0663	1.0731	0.0184	1.0915		3,698.440 1	3,698.440 1	0.0883	0.0870	3,726.565 3
Total	**1.5794**	**5.7647**	**15.7119**	**0.0612**	**4.9433**	**0.0569**	**5.0002**	**1.3314**	**0.0537**	**1.3851**		**6,385.294 6**	**6,385.294 6**	**0.1586**	**0.4837**	**6,533.414 3**

3.5 Building Construction - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5728	14.3849	16.2440	0.0269		0.6997	0.6997		0.6584	0.6584	0.0000	2,555.2099	2,555.2099	0.6079		2,570.4061
Total	**1.5728**	**14.3849**	**16.2440**	**0.0269**		**0.6997**	**0.6997**		**0.6584**	**0.6584**	**0.0000**	**2,555.2099**	**2,555.2099**	**0.6079**		**2,570.4061**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1639	4.9106	2.0606	0.0251	0.8970	0.0369	0.9339	0.2583	0.0353	0.2936		2,686.8545	2,686.8545	0.0702	0.3968	2,806.8490
Worker	1.4155	0.8541	13.6514	0.0361	4.0463	0.0200	4.0663	1.0731	0.0184	1.0915		3,698.4401	3,698.4401	0.0883	0.0870	3,726.5653
Total	**1.5794**	**5.7647**	**15.7119**	**0.0612**	**4.9433**	**0.0569**	**5.0002**	**1.3314**	**0.0537**	**1.3851**		**6,385.2946**	**6,385.2946**	**0.1586**	**0.4837**	**6,533.4143**

3.5 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4716	13.4438	16.1668	0.0270		0.6133	0.6133		0.5769	0.5769		2,555.6989	2,555.6989	0.6044		2,570.8077
Total	**1.4716**	**13.4438**	**16.1668**	**0.0270**		**0.6133**	**0.6133**		**0.5769**	**0.5769**		**2,555.6989**	**2,555.6989**	**0.6044**		**2,570.8077**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1601	4.9543	2.0263	0.0247	0.8969	0.0363	0.9333	0.2583	0.0348	0.2930		2,649.8412	2,649.8412	0.0681	0.3913	2,768.1383
Worker	1.3150	0.7583	12.7127	0.0351	4.0463	0.0192	4.0655	1.0731	0.0177	1.0908		3,619.0940	3,619.0940	0.0799	0.0806	3,645.1167
Total	**1.4751**	**5.7125**	**14.7390**	**0.0598**	**4.9433**	**0.0555**	**4.9988**	**1.3314**	**0.0524**	**1.3838**		**6,268.9352**	**6,268.9352**	**0.1480**	**0.4719**	**6,413.2551**

3.5 Building Construction - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4716	13.4438	16.1668	0.0270		0.6133	0.6133		0.5769	0.5769	0.0000	2,555.6989	2,555.6989	0.6044		2,570.8077
Total	**1.4716**	**13.4438**	**16.1668**	**0.0270**		**0.6133**	**0.6133**		**0.5769**	**0.5769**	**0.0000**	**2,555.6989**	**2,555.6989**	**0.6044**		**2,570.8077**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1601	4.9543	2.0263	0.0247	0.8969	0.0363	0.9333	0.2583	0.0348	0.2930		2,649.8412	2,649.8412	0.0681	0.3913	2,768.1383
Worker	1.3150	0.7583	12.7127	0.0351	4.0463	0.0192	4.0655	1.0731	0.0177	1.0908		3,619.0940	3,619.0940	0.0799	0.0806	3,645.1167
Total	**1.4751**	**5.7125**	**14.7390**	**0.0598**	**4.9433**	**0.0555**	**4.9988**	**1.3314**	**0.0524**	**1.3838**		**6,268.9352**	**6,268.9352**	**0.1480**	**0.4719**	**6,413.2551**

3.6 Paving - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.9882	9.5246	14.6258	0.0228		0.4685	0.4685		0.4310	0.4310		2,207.5472	2,207.5472	0.7140		2,225.3963
Paving	0.4192					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.4074**	**9.5246**	**14.6258**	**0.0228**		**0.4685**	**0.4685**		**0.4310**	**0.4310**		**2,207.5472**	**2,207.5472**	**0.7140**		**2,225.3963**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0545	0.0314	0.5268	1.4500e-003	0.1677	8.0000e-004	0.1685	0.0445	7.3000e-004	0.0452		149.9625	149.9625	3.3100e-003	3.3400e-003	151.0408
Total	**0.0545**	**0.0314**	**0.5268**	**1.4500e-003**	**0.1677**	**8.0000e-004**	**0.1685**	**0.0445**	**7.3000e-004**	**0.0452**		**149.9625**	**149.9625**	**3.3100e-003**	**3.3400e-003**	**151.0408**

3.6 Paving - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.9882	9.5246	14.6258	0.0228		0.4685	0.4685		0.4310	0.4310	0.0000	2,207.547 2	2,207.547 2	0.7140		2,225.396 3
Paving	0.4192					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.4074**	**9.5246**	**14.6258**	**0.0228**		**0.4685**	**0.4685**		**0.4310**	**0.4310**	**0.0000**	**2,207.547 2**	**2,207.547 2**	**0.7140**		**2,225.396 3**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0545	0.0314	0.5268	1.4500e-003	0.1677	8.0000e-004	0.1685	0.0445	7.3000e-004	0.0452		149.9625	149.9625	3.3100e-003	3.3400e-003	151.0408
Total	**0.0545**	**0.0314**	**0.5268**	**1.4500e-003**	**0.1677**	**8.0000e-004**	**0.1685**	**0.0445**	**7.3000e-004**	**0.0452**		**149.9625**	**149.9625**	**3.3100e-003**	**3.3400e-003**	**151.0408**

3.7 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	14.3800					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609		281.4481	281.4481	0.0159		281.8443
Total	**14.5607**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**		**281.4481**	**281.4481**	**0.0159**		**281.8443**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2615	0.1508	2.5285	6.9800e-003	0.8048	3.8200e-003	0.8086	0.2134	3.5200e-003	0.2170		719.8198	719.8198	0.0159	0.0160	724.9956
Total	**0.2615**	**0.1508**	**2.5285**	**6.9800e-003**	**0.8048**	**3.8200e-003**	**0.8086**	**0.2134**	**3.5200e-003**	**0.2170**		**719.8198**	**719.8198**	**0.0159**	**0.0160**	**724.9956**

3.7 Architectural Coating - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	14.3800					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609	0.0000	281.4481	281.4481	0.0159		281.8443
Total	**14.5607**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**	**0.0000**	**281.4481**	**281.4481**	**0.0159**		**281.8443**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2615	0.1508	2.5285	6.9800e-003	0.8048	3.8200e-003	0.8086	0.2134	3.5200e-003	0.2170		719.8198	719.8198	0.0159	0.0160	724.9956
Total	**0.2615**	**0.1508**	**2.5285**	**6.9800e-003**	**0.8048**	**3.8200e-003**	**0.8086**	**0.2134**	**3.5200e-003**	**0.2170**		**719.8198**	**719.8198**	**0.0159**	**0.0160**	**724.9956**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.5902	2.0417	15.5690	0.0346	3.4707	0.0261	3.4968	0.9257	0.0245	0.9501		3,583.470 4	3,583.470 4	0.1833	0.1613	3,636.103 8
Unmitigated	1.5902	2.0417	15.5690	0.0346	3.4707	0.0261	3.4968	0.9257	0.0245	0.9501		3,583.470 4	3,583.470 4	0.1833	0.1613	3,636.103 8

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Asphalt Surfaces	0.00	0.00	0.00		
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Single Family Housing	481.00	481.00	481.00	1,643,650	1,643,650
Total	481.00	481.00	481.00	1,643,650	1,643,650

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Asphalt Surfaces	0.540566	0.056059	0.172680	0.136494	0.026304	0.007104	0.011680	0.017449	0.000554	0.000251	0.025076	0.000954	0.004830
Other Non-Asphalt Surfaces	0.540566	0.056059	0.172680	0.136494	0.026304	0.007104	0.011680	0.017449	0.000554	0.000251	0.025076	0.000954	0.004830
Single Family Housing	0.540566	0.056059	0.172680	0.136494	0.026304	0.007104	0.011680	0.017449	0.000554	0.000251	0.025076	0.000954	0.004830

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0418	0.3571	0.1520	2.2800e-003		0.0289	0.0289		0.0289	0.0289		455.8733	455.8733	8.7400e-003	8.3600e-003	458.5824
NaturalGas Unmitigated	0.0418	0.3571	0.1520	2.2800e-003		0.0289	0.0289		0.0289	0.0289		455.8733	455.8733	8.7400e-003	8.3600e-003	458.5824

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	3874.92	0.0418	0.3571	0.1520	2.2800e-003		0.0289	0.0289		0.0289	0.0289		455.8733	455.8733	8.7400e-003	8.3600e-003	458.5824
Total		**0.0418**	**0.3571**	**0.1520**	**2.2800e-003**		**0.0289**	**0.0289**		**0.0289**	**0.0289**		**455.8733**	**455.8733**	**8.7400e-003**	**8.3600e-003**	**458.5824**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	3.87492	0.0418	0.3571	0.1520	2.2800e-003		0.0289	0.0289		0.0289	0.0289		455.8733	455.8733	8.7400e-003	8.3600e-003	458.5824
Total		**0.0418**	**0.3571**	**0.1520**	**2.2800e-003**		**0.0289**	**0.0289**		**0.0289**	**0.0289**		**455.8733**	**455.8733**	**8.7400e-003**	**8.3600e-003**	**458.5824**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.4954	0.7525	4.4253	4.7200e-003		0.0799	0.0799		0.0799	0.0799	0.0000	907.4317	907.4317	0.0244	0.0165	912.9584
Unmitigated	2.4954	0.7525	4.4253	4.7200e-003		0.0799	0.0799		0.0799	0.0799	0.0000	907.4317	907.4317	0.0244	0.0165	912.9584

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.2167					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	2.0721					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0825	0.7050	0.3000	4.5000e-003		0.0570	0.0570		0.0570	0.0570	0.0000	900.0000	900.0000	0.0173	0.0165	905.3483
Landscaping	0.1242	0.0475	4.1253	2.2000e-004		0.0229	0.0229		0.0229	0.0229		7.4317	7.4317	7.1400e-003		7.6102
Total	**2.4954**	**0.7525**	**4.4253**	**4.7200e-003**		**0.0799**	**0.0799**		**0.0799**	**0.0799**	**0.0000**	**907.4317**	**907.4317**	**0.0244**	**0.0165**	**912.9584**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.2167					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	2.0721					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0825	0.7050	0.3000	4.5000e-003		0.0570	0.0570		0.0570	0.0570	0.0000	900.0000	900.0000	0.0173	0.0165	905.3483
Landscaping	0.1242	0.0475	4.1253	2.2000e-004		0.0229	0.0229		0.0229	0.0229		7.4317	7.4317	7.1400e-003		7.6102
Total	**2.4954**	**0.7525**	**4.4253**	**4.7200e-003**		**0.0799**	**0.0799**		**0.0799**	**0.0799**	**0.0000**	**907.4317**	**907.4317**	**0.0244**	**0.0165**	**912.9584**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Chino Hills Paradise Ranch

San Bernardino-South Coast County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	8.80	Acre	8.80	383,328.00	0
Other Non-Asphalt Surfaces	10.00	Acre	10.00	435,600.00	0
Single Family Housing	50.00	Dwelling Unit	26.40	90,000.00	143

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	32
Climate Zone	10			**Operational Year**	2024
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	390.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Per project applicant, 85.2 acre site with 50 two-story single family residential homes, 8.8 acres of paving (assumed 25% of residential area) and 10 acres of open space. There is an additional 40 acres of natural open space.

Construction Phase - Building construction schedule condensed to fit timeline proposed by applicant.

Grading -

Demolition - Per project applicant, the Project would demolish the 1,250 square foot, three-bedroom residential use, barn, and stables currently on-site.

Vehicle Trips - Per traffic study, 481 daily trips generated (9.62 trips per day per unit for 50 units)

Woodstoves - No woodstoves

Sequestration - Per project description, the Project would provide approximately 125 trees on the slope area of the Project Site (125 trees are required per City code), 48 front yard trees, and 112 street trees.

Construction Off-road Equipment Mitigation -

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Mobile Land Use Mitigation -

Waste Mitigation - AB 341 requires each jurisdiction in CA to divert at least 75% of their waste away from landfills by 2020.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	740.00	430.00
tblConstructionPhase	PhaseEndDate	3/6/2026	12/27/2024
tblConstructionPhase	PhaseEndDate	10/3/2025	7/26/2024
tblConstructionPhase	PhaseEndDate	12/19/2025	10/11/2024
tblConstructionPhase	PhaseStartDate	12/20/2025	10/12/2024
tblConstructionPhase	PhaseStartDate	10/4/2025	7/27/2024
tblFireplaces	NumberWood	2.50	0.00
tblGrading	MaterialExported	0.00	59,075.00
tblGrading	MaterialImported	0.00	41,410.00
tblLandUse	LotAcreage	16.23	26.40
tblSequestration	NumberOfNewTrees	0.00	285.00
tblVehicleTrips	ST_TR	9.54	9.62
tblVehicleTrips	SU_TR	8.55	9.62
tblVehicleTrips	WD_TR	9.44	9.62
tblWoodstoves	NumberCatalytic	2.50	0.00
tblWoodstoves	NumberNoncatalytic	2.50	0.00
tblWoodstoves	WoodstoveDayYear	25.00	0.00
tblWoodstoves	WoodstoveWoodMass	999.60	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	4.3135	62.8663	35.8085	0.1625	19.8582	1.8762	21.4718	10.1558	1.7349	11.6404	0.0000	16,936.0463	16,936.0463	2.4077	1.7065	17,504.7666
2023	3.0887	20.4698	29.6039	0.0848	4.9433	0.7568	5.7000	1.3314	0.7123	2.0436	0.0000	8,599.2731	8,599.2731	0.7660	0.4878	8,763.7780
2024	14.8133	19.4731	28.7311	0.0835	4.9433	0.6690	5.6123	1.3314	0.6295	1.9609	0.0000	8,491.5383	8,491.5383	0.7521	0.4756	8,652.0824
Maximum	**14.8133**	**62.8663**	**35.8085**	**0.1625**	**19.8582**	**1.8762**	**21.4718**	**10.1558**	**1.7349**	**11.6404**	**0.0000**	**16,936.0463**	**16,936.0463**	**2.4077**	**1.7065**	**17,504.7666**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	4.3135	62.8663	35.8085	0.1625	7.8674	1.8762	9.4811	3.9933	1.7349	5.4779	0.0000	16,936.0463	16,936.0463	2.4077	1.7065	17,504.7666
2023	3.0887	20.4698	29.6039	0.0848	4.9433	0.7568	5.7000	1.3314	0.7123	2.0436	0.0000	8,599.2731	8,599.2731	0.7660	0.4878	8,763.7780
2024	14.8133	19.4731	28.7311	0.0835	4.9433	0.6690	5.6123	1.3314	0.6295	1.9609	0.0000	8,491.5383	8,491.5383	0.7521	0.4756	8,652.0824
Maximum	**14.8133**	**62.8663**	**35.8085**	**0.1625**	**7.8674**	**1.8762**	**9.4811**	**3.9933**	**1.7349**	**5.4779**	**0.0000**	**16,936.0463**	**16,936.0463**	**2.4077**	**1.7065**	**17,504.7666**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	40.31	0.00	36.57	48.07	0.00	39.39	0.00	0.00	0.00	0.00	0.00	0.00

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	2.4954	0.7525	4.4253	4.7200e-003		0.0799	0.0799		0.0799	0.0799	0.0000	907.4317	907.4317	0.0244	0.0165	912.9584
Energy	0.0418	0.3571	0.1520	2.2800e-003		0.0289	0.0289		0.0289	0.0289		455.8733	455.8733	8.7400e-003	8.3600e-003	458.5824
Mobile	1.3866	2.1686	13.8982	0.0321	3.4707	0.0262	3.4968	0.9257	0.0245	0.9501		3,324.8449	3,324.8449	0.1875	0.1652	3,378.7752
Total	**3.9238**	**3.2782**	**18.4754**	**0.0391**	**3.4707**	**0.1349**	**3.6055**	**0.9257**	**0.1332**	**1.0589**	**0.0000**	**4,688.1500**	**4,688.1500**	**0.2206**	**0.1901**	**4,750.3160**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	2.4954	0.7525	4.4253	4.7200e-003		0.0799	0.0799		0.0799	0.0799	0.0000	907.4317	907.4317	0.0244	0.0165	912.9584
Energy	0.0418	0.3571	0.1520	2.2800e-003		0.0289	0.0289		0.0289	0.0289		455.8733	455.8733	8.7400e-003	8.3600e-003	458.5824
Mobile	1.3866	2.1686	13.8982	0.0321	3.4707	0.0262	3.4968	0.9257	0.0245	0.9501		3,324.8449	3,324.8449	0.1875	0.1652	3,378.7752
Total	**3.9238**	**3.2782**	**18.4754**	**0.0391**	**3.4707**	**0.1349**	**3.6055**	**0.9257**	**0.1332**	**1.0589**	**0.0000**	**4,688.1500**	**4,688.1500**	**0.2206**	**0.1901**	**4,750.3160**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	5/1/2022	7/8/2022	5	50	
2	Site Preparation	Site Preparation	7/9/2022	8/19/2022	5	30	
3	Grading	Grading	8/20/2022	12/2/2022	5	75	
4	Building Construction	Building Construction	12/3/2022	7/26/2024	5	430	
5	Paving	Paving	7/27/2024	10/11/2024	5	55	
6	Architectural Coating	Architectural Coating	10/12/2024	12/27/2024	5	55	

Acres of Grading (Site Preparation Phase): 45

Acres of Grading (Grading Phase): 225

Acres of Paving: 18.8

Residential Indoor: 182,250; Residential Outdoor: 60,750; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 49,136 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Cranes	1	7.00	231	0.29
Demolition	Excavators	3	8.00	158	0.38
Grading	Excavators	2	8.00	158	0.38

Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Grading	Graders	1	8.00	187	0.41
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	6.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	12,561.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	362.00	140.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	72.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Demolition - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0246	0.0000	0.0246	3.7300e-003	0.0000	3.7300e-003			0.0000			0.0000
Off-Road	2.6392	25.7194	20.5941	0.0388		1.2427	1.2427		1.1553	1.1553		3,746.7812	3,746.7812	1.0524		3,773.0920
Total	**2.6392**	**25.7194**	**20.5941**	**0.0388**	**0.0246**	**1.2427**	**1.2673**	**3.7300e-003**	**1.1553**	**1.1590**		**3,746.7812**	**3,746.7812**	**1.0524**		**3,773.0920**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	4.4000e-004	0.0172	4.3600e-003	7.0000e-005	2.1000e-003	1.7000e-004	2.2700e-003	5.8000e-004	1.6000e-004	7.4000e-004		7.6913	7.6913	3.3000e-004	1.2200e-003	8.0627
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0610	0.0423	0.5076	1.4000e-003	0.1677	8.8000e-004	0.1685	0.0445	8.1000e-004	0.0453		142.5884	142.5884	4.0800e-003	4.0400e-003	143.8959
Total	**0.0615**	**0.0595**	**0.5120**	**1.4700e-003**	**0.1698**	**1.0500e-003**	**0.1708**	**0.0451**	**9.7000e-004**	**0.0460**		**150.2797**	**150.2797**	**4.4100e-003**	**5.2600e-003**	**151.9586**

3.2 Demolition - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					9.6000e-003	0.0000	9.6000e-003	1.4500e-003	0.0000	1.4500e-003			0.0000			0.0000
Off-Road	2.6392	25.7194	20.5941	0.0388		1.2427	1.2427		1.1553	1.1553	0.0000	3,746.7812	3,746.7812	1.0524		3,773.0920
Total	**2.6392**	**25.7194**	**20.5941**	**0.0388**	**9.6000e-003**	**1.2427**	**1.2523**	**1.4500e-003**	**1.1553**	**1.1567**	**0.0000**	**3,746.7812**	**3,746.7812**	**1.0524**		**3,773.0920**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	4.4000e-004	0.0172	4.3600e-003	7.0000e-005	2.1000e-003	1.7000e-004	2.2700e-003	5.8000e-004	1.6000e-004	7.4000e-004		7.6913	7.6913	3.3000e-004	1.2200e-003	8.0627
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0610	0.0423	0.5076	1.4000e-003	0.1677	8.8000e-004	0.1685	0.0445	8.1000e-004	0.0453		142.5884	142.5884	4.0800e-003	4.0400e-003	143.8959
Total	**0.0615**	**0.0595**	**0.5120**	**1.4700e-003**	**0.1698**	**1.0500e-003**	**0.1708**	**0.0451**	**9.7000e-004**	**0.0460**		**150.2797**	**150.2797**	**4.4100e-003**	**5.2600e-003**	**151.9586**

3.3 Site Preparation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					19.6570	0.0000	19.6570	10.1025	0.0000	10.1025			0.0000			0.0000
Off-Road	3.1701	33.0835	19.6978	0.0380		1.6126	1.6126		1.4836	1.4836		3,686.0619	3,686.0619	1.1922		3,715.8655
Total	**3.1701**	**33.0835**	**19.6978**	**0.0380**	**19.6570**	**1.6126**	**21.2696**	**10.1025**	**1.4836**	**11.5860**		**3,686.0619**	**3,686.0619**	**1.1922**		**3,715.8655**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0732	0.0508	0.6091	1.6800e-003	0.2012	1.0600e-003	0.2023	0.0534	9.7000e-004	0.0543		171.1060	171.1060	4.9000e-003	4.8500e-003	172.6750
Total	**0.0732**	**0.0508**	**0.6091**	**1.6800e-003**	**0.2012**	**1.0600e-003**	**0.2023**	**0.0534**	**9.7000e-004**	**0.0543**		**171.1060**	**171.1060**	**4.9000e-003**	**4.8500e-003**	**172.6750**

3.3 Site Preparation - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					7.6662	0.0000	7.6662	3.9400	0.0000	3.9400			0.0000			0.0000
Off-Road	3.1701	33.0835	19.6978	0.0380		1.6126	1.6126		1.4836	1.4836	0.0000	3,686.0619	3,686.0619	1.1922		3,715.8655
Total	**3.1701**	**33.0835**	**19.6978**	**0.0380**	**7.6662**	**1.6126**	**9.2788**	**3.9400**	**1.4836**	**5.4235**	**0.0000**	**3,686.0619**	**3,686.0619**	**1.1922**		**3,715.8655**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0732	0.0508	0.6091	1.6800e-003	0.2012	1.0600e-003	0.2023	0.0534	9.7000e-004	0.0543		171.1060	171.1060	4.9000e-003	4.8500e-003	172.6750
Total	**0.0732**	**0.0508**	**0.6091**	**1.6800e-003**	**0.2012**	**1.0600e-003**	**0.2023**	**0.0534**	**9.7000e-004**	**0.0543**		**171.1060**	**171.1060**	**4.9000e-003**	**4.8500e-003**	**172.6750**

3.4 Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					9.3551	0.0000	9.3551	3.6767	0.0000	3.6767			0.0000			0.0000
Off-Road	3.6248	38.8435	29.0415	0.0621		1.6349	1.6349		1.5041	1.5041		6,011.4105	6,011.4105	1.9442		6,060.0158
Total	**3.6248**	**38.8435**	**29.0415**	**0.0621**	**9.3551**	**1.6349**	**10.9900**	**3.6767**	**1.5041**	**5.1808**		**6,011.4105**	**6,011.4105**	**1.9442**		**6,060.0158**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.6073	23.9664	6.0902	0.0986	2.9330	0.2401	3.1731	0.8043	0.2298	1.0340		10,734.5179	10,734.5179	0.4580	1.7011	11,252.8896
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0814	0.0564	0.6768	1.8700e-003	0.2236	1.1700e-003	0.2247	0.0593	1.0800e-003	0.0604		190.1178	190.1178	5.4400e-003	5.3900e-003	191.8611
Total	**0.6886**	**24.0228**	**6.7670**	**0.1005**	**3.1565**	**0.2413**	**3.3979**	**0.8635**	**0.2308**	**1.0944**		**10,924.6357**	**10,924.6357**	**0.4634**	**1.7065**	**11,444.7507**

3.4 Grading - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.6485	0.0000	3.6485	1.4339	0.0000	1.4339			0.0000			0.0000
Off-Road	3.6248	38.8435	29.0415	0.0621		1.6349	1.6349		1.5041	1.5041	0.0000	6,011.4105	6,011.4105	1.9442		6,060.0158
Total	**3.6248**	**38.8435**	**29.0415**	**0.0621**	**3.6485**	**1.6349**	**5.2834**	**1.4339**	**1.5041**	**2.9380**	**0.0000**	**6,011.4105**	**6,011.4105**	**1.9442**		**6,060.0158**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.6073	23.9664	6.0902	0.0986	2.9330	0.2401	3.1731	0.8043	0.2298	1.0340		10,734.5179	10,734.5179	0.4580	1.7011	11,252.8896
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0814	0.0564	0.6768	1.8700e-003	0.2236	1.1700e-003	0.2247	0.0593	1.0800e-003	0.0604		190.1178	190.1178	5.4400e-003	5.3900e-003	191.8611
Total	**0.6886**	**24.0228**	**6.7670**	**0.1005**	**3.1565**	**0.2413**	**3.3979**	**0.8635**	**0.2308**	**1.0944**		**10,924.6357**	**10,924.6357**	**0.4634**	**1.7065**	**11,444.7507**

3.5 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7062	15.6156	16.3634	0.0269		0.8090	0.8090		0.7612	0.7612		2,554.3336	2,554.3336	0.6120		2,569.6322
Total	**1.7062**	**15.6156**	**16.3634**	**0.0269**		**0.8090**	**0.8090**		**0.7612**	**0.7612**		**2,554.3336**	**2,554.3336**	**0.6120**		**2,569.6322**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.2345	6.4358	2.3291	0.0262	0.8970	0.0732	0.9701	0.2583	0.0700	0.3283		2,804.0532	2,804.0532	0.0752	0.4152	2,929.6681
Worker	1.4728	1.0214	12.2500	0.0338	4.0463	0.0212	4.0676	1.0731	0.0196	1.0927		3,441.1322	3,441.1322	0.0986	0.0976	3,472.6864
Total	**1.7073**	**7.4572**	**14.5791**	**0.0600**	**4.9433**	**0.0944**	**5.0377**	**1.3314**	**0.0896**	**1.4209**		**6,245.1854**	**6,245.1854**	**0.1738**	**0.5128**	**6,402.3545**

3.5 Building Construction - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7062	15.6156	16.3634	0.0269		0.8090	0.8090		0.7612	0.7612	0.0000	2,554.3336	2,554.3336	0.6120		2,569.6322
Total	**1.7062**	**15.6156**	**16.3634**	**0.0269**		**0.8090**	**0.8090**		**0.7612**	**0.7612**	**0.0000**	**2,554.3336**	**2,554.3336**	**0.6120**		**2,569.6322**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.2345	6.4358	2.3291	0.0262	0.8970	0.0732	0.9701	0.2583	0.0700	0.3283		2,804.0532	2,804.0532	0.0752	0.4152	2,929.6681
Worker	1.4728	1.0214	12.2500	0.0338	4.0463	0.0212	4.0676	1.0731	0.0196	1.0927		3,441.1322	3,441.1322	0.0986	0.0976	3,472.6864
Total	**1.7073**	**7.4572**	**14.5791**	**0.0600**	**4.9433**	**0.0944**	**5.0377**	**1.3314**	**0.0896**	**1.4209**		**6,245.1854**	**6,245.1854**	**0.1738**	**0.5128**	**6,402.3545**

3.5 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5728	14.3849	16.2440	0.0269		0.6997	0.6997		0.6584	0.6584		2,555.2099	2,555.2099	0.6079		2,570.4061
Total	**1.5728**	**14.3849**	**16.2440**	**0.0269**		**0.6997**	**0.6997**		**0.6584**	**0.6584**		**2,555.2099**	**2,555.2099**	**0.6079**		**2,570.4061**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1525	5.1868	2.1241	0.0251	0.8970	0.0371	0.9340	0.2583	0.0355	0.2937		2,693.3704	2,693.3704	0.0697	0.3980	2,813.7182
Worker	1.3635	0.8981	11.2358	0.0327	4.0463	0.0200	4.0663	1.0731	0.0184	1.0915		3,350.6928	3,350.6928	0.0885	0.0898	3,379.6538
Total	**1.5160**	**6.0849**	**13.3599**	**0.0579**	**4.9433**	**0.0570**	**5.0003**	**1.3314**	**0.0539**	**1.3852**		**6,044.0632**	**6,044.0632**	**0.1581**	**0.4878**	**6,193.3720**

3.5 Building Construction - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5728	14.3849	16.2440	0.0269		0.6997	0.6997		0.6584	0.6584	0.0000	2,555.2099	2,555.2099	0.6079		2,570.4061
Total	**1.5728**	**14.3849**	**16.2440**	**0.0269**		**0.6997**	**0.6997**		**0.6584**	**0.6584**	**0.0000**	**2,555.2099**	**2,555.2099**	**0.6079**		**2,570.4061**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1525	5.1868	2.1241	0.0251	0.8970	0.0371	0.9340	0.2583	0.0355	0.2937		2,693.3704	2,693.3704	0.0697	0.3980	2,813.7182
Worker	1.3635	0.8981	11.2358	0.0327	4.0463	0.0200	4.0663	1.0731	0.0184	1.0915		3,350.6928	3,350.6928	0.0885	0.0898	3,379.6538
Total	**1.5160**	**6.0849**	**13.3599**	**0.0579**	**4.9433**	**0.0570**	**5.0003**	**1.3314**	**0.0539**	**1.3852**		**6,044.0632**	**6,044.0632**	**0.1581**	**0.4878**	**6,193.3720**

3.5 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4716	13.4438	16.1668	0.0270		0.6133	0.6133		0.5769	0.5769		2,555.698 9	2,555.698 9	0.6044		2,570.807 7
Total	**1.4716**	**13.4438**	**16.1668**	**0.0270**		**0.6133**	**0.6133**		**0.5769**	**0.5769**		**2,555.698 9**	**2,555.698 9**	**0.6044**		**2,570.807 7**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1486	5.2323	2.0893	0.0248	0.8969	0.0365	0.9334	0.2583	0.0349	0.2932		2,656.317 6	2,656.317 6	0.0675	0.3925	2,774.959 7
Worker	1.2698	0.7970	10.4749	0.0318	4.0463	0.0192	4.0655	1.0731	0.0177	1.0908		3,279.521 9	3,279.521 9	0.0802	0.0832	3,306.315 0
Total	**1.4184**	**6.0293**	**12.5642**	**0.0566**	**4.9433**	**0.0557**	**4.9989**	**1.3314**	**0.0526**	**1.3840**		**5,935.839 4**	**5,935.839 4**	**0.1477**	**0.4756**	**6,081.274 7**

3.5 Building Construction - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4716	13.4438	16.1668	0.0270		0.6133	0.6133		0.5769	0.5769	0.0000	2,555.698 9	2,555.698 9	0.6044		2,570.807 7
Total	**1.4716**	**13.4438**	**16.1668**	**0.0270**		**0.6133**	**0.6133**		**0.5769**	**0.5769**	**0.0000**	**2,555.698 9**	**2,555.698 9**	**0.6044**		**2,570.807 7**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.1486	5.2323	2.0893	0.0248	0.8969	0.0365	0.9334	0.2583	0.0349	0.2932		2,656.317 6	2,656.317 6	0.0675	0.3925	2,774.959 7
Worker	1.2698	0.7970	10.4749	0.0318	4.0463	0.0192	4.0655	1.0731	0.0177	1.0908		3,279.521 9	3,279.521 9	0.0802	0.0832	3,306.315 0
Total	**1.4184**	**6.0293**	**12.5642**	**0.0566**	**4.9433**	**0.0557**	**4.9989**	**1.3314**	**0.0526**	**1.3840**		**5,935.839 4**	**5,935.839 4**	**0.1477**	**0.4756**	**6,081.274 7**

3.6 Paving - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.9882	9.5246	14.6258	0.0228		0.4685	0.4685		0.4310	0.4310		2,207.547 2	2,207.547 2	0.7140		2,225.396 3
Paving	0.4192					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.4074**	**9.5246**	**14.6258**	**0.0228**		**0.4685**	**0.4685**		**0.4310**	**0.4310**		**2,207.547 2**	**2,207.547 2**	**0.7140**		**2,225.396 3**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0526	0.0330	0.4340	1.3200e-003	0.1677	8.0000e-004	0.1685	0.0445	7.3000e-004	0.0452		135.8918	135.8918	3.3200e-003	3.4500e-003	137.0020
Total	**0.0526**	**0.0330**	**0.4340**	**1.3200e-003**	**0.1677**	**8.0000e-004**	**0.1685**	**0.0445**	**7.3000e-004**	**0.0452**		**135.8918**	**135.8918**	**3.3200e-003**	**3.4500e-003**	**137.0020**

3.6 Paving - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.9882	9.5246	14.6258	0.0228		0.4685	0.4685		0.4310	0.4310	0.0000	2,207.547 2	2,207.547 2	0.7140		2,225.396 3
Paving	0.4192					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**1.4074**	**9.5246**	**14.6258**	**0.0228**		**0.4685**	**0.4685**		**0.4310**	**0.4310**	**0.0000**	**2,207.547 2**	**2,207.547 2**	**0.7140**		**2,225.396 3**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0526	0.0330	0.4340	1.3200e-003	0.1677	8.0000e-004	0.1685	0.0445	7.3000e-004	0.0452		135.8918	135.8918	3.3200e-003	3.4500e-003	137.0020
Total	**0.0526**	**0.0330**	**0.4340**	**1.3200e-003**	**0.1677**	**8.0000e-004**	**0.1685**	**0.0445**	**7.3000e-004**	**0.0452**		**135.8918**	**135.8918**	**3.3200e-003**	**3.4500e-003**	**137.0020**

3.7 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	14.3800					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609		281.4481	281.4481	0.0159		281.8443
Total	**14.5607**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**		**281.4481**	**281.4481**	**0.0159**		**281.8443**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2526	0.1585	2.0834	6.3200e-003	0.8048	3.8200e-003	0.8086	0.2134	3.5200e-003	0.2170		652.2806	652.2806	0.0160	0.0165	657.6096
Total	**0.2526**	**0.1585**	**2.0834**	**6.3200e-003**	**0.8048**	**3.8200e-003**	**0.8086**	**0.2134**	**3.5200e-003**	**0.2170**		**652.2806**	**652.2806**	**0.0160**	**0.0165**	**657.6096**

3.7 Architectural Coating - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	14.3800					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609	0.0000	281.4481	281.4481	0.0159		281.8443
Total	**14.5607**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**	**0.0000**	**281.4481**	**281.4481**	**0.0159**		**281.8443**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.2526	0.1585	2.0834	6.3200e-003	0.8048	3.8200e-003	0.8086	0.2134	3.5200e-003	0.2170		652.2806	652.2806	0.0160	0.0165	657.6096
Total	**0.2526**	**0.1585**	**2.0834**	**6.3200e-003**	**0.8048**	**3.8200e-003**	**0.8086**	**0.2134**	**3.5200e-003**	**0.2170**		**652.2806**	**652.2806**	**0.0160**	**0.0165**	**657.6096**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.3866	2.1686	13.8982	0.0321	3.4707	0.0262	3.4968	0.9257	0.0245	0.9501		3,324.8449	3,324.8449	0.1875	0.1652	3,378.7752
Unmitigated	1.3866	2.1686	13.8982	0.0321	3.4707	0.0262	3.4968	0.9257	0.0245	0.9501		3,324.8449	3,324.8449	0.1875	0.1652	3,378.7752

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Asphalt Surfaces	0.00	0.00	0.00		
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Single Family Housing	481.00	481.00	481.00	1,643,650	1,643,650
Total	481.00	481.00	481.00	1,643,650	1,643,650

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Asphalt Surfaces	0.540566	0.056059	0.172680	0.136494	0.026304	0.007104	0.011680	0.017449	0.000554	0.000251	0.025076	0.000954	0.004830
Other Non-Asphalt Surfaces	0.540566	0.056059	0.172680	0.136494	0.026304	0.007104	0.011680	0.017449	0.000554	0.000251	0.025076	0.000954	0.004830
Single Family Housing	0.540566	0.056059	0.172680	0.136494	0.026304	0.007104	0.011680	0.017449	0.000554	0.000251	0.025076	0.000954	0.004830

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0418	0.3571	0.1520	2.2800e-003		0.0289	0.0289		0.0289	0.0289		455.8733	455.8733	8.7400e-003	8.3600e-003	458.5824
NaturalGas Unmitigated	0.0418	0.3571	0.1520	2.2800e-003		0.0289	0.0289		0.0289	0.0289		455.8733	455.8733	8.7400e-003	8.3600e-003	458.5824

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	3874.92	0.0418	0.3571	0.1520	2.2800e-003		0.0289	0.0289		0.0289	0.0289		455.8733	455.8733	8.7400e-003	8.3600e-003	458.5824
Total		**0.0418**	**0.3571**	**0.1520**	**2.2800e-003**		**0.0289**	**0.0289**		**0.0289**	**0.0289**		**455.8733**	**455.8733**	**8.7400e-003**	**8.3600e-003**	**458.5824**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	3.87492	0.0418	0.3571	0.1520	2.2800e-003		0.0289	0.0289		0.0289	0.0289		455.8733	455.8733	8.7400e-003	8.3600e-003	458.5824
Total		**0.0418**	**0.3571**	**0.1520**	**2.2800e-003**		**0.0289**	**0.0289**		**0.0289**	**0.0289**		**455.8733**	**455.8733**	**8.7400e-003**	**8.3600e-003**	**458.5824**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	2.4954	0.7525	4.4253	4.7200e-003		0.0799	0.0799		0.0799	0.0799	0.0000	907.4317	907.4317	0.0244	0.0165	912.9584
Unmitigated	2.4954	0.7525	4.4253	4.7200e-003		0.0799	0.0799		0.0799	0.0799	0.0000	907.4317	907.4317	0.0244	0.0165	912.9584

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.2167					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	2.0721					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0825	0.7050	0.3000	4.5000e-003		0.0570	0.0570		0.0570	0.0570	0.0000	900.0000	900.0000	0.0173	0.0165	905.3483
Landscaping	0.1242	0.0475	4.1253	2.2000e-004		0.0229	0.0229		0.0229	0.0229		7.4317	7.4317	7.1400e-003		7.6102
Total	**2.4954**	**0.7525**	**4.4253**	**4.7200e-003**		**0.0799**	**0.0799**		**0.0799**	**0.0799**	**0.0000**	**907.4317**	**907.4317**	**0.0244**	**0.0165**	**912.9584**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.2167					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	2.0721					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0825	0.7050	0.3000	4.5000e-003		0.0570	0.0570		0.0570	0.0570	0.0000	900.0000	900.0000	0.0173	0.0165	905.3483
Landscaping	0.1242	0.0475	4.1253	2.2000e-004		0.0229	0.0229		0.0229	0.0229		7.4317	7.4317	7.1400e-003		7.6102
Total	**2.4954**	**0.7525**	**4.4253**	**4.7200e-003**		**0.0799**	**0.0799**		**0.0799**	**0.0799**	**0.0000**	**907.4317**	**907.4317**	**0.0244**	**0.0165**	**912.9584**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

<u>Fire Pumps and Emergency Generators</u>

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

<u>Boilers</u>

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

<u>User Defined Equipment</u>

Equipment Type	Number

11.0 Vegetation

Appendix B:

CalEEMod Annual Emission Output

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Chino Hills Paradise Ranch

San Bernardino-South Coast County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Asphalt Surfaces	8.80	Acre	8.80	383,328.00	0
Other Non-Asphalt Surfaces	10.00	Acre	10.00	435,600.00	0
Single Family Housing	50.00	Dwelling Unit	26.40	90,000.00	143

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	32
Climate Zone	10			**Operational Year**	2024
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	390.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Per project applicant, 85.2 acre site with 50 two-story single family residential homes, 8.8 acres of paving (assumed 25% of residential area) and 10 acres of open space. There is an additional 40 acres of natural open space.

Construction Phase - Building construction schedule condensed to fit timeline proposed by applicant.

Grading -

Demolition - Per project applicant, the Project would demolish the 1,250 square foot, three-bedroom residential use, barn, and stables currently on-site.

Vehicle Trips - Per traffic study, 481 daily trips generated (9.62 trips per day per unit for 50 units)

Woodstoves - No woodstoves

Sequestration - Per project description, the Project would provide approximately 125 trees on the slope area of the Project Site (125 trees are required per City code), 48 front yard trees, and 112 street trees.

Construction Off-road Equipment Mitigation -

Mobile Land Use Mitigation -

Waste Mitigation - AB 341 requires each jurisdiction in CA to divert at least 75% of their waste away from landfills by 2020.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	740.00	430.00
tblConstructionPhase	PhaseEndDate	3/6/2026	12/27/2024
tblConstructionPhase	PhaseEndDate	10/3/2025	7/26/2024
tblConstructionPhase	PhaseEndDate	12/19/2025	10/11/2024
tblConstructionPhase	PhaseStartDate	12/20/2025	10/12/2024
tblConstructionPhase	PhaseStartDate	10/4/2025	7/27/2024
tblFireplaces	NumberWood	2.50	0.00
tblGrading	MaterialExported	0.00	59,075.00
tblGrading	MaterialImported	0.00	41,410.00
tblLandUse	LotAcreage	16.23	26.40
tblSequestration	NumberOfNewTrees	0.00	285.00
tblVehicleTrips	ST_TR	9.54	9.62
tblVehicleTrips	SU_TR	8.55	9.62
tblVehicleTrips	WD_TR	9.44	9.62
tblWoodstoves	NumberCatalytic	2.50	0.00
tblWoodstoves	NumberNoncatalytic	2.50	0.00
tblWoodstoves	WoodstoveDayYear	25.00	0.00
tblWoodstoves	WoodstoveWoodMass	999.60	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.3112	3.7364	2.4893	8.5700e-003	0.8183	0.1347	0.9530	0.3364	0.1247	0.4611	0.0000	797.5405	797.5405	0.1293	0.0629	819.5197
2023	0.3890	2.6639	3.9148	0.0111	0.6308	0.0984	0.7292	0.1702	0.0926	0.2628	0.0000	1,021.5436	1,021.5436	0.0905	0.0578	1,041.0340
2024	0.6568	1.7627	2.7148	7.2300e-003	0.3901	0.0649	0.4550	0.1051	0.0609	0.1660	0.0000	664.0623	664.0623	0.0700	0.0330	675.6530
Maximum	**0.6568**	**3.7364**	**3.9148**	**0.0111**	**0.8183**	**0.1347**	**0.9530**	**0.3364**	**0.1247**	**0.4611**	**0.0000**	**1,021.5436**	**1,021.5436**	**0.1293**	**0.0629**	**1,041.0340**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.3112	3.7364	2.4893	8.5700e-003	0.4241	0.1347	0.5588	0.1598	0.1247	0.2845	0.0000	797.5401	797.5401	0.1293	0.0629	819.5193
2023	0.3890	2.6639	3.9148	0.0111	0.6308	0.0984	0.7292	0.1702	0.0926	0.2628	0.0000	1,021.5433	1,021.5433	0.0905	0.0578	1,041.0337
2024	0.6568	1.7627	2.7148	7.2300e-003	0.3901	0.0649	0.4550	0.1051	0.0609	0.1660	0.0000	664.0620	664.0620	0.0700	0.0330	675.6527
Maximum	**0.6568**	**3.7364**	**3.9148**	**0.0111**	**0.6308**	**0.1347**	**0.7292**	**0.1702**	**0.1247**	**0.2845**	**0.0000**	**1,021.5433**	**1,021.5433**	**0.1293**	**0.0629**	**1,041.0337**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	21.43	0.00	18.45	28.87	0.00	19.85	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	5-1-2022	7-31-2022	1.0006	1.0006
2	8-1-2022	10-31-2022	1.9816	1.9816
3	11-1-2022	1-31-2023	1.3029	1.3029
4	2-1-2023	4-30-2023	0.7461	0.7461
5	5-1-2023	7-31-2023	0.7656	0.7656
6	8-1-2023	10-31-2023	0.7685	0.7685
7	11-1-2023	1-31-2024	0.7608	0.7608
8	2-1-2024	4-30-2024	0.7160	0.7160
9	5-1-2024	7-31-2024	0.7064	0.7064
10	8-1-2024	9-30-2024	0.2400	0.2400
		Highest	1.9816	1.9816

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.4343	0.0148	0.5194	8.0000e-005		3.5700e-003	3.5700e-003		3.5700e-003	3.5700e-003	0.0000	11.0486	11.0486	1.0000e-003	1.9000e-004	11.1295
Energy	7.6300e-003	0.0652	0.0277	4.2000e-004		5.2700e-003	5.2700e-003		5.2700e-003	5.2700e-003	0.0000	146.0998	146.0998	7.4100e-003	2.1100e-003	146.9126
Mobile	0.2505	0.4026	2.6350	5.9200e-003	0.6198	4.7500e-003	0.6245	0.1656	4.4500e-003	0.1700	0.0000	556.4680	556.4680	0.0313	0.0277	565.4909
Waste						0.0000	0.0000		0.0000	0.0000	11.9014	0.0000	11.9014	0.7034	0.0000	29.4851
Water						0.0000	0.0000		0.0000	0.0000	1.0335	11.5693	12.6028	0.1071	2.6200e-003	16.0632
Total	**0.6924**	**0.4826**	**3.1821**	**6.4200e-003**	**0.6198**	**0.0136**	**0.6334**	**0.1656**	**0.0133**	**0.1788**	**12.9349**	**725.1857**	**738.1206**	**0.8502**	**0.0326**	**769.0813**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.4343	0.0148	0.5194	8.0000e-005		3.5700e-003	3.5700e-003		3.5700e-003	3.5700e-003	0.0000	11.0486	11.0486	1.0000e-003	1.9000e-004	11.1295
Energy	7.6300e-003	0.0652	0.0277	4.2000e-004		5.2700e-003	5.2700e-003		5.2700e-003	5.2700e-003	0.0000	146.0998	146.0998	7.4100e-003	2.1100e-003	146.9126
Mobile	0.2505	0.4026	2.6350	5.9200e-003	0.6198	4.7500e-003	0.6245	0.1656	4.4500e-003	0.1700	0.0000	556.4680	556.4680	0.0313	0.0277	565.4909
Waste						0.0000	0.0000		0.0000	0.0000	2.9753	0.0000	2.9753	0.1758	0.0000	7.3713
Water						0.0000	0.0000		0.0000	0.0000	1.0335	11.5693	12.6028	0.1071	2.6200e-003	16.0632
Total	**0.6924**	**0.4826**	**3.1821**	**6.4200e-003**	**0.6198**	**0.0136**	**0.6334**	**0.1656**	**0.0133**	**0.1788**	**4.0089**	**725.1857**	**729.1945**	**0.3227**	**0.0326**	**746.9675**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**69.01**	**0.00**	**1.21**	**62.05**	**0.00**	**2.88**

2.3 Vegetation

Vegetation

	CO2e
Category	MT
New Trees	201.7800
Total	**201.7800**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	5/1/2022	7/8/2022	5	50	
2	Site Preparation	Site Preparation	7/9/2022	8/19/2022	5	30	
3	Grading	Grading	8/20/2022	12/2/2022	5	75	
4	Building Construction	Building Construction	12/3/2022	7/26/2024	5	430	
5	Paving	Paving	7/27/2024	10/11/2024	5	55	
6	Architectural Coating	Architectural Coating	10/12/2024	12/27/2024	5	55	

Acres of Grading (Site Preparation Phase): 45

Acres of Grading (Grading Phase): 225

Acres of Paving: 18.8

Residential Indoor: 182,250; Residential Outdoor: 60,750; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 49,136 (Architectural Coating – sqft)

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Architectural Coating	Air Compressors	1	6.00	78	0.48
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Building Construction	Cranes	1	7.00	231	0.29
Demolition	Excavators	3	8.00	158	0.38
Grading	Excavators	2	8.00	158	0.38
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Grading	Graders	1	8.00	187	0.41
Paving	Pavers	2	8.00	130	0.42
Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	6.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	12,561.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Building Construction	9	362.00	140.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	72.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Demolition - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					6.2000e-004	0.0000	6.2000e-004	9.0000e-005	0.0000	9.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0660	0.6430	0.5149	9.7000e-004		0.0311	0.0311		0.0289	0.0289	0.0000	84.9756	84.9756	0.0239	0.0000	85.5723
Total	**0.0660**	**0.6430**	**0.5149**	**9.7000e-004**	**6.2000e-004**	**0.0311**	**0.0317**	**9.0000e-005**	**0.0289**	**0.0290**	**0.0000**	**84.9756**	**84.9756**	**0.0239**	**0.0000**	**85.5723**

3.2 Demolition - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.0000e-005	4.3000e-004	1.1000e-004	0.0000	5.0000e-005	0.0000	6.0000e-005	1.0000e-005	0.0000	2.0000e-005	0.0000	0.1744	0.1744	1.0000e-005	3.0000e-005	0.1828
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.4100e-003	1.1100e-003	0.0133	4.0000e-005	4.1100e-003	2.0000e-005	4.1300e-003	1.0900e-003	2.0000e-005	1.1100e-003	0.0000	3.2982	3.2982	9.0000e-005	9.0000e-005	3.3288
Total	**1.4200e-003**	**1.5400e-003**	**0.0134**	**4.0000e-005**	**4.1600e-003**	**2.0000e-005**	**4.1900e-003**	**1.1000e-003**	**2.0000e-005**	**1.1300e-003**	**0.0000**	**3.4726**	**3.4726**	**1.0000e-004**	**1.2000e-004**	**3.5116**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.4000e-004	0.0000	2.4000e-004	4.0000e-005	0.0000	4.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0660	0.6430	0.5149	9.7000e-004		0.0311	0.0311		0.0289	0.0289	0.0000	84.9755	84.9755	0.0239	0.0000	85.5722
Total	**0.0660**	**0.6430**	**0.5149**	**9.7000e-004**	**2.4000e-004**	**0.0311**	**0.0313**	**4.0000e-005**	**0.0289**	**0.0289**	**0.0000**	**84.9755**	**84.9755**	**0.0239**	**0.0000**	**85.5722**

3.2 Demolition - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.0000e-005	4.3000e-004	1.1000e-004	0.0000	5.0000e-005	0.0000	6.0000e-005	1.0000e-005	0.0000	2.0000e-005	0.0000	0.1744	0.1744	1.0000e-005	3.0000e-005	0.1828
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.4100e-003	1.1100e-003	0.0133	4.0000e-005	4.1100e-003	2.0000e-005	4.1300e-003	1.0900e-003	2.0000e-005	1.1100e-003	0.0000	3.2982	3.2982	9.0000e-005	9.0000e-005	3.3288
Total	**1.4200e-003**	**1.5400e-003**	**0.0134**	**4.0000e-005**	**4.1600e-003**	**2.0000e-005**	**4.1900e-003**	**1.1000e-003**	**2.0000e-005**	**1.1300e-003**	**0.0000**	**3.4726**	**3.4726**	**1.0000e-004**	**1.2000e-004**	**3.5116**

3.3 Site Preparation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2949	0.0000	0.2949	0.1515	0.0000	0.1515	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0476	0.4963	0.2955	5.7000e-004		0.0242	0.0242		0.0223	0.0223	0.0000	50.1591	50.1591	0.0162	0.0000	50.5647
Total	**0.0476**	**0.4963**	**0.2955**	**5.7000e-004**	**0.2949**	**0.0242**	**0.3191**	**0.1515**	**0.0223**	**0.1738**	**0.0000**	**50.1591**	**50.1591**	**0.0162**	**0.0000**	**50.5647**

3.3 Site Preparation - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0200e-003	8.0000e-004	9.5800e-003	3.0000e-005	2.9600e-003	2.0000e-005	2.9800e-003	7.9000e-004	1.0000e-005	8.0000e-004	0.0000	2.3747	2.3747	7.0000e-005	7.0000e-005	2.3968
Total	**1.0200e-003**	**8.0000e-004**	**9.5800e-003**	**3.0000e-005**	**2.9600e-003**	**2.0000e-005**	**2.9800e-003**	**7.9000e-004**	**1.0000e-005**	**8.0000e-004**	**0.0000**	**2.3747**	**2.3747**	**7.0000e-005**	**7.0000e-005**	**2.3968**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1150	0.0000	0.1150	0.0591	0.0000	0.0591	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0476	0.4963	0.2955	5.7000e-004		0.0242	0.0242		0.0223	0.0223	0.0000	50.1590	50.1590	0.0162	0.0000	50.5646
Total	**0.0476**	**0.4963**	**0.2955**	**5.7000e-004**	**0.1150**	**0.0242**	**0.1392**	**0.0591**	**0.0223**	**0.0814**	**0.0000**	**50.1590**	**50.1590**	**0.0162**	**0.0000**	**50.5646**

3.3 Site Preparation - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0200e-003	8.0000e-004	9.5800e-003	3.0000e-005	2.9600e-003	2.0000e-005	2.9800e-003	7.9000e-004	1.0000e-005	8.0000e-004	0.0000	2.3747	2.3747	7.0000e-005	7.0000e-005	2.3968
Total	**1.0200e-003**	**8.0000e-004**	**9.5800e-003**	**3.0000e-005**	**2.9600e-003**	**2.0000e-005**	**2.9800e-003**	**7.9000e-004**	**1.0000e-005**	**8.0000e-004**	**0.0000**	**2.3747**	**2.3747**	**7.0000e-005**	**7.0000e-005**	**2.3968**

3.4 Grading - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.3508	0.0000	0.3508	0.1379	0.0000	0.1379	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1359	1.4566	1.0891	2.3300e-003		0.0613	0.0613		0.0564	0.0564	0.0000	204.5048	204.5048	0.0661	0.0000	206.1583
Total	**0.1359**	**1.4566**	**1.0891**	**2.3300e-003**	**0.3508**	**0.0613**	**0.4121**	**0.1379**	**0.0564**	**0.1943**	**0.0000**	**204.5048**	**204.5048**	**0.0661**	**0.0000**	**206.1583**

3.4 Grading - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0233	0.9046	0.2254	3.7000e-003	0.1082	9.0000e-003	0.1172	0.0297	8.6100e-003	0.0383	0.0000	365.0241	365.0241	0.0156	0.0579	382.6521
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.8300e-003	2.2200e-003	0.0266	7.0000e-005	8.2200e-003	4.0000e-005	8.2700e-003	2.1800e-003	4.0000e-005	2.2200e-003	0.0000	6.5965	6.5965	1.9000e-004	1.9000e-004	6.6577
Total	**0.0262**	**0.9069**	**0.2520**	**3.7700e-003**	**0.1164**	**9.0400e-003**	**0.1254**	**0.0319**	**8.6500e-003**	**0.0405**	**0.0000**	**371.6205**	**371.6205**	**0.0158**	**0.0580**	**389.3097**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1368	0.0000	0.1368	0.0538	0.0000	0.0538	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1359	1.4566	1.0891	2.3300e-003		0.0613	0.0613		0.0564	0.0564	0.0000	204.5045	204.5045	0.0661	0.0000	206.1580
Total	**0.1359**	**1.4566**	**1.0891**	**2.3300e-003**	**0.1368**	**0.0613**	**0.1981**	**0.0538**	**0.0564**	**0.1102**	**0.0000**	**204.5045**	**204.5045**	**0.0661**	**0.0000**	**206.1580**

3.4 Grading - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0233	0.9046	0.2254	3.7000e-003	0.1082	9.0000e-003	0.1172	0.0297	8.6100e-003	0.0383	0.0000	365.0241	365.0241	0.0156	0.0579	382.6521
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.8300e-003	2.2200e-003	0.0266	7.0000e-005	8.2200e-003	4.0000e-005	8.2700e-003	2.1800e-003	4.0000e-005	2.2200e-003	0.0000	6.5965	6.5965	1.9000e-004	1.9000e-004	6.6577
Total	**0.0262**	**0.9069**	**0.2520**	**3.7700e-003**	**0.1164**	**9.0400e-003**	**0.1254**	**0.0319**	**8.6500e-003**	**0.0405**	**0.0000**	**371.6205**	**371.6205**	**0.0158**	**0.0580**	**389.3097**

3.5 Building Construction - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0171	0.1562	0.1636	2.7000e-004		8.0900e-003	8.0900e-003		7.6100e-003	7.6100e-003	0.0000	23.1725	23.1725	5.5500e-003	0.0000	23.3113
Total	**0.0171**	**0.1562**	**0.1636**	**2.7000e-004**		**8.0900e-003**	**8.0900e-003**		**7.6100e-003**	**7.6100e-003**	**0.0000**	**23.1725**	**23.1725**	**5.5500e-003**	**0.0000**	**23.3113**

3.5 Building Construction - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.3900e-003	0.0645	0.0229	2.6000e-004	8.8300e-003	7.3000e-004	9.5600e-003	2.5500e-003	7.0000e-004	3.2500e-003	0.0000	25.4217	25.4217	6.9000e-004	3.7600e-003	26.5608
Worker	0.0137	0.0107	0.1285	3.5000e-004	0.0397	2.1000e-004	0.0399	0.0105	2.0000e-004	0.0107	0.0000	31.8390	31.8390	9.1000e-004	9.1000e-004	32.1343
Total	**0.0160**	**0.0752**	**0.1513**	**6.1000e-004**	**0.0485**	**9.4000e-004**	**0.0495**	**0.0131**	**9.0000e-004**	**0.0140**	**0.0000**	**57.2607**	**57.2607**	**1.6000e-003**	**4.6700e-003**	**58.6951**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0171	0.1562	0.1636	2.7000e-004		8.0900e-003	8.0900e-003		7.6100e-003	7.6100e-003	0.0000	23.1725	23.1725	5.5500e-003	0.0000	23.3113
Total	**0.0171**	**0.1562**	**0.1636**	**2.7000e-004**		**8.0900e-003**	**8.0900e-003**		**7.6100e-003**	**7.6100e-003**	**0.0000**	**23.1725**	**23.1725**	**5.5500e-003**	**0.0000**	**23.3113**

3.5 Building Construction - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.3900e-003	0.0645	0.0229	2.6000e-004	8.8300e-003	7.3000e-004	9.5600e-003	2.5500e-003	7.0000e-004	3.2500e-003	0.0000	25.4217	25.4217	6.9000e-004	3.7600e-003	26.5608
Worker	0.0137	0.0107	0.1285	3.5000e-004	0.0397	2.1000e-004	0.0399	0.0105	2.0000e-004	0.0107	0.0000	31.8390	31.8390	9.1000e-004	9.1000e-004	32.1343
Total	**0.0160**	**0.0752**	**0.1513**	**6.1000e-004**	**0.0485**	**9.4000e-004**	**0.0495**	**0.0131**	**9.0000e-004**	**0.0140**	**0.0000**	**57.2607**	**57.2607**	**1.6000e-003**	**4.6700e-003**	**58.6951**

3.5 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2045	1.8700	2.1117	3.5000e-003		0.0910	0.0910		0.0856	0.0856	0.0000	301.3462	301.3462	0.0717	0.0000	303.1383
Total	**0.2045**	**1.8700**	**2.1117**	**3.5000e-003**		**0.0910**	**0.0910**		**0.0856**	**0.0856**	**0.0000**	**301.3462**	**301.3462**	**0.0717**	**0.0000**	**303.1383**

3.5 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0205	0.6715	0.2718	3.2600e-003	0.1148	4.8100e-003	0.1196	0.0331	4.6000e-003	0.0377	0.0000	317.1951	317.1951	8.2600e-003	0.0469	331.3705
Worker	0.1640	0.1224	1.5312	4.3400e-003	0.5160	2.6000e-003	0.5186	0.1370	2.3900e-003	0.1394	0.0000	403.0024	403.0024	0.0106	0.0109	406.5253
Total	**0.1845**	**0.7939**	**1.8031**	**7.6000e-003**	**0.6308**	**7.4100e-003**	**0.6382**	**0.1702**	**6.9900e-003**	**0.1772**	**0.0000**	**720.1975**	**720.1975**	**0.0188**	**0.0578**	**737.8957**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2045	1.8700	2.1117	3.5000e-003		0.0910	0.0910		0.0856	0.0856	0.0000	301.3458	301.3458	0.0717	0.0000	303.1380
Total	**0.2045**	**1.8700**	**2.1117**	**3.5000e-003**		**0.0910**	**0.0910**		**0.0856**	**0.0856**	**0.0000**	**301.3458**	**301.3458**	**0.0717**	**0.0000**	**303.1380**

3.5 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0205	0.6715	0.2718	3.2600e-003	0.1148	4.8100e-003	0.1196	0.0331	4.6000e-003	0.0377	0.0000	317.1951	317.1951	8.2600e-003	0.0469	331.3705
Worker	0.1640	0.1224	1.5312	4.3400e-003	0.5160	2.6000e-003	0.5186	0.1370	2.3900e-003	0.1394	0.0000	403.0024	403.0024	0.0106	0.0109	406.5253
Total	**0.1845**	**0.7939**	**1.8031**	**7.6000e-003**	**0.6308**	**7.4100e-003**	**0.6382**	**0.1702**	**6.9900e-003**	**0.1772**	**0.0000**	**720.1975**	**720.1975**	**0.0188**	**0.0578**	**737.8957**

3.5 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1104	1.0083	1.2125	2.0200e-003		0.0460	0.0460		0.0433	0.0433	0.0000	173.8868	173.8868	0.0411	0.0000	174.9148
Total	**0.1104**	**1.0083**	**1.2125**	**2.0200e-003**		**0.0460**	**0.0460**		**0.0433**	**0.0433**	**0.0000**	**173.8868**	**173.8868**	**0.0411**	**0.0000**	**174.9148**

3.5 Building Construction - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0116	0.3909	0.1542	1.8600e-003	0.0662	2.7300e-003	0.0690	0.0191	2.6100e-003	0.0217	0.0000	180.4777	180.4777	4.6200e-003	0.0267	188.5397
Worker	0.0880	0.0626	0.8235	2.4300e-003	0.2977	1.4400e-003	0.2991	0.0791	1.3300e-003	0.0804	0.0000	227.5512	227.5512	5.5300e-003	5.8400e-003	229.4311
Total	**0.0996**	**0.4535**	**0.9777**	**4.2900e-003**	**0.3639**	**4.1700e-003**	**0.3681**	**0.0982**	**3.9400e-003**	**0.1021**	**0.0000**	**408.0289**	**408.0289**	**0.0102**	**0.0325**	**417.9708**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1104	1.0083	1.2125	2.0200e-003		0.0460	0.0460		0.0433	0.0433	0.0000	173.8866	173.8866	0.0411	0.0000	174.9146
Total	**0.1104**	**1.0083**	**1.2125**	**2.0200e-003**		**0.0460**	**0.0460**		**0.0433**	**0.0433**	**0.0000**	**173.8866**	**173.8866**	**0.0411**	**0.0000**	**174.9146**

3.5 Building Construction - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0116	0.3909	0.1542	1.8600e-003	0.0662	2.7300e-003	0.0690	0.0191	2.6100e-003	0.0217	0.0000	180.4777	180.4777	4.6200e-003	0.0267	188.5397
Worker	0.0880	0.0626	0.8235	2.4300e-003	0.2977	1.4400e-003	0.2991	0.0791	1.3300e-003	0.0804	0.0000	227.5512	227.5512	5.5300e-003	5.8400e-003	229.4311
Total	**0.0996**	**0.4535**	**0.9777**	**4.2900e-003**	**0.3639**	**4.1700e-003**	**0.3681**	**0.0982**	**3.9400e-003**	**0.1021**	**0.0000**	**408.0289**	**408.0289**	**0.0102**	**0.0325**	**417.9708**

3.6 Paving - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0272	0.2619	0.4022	6.3000e-004		0.0129	0.0129		0.0119	0.0119	0.0000	55.0730	55.0730	0.0178	0.0000	55.5183
Paving	0.0115					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0387**	**0.2619**	**0.4022**	**6.3000e-004**		**0.0129**	**0.0129**		**0.0119**	**0.0119**	**0.0000**	**55.0730**	**55.0730**	**0.0178**	**0.0000**	**55.5183**

3.6 Paving - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3400e-003	9.5000e-004	0.0125	4.0000e-005	4.5200e-003	2.0000e-005	4.5400e-003	1.2000e-003	2.0000e-005	1.2200e-003	0.0000	3.4573	3.4573	8.0000e-005	9.0000e-005	3.4858
Total	**1.3400e-003**	**9.5000e-004**	**0.0125**	**4.0000e-005**	**4.5200e-003**	**2.0000e-005**	**4.5400e-003**	**1.2000e-003**	**2.0000e-005**	**1.2200e-003**	**0.0000**	**3.4573**	**3.4573**	**8.0000e-005**	**9.0000e-005**	**3.4858**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0272	0.2619	0.4022	6.3000e-004		0.0129	0.0129		0.0119	0.0119	0.0000	55.0729	55.0729	0.0178	0.0000	55.5182
Paving	0.0115					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0387**	**0.2619**	**0.4022**	**6.3000e-004**		**0.0129**	**0.0129**		**0.0119**	**0.0119**	**0.0000**	**55.0729**	**55.0729**	**0.0178**	**0.0000**	**55.5182**

3.6 Paving - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3400e-003	9.5000e-004	0.0125	4.0000e-005	4.5200e-003	2.0000e-005	4.5400e-003	1.2000e-003	2.0000e-005	1.2200e-003	0.0000	3.4573	3.4573	8.0000e-005	9.0000e-005	3.4858
Total	**1.3400e-003**	**9.5000e-004**	**0.0125**	**4.0000e-005**	**4.5200e-003**	**2.0000e-005**	**4.5400e-003**	**1.2000e-003**	**2.0000e-005**	**1.2200e-003**	**0.0000**	**3.4573**	**3.4573**	**8.0000e-005**	**9.0000e-005**	**3.4858**

3.7 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.3955					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.9700e-003	0.0335	0.0498	8.0000e-005		1.6800e-003	1.6800e-003		1.6800e-003	1.6800e-003	0.0000	7.0215	7.0215	4.0000e-004	0.0000	7.0313
Total	**0.4004**	**0.0335**	**0.0498**	**8.0000e-005**		**1.6800e-003**	**1.6800e-003**		**1.6800e-003**	**1.6800e-003**	**0.0000**	**7.0215**	**7.0215**	**4.0000e-004**	**0.0000**	**7.0313**

3.7 Architectural Coating - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.4200e-003	4.5700e-003	0.0601	1.8000e-004	0.0217	1.1000e-004	0.0218	5.7700e-003	1.0000e-004	5.8600e-003	0.0000	16.5949	16.5949	4.0000e-004	4.3000e-004	16.7320
Total	**6.4200e-003**	**4.5700e-003**	**0.0601**	**1.8000e-004**	**0.0217**	**1.1000e-004**	**0.0218**	**5.7700e-003**	**1.0000e-004**	**5.8600e-003**	**0.0000**	**16.5949**	**16.5949**	**4.0000e-004**	**4.3000e-004**	**16.7320**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.3955					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.9700e-003	0.0335	0.0498	8.0000e-005		1.6800e-003	1.6800e-003		1.6800e-003	1.6800e-003	0.0000	7.0214	7.0214	4.0000e-004	0.0000	7.0313
Total	**0.4004**	**0.0335**	**0.0498**	**8.0000e-005**		**1.6800e-003**	**1.6800e-003**		**1.6800e-003**	**1.6800e-003**	**0.0000**	**7.0214**	**7.0214**	**4.0000e-004**	**0.0000**	**7.0313**

3.7 Architectural Coating - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.4200e-003	4.5700e-003	0.0601	1.8000e-004	0.0217	1.1000e-004	0.0218	5.7700e-003	1.0000e-004	5.8600e-003	0.0000	16.5949	16.5949	4.0000e-004	4.3000e-004	16.7320
Total	**6.4200e-003**	**4.5700e-003**	**0.0601**	**1.8000e-004**	**0.0217**	**1.1000e-004**	**0.0218**	**5.7700e-003**	**1.0000e-004**	**5.8600e-003**	**0.0000**	**16.5949**	**16.5949**	**4.0000e-004**	**4.3000e-004**	**16.7320**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.2505	0.4026	2.6350	5.9200e-003	0.6198	4.7500e-003	0.6245	0.1656	4.4500e-003	0.1700	0.0000	556.4680	556.4680	0.0313	0.0277	565.4909
Unmitigated	0.2505	0.4026	2.6350	5.9200e-003	0.6198	4.7500e-003	0.6245	0.1656	4.4500e-003	0.1700	0.0000	556.4680	556.4680	0.0313	0.0277	565.4909

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Asphalt Surfaces	0.00	0.00	0.00		
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Single Family Housing	481.00	481.00	481.00	1,643,650	1,643,650
Total	481.00	481.00	481.00	1,643,650	1,643,650

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Other Non-Asphalt Surfaces	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Asphalt Surfaces	0.540566	0.056059	0.172680	0.136494	0.026304	0.007104	0.011680	0.017449	0.000554	0.000251	0.025076	0.000954	0.004830
Other Non-Asphalt Surfaces	0.540566	0.056059	0.172680	0.136494	0.026304	0.007104	0.011680	0.017449	0.000554	0.000251	0.025076	0.000954	0.004830

Single Family Housing	0.540566	0.056059	0.172680	0.136494	0.026304	0.007104	0.011680	0.017449	0.000554	0.000251	0.025076	0.000954	0.004830

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	70.6249	70.6249	5.9600e-003	7.2000e-004	70.9892
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	70.6249	70.6249	5.9600e-003	7.2000e-004	70.9892
NaturalGas Mitigated	7.6300e-003	0.0652	0.0277	4.2000e-004		5.2700e-003	5.2700e-003		5.2700e-003	5.2700e-003	0.0000	75.4749	75.4749	1.4500e-003	1.3800e-003	75.9235
NaturalGas Unmitigated	7.6300e-003	0.0652	0.0277	4.2000e-004		5.2700e-003	5.2700e-003		5.2700e-003	5.2700e-003	0.0000	75.4749	75.4749	1.4500e-003	1.3800e-003	75.9235

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	1.41435e+006	7.6300e-003	0.0652	0.0277	4.2000e-004		5.2700e-003	5.2700e-003		5.2700e-003	5.2700e-003	0.0000	75.4749	75.4749	1.4500e-003	1.3800e-003	75.9235
Total		**7.6300e-003**	**0.0652**	**0.0277**	**4.2000e-004**		**5.2700e-003**	**5.2700e-003**		**5.2700e-003**	**5.2700e-003**	**0.0000**	**75.4749**	**75.4749**	**1.4500e-003**	**1.3800e-003**	**75.9235**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	1.41435e+006	7.6300e-003	0.0652	0.0277	4.2000e-004		5.2700e-003	5.2700e-003		5.2700e-003	5.2700e-003	0.0000	75.4749	75.4749	1.4500e-003	1.3800e-003	75.9235
Total		**7.6300e-003**	**0.0652**	**0.0277**	**4.2000e-004**		**5.2700e-003**	**5.2700e-003**		**5.2700e-003**	**5.2700e-003**	**0.0000**	**75.4749**	**75.4749**	**1.4500e-003**	**1.3800e-003**	**75.9235**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	398233	70.6249	5.9600e-003	7.2000e-004	70.9892
Total		**70.6249**	**5.9600e-003**	**7.2000e-004**	**70.9892**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	398233	70.6249	5.9600e-003	7.2000e-004	70.9892
Total		**70.6249**	**5.9600e-003**	**7.2000e-004**	**70.9892**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.4343	0.0148	0.5194	8.0000e-005		3.5700e-003	3.5700e-003		3.5700e-003	3.5700e-003	0.0000	11.0486	11.0486	1.0000e-003	1.9000e-004	11.1295
Unmitigated	0.4343	0.0148	0.5194	8.0000e-005		3.5700e-003	3.5700e-003		3.5700e-003	3.5700e-003	0.0000	11.0486	11.0486	1.0000e-003	1.9000e-004	11.1295

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0395					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.3782					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	1.0300e-003	8.8100e-003	3.7500e-003	6.0000e-005		7.1000e-004	7.1000e-004		7.1000e-004	7.1000e-004	0.0000	10.2058	10.2058	2.0000e-004	1.9000e-004	10.2665
Landscaping	0.0155	5.9400e-003	0.5157	3.0000e-005		2.8600e-003	2.8600e-003		2.8600e-003	2.8600e-003	0.0000	0.8427	0.8427	8.1000e-004	0.0000	0.8630
Total	**0.4342**	**0.0148**	**0.5194**	**9.0000e-005**		**3.5700e-003**	**3.5700e-003**		**3.5700e-003**	**3.5700e-003**	**0.0000**	**11.0486**	**11.0486**	**1.0100e-003**	**1.9000e-004**	**11.1295**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0395					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.3782					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	1.0300e-003	8.8100e-003	3.7500e-003	6.0000e-005		7.1000e-004	7.1000e-004		7.1000e-004	7.1000e-004	0.0000	10.2058	10.2058	2.0000e-004	1.9000e-004	10.2665
Landscaping	0.0155	5.9400e-003	0.5157	3.0000e-005		2.8600e-003	2.8600e-003		2.8600e-003	2.8600e-003	0.0000	0.8427	0.8427	8.1000e-004	0.0000	0.8630
Total	**0.4342**	**0.0148**	**0.5194**	**9.0000e-005**		**3.5700e-003**	**3.5700e-003**		**3.5700e-003**	**3.5700e-003**	**0.0000**	**11.0486**	**11.0486**	**1.0100e-003**	**1.9000e-004**	**11.1295**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	12.6028	0.1071	2.6200e-003	16.0632
Unmitigated	12.6028	0.1071	2.6200e-003	16.0632

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	3.2577 / 2.05377	12.6028	0.1071	2.6200e-003	16.0632
Total		**12.6028**	**0.1071**	**2.6200e-003**	**16.0632**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	3.2577 / 2.05377	12.6028	0.1071	2.6200e-003	16.0632
Total		**12.6028**	**0.1071**	**2.6200e-003**	**16.0632**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Institute Recycling and Composting Services

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	2.9753	0.1758	0.0000	7.3713
Unmitigated	11.9014	0.7034	0.0000	29.4851

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	58.63	11.9014	0.7034	0.0000	29.4851
Total		**11.9014**	**0.7034**	**0.0000**	**29.4851**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Single Family Housing	14.6575	2.9753	0.1758	0.0000	7.3713
Total		**2.9753**	**0.1758**	**0.0000**	**7.3713**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

	Total CO2	CH4	N2O	CO2e
Category	MT			
Unmitigated	201.7800	0.0000	0.0000	201.7800

11.2 Net New Trees

Species Class

	Number of Trees	Total CO2	CH4	N2O	CO2e
		MT			
Miscellaneous	285	201.7800	0.0000	0.0000	201.7800
Total		**201.7800**	**0.0000**	**0.0000**	**201.7800**

Appendix C:

EMFAC2017 Output

Calendar Year: 2022
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, trips/day for Trips, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

Region	Calendar Year	Vehicle Ca	Model Year	Speed	Fuel	Population	Trips	Fuel Consumption	Fuel Consumption	Total Fuel Consumption	VMT	Total VMT	Miles Per Gallon	Vehicle Class
South Coast AQMD	2022	HHDT	Aggregate	Aggregate	Gasoline	77.82251	1557.073	1.914672095	1914.672095	1984478.157	7970.981	13381402.09	**6.74**	HHD
South Coast AQMD	2022	HHDT	Aggregate	Aggregate	Diesel	108362	1118617	1982.563485	1982563.485		13373431			
South Coast AQMD	2022	LDA	Aggregate	Aggregate	Gasoline	6542832	30915701	8178.144259	8178144.259	8226568.36	2.52E+08	254602375.4	**30.95**	LDA
South Coast AQMD	2022	LDA	Aggregate	Aggregate	Diesel	58937.5	279973.4	48.42410045	48424.10045		2358230			
South Coast AQMD	2022	LDA	Aggregate	Aggregate	Electricity	127532.6	637025.4	0	0		5177709			
South Coast AQMD	2022	LDT1	Aggregate	Aggregate	Gasoline	736905.6	3399512	1031.447408	1031447.408	1031847.287	27300896	27309932.68	**26.47**	LDT1
South Coast AQMD	2022	LDT1	Aggregate	Aggregate	Diesel	387.1571	1348.408	0.39987912	399.8791198		9037.122			
South Coast AQMD	2022	LDT1	Aggregate	Aggregate	Electricity	5339.042	26794.47	0	0		221507.4			
South Coast AQMD	2022	LDT2	Aggregate	Aggregate	Gasoline	2246303	10535910	3436.155557	3436155.557	3453207.618	84740129	85348125.78	**24.72**	LDT2
South Coast AQMD	2022	LDT2	Aggregate	Aggregate	Diesel	14234.59	70193.22	17.05206088	17052.06088		607996.5			
South Coast AQMD	2022	LDT2	Aggregate	Aggregate	Electricity	22589.96	114302.6	0	0		734756.1			
South Coast AQMD	2022	LHDT1	Aggregate	Aggregate	Gasoline	175903.1	2620694	598.0685493	598068.5493	821513.5103	6298251	11115258.37	**13.53**	LHDT1
South Coast AQMD	2022	LHDT1	Aggregate	Aggregate	Diesel	119380.7	1501659	223.444961	223444.961		4817007			
South Coast AQMD	2022	LHDT2	Aggregate	Aggregate	Gasoline	30009.92	447103.1	113.5150695	113515.0695	209067.0531	1040649	2902289.397	**13.88**	LHDT2
South Coast AQMD	2022	LHDT2	Aggregate	Aggregate	Diesel	47335.63	595422.7	95.55198358	95551.98358		1861640			
South Coast AQMD	2022	MCY	Aggregate	Aggregate	Gasoline	295960.1	591920.2	56.92214589	56922.14589	56922.14589	2072370	2072370.126	**36.41**	MCY
South Coast AQMD	2022	MDV	Aggregate	Aggregate	Gasoline	1579640	7302407	2793.799561	2793799.561	2842944.316	55888916	57233722.8	**20.13**	MDV
South Coast AQMD	2022	MDV	Aggregate	Aggregate	Diesel	33348.92	163526.3	49.14475473	49144.75473		1344806			
South Coast AQMD	2022	MDV	Aggregate	Aggregate	Electricity	11658.48	59625.3	0	0		391944.3			
South Coast AQMD	2022	MH	Aggregate	Aggregate	Gasoline	35097.75	3511.179	64.70410395	64704.10395	76270.38211	333282.4	455641.5746	**5.97**	MH
South Coast AQMD	2022	MH	Aggregate	Aggregate	Diesel	12758.81	1275.881	11.56627815	11566.27815		122359.2			
South Coast AQMD	2022	MHDT	Aggregate	Aggregate	Gasoline	25445.41	509111.8	269.2842176	269284.2176	1009568.488	1367743	9307083.084	**9.22**	MHDT
South Coast AQMD	2022	MHDT	Aggregate	Aggregate	Diesel	123310	1231988	740.28427	740284.27		7939340			
South Coast AQMD	2022	OBUS	Aggregate	Aggregate	Gasoline	5959.443	119236.5	49.67589796	49675.89796	88138.04214	250653.5	576603.5972	**6.54**	OBUS
South Coast AQMD	2022	OBUS	Aggregate	Aggregate	Diesel	4274.499	41607.39	38.46214418	38462.14418		325950.1			
South Coast AQMD	2022	SBUS	Aggregate	Aggregate	Gasoline	2630.829	10523.32	11.7605267	11760.5267	39328.1885	107369.8	316915.9173	**8.06**	SBUS
South Coast AQMD	2022	SBUS	Aggregate	Aggregate	Diesel	6631.313	76524.43	27.5676618	27567.6618		209546.1			
South Coast AQMD	2022	UBUS	Aggregate	Aggregate	Gasoline	952.146	3808.584	18.40085629	18400.85629	18647.65249	89256	90734.08386	**4.87**	UBUS
South Coast AQMD	2022	UBUS	Aggregate	Aggregate	Diesel	14.14142	56.56567	0.246796198	246.7961984		1478.086			
South Coast AQMD	2022	UBUS	Aggregate	Aggregate	Electricity	17.11694	68.46776	0			1343.185			

Source: EMFAC2017 (v1.0.3) Emissions Inventory
Region Type: Air District
Region: South Coast AQMD
Calendar Year: 2023
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, trips/day for Trips, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

Region	Calendar Y	Vehicle Cat	Model Year	Speed	Fuel	Population	VMT	Trips	Fuel Consumption	Fuel Consumption	Total Fuel Consumption	VMT	Total VMT	Miles Per Gallon	Vehicle Class
South Coas	2023	HHDT	Aggregate	Aggregate	Gasoline	75.10442936	8265.097	1502.689	1.936286145	1936.286145	1913466.474	8265.097	13656273.03	7.14	**HHD**
South Coas	2023	HHDT	Aggregate	Aggregate	Diesel	109818.6753	13648008	1133618	1911.530188	1911530.188		13648008			
South Coas	2023	LDA	Aggregate	Aggregate	Gasoline	6635002.295	2.53E+08	31352477	7971.24403	7971244.03	8020635.698	2.53E+08	255180358.3	31.82	**LDA**
South Coas	2023	LDA	Aggregate	Aggregate	Diesel	62492.97958	2469816	297086.6	49.3916685	49391.6685		2469816			
South Coas	2023	LDA	Aggregate	Aggregate	Electricity	150700.3971	6237106	751566	0	0		6237106			
South Coas	2023	LDT1	Aggregate	Aggregate	Gasoline	758467.6481	27812996	3504563	1023.913006	1023913.006	1024279.466	27812996	27821405.09	27.16	**LDT1**
South Coas	2023	LDT1	Aggregate	Aggregate	Diesel	360.7799144	8408.618	1256.88	0.366459477	366.4594769		8408.618			
South Coas	2023	LDT1	Aggregate	Aggregate	Electricity	7122.93373	303507.5	35798.19	0	0		303507.5			
South Coas	2023	LDT2	Aggregate	Aggregate	Gasoline	2285150.139	85272416	10723315	3338.798312	3338798.312	3356536.438	85272416	85922778.34	25.60	**LDT2**
South Coas	2023	LDT2	Aggregate	Aggregate	Diesel	15594.68309	650362.8	76635.83	17.73812611	17738.12611		650362.8			
South Coas	2023	LDT2	Aggregate	Aggregate	Electricity	28809.63735	917592.8	145405.4	0	0		917592.8			
South Coas	2023	LHDT1	Aggregate	Aggregate	Gasoline	174910.3847	6216643	2605904	583.3851736	583385.1736	811563.1022	6216643	11211395.79	13.81	**LHDT1**
South Coas	2023	LHDT1	Aggregate	Aggregate	Diesel	125545.0822	4994753	1579199	228.1779285	228177.9285		4994753			
South Coas	2023	LHDT2	Aggregate	Aggregate	Gasoline	30102.75324	1034569	448486.2	111.5753864	111575.3864	209423.5025	1034569	2969599.008	14.18	**LHDT2**
South Coas	2023	LHDT2	Aggregate	Aggregate	Diesel	50003.13116	1935030	628976.5	97.84811618	97848.11618		1935030			
South Coas	2023	MCY	Aggregate	Aggregate	Gasoline	305044.5141	2104624	610089	57.849018	57849.018	57849.018	2104624	2104623.657	36.38	**MCY**
South Coas	2023	MDV	Aggregate	Aggregate	Gasoline	1589862.703	55684188	7354860	2693.883526	2693883.526	2744536.341	55684188	57109879.73	20.81	**MDV**
South Coas	2023	MDV	Aggregate	Aggregate	Diesel	36128.1019	1425691	176566.9	50.65281491	50652.81491		1425691			
South Coas	2023	MDV	Aggregate	Aggregate	Electricity	16376.67653	537591.7	83475.95	0	0		537591.7			
South Coas	2023	MH	Aggregate	Aggregate	Gasoline	34679.50542	330042.9	3469.338	63.26295123	63262.95123	74893.26955	330042.9	454344.9436	6.07	**MH**
South Coas	2023	MH	Aggregate	Aggregate	Diesel	13122.69387	124302	1312.269	11.63031832	11630.31832		124302			
South Coas	2023	MHDT	Aggregate	Aggregate	Gasoline	25624.3151	1363694	512691.3	265.2060557	265206.0557	989975.6425	1363694	9484317.768	9.58	**MHDT**
South Coas	2023	MHDT	Aggregate	Aggregate	Diesel	122124.488	8120623	1221858	724.7695868	724769.5868		8120623			
South Coas	2023	OBUS	Aggregate	Aggregate	Gasoline	5955.291639	245774	119153.5	48.07750689	48077.50689	86265.88761	245774	579743.8353	6.72	**OBUS**
South Coas	2023	OBUS	Aggregate	Aggregate	Diesel	4286.940093	333969.8	41558.29	38.18838072	38188.38072		333969.8			
South Coas	2023	SBUS	Aggregate	Aggregate	Gasoline	2783.643068	112189.6	11134.57	12.19474692	12194.74692	39638.85935	112189.6	323043.5203	8.15	**SBUS**
South Coas	2023	SBUS	Aggregate	Aggregate	Diesel	6671.825716	210853.9	76991.94	27.44411242	27444.11242		210853.9			
South Coas	2023	UBUS	Aggregate	Aggregate	Gasoline	957.7686184	89782.63	3831.074	17.62416327	17624.16327	17863.66378	89782.63	91199.2533	5.11	**UBUS**
South Coas	2023	UBUS	Aggregate	Aggregate	Diesel	13.00046095	1416.622	52.00184	0.239500509	239.5005093		1416.622			
South Coas	2023	UBUS	Aggregate	Aggregate	Electricity	16.11693886	1320.163	64.46776	0			1320.163			

GEOTECHNICAL INVESTIGATION
PROPOSED PARADISE RANCH RESIDENTIAL DEVELOPMENT
WEST OF CANYON HILLS ROAD AND SOUTH OF ESQUILIME AND ALPINE DRIVES
CITY OF CHINO HILLS, CALIFORNIA

Prepared for:

TTLC CHINO HILLS – PARADISE RANCH, LLC
2372 Morse Avenue, Suite 618
Irvine, California 92614

Project No. 12322.001

July 15, 2019

July 15, 2019

Project No. 12322.001

TTLC Chino Hills – Paradise Ranch, LLC
2372 Morse Avenue, Suite 618
Irvine, California 92614

Attention: Mr. Robert Flitton
Regional Director – Southern California

Subject: Geotechnical Investigation
Proposed Paradise Ranch Residential Development
West of Canyon Hills Road and South of Esquilime and Alpine Drives
City of Chino Hills, California

INTRODUCTION

In response to your request and authorization, Leighton and Associates, Inc. (Leighton) has conducted a geotechnical investigation of the proposed Paradise Ranch Residential development, located west of Canyon Hills Road and south of Esquilime and Alpine Drives in the City of Chino Hills, California. The purpose of our study has been to review the geotechnical and geologic conditions at the site with respect to the proposed development and to provide geotechnical recommendations for design and construction of the proposed improvements. This review addresses significant geologic constraints to the proposed development design. Our review is based on data we collected as part of this study as well as data collected previously by Leighton.

In conducting our review, we have used a grading concept prepared for the site by Hunsaker and Associates dated January 14, 2016 and the Pre-Development Review Exhibit prepared by Hunsaker and Associates dated November 14, 2018. An electronic copy of the grading concept was used in our study and serves as the base for the geotechnical map.

The site of the proposed development is not located within State established Earthquake Fault Zones or Liquefaction Zones. Several areas along the hillsides onsite are mapped within State designated Earthquake-Induced Landslide Zones. Additional significant geotechnical concerns addressed in this report include the potential stability of manufactured and natural slopes ascending above and descending below the development.

Based on our review, development of the project is geotechnically feasible, although constraints to development are present. Site geotechnical conditions and our findings and conclusions regarding development of the site are provided in the attached report.

We appreciate the opportunity to work with you on the development of this project. If you have any questions regarding this report, please call us at your convenience.

Respectfully submitted,

LEIGHTON AND ASSOCIATES, INC.

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SGO/JDH/PB/dlm

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1.0 INTRODUCTION

1.1 Site Location and Description

The Paradise Ranch development is located west of Canyon Hills Road and south of Esquilime and Alpine Drives in the City of Chino Hills, California (see Figure 1, Site Location Map).

The property is located in the eastern Puente Hills. The proposed residential development is situated in the eastern portion of the site, which is characterized by a northeast-facing hillside and a relatively flat terrace located at the base of the hill. To the north and northeast, a slope gently descends from the terrace toward on adjacent natural drainage.

The ridgelines along the hillside are separated by southwest-northeast trending drainages.

Based on our review of aerial photographs, this area has been historically used as open space and a ranch. Previous development onsite includes residences and ranching structures in the northeastern corner of the property, a residence at the top of the ridge in the central portion of the site, a paved road from the entrance at the eastern edge of the site to the residence at the top of the ridge, and other unimproved roads in various areas. In addition, power lines and poles are present in the southern area.

Elevations within the area planned for development range from a low of about 955 feet above mean sea level (msl) in the eastern edge of the site to a high of about 1,160 feet msl in the southern portion of the site where the top of a design cut slope is planned.

1.2 Proposed Development

Based on the 100-scale grading concept for the project prepared by Hunsaker and Associates, the proposed development consists of residential development and areas for desilting and debris detention. Forty-two residential lots are planned, as well as drainage, street, utility, hardscape and landscape improvements. The project generally includes construction of a cul-de-sac road with a single access connection from Canyon Hills Road. Grading as currently planned will include excavation of the hillside in the eastern portion of the property and placement of compacted fill in the intervening canyon areas and in the lower eastern edge of the property. The current design includes several fill and cut manufactured slopes to yield relatively level residential pads as well as natural slopes ascending above the development. The grading design includes planned fill depths up to approximately 40 feet. Cut slopes are planned up to approximately 180 feet in height. The tallest fill slope is expected to be on the order of 50 feet in height (Slope 4).

1.3 Purpose of Investigation

The purpose of our study has been to evaluate the geotechnical and geologic conditions at the site with respect to the proposed development and provide geotechnical recommendations for design and construction of the proposed improvements. Our evaluation has been based on data collected by Leighton during this study as well as data collected previously by us (Leighton, 2001).

1.4 Previous Work

Leighton performed a geotechnical due diligence review of the property in 2001. The purpose of that review was to evaluate the geotechnical aspects of the site based on existing data available at that time and relate that data to development. During our due diligence review, we identified significant geotechnical constraints relating to development of the site, which included settlement-prone earth materials and slope stability issues. We concluded that development of the site is geotechnically feasible as long as good planning and design of the project are implemented to minimize the impact of the identified geotechnical constraints.

1.5 Scope of Work

The scope of work for the project has included the following tasks:

- We reviewed available relevant geotechnical/geological reports, literature and historic aerial photographs. This included review of data collected onsite during our previous geotechnical due diligence review. Relevant data from the previous studies has been used in our study. Reports, maps and aerial photographs reviewed are referenced in Appendix A.
- We mapped the general distribution of earth materials at the site and the geologic structure of bedrock exposures.

- We coordinated with Underground Service Alert (USA) to have major utilities and/or easements crossing the site located. We also coordinated our work with a site representative.
- We drilled, logged and sampled three hollow-stem auger borings (HS-1 through HS-3) in representative locations for evaluation of liquefaction potential and compressible alluvial soil. A fourth hollow-stem auger boring was drilled but encountered a leach field at shallow depth. The borings were advanced to depths extending to a maximum of approximately 50 feet below the existing ground surface (bgs). Each boring was visually logged by a member of our technical staff. Representative bulk and relatively undisturbed soil samples were collected at selected depth intervals. Standard Penetration Tests (SPT) were conducted at selected depth intervals. Boring logs are provided in Appendix B. Locations of borings are shown on the Geotechnical Map, Plate 1.
- We conducted one percolation/infiltration test at a depth of approximately 10 feet below the existing grade in the vicinity of a proposed infiltration/ detention basin in the southeastern portion of the site. Percolation/infiltration testing was performed in general accordance with County of San Bernardino guidelines. Infiltration test results are presented in Appendix D.
- We drilled, logged and sampled six (6) large diameter borings (BA-1 through BA-5, including BA-3A) in representative locations for evaluation of lithology and geologic structure pertinent to slope stability. The borings were advanced to depths extending down to 121 feet bgs. Each boring was visually logged at the surface by a member of our technical staff. Representative bulk and relatively undisturbed soil samples were collected at selected depth intervals. Each large-diameter boring was logged downhole by a State licensed Certified Engineering Geologist. Boring logs are provided in Appendix B. Locations of borings are shown on the Geotechnical Map, Plate 1.
- We conducted laboratory testing of selected, representative soil and/or bedrock samples including maximum dry density and optimum moisture content, in situ dry density and moisture content, grain size distribution, direct shear, expansion index, Atterberg limits, maximum dry density and optimum moisture content, and corrosion potential. The in-situ dry density and moisture content results are provided on the borings logs. Laboratory test results are provided in Appendix C.
- We attended project team meetings as requested.
- Geotechnical and geologic analyses of the collected data have been performed and/or supervised by a State licensed Geotechnical Engineer and Certified Engineering Geologist.
- We prepared this report providing the findings and conclusions of our study and recommendations for design and construction of the proposed development.

2.0 FINDINGS

2.1 Regional Geologic Setting

The Paradise Ranch project is located within the eastern Puente Hills. The Puente Hills are located where the Peninsular Ranges geomorphic province interacts with the Transverse Ranges geomorphic province. This is an area where the lateral strain of the Elsinore Fault Zone in the Peninsular Ranges to the south is accommodated by the faults and folds bounding and within the east-west trending Puente Hills to the north.

The Puente Hills are a structural block, north of the Whittier fault and southwest of the Chino fault, that uplifted and emerged in the Pleistocene. This uplift is a result of north-south compression that has been accommodated by the Puente Hills blind thrust fault (Grant and Gath, 2007). The relief of the Puente Hills is a result of a history of uplift and erosion. During Quaternary uplift, erosion rates of the streams in the Puente Hills increased, and gullies were incised in existing broad canyons. These gullies decrease in depth upstream, and, in general, streams that flow towards the southwest are longer than those flowing to the north and northeast. This pattern of gully depth and the asymmetrical pattern of the older broad canyons indicates that the Puente Hills block tilted towards the northeast during Quaternary uplift (Durham and Yerkes, 1964).

The dominant structural features in the eastern Puente Hills region are the Whittier fault and the Chino fault. This area of Southern California has and is continuously experiencing major crustal disturbance as the site is located relatively near the boundary between the Pacific and North American Plates. The bulk of the generally right-lateral transform movement between the two major tectonic plates occurs along the San Andreas fault and associated faults such as the Elsinore and San Jacinto faults.

The Regional Fault Map (Figure 3) presents a generalized depiction of the major faults in this area of Southern California.

2.2 Earth Units

Geologic units present onsite include relatively young surficial deposits and bedrock. The general distribution of the earth units is shown on the Geotechnical Map.

2.2.1 Surficial Units

Mapped surficial units include artificial fill, colluvium, and older alluvium.

Undocumented Artificial Fill: Relatively thin amounts (2 to 3 feet thick) of artificial fill is present in the eastern portion of the site associated with past ranch uses of the property. Artificial fill, where observed, generally consisted of silty sand and sandy to silty clay that is loose and compressible and unsuitable to support structures or additional fill. A gravel filled leach field was encountered at Boring B-4

Colluvium (Map Symbol: Qcol): Colluvium is a soil overburden that has accumulated in hillside portions of the site mappable to a thickness of 4 feet or greater by a combination of deep bedrock weathering and slope wash. Colluvium encountered onsite consisted mainly of dark-brown, porous, sandy to clayey silts, and silty clays. It was commonly present at the toes of natural slopes, in reentrants, and along the margins of drainage channels.

Older Alluvium (Map Symbol: Qalo). Pleistocene-age alluvial soils were mapped onsite and appear to be uplifted remnants of older alluvial valley deposits adjacent to modern drainages. The older alluvium generally consists of silty sand to sandy clay with sandy silt and sandy clay. Where observed in our borings, the unit was dark brown, brown, and grayish brown, moist to wet, and generally firm to dense.

2.2.2 Bedrock Units

The bedrock unit mapped onsite was classified as the Puente Formation Soquel Member.

Puente Formation, Soquel Member (Map Symbol: Tps): The late Miocene-age Soquel Member of the Puente Formation has been mapped across the majority of the hillside portions of the site. The predominate lithologic unit of Soquel member observed onsite were interbedded fine sandstone, claystone, siltstone, and shales. This unit was typically brown in the upper portions of the borings and dark gray (unoxidized) in the lower portions of our deeper borings. The bedrock was observed to be moist, dense, and moderately cemented.

2.3 Geologic Structure

The Soquel member bedrock underlying the proposed development site was measured to generally dip to the southwest and to the southeast at inclinations of about 3 to 25 degrees, except in the southeastern portion of the site where bedding orientations were variable. In BA-3 and BA-3A, bedding orientations dipped towards the north at inclinations of roughly 9 to 22 degrees in the upper 30 to 55 feet, and towards the west at inclinations of approximately 5 to 22 degrees below. In several areas, bedrock bedding planes were well developed including laminated claystones and shales, and bedding orientations were easily discerned. The Soquel member bedrock was slightly fractured in many areas and severely fractured in localized zones observed in borings in the southeastern portion of the site

2.4 Surface and Groundwater

Surface water was not observed onsite during our investigation. Groundwater was encountered in the hollow-stem auger borings extending to depths ranging from 22 to 33 feet bgs within older alluvium in the eastern portion of the site, which is at a similar elevation as the stream bed to the east of the site. The groundwater elevation generally coincides with the bottom elevation of the natural drainage adjacent to the northwest. Historic groundwater data for this area is very limited. The subsurface data was collected in spring of a relatively wet year. It is probable that groundwater levels fluctuate seasonally based on rainfall amounts, urban runoff and other factors.

Groundwater was generally absent in the hillside portion of the site, although perched water may be present locally.

The depth of water within the explorations, where encountered, is presented on the Geotechnical Map (Plate 1) and exploration logs.

2.5 Faulting and Seismicity

2.5.1 Faulting

The site of the proposed Paradise Ranch development is located outside of mapped Earthquake Fault Zones designated by the State of California (CGS, 2016). Geologic mapping by Dibblee and Ehrenspeck (2001) indicated no faults tracing through or projecting towards the site. Geologic mapping by Durham and Yerkes (1964) indicated a fault possibly tracing through the eastern edge of the site. Durham and Yerkes have mapped the site, including where the potential fault traces, in Puente Formation, Soquel Member bedrock. The fault was mapped to be approximately located or imperfectly exposed and was indicated with a component of vertical displacement with the downthrown block to the west of the upthrust block. Based on our mapping of the site, this portion of the property was covered by Pleistocene older alluvium. There were no surficial expressions of displacement of the older alluvium in the area of the potential fault mapped by Durham and Yerkes during our review of historical aerial photographs and during our onsite reconnaissance and geologic mapping.

2.5.2 Seismicity

Much of southern California is in an area of moderate to high seismic risk, and it is not generally considered economically feasible to build structures totally resistant to earthquake-related hazards. However, current state-of-the-practice standards for design and construction are intended to reduce the potential for major structural damage.

The site will be prone to ground shaking resulting from an earthquake occurring along several major active or potentially active faults in southern California. Regional active and potentially active faults that could produce significant ground shaking at the site include the Chino, Elsinore, Puente Hills, San Jose, and Cucamonga faults.

Design of structures at the site in accordance with requirements of the current California Building Code (CBC) is intended to reduce the impact of seismic shaking on the proposed improvements. We have selected Site Class D for seismic analysis of the site (Chapter 20 of ASCE 7-10). Based on ASCE 7-10 Equation 11.8-1, the Peak Ground Acceleration (PGA) based on the Maximum Considered Earthquake (MCE_G) is 0.86g. Seismic design parameters are presented in Section 3.10 of this report.

The PGA and hazard deaggregation were estimated for use in pseudo-static slope stability analysis using the United States Geological Survey's (USGS) Interactive Deaggregations utility. This analysis considers a 10% probability of exceedance in 50 years (475-year return period). The results of this analysis indicate that the predominant modal earthquake has a PGA of 0.48g with magnitude of approximately 6.5 (M_W) at a distance on the order of 8.2 kilometers for the Maximum Considered Earthquake.

Based on these results, we have selected a PGA of 0.86g for seismic analysis of the onsite soils (seismic settlement and liquefaction), and a PGA of 0.48g for pseudo-static slope stability analysis.

2.6 Secondary Seismic Hazards

2.6.1 Liquefaction Potential

Liquefaction is a phenomenon in which loose, saturated, granular soil temporarily behaves similarly to a fluid when subjected to high intensity ground shaking. Liquefaction can occur when three general conditions exist: 1) shallow groundwater, 2) low-density silty or sandy soil, and 3) high intensity ground motion.

Groundwater was encountered in the hollow-stem auger borings at depths ranging from 22 to 33 feet bgs within older alluvium in the eastern portion of the site. Relatively loose sands and firm sandy clay soils were generally encountered in Borings HS-1 through HS-3 at depths ranging from 20 feet to 40 feet.

As such, we performed liquefaction evaluation of the site, based on data collected during our site exploration. Our analysis was based on the modified Seed Simplified Procedure as detailed by Youd et al. (2001) and Martin and Lew (1999). Parameters utilized in our analysis include Standard Penetration Test (SPT) results from the hollow-stem auger borings, visual descriptions of soil samples retrieved, and geotechnical laboratory test results, including sieve analyses, Atterberg limits, and moisture content. Soil susceptibility to liquefaction is estimated based on several factors, including relative density, fines content, plasticity, and moisture content.

Based on our analysis using a factor of safety against liquefaction of 1.3, and assuming the groundwater levels as encountered in our borings, several soil layers within the alluvial deposits encountered in our hollow-stem auger borings would be susceptible to liquefaction under the design seismic ground motion. The potentially liquefiable soils are generally encountered between 25 and 40 feet bgs .

Based on the upper 30 to 40 feet of material (native soil plus the addition of 10 to 20 feet of compacted fill) being non-liquefiable, the potential for surface manifestations of liquefaction, such as bearing failures and sand boils, is considered low.

The encountered Puente Formation bedrock is not expected to be susceptible to liquefaction

A summary of the liquefaction analysis is included in Appendix G.

During strong seismic shaking lateral movement can occur along weak liquefiable layers adjacent to gently to steeply sloping terrain (Lateral Spreading). There does appear to be a potential for lateral spreading of the overlying fill and alluvial soil toward the adjacent drainage during strong seismic shaking. However, after overexcavation of the alluvial soil as recommended later in this report, the potential for lateral spreading will be low.

2.6.2 Seismically Induced Settlement

During a strong seismic event, seismically induced settlement can occur within loose to moderately dense, dry or saturated granular soil. Settlement caused by ground shaking is often nonuniformly distributed, which can result in differential settlement.

We have performed analyses to estimate the potential for seismically induced settlement using the method of Tokimatsu and Seed, and based on Martin and Lew (1999), considering the maximum considered earthquake (MCE) and peak ground acceleration (PGA_M). A historic high groundwater equivalent to the encountered groundwater was considered. The results of our analyses indicate that the onsite alluvial soils are susceptible to significant seismic settlement based on the PGA_M of 0.86g and MCE of 6.5 (M_W). However, after overexcavation of the alluvial soils as recommended later in this report, total seismic settlement is expected to be 1.5 inch or less. Differential settlement resulting from seismic loading is generally assumed to be one-half of the total seismically induced settlement over a distance of 40 feet.

2.7 Subsidence

Ground subsidence has occurred in many areas of California and is often due to underground fluid withdrawals, either water or oil. Subsidence has also been related to other factors, such as incipient slope failure (possibly due to seismic shaking) and collapsible soils. Significant fluid withdrawals have not occurred in this area and no evidence of subsidence has been noted. Compacted fill is not expected to undergo significant settlement due to collapse potential. The site is not expected to be subject to significant subsidence.

2.8 Infiltration Testing

One well permeameter test (at the location of boring HS-1) was conducted to estimate the infiltration rate near the location of a potential detention basin in the southeastern portion of the site. The well permeameter test was conducted within the boring at a depth reaching 10 feet bgs. This test was conducted at an elevation of approximately 965 above mean sea level (msl). The actual design elevation of the basin bottom is 998 msl in what will be compacted fill.

A well permeameter test is useful for field measurements of soil infiltration rates and is suited for testing when the design depth of the basin or chamber is deeper than current existing grades. The test consists of excavating a boring to the depth of the test. A layer of clean sand is placed in the boring bottom to support temporary perforated well casing pipe. In addition, sand is poured around the outside of the well casing within the test zone to prevent the boring from caving/collapsing or eroding when water is added. A float valve apparatus, placed inside the casing, adds water stored in barrels at the top of the hole to the boring as water infiltrates into the soil, while maintaining a constant water head in the boring. The volume percolated during timed intervals is converted into an incremental infiltration rate, in inches per hour. The test was conducted based on the USBR 7300-89 test method.

Our test performed at an elevation of about 965 msl within the silty sand and sandy clay of the older alluvium indicated a small-scale infiltration rate of approximately 0.1 inch per hour. This is a raw value, before applying an appropriate factor of safety or correction factor. Results of the infiltration testing are provided in Appendix D.

2.9 Slope Stability

2.9.1 Present Slope Stability

Natural slope stability within the Soquel member is generally moderate to poor. Bedrock landslides on natural slopes are present in the region and appear to be the result of oversteepened slopes or failures along planes of weakness, such as bedding planes, faults or fractures. Surficial slumps during heavy rains are common, with mud or debris flows occurring on steeper slopes.

Evidence of landslides were not observed during review of aerial photographs, surficial geologic mapping and down-hole logging of large-diameter borings during this study.

2.9.2 Slope Stability of the Proposed Development

We have mapped four (4) major cut, fill or natural slopes within or adjacent to the development with potential slope stability impacts to the development. All manufactured slopes are designed with a maximum slope inclination of 2:1 (horizontal to vertical). These slopes are numbered in the text and on the Geotechnical Map and are discussed in detail in the Table of Slopes (Appendix E).

2.9.3 Slope Stability Parameters

Strength parameters used in our analyses were developed based upon our experience, laboratory testing, parameters developed on several other projects in the City of Chino Hills and within the Puente Hills (Leighton and Associates, 1986, 1996a, 1996b, 2003, 2005a, 2005b, 2006) and our engineering judgment. The parameters used are summarized in the following Table 1 below.

Table 1- Slope Stability Strength Parameters

Material	Cohesion	Friction Angle (deg)	Unit Weight (pcf)
Cross Bedding Puente Formation, Soquel Member (Tps)	345	35	125
Older Alluvium (Qalo)	200	30	125
Engineered Fill (Af) 90% Relative Compaction	200	30	120
Engineered Fill (Af) 95% Relative Compaction	200	32	120

2.9.4 Slope Stability Analysis

Slope stability was performed using Rocscience Slide 2018 version 8.023, a computer application, in which we utilized Spencer's method of analysis. Calculations for stability were developed by searching for the minimum factor of safety for circular slip surfaces at varying depths. The minimum acceptable factor of safety criteria used in our stability analysis was a factor of safety of 1.5 for the static case and 1.0 for the seismic case. Homogeneous soil materials and arcuate failure surfaces were assumed as out-of slope bedding conditions were not anticipated based on the mapped geologic conditions and those encountered in the borings.

Slope stability analysis for the seismic case used a seismic coefficient of 0.23, which was derived based on a screening analysis for a 5 cm displacement using a 475-year return period peak ground acceleration in accordance with Special Publication 117A.

Slope stability analyses is included in Appendix F.

Fill Slope Stability

Stability analyses were conducted for the tallest design fill slope, Slope 4, with a height of about 50 feet at a slope ratio of 2:1. We also conducted fill slope stability analyses for design cut Slope 1, which is expected to be the tallest fill slope onsite (approximately 180 feet tall) once constructed with a stability fill. The analyses indicate that the proposed fill slopes have acceptable factors of safety against deep-seated failures for static and seismic cases when constructed in accordance with our recommendations presented later in this report.

Cut and Natural Slope Stability

Stability analyses were conducted for design cut slope and natural slopes deemed to pose critical slope stability concerns. In general, the cut slopes onsite are composed of sandstone, siltstone, shale and claystone. Well-developed bedding planes are present in most areas mapped and drilled onsite, with the bedding in these areas generally dipping neutrally and/or into slope for most of the design cut slopes. In the southeastern portion of the site (Slope 1), bedding orientation varied, and the bedrock was found to be fractured within localized zones.

The conditions of each slope including remedial recommendations are discussed in the Table of Slopes (Appendix E) and are shown on the Geotechnical Map (Plate 1) and Geotechnical Cross-sections (Plate 2). Stability analyses for slopes are provided in Appendix F.

2.10 Compressible Soils and Settlement

Settlement-prone materials include topsoil, undocumented fill, colluvium, older alluvium, and weathered bedrock. Each of these types of compressible materials are present in areas of the site where placement of fill is proposed. Within the structural areas of the development, the older alluvium and colluvium will require removal to unweathered bedrock.

Newly placed compacted fill is also expected to be prone to settlement due to the planned depth of proposed fill (on the order of 80 feet thick). Compacted fill is not expected to be prone to collapse (settlement upon wetting).

2.11 Expansive Soils

Earth materials present at finish pad grade are expected to consist of silty sand to clayey silt. Laboratory testing (Appendix C) performed during this investigation onsite indicated low soil expansion potential (EI of 28). Upward pressures induced by expansive soils can have significant effects upon structures and other surface improvements. Shrinkage of these soils during drying can also cause damage as structural support is removed. Additional Expansion index testing should be performed during rough grading on soils at finished grade to provide appropriate foundation recommendations.

2.12 Soluble Sulfates

Based on laboratory analysis for the site (Appendix C), concentrations of soluble sulfates were tested to be below 0.1 percent by weight in onsite soils, which is considered "negligible" sulfate exposure. However, surficial soils and bedrock derived soils with significant amounts of soluble sulfates may be present onsite. If exposed at pad grade, this material poses a potential for sulfate reaction with concrete in contact with the soil. Additional testing for soluble sulfate should be conducted during rough grading of the site.

2.13 Corrosivity and Resistivity

Soil corrosivity to metals can be estimated by the soil's chloride content, pH level, and electrical resistivity. Soil with a chloride content greater than 500 ppm is considered to be corrosive to ferrous metal, per California Test 422. In general, soil having a minimum resistivity below 1,000 ohm-cm is considered severely corrosive to metals; soil having a minimum resistivity between 1,000 and 2,000 ohm-cm is considered corrosive to metals, and soil having a minimum resistivity between 2,000 and 10,000 ohm-cm is considered to be moderately corrosive.

Representative soil samples were tested during this investigation to evaluate chloride content, minimum resistivity, and pH level. The tests results indicate chloride content of up to 40 ppm, a minimum soil resistivity of 815 ohm-cm, and pH level of 7.57. Based on these test results, the earth materials onsite are considered severely corrosive to ferrous metals. Additional laboratory testing should be performed at the completion of rough grading to evaluate the corrosivity of the soil present at finish grade.

2.14 Rippability and Oversize Materials

The prevailing bedrock materials onsite should be generally rippable using conventional heavy equipment in good working condition and modern earthmoving methods. Moderately hard, cemented layers of sandstone and siltstone were encountered in several borings onsite. These layers are not expected to be more than a few feet thick. However, they may be laterally continuous. Oversize material will be generated from these cemented beds and could be of such volume locally to be a constraint to routine grading operations

Oversize material should be placed in accordance with the General Earthwork and Grading Specifications (Appendix I).

2.15 Erosion

The potential for erosion on the fill slopes or other graded areas is expected to be moderate. Provisions for surface drainage, terrace drains, slope planting, and other measures in accordance with City of Chino Hills and California Building Code (CBC) guidelines will provide long term protection.

2.16 Earthwork Shrinkage and Subsidence

The change in volume of excavated materials upon recompaction as fill varies according to soil type and location. This volume change is represented as a percentage increase (bulking) or decrease (shrinkage) in volume of fill after removal and recompaction. Subsidence occurs as natural ground is moisture conditioned and densified to receive fill.

The colluvial and alluvial soils onsite are expected to shrink in volume when replaced as compacted fill. Conversely, bedrock is generally expected to bulk slightly in volume where excavated and replaced as compacted fill. Our estimates for shrinkage in alluvial soils are 10 to 15 percent, and our estimate for bulking in bedrock is 0 to 3 percent. Subsidence during ground preparation is expected to be 0.1 foot. This does not consider settlement/subsidence due to loading of existing fill or alluvium/colluvium with new fill placement.

The level of fill compaction, variations in the dry density of the existing soil and other factors influence the amount of volume change. Some adjustments to earthwork volume should be anticipated during grading of the site.

3.0 CONCLUSIONS AND RECOMMENDATIONS

3.1 General Conclusion

Based upon this investigation, we conclude that the proposed development is feasible from a geotechnical standpoint. It is our judgment, based on the specific data and information contained or referenced in this report, that the proposed development will be safe against hazards from landslides, settlement or slippage, and the proposed grading will not adversely affect the stability of adjacent properties, provided the recommendations presented herein are correctly implemented. No severe geologic or soil-related hazards or constraints have been found during the course of this study that would preclude development of the site. The most severe constraints to development include the potential for strong seismic shaking, and the stability of natural and manufactured slopes adjacent to the development. Recommendations to mitigate these hazards and other constraints are provided within this report.

3.2 General Earthwork and Grading

All grading should be performed in accordance with the General Earthwork and Grading Specifications presented in Appendix I, unless specifically revised or amended below and in accordance with all applicable California Building Code and City of Chino Hills requirements.

3.2.1 Site Preparation

Prior to construction, the site (areas of grading) should be cleared of vegetation, trash and debris, which should be disposed of offsite. Any underground obstructions should be removed as should large trees and their root systems. Existing structures to be removed should be demolished and removed from the site. Resulting cavities should be properly backfilled and compacted. Efforts should be made to locate existing utility lines. Those lines should be removed or rerouted if they interfere with the proposed construction, and the resulting cavities should be properly backfilled and compacted.

3.2.2 Overexcavation of Compressible Soils

Overexcavation of compressible soil will be required during grading of the development. Removal of compressible material should extend such that firm material is present on a 1:1 projection from the surface to the accepted removal bottom. The overexcavated materials should be moisture-conditioned (or dried), as necessary, and recompacted as structural fill in accordance with the recommendations in this report and during grading based on observation and testing. For planning purposes, estimated removal depths are discussed below and are shown on the Geotechnical Map.

All undocumented fill and older alluvial soil in the eastern portion of the site should be overexcavated to Puente Formation bedrock (generally depths on the order 20 to 45 feet below the existing ground surface). Overexcavation of this material is recommended to reduce the potential for soil settlement under the load of fill being placed in this area, to reduce the potential for seismic settlement and to reduce the potential for lateral movement toward the offsite drainage during strong seismic shaking.

Alluvium and colluvium in canyon areas within proposed grading limits should be overexcavated to bedrock prior to fill placement. In canyon areas, the depth of alluvium and colluvium is expected to range up to about 5 to 15 feet in thickness.

All overexcavation bottoms should be mapped and approved by Leighton prior to processing of the bottom and subsequent fill placement.

The overexcavation bottom should be scarified to a depth of 6 inches, moisture conditioned and recompacted using the same standard for compacted fill as discussed in following sections. Compacted fill should then be placed in the overexcavation area to design grades.

3.2.3 Groundwater and Wet Removals

Groundwater was encountered at depths of 22 to 33 feet in the eastern portion of the site. The depth to groundwater is shallower than the depth of recommended overexcavation of older alluvial soil. Although some seasonal variation in groundwater depth is probable, dewatering of the excavation to achieve the recommended removals should be expected. Special equipment/procedures for removal of wet soils including swamp cats, draglines, excavators, pumps and top-loading earthmoving equipment should be anticipated. Also, wet soil may require air drying and/or mixing with dry material prior to placement as controlled fill.

Specific recommendations for dewatering, wet removals and establishing a firm base after the required removals are made should be provided as the project proceeds.

3.2.4 Major Slopes

There are four (4) major design cut and fill slopes onsite with potential slope stability impacts to the development. All of these slopes are considered grossly stable as designed. However, two of the slopes are considered surficially unstable due to the potential for oblique out-of-slope bedding components. All manufactured slopes are designed at a maximum slope inclination of 2:1. The major slopes have been assigned slope numbers for correlation between the text and the accompanying geotechnical map and cross sections. The conditions of each slope are discussed in the Table of Slopes (Appendix E).

All cut slopes, back cuts and stability fill excavations should be geologically mapped in detail during grading to further evaluate the geologic conditions upon which our recommendations were made. In order to facilitate geologic mapping, key bottoms should be cleaned of loose surficial debris, and all back cuts, front cuts and/or sidewalls should be periodically cleaned of loose slough (“slope-boarded”) during excavation.

No back cuts should be constructed at a gradient steeper than a 1.5:1. The back cuts for slopes should be cut as discussed in the Table of Major Slopes. Front cuts may be cut at a 1:1 slope gradient, unless mapping during grading indicates otherwise.

3.2.5 Natural Slopes and Mud/Debris Flow Potential

The surficial stability of slopes proposed to remain natural is dependent upon the thickness of weaker surficial soil and slope gradient. Thick accumulations of surficial soil on steep slopes are susceptible to surficial failures, mudflows and downhill creep during periods of heavy rainfall. Several areas of the development are located immediately below natural slopes that are susceptible to future failures. Significant damage to downslope improvements can result from soil slumps and debris flows originating on the steep slopes above the development. To mitigate the potential for damage from debris flows and slumps, we recommend that debris catchment basins be provided where canyons and reentrants descend from slopes to the area of the development.

3.2.6 Stability of Temporary Cut Slopes

The stability of temporary cut slopes created during buttress excavation, canyon cleanout operations, or construction of retaining walls is always a concern. The process of constructing slope stability measures always results in temporary destabilization of the slope during the construction process. Temporary stability depends on many factors, including the slope angle, structural features in the bedrock, shear strength along planes of weakness, height of the slope, groundwater conditions, and the length of time the cut remains unsupported and exposed to equipment vibrations and rainfall. In addition, temporary cut slopes are typically designed with minimal factors of safety.

While in many cases it may be possible to increase the stability of a back cut during construction (such as offloading the cut materials above or constructing the back cut slope to a flatter angle), these measures typically increase the grading costs. Therefore, it is necessary to weigh the risk of the potential for damage and additional costs of a back cut failure against the actual costs to reduce the risk. In areas where upslope developments are present, adequate slope stability to protect those areas must be maintained. In areas where the damage will be only temporary and will not impact offsite properties, the developer's options increase with respect to the level of risk they may be willing to accept.

Measures typically taken to reduce the potential of temporary cut slopes failing during canyon cleanouts and buttress key excavations include: (1) keeping the time between cutting and filling operations to a minimum; (2) limiting the maximum length of a cut exposed at any one time; and (3) avoiding operation of heavy equipment on or near the top of the back cut. It has been assumed during our analysis that the cuts will be offloaded (where applicable) prior to construction, and that buttresses or shear keys will be backfilled immediately after construction. Varying from this procedure will increase the potential for failures of temporary cut slopes. All OSHA requirements with regard to excavation safety should be implemented.

We recommend that the potential for back cut failures be fully discussed with your representative, representatives from Leighton and Associates and the grading contractor prior to the onset of construction. In this way, the timing of construction and the risks and costs of a failure can be clearly established before a failure occurs.

3.2.7 Fill Slopes

Fill slopes should be constructed in accordance with the attached General Earthwork and Grading Specifications (Appendix I), following typical key excavation and benching. In order to achieve good compaction at the slope face, we recommend that fill slopes be overfilled a minimum of 2 feet and then cut back to compacted material. After cutting back, the final slope should be rolled with compaction equipment where determined necessary by the geotechnical engineer. Care should be taken during grading to confirm the adequacy of compaction of the slopes within the development.

3.2.8 Building Pad Overexcavation

Pad overexcavation will be required to reduce the potential for adverse differential settlement, expansion or to retard surface water infiltration behind stability fills. The pads should be undercut a minimum depth of 36 inches below the bottom of the proposed footings, or 5 feet below finish grade, whichever is deeper, and replaced as compacted fill. Deeper overexcavation may be recommended in areas of steep cut/fill transitions or other areas where conditions suggest such recommended action is warranted. Overexcavation of building pads should be anticipated for the following conditions:

- The cut portion of transition (cut-and-fill) lots.
- Lots above slope stability fills.
- Lots that become cut/fill transition lots after alluvial removals.
- Cut lots exposing bedrock materials with a high potential for expansion or differential expansion (i.e., sandstone and clay).

3.3 Fill Placement

The onsite soils are suitable for use as compacted fill provided they are free of organic material, debris and oversize rocks (larger than 12 inches in dimension).

Fill soils should be placed in accordance with the General Earthwork and Grading Specifications presented in Appendix I, except as amended herein. In order to reduce the potential for adverse hydrocompression settlement, we recommend that fill deeper than 50 feet below finish grade be placed at a minimum of 95 percent relative compaction at 1 to 3 percentage points above the material's optimum moisture content. Fill less than 50 feet below existing grade should be placed at a minimum of 90 percent of the maximum dry density with a moisture content of at least optimum and an average moisture content at or slightly above optimum moisture content.

Fill soils placed during slope stability keyway and fill buttress construction should be placed at a minimum 95 percent of the maximum dry density with 1 to 3 percentage points above optimum moisture content.

3.4 Settlement Monitoring

Following the recommended overexcavation of alluvial soil to depths of 45 feet followed by placement to achieve design grade, fill depths up to 80 feet are anticipated. Fills of this thickness can experience post construction settlement of several inches. Thus, we recommend post grading settlement monitoring be conducted where fill depths exceed 50 feet. Preliminary locations of settlement monuments are shown on the geotechnical map. Actual locations should be established based on conditions encountered during site grading. Settlement monuments should be constructed in accordance with the details presented in Appendix H. We recommend that the grading contractor be made responsible for the construction and protection of all settlement monuments.

The settlement monuments should be accurately surveyed by the civil engineer every two weeks for the first three months, and monthly thereafter. The settlement monitoring should continue until Leighton has determined that the rate of settlement, and the estimated total and differential settlement are within acceptable limits for the proposed improvements.

Construction of improvements in the areas where settlement monitoring is being performed must be delayed until the completion of the monitoring program in the respective areas. It is difficult to accurately predict the length of time that the settlement monitoring program will be required. However, it has been our experience with fills of similar depth, that a period of about 3 to 12 months is typical. Three months is the minimum time required to obtain sufficient data for estimating long-term settlement, regardless of the depth of fill.

If timing is critical, it may be possible in some areas to increase the rate of settlement and reduce the total length of time required for settlement monitoring by placing a 20-foot-deep fill stockpile above design grade in the area where native soils remain.

3.5 Slope Protection

Provisions for surface drainage, terrace drains, slope planting and other measures in accordance with City of Chino Hills guidelines should be provided immediately following construction. Slope protection polymers, straw waddles and/or jute mesh should also be considered to limit the amount of erosion on slopes or graded areas subject to erosion until landscaping and other permanent erosion protection measures are fully in place.

3.6 Groundwater and Subdrainage

All excavations for stability fills should be provided with back cut subdrains to reduce the potential for infiltrating water to perch and migrate toward slopes. Local areas of particularly abundant groundwater may require subdrainage in addition to the typical buttress back cut subdrains as detailed in the General Earthwork and Grading Specifications (Appendix I).

In addition, canyon drains may be placed after completion of compressible soil removals in the canyon areas and within the limits of remedial removals. If areas of high moisture are encountered during remedial removals, canyon subdrainiage may be recommended. If needed, canyon subdrains should be placed along the sides of canyon where deep fill is planned. Such drains should be placed every 30 to 50 vertical feet.

Canyon subdrains should be constructed with Schedule 40 PVC pipe surrounded by 9 cubic feet per lineal foot of Class II permeable filter material. Subdrains placed along the back cut of stability fills may be constructed with 3 cubic feet per lineal foot of Class II permeable filter material with outlet cannons provided every 100 feet laterally. All subdrains should be constructed in accordance with the standard specifications presented in Appendix I. The location of all subdrains should be surveyed by the project civil engineer.

3.7 Infiltration Characteristics

Based on the infiltration rates observed from the well permeameter test at boring HS-1, we anticipate that older alluvium encountered within the upper 10 feet will not infiltrate well. As such, infiltration in older alluvium does not appear feasible.

3.8 Slope Creep

Our observations on similar sites in older developments indicate that many backyard and sideyard walls on shallow foundations near the tops of slopes tend to tilt excessively over time as a result of slope creep. The time required to develop significant tilt, or other associated distress, depends upon several factors, some of which may not yet be fully understood. Some known factors are the amount of seasonal moisture change, the soil expansion/shrinkage potential, the type of wall, the slope steepness and height, and the depth of wall footing and its closeness to the edge of the slope. At present, it is not possible to precisely quantify slope creep or predict the distance from the top of slope where creep effects may eventually be observed.

Although fences and free-standing walls have traditionally been considered nonstructural elements with little attention given to their foundation design, some options are available to reduce the effect of slope creep where these improvements are near the tops of slopes. One option (the preferred) is to design the fence or free-standing wall so that tilting or cracking will be less visually obvious, or so that they may be economically repaired or replaced. Another option is to deepen their footings to meet the criteria previously recommended for retaining wall footings.

Another option that appears to be effective is to support the fences or free-standing walls near the top of slopes on a pier-and-grade-beam system. The piers normally consist of minimum 12-inch diameter, cast-in-drilled-hole "mini piers", spaced at a maximum of 8 feet on center, and connected together by a minimum 12-inch-thick grade beam at shallow depth. The piers are typically at least 7 feet deep for low expansive soil and at least 10 feet deep for medium or highly expansive soil. The steel reinforcement for the system should be designed with consideration of the wall/fence type and loading conditions. Walls or fences aligned essentially perpendicular to the top of the slope (sideyard walls) are normally supported on the pier-and-grade-beam system for at least that part of the wall that is within 15 feet from the top of slope.

3.9 Building Setbacks

Building setbacks from the tops and toes of natural and manufactured slopes should be provided in accordance with the current California Building Code (CBC) and as required for slope stability requirements (see Table of Slopes, Appendix E).

3.10 Foundation Recommendations

The following recommendations are based on the onsite soils with medium expansion potential.

Conventional Foundations

The footings for two- to three-story buildings should have a minimum embedment depth of 18 inches and minimum width of 18 and 24 inches for square and continuous footings, respectively.

An allowable bearing pressure of 1,800 psf may be used, based on the minimum embedment depth and width. The allowable bearing value may be increased by 250 psf per foot increase in depth or width to a maximum allowable bearing pressure of 3,500 psf. The allowable bearing pressures are for the total dead load and frequently applied live loads. The allowable bearing pressure may be increased by one third when considering loads of short duration, such as those imposed by wind and seismic forces.

Footing reinforcement should be designed by the structural engineer. However, as a minimum, footing reinforcement should consist of one No. 4 rebar at the top and at the bottom of continuous footings and No. 4 rebar spaced at 18 inches on center in each direction for isolated footings. A plasticity index of 25 may be assumed for preliminary design.

Post-Tensioned Foundations

Based on onsite soils having a medium expansion potential, the recommended geotechnical design parameters for post-tensioned foundation are summarized in Table 2 below.

Table 2 - Post-Tensioned Slab Design Parameters

Condition	Center Lift	Edge Lift
Edge Moisture Variance Distance, e_m (feet)	8.7	4.5
Differential soil Movement, y_m (inches)	0.6	1.0

An average allowable bearing pressure of 1,500 pounds per square foot (psf) for dead plus live loads with maximum localized bearing pressure of 2,000 psf for column or wall loads may be used for designing a rigid slab. A subgrade modulus of 180 pounds per cubic inch (pci) may be assumed. The values may be increased by one-third for short-term loading including wind and seismic loads. Regardless of the method used for designing the slabs, the structural engineer should provide the slab with adequate stiffness to minimize potential cracking. The design of post-tensioned slab foundations should follow the procedures described in the latest edition of the Design of Post-Tensioned Slabs-on-Ground by the Post-Tensioning Institute (PTI, 2008).

The above recommended design criteria may subject to change if the expansion potential of the subgrade soil is found to be different during the construction phase.

To provide more uniform moisture in the subgrade, the top 16 inches of the prepared subgrade should be pre-saturated to 120 percent of the optimum moisture prior to placement of concrete.

The soil-moisture around the immediate perimeter of the slab should be maintained to near-optimum moisture content (or above) during construction and up to occupancy of the homes.

The geotechnical parameters provided in Table 2 assume that if the areas adjacent to the foundation are planted and irrigated, these areas will be designed with proper drainage so ponding, which causes significant moisture change below the foundation, does not occur. Our recommendations do not account for excessive irrigation and incorrect landscape design. Sunken planters placed adjacent to the foundation should either be designed to prevent moisture infiltration below the foundation or have efficient drainage system liners. Some lifting of the perimeter foundation beam should be expected even with properly constructed planters. Based on the design parameters we have provided, and our experience with monitoring similar sites on these types of soils, we would expect that with overwatering, up to 1 inch of uplift would occur at the perimeter of the foundation relative to the central portion of the slab.

Future homeowners should be informed and educated regarding the importance of maintaining a constant level of soil moisture. The owners should be made aware of the potential negative consequences of both excessive watering, as well as allowing expansive soils to become too dry. The soil will undergo shrinkage as it dries up, followed by swelling during the winter, rainy season or when irrigation is resumed, resulting in distress to improvements and structures.

Lateral Load Resistance

Soil resistance available to withstand lateral loads on a shallow foundation is a function of the frictional resistance along the base of the footing and the passive resistance that may develop as the face of the structure tends to move into the soil. The frictional resistance between the base of the foundation and the subgrade soil may be computed using a coefficient of friction of 0.30. The passive resistance may be computed using an allowable equivalent fluid pressure of 225 pounds per cubic foot (pcf), assuming there is constant contact between the footing and undisturbed soil. The coefficient of friction and passive resistance may be combined without further reduction.

Increase in Bearing and Friction - Short Duration Loads

The allowable bearing pressure and coefficient of friction values may be increased by one-third when considering loads of short duration, such as those imposed by wind and seismic forces.

Additional Recommendations for Slabs-On-Grade

Slabs-on-grade should have the following minimum recommended components:

Moisture Retarder: A minimum of 10-mil moisture retarder should be placed below slabs where moisture-sensitive floor coverings or equipment is planned. The structural engineer should specify pertinent concrete design parameters and moisture migration prevention measures, such as whether a capillary break (4 inches of ½-inch crushed rock) should be placed under the vapor retarder and whether or not a sand blotter layer should be placed over the vapor retarder. Gravel or other protruding objects that could puncture the moisture retarder should be removed from the subgrade prior to placing the vapor retarder, or a heavier vapor retarder can be used.

Minor cracking of the concrete as it cures, due to drying and shrinkage is normal and should be expected. However, cracking is often aggravated by a high water/cement ratio, high concrete temperature at the time of placement, small nominal aggregate size, and rapid moisture loss due to hot, dry, and/or windy weather conditions during placement and curing. Cracking due to temperature and moisture fluctuations can also be expected. Low slump concrete can reduce the potential for shrinkage cracking. Additionally, our experience indicates that reinforcement in slabs and foundations can generally reduce the potential for concrete cracking. The structural engineer should consider these components in slab design and specifications.

Moisture retarders can reduce, but not eliminate moisture vapor rise from the underlying soils up through the slab. Floor covering manufacturers should be consulted for specific recommendations.

Leighton does not practice in the field of moisture vapor transmission evaluation, since this is not specifically a geotechnical issue. Therefore, we recommend that a qualified person, such as the flooring subcontractor and/or structural engineer, be consulted with to evaluate the general and specific moisture vapor transmission paths and any impact on the proposed construction. That person should provide recommendations for mitigation of potential adverse impact of moisture vapor transmission on various components of the structures as deemed appropriate.

3.11 Seismic Design Parameters

Seismic parameters presented in this report should be considered during project design. In order to reduce the effects of ground shaking produced by regional seismic events, seismic design should be performed in accordance with the most recent edition of the California Building Code (CBC). The following data summarized in Table 3 should be considered for the seismic analysis of the subject site:

Table 3 – Seismic Design Parameters

2016 CBC Categorization/Coefficient	Design Value
Site Longitude (decimal degrees)	-117.7782
Site Latitude (decimal degrees)	33.9606
Site Class Definition (ASCE 7 Table 20.3-1)	D
Mapped Spectral Response Acceleration at 0.2s Period, S_S (plate 1613.3.1(1))	2.248 g
Mapped Spectral Response Acceleration at 1s Period, S_1 (Figure 1613.3.1(2))	0.796 g
Short Period Site Coefficient at 0.2s Period, F_a (Table 1613.3.3(1))	1.0
Long Period Site Coefficient at 1s Period, F_v (Table 1613.3.3(2)	1.5
Adjusted Spectral Response Acceleration at 0.2s Period, S_{MS} (Eq. 16-37)	2.248 g
Adjusted Spectral Response Acceleration at 1s Period, S_{M1} (Eq. 16-38)	1.194 g
Design Spectral Response Acceleration at 0.2s Period, S_{DS} (Eq. 16-39)	1.499 g
Design Spectral Response Acceleration at 1s Period, S_{D1} (Eq. 16-40)	0.796 g

3.12 Retaining Walls

Retaining wall foundations should be constructed entirely on compacted fill or competent bedrock. Where shallow fill (less than 3 feet) or both compacted fill and bedrock (cut/fill transition) are present beneath the bottom of the footing, the area should be overexcavated such that there is a minimum of 18 inches of compacted fill below the bottom of the footing. Alternatively a construction joint may be designed at the point of transition.

Our recommended lateral earth pressures are provided below as equivalent fluid pressure. These values do not contain an appreciable factor of safety, so the structural engineer should apply the applicable factors of safety and/or load factors during design. A soil unit weight of 120 pcf may be assumed for calculating the actual weight of the soil over the wall footing.

Due to the presence of expansive soils onsite, we recommend that retaining walls be backfilled with clean sand and constructed with a backdrain in accordance with the recommendations on Figure 5 presented at the end of the report. Using native soils as retaining wall backfill will potentially result in higher lateral earth pressures exerted on the wall due to the highly expansive soils. Thus, the following equivalent earth pressure recommendations are based on the assumption that a sand backfill exhibiting a sand equivalent of 30 or greater will be utilized.

Static Equivalent Fluid Weight (pcf)		
Condition	Level Backfill	2:1 Slope
Active	35	58
At-Rest	55	85
Passive	240 (allowable) (Maximum of 3,500 psf)	133 (allowable) (2:1 slope in front of wall)

The active pressure may be used to design an unrestrained retaining wall, such as a cantilever wall that is free to tilt slightly. For a restrained wall, such as a basement wall, curved walls without joints, or walls restrained at corners, the at-rest pressure should be used. If tilting of wall segments is acceptable and construction joints are provided at all angle points and frequently along curved wall segments (preferably not exceeding 15 feet), the active pressure may be used.

In addition to the above lateral forces due to retained earth, lateral forces from other superimposed loadings, such as loads from adjacent structures or vehicles, should be added if the load falls within a 1:1 projection backward from the heel of the retaining wall footing. To minimize the surcharge loading from an adjacent building, and to minimize settlement of the adjacent building, the building footings can be deepened to below the 1:1 projection from the heel of the retaining wall footing.

Passive pressure is used to compute lateral soil resistance to lateral structural movement. In addition, for sliding resistance, a frictional resistance coefficient of 0.30 may be used at the concrete and soil interface. The lateral passive resistance should be taken into account only if it is ensured that the soil against the embedded foundation elements providing passive resistance will remain intact with time.

Retaining wall footings should have a minimum width of 2 feet and a minimum embedment of 12 inches below the lowest adjacent grade. Retaining walls constructed at, or near the top of slopes, or mid-slope walls should have a minimum depth of embedment such that there is a minimum of 7 feet (measured horizontally) between the bottom, outside edge of the footing and the face of the descending slope. Based on these criteria, retaining wall footings can be designed using an allowable bearing capacity of 2,500 psf. This value can be increased 200 psf for each additional foot of width or embedment to a maximum value of 3,500 psf.

3.13 Exterior Concrete Slab Construction

Exterior concrete in contact with expansive soils such as driveways, ramps, curbs, gutters, sidewalks, patio slabs, and swimming pool decks, will generally crack. Inclusion of joints at frequent intervals and reinforcement will help control the locations of the cracks, and thus reduce the unsightly appearance. When cracking occurs, repairs may be needed to mitigate the trip hazard and/or improve the appearance.

There are a number of well-known steps that can be taken during construction to reduce the amount of cracking or its consequences. These steps include, but are not limited to, the following. As a minimum, exterior concrete slabs should be at least 4 inches thick, and driveways or ramps should have the edges thickened to at least 6 inches. Construction or weakened plane joints should be spaced at intervals of 8 feet or less for driveways, ramps, sidewalks, patio slabs, pool decks, curbs and gutters. We suggest that driveway, ramp, patio and pool deck concrete slabs be reinforced using No. 3 Rebar, 18 inches on center in both directions, placed at mid-thickness. Although not a general practice, presaturation of exterior slab-on-grade subgrade soils will further reduce the potential for unsightly slab cracks due to soil expansion.

Cracking of concrete is often not due to settlement or heave of soils, but often due to other factors such as the use of too high a water/cement ratio and/or inadequate steps being taken to prevent moisture loss during curing. This potential for concrete distress can be reduced by proper design of the concrete mix, and by proper placement and curing of the concrete.

3.14 Surface Drainage

Subdrainage is recommended where shallow groundwater seepage is observed during grading. However, inadequate control of runoff water or heavy irrigation may result in additional seepage or shallow perched groundwater conditions, even where none existed before. Inadequate control of runoff water and/or poorly controlled irrigation can cause the onsite soils to expand and/or shrink, producing heaving and/or settlement of foundations, flatwork, walls, and yard improvements, and increasing the rate of soil creep on and immediately behind slopes.

Maintaining adequate surface drainage, proper disposal of runoff water and control of irrigation should help reduce the potential for future soil moisture problems.

Positive surface drainage should be provided to direct surface water away from structures and slopes and towards the street or other suitable collective drainage facilities. Water should be transported off the site in approved drainage devices such as gutters, paved drainage swales, or watertight area drains and collector pipes.

Surface drainage should be provided to prevent ponding of water adjacent to structures (buildings, pools, spas, etc.). In general, the area around buildings should slope away from the buildings. We suggest that unpaved lawn and landscaped areas have a minimum gradient of one percent (preferably two percent or more) sloping away from buildings. Roof gutters with downspouts are recommended and the roof runoff should be carried to the street or other suitable drainage outlets by watertight drain pipes or over paved areas.

Consideration should be given to avoiding construction of planter areas adjacent to structures (buildings, pools, spas, etc.). Provisions should be made to drain excess irrigation water from the planters without saturating the subgrade below or adjacent to the planters. Raised planter boxes may be drained with weepholes.

Planting areas and other exposed soil areas should be graded to prevent ponding. Paved areas should be provided with adequate drainage devices, gradients, and curbing to prevent runoff flowing from the paved areas onto adjacent unpaved areas.

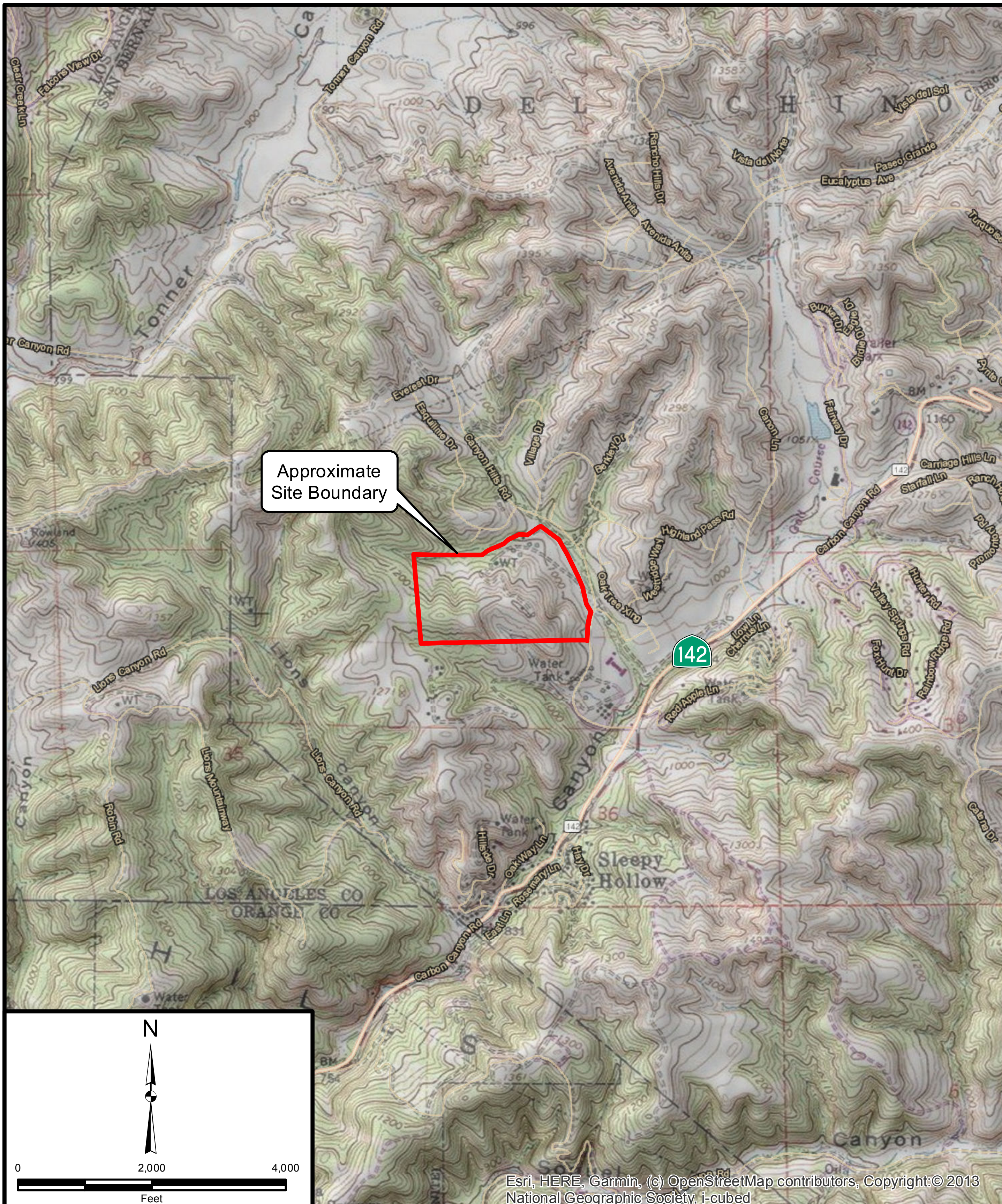
Care should be taken to avoid heavy irrigation, but under-irrigation should also be avoided. The goal should be to balance the total rate of water being introduced into the ground from the combination of irrigation, rainfall, and other possible sources against the water loss from evapotranspiration in order to maintain a nearly constant moisture content in subgrade soils.

3.15 Additional Geotechnical Services

This report was based, in part, upon data obtained from a limited number of observations, site visits, soil excavations, samples, and tests. Such information is, by necessity, incomplete. The nature of many sites is such that differing soils or geologic conditions can be experienced within small distances and under varying climatic conditions. Changes in subsurface conditions can and do occur over time. Therefore, the findings, conclusions, and recommendations presented in this report are only valid if Leighton and Associates has the opportunity to observe the subsurface conditions during grading and construction in order to confirm that our preliminary data are representative for the site.

Our geotechnical recommendations provided in this report are based on development plans available at the time report preparation. Leighton and Associates should review any revisions to the plans to comment on the geotechnical aspects of the revisions. Additional geotechnical studies should be conducted as the project proceeds to further address the geotechnical conditions of the site and the proposed development.

Geotechnical observation and testing should be conducted during excavation and all phases of grading operations when that time arises.



Project: 12322.001	Eng/Geol: SGO
Scale: 1 " = 2,000 '	Date: June 2019

Base Map: ESRI ArcGIS Online 2019

Author: Leighton Geomatics (mmurphy)

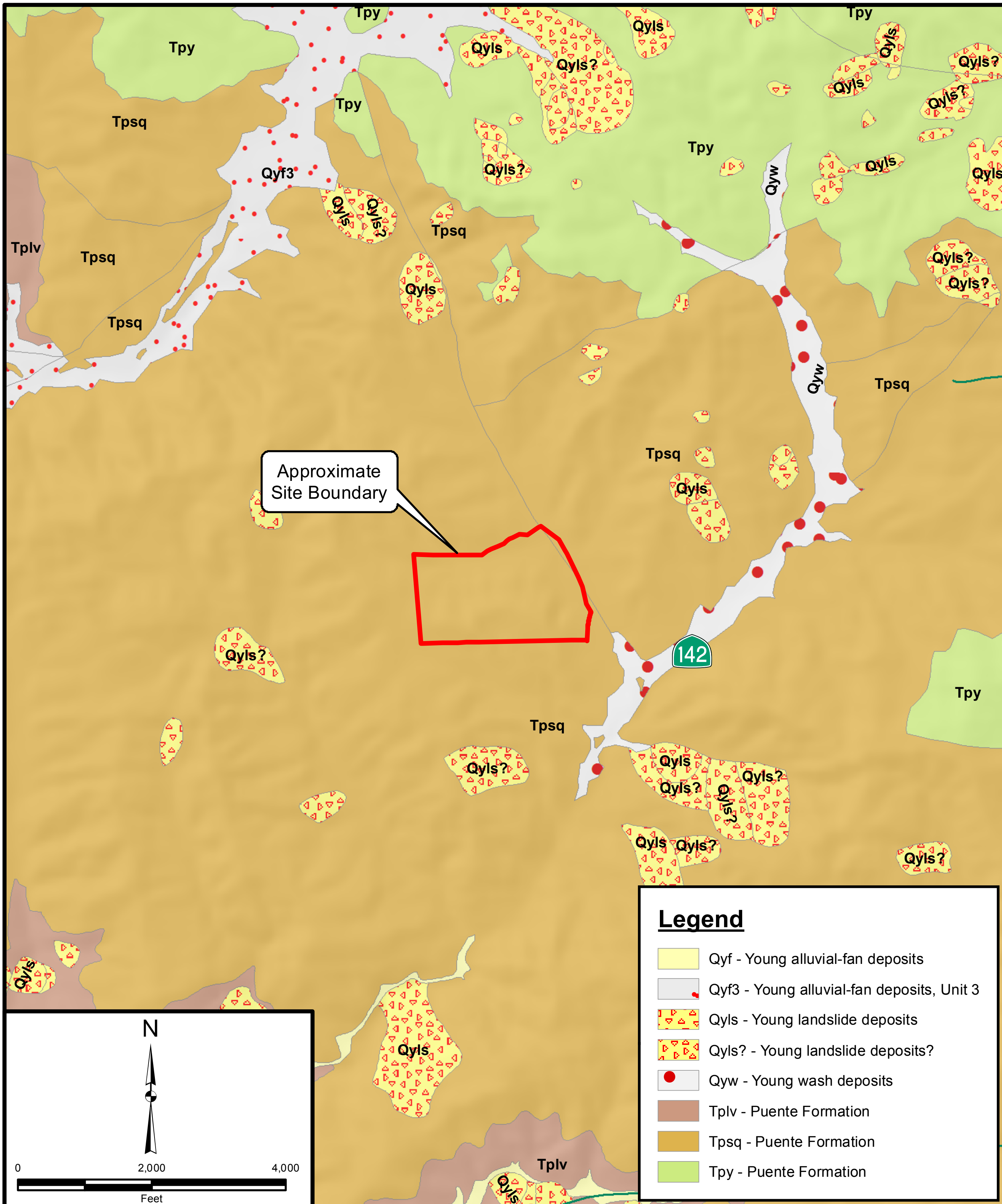
SITE LOCATION MAP

Paradise Ranch Residential Development
West of Canyon Hills Road and South of
Esquilime and Alpine Drives
Chino Hills, California

Figure 1

Leighton

Map Saved as V:\Drafting\12322\001\Maps\12322-001_F01_SLM_2019-06-04.mxd on 6/4/2019 5:47:24 PM



Project: 12322.001	Eng/Geol: SGO
Scale: 1 " = 2,000 '	Date: June 2019

Reference: USGS, 2006 Geologic map of the San Bernardino and Santa Ana 30'x60 quadrangle, California Version 1,0 Open File Report 2006-1217.
Author: Leighton Geomatics (mmurphy)

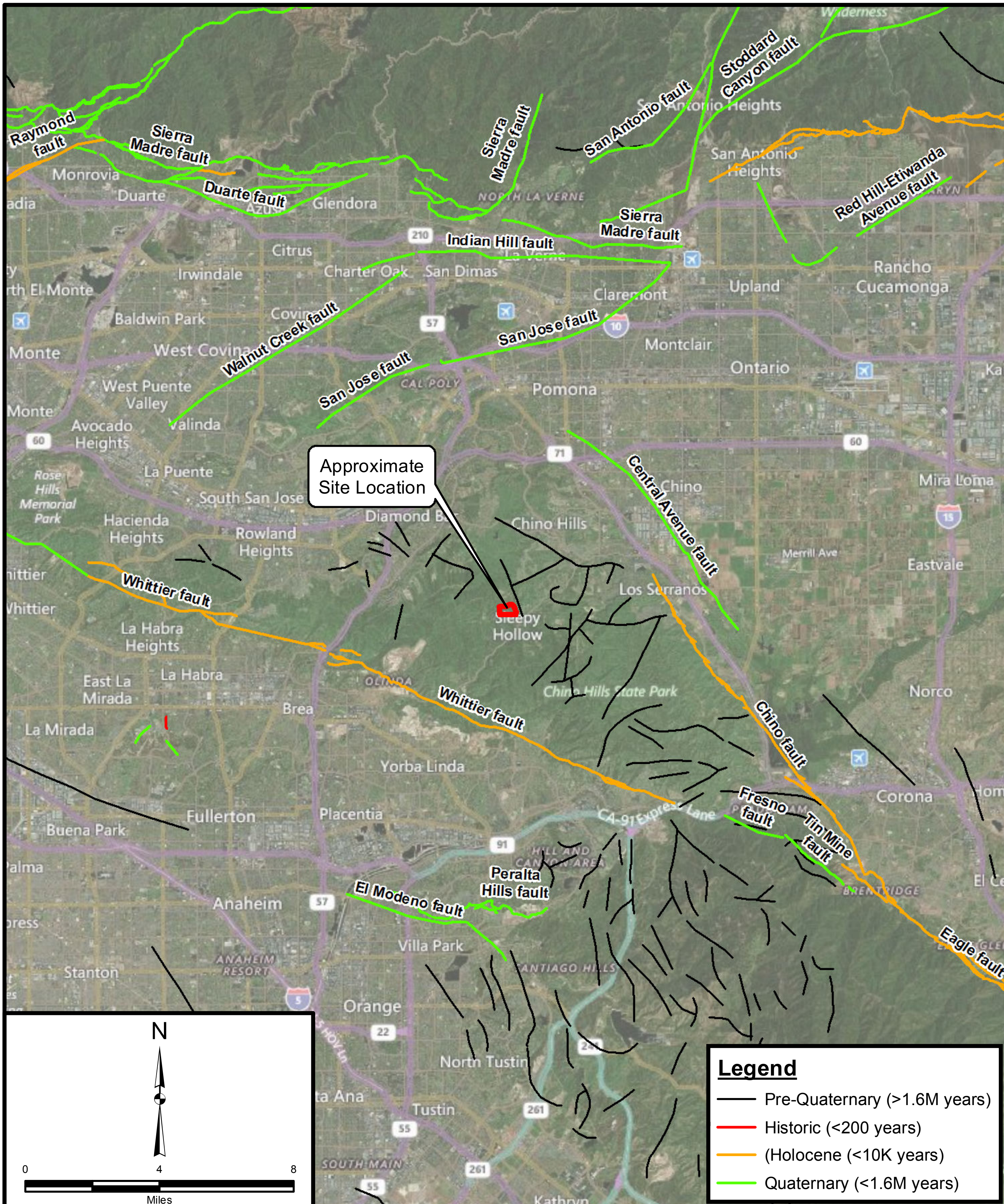
REGIONAL GEOLOGY MAP

Paradise Ranch Residential Development
West of Canyon Hills Road and South of
Esquilime and Alpine Drives
Chino Hills, California

Figure 2

Leighton

Map Saved as P:\Drafting\12322\001\Maps\12322-001_F02_RGM_2019-06-04.mxd on 6/4/2019 5:57:47 PM



Project: 12322.001	Eng/Geol: SGO
Scale: 1 " = 4 miles	Date: June 2019

Base Map: ESRI ArcGIS Online 2019
Thematic Information: Leighton, Bryant, W. A. (compiler), 2005, Digital Database of Quaternary and Younger Faults from the Fault Activity Map of California, version 2.0: CGS
Author: Leighton Geomatics (mmurphy)

REGIONAL FAULT MAP

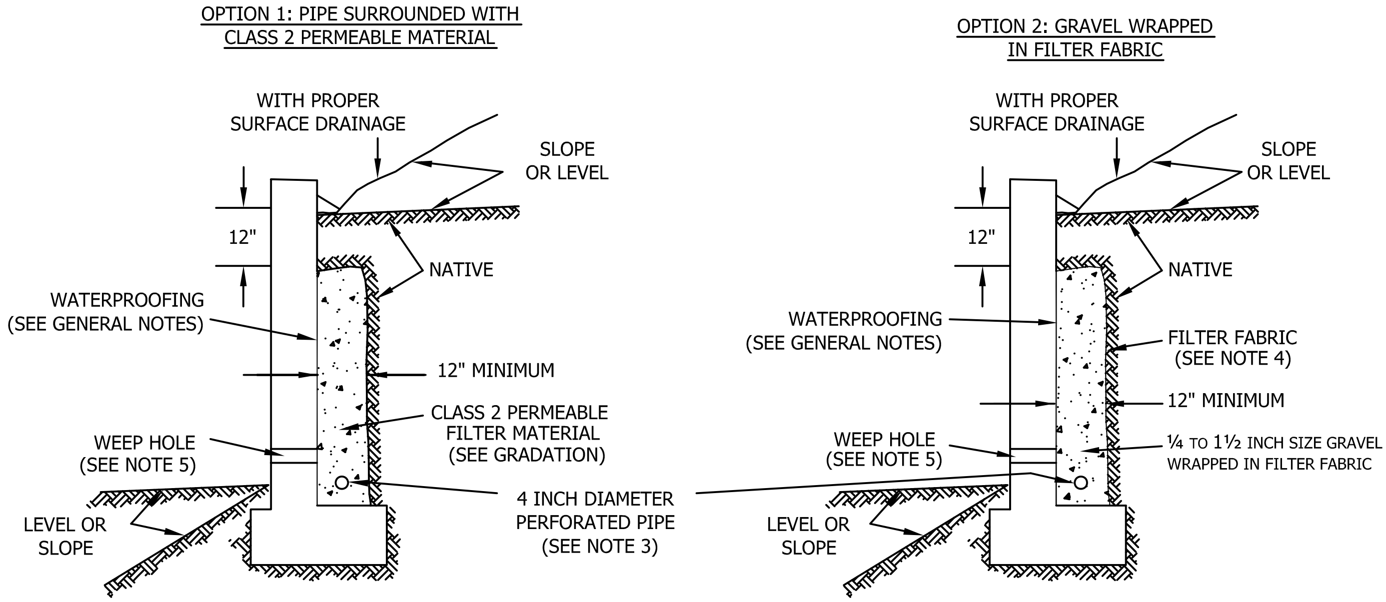
Paradise Ranch Residential Development
West of Canyon Hills Road and South of
Esquilime and Alpine Drives
Chino Hills, California

Figure 3

Leighton

Map Saved as V:\Drafting\12322\001\Maps\12322-001_F03_RFM_2019-06-04.mxd on 6/4/2019 6:10:11 PM

SUBDRAIN OPTIONS AND BACKFILL WHEN NATIVE MATERIAL HAS EXPANSION INDEX OF ≤50



Class 2 Filter Permeable Material Gradation
Per Caltrans Specifications

Sieve Size	Percent Passing
1"	100
3/4"	90-100
3/8"	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

GENERAL NOTES:

* Waterproofing should be provided where moisture nuisance problem through the wall is undesirable.
* Water proofing of the walls is not under purview of the geotechnical engineer
* All drains should have a gradient of 1 percent minimum
*Outlet portion of the subdrain should have a 4-inch diameter solid pipe discharged into a suitable disposal area designed by the project engineer. The subdrain pipe should be accessible for maintenance (rodding)
*Other subdrain backfill options are subject to the review by the geotechnical engineer and modification of design parameters.

Notes:
1) Sand should have a sand equivalent of 30 or greater and may be densified by water jetting.
2) 1 Cu. ft. per ft. of 1/4- to 1 1/2-inch size gravel wrapped in filter fabric
3) Pipe type should be ASTM D1527 Acrylonitrile Butadiene Styrene (ABS) SDR35 or ASTM D1785 Polyvinyl Chloride plastic (PVC), Schedule 40, Armco A2000 PVC, or approved equivalent. Pipe should be installed with perforations down. Perforations should be 3/8 inch in diameter placed at the ends of a 120-degree arc in two rows at 3-inch on center (staggered)
4) Filter fabric should be Mirafi 140NC or approved equivalent.
5) Weephole should be 3-inch minimum diameter and provided at 10-foot maximum intervals. If exposure is permitted, weepholes should be located 12 inches above finished grade. If exposure is not permitted such as for a wall adjacent to a sidewalk/curb, a pipe under the sidewalk to be discharged through the curb face or equivalent should be provided. For a basement-type wall, a proper subdrain outlet system should be provided.
6) Retaining wall plans should be reviewed and approved by the geotechnical engineer.
7) Walls over six feet in height are subject to a special review by the geotechnical engineer and modifications to the above requirements.

RETAINING WALL BACKFILL AND SUBDRAIN DETAIL FOR WALLS 6 FEET OR LESS IN HEIGHT

WHEN NATIVE MATERIAL HAS EXPANSION INDEX OF ≤50

Leighton

Figure 4

APPENDIX A

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Aerial Photos Reviewed:

Date:	Flight Number:	Frame(s):	Scale:	Source:
05/30/1938	AXJ/AXL	40-83	1:12,000	USDA
07/13/1938	AXJ/AXL	67-74	1:12,000	USDA
1946				NETR
1952				NETR
01/02/1953	AXJ-9K	121, 122	1:20,000	USDA
1959				NETR
07/13/1960	23870	2674, 2675	1:14,400	Fairchild
1963				NETR
1965				NETR
1966				NETR
1972				NETR
01/23/1975	C-252	28	1:12,000	San Bernardino County Flood Control District
03/15/1977	CARBCYN	1-2, 1-3	1:6,000	Unknown
11/12/1979	79177	4, 5, 15, 16	1:24,000	Unknown
1980				NETR
05/31/1994				Google
06/04/2002				Google
11/30/2003				Google
03/06/2004				Google
04/05/2004				Google
12/31/2004				Google
04/01/2005				Google
08/18/2005				Google
06/11/2005				Google
12/31/2005				Google
03/15/2006				Google
03/30/2007				Google
06/17/2007				Google
10/22/2007				Google
05/24/2009				Google
11/14/2009				Google
04/24/2010				Google
03/07/2011				Google

Date:	Flight Number:	Frame(s):	Scale:	Source:
03/15/2013				Google
04/16/2013				Google
04/23/2014				Google
03/24/2015				Google
02/02/2016				Google
10/18/2016				Google
03/09/2017				Google
12/03/2017				Google
03/29/2018				Google
06/08/2018				Google

APPENDIX B

Geotechnical Boring Logs

GEOTECHNICAL BORING LOG BA-1

Project No.	12322.001	**Date Drilled**	4-9-19
Project	Paradise Ranch	**Logged By**	JDO\SGO
Drilling Co.	Roy Brothers Drilling	**Hole Diameter**	28"
Drilling Method	LoDrill - varieslb - Kelly Bar - 12" Drop	**Ground Elevation**	1090'
Location	See Figure 2	**Sampled By**	JDO

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
									This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
1090	0			BULK					@surface: grasses **Puente Formation, Soquel Member (Tps)** 0-11', SILTY SANDSTONE - orangish brown to tan, weathered near surface, massive, mostly fine to medium sands, thinly interbedded siltstone/claystone/sandstone beds below 1.5' depth, contains minor fractures with roots @1.5', siltstone/claystone beds approximately 1" thick	
			B: N40W, 20S							
1085	5			R1	10			SM	@5' sample: SILTY SANDSTONE, light orange tan, moist, fine to medium sand, nonplastic, sandstone is massive, disturbed siltstone/claystone beds thicken, interbedded with unoxidized, light gray sands	
			B: N55W, 21S							
			B: N50W, 10S							
1080	10		B: E-W, 10S	R2	13			SM-ML	@10' sample: SILTY SANDSTONE interbedded with siltstone, light orange brown to gray, moist, fine to medium sand, nonplastic 11'-26', SILTSTONE/ CLAYSTONE/ SANDSTONE interbeds and less thickly bedded sandstone. Repeating sequences of sandstone and siltstone-claystone with interbedded fine sand beds with varying levels of oxidation, bedding is fairly consistant @13', roots present to 13'	
			B: N45W, 18S							
1075	15									
			B: N73W, 10S							
1070	20		B: N70W, 12S	R3	15			SM-CL	@20' sharp contact between fine and coarse grained sandstone @20' sample: SILTY SANDSTONE interbedded with siltstone and claystone, light orange brown to gray, moist, fine to medium sand, nonplastic	
			B: E-W, 14S							
1065	25								26'-45', SILTSTONE and CLAYSTONE with fine sandstone interbeds. Siltstone and claystone are gray to dark gray with some oxidation, sand beds are mostly oxidized	
1060	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

* * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * *

GEOTECHNICAL BORING LOG BA-1

Project No.	12322.001	**Date Drilled**	4-9-19
Project	Paradise Ranch	**Logged By**	JDO\SGO
Drilling Co.	Roy Brothers Drilling	**Hole Diameter**	28"
Drilling Method	LoDrill - varieslb - Kelly Bar - 12" Drop	**Ground Elevation**	1090'
Location	See Figure 2	**Sampled By**	JDO

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	Soil Description	Type of Tests
1060	30			R4	15			SM-CL	@30' sample: SILTY SANDSTONE interbedded with slitstone and claystone, light orange tan to gray, moist, fine to medium sand, nonplastic, mostly oxidized	
			B: N75W, 14S							
1055	35									
1050	40		B: N85W, 13S							
1045	45			R5	20			SM-CL	@45' sample: SILTY SANDSTONE interbedded with siltstone and claystone, light orange tan to gray, moist, fine to medium sand, nonplastic, mostly oxidized 45'-T.D., SANDSTONE interbedded with the siltstone-claystone beds. Beds have variable surfaces and dips with some cross bedding	
			B: N67W, 10S							
			B: N85W, 10S							
1040	50			R6	20			SM-CL	@50' sample: SILTY SANDSTONE interbedded with siltstone and claystone, light gray to gray, moist, fine to medium sand, nonplastic, sandstone is mostly unoxidized	
			B: N80W, 12S							
			B: N80W, 11S							
1035	55									
1030	60									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

-200	% FINES PASSING	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

*** This log is a part of a report by Leighton and should not be used as a stand-alone document. ***

GEOTECHNICAL BORING LOG BA-1

Project No.	12322.001	**Date Drilled**	4-9-19
Project	Paradise Ranch	**Logged By**	JDO\SGO
Drilling Co.	Roy Brothers Drilling	**Hole Diameter**	28"
Drilling Method	LoDrill - varieslb - Kelly Bar - 12" Drop	**Ground Elevation**	1090'
Location	See Figure 2	**Sampled By**	JDO

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
									This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
1030	60			R7	30				@60' sample: No recovery	
									Total depth of 60 feet Logged to 57 feet No groundwater encountered Backfilled with soil cuttings	
1025	65									
1020	70									
1015	75									
1010	80									
1005	85									
1000	90									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG BA-2

Project No.	12322.001	**Date Drilled**	4-10-19
Project	Paradise Ranch	**Logged By**	JDO\SGO
Drilling Co.	Roy Brothers Drilling	**Hole Diameter**	28"
Drilling Method	LoDrill - varieslb - Kelly Bar - 12" Drop	**Ground Elevation**	1065'
Location	See Figure 2	**Sampled By**	JDO

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	Soil Description	Type of Tests
1065	0								@surface: grasses **Puente Formation, Soquel Member (Tps)** 0-17', SANDSTONE - weathered and oxidized to unoxidized, massive to weakly beddedsome steep fractures through the area, fractures are filled with roots near surface and infilled with white precipitates (calcite) deeper, couple of minor silty beds	
1060	5			R1	9			SM	@5' sample: SILTY SANDSTONE, light orange tan, moist, fine to medium sand, nonplastic, weathered, fractures with roots @5.2', unoxidized sandstone bed with irregular contact, appears to be shallow dip	
1055	10			R2	10			SM	@10' sample: SILTY SANDSTONE, light orange tan, moist, fine to medium sand, nonplastic, weathered, fractures with roots @12', irregularly oriented clay seam, not continuous, dipping generally towards the southeast @13', contact of sandstone above and harder sandstone below, irregular contact, calcite infilled fractures	
1050	15		C: N5W, 7E						@15.4', bottom of harder sandstone, irregular contact with inferred dip	
			B: N26E, 4SE B: N45E, 4SE	BULK					17'-25', SANDSTONE - light gray with interbeds of gray to dark gray and orangish brown siltstone-claystone. Sandstone between finer beds is largely unoxidized @17.6', sequence of claystone-siltstone-sandstone beds, approximately 3 to 8 inches thick, contacts are slightly irregular, cross bedded, with shallow dips, fine sandstone beds are laregely unoxidized	
1045	20		B: N53E, 4SE	R3	13			SM-CL		
1040	25		B/C: N86W, 7SW						25'-55.6', SANDSTONE - massive to weakly bedded, minor beds of siltstone-claystone, mostly fine to medium grained sand grains, some gradation to coarser grained sandstone, and also with various levels of oxidation, deeper sands are largely oxidized	
1035	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG BA-2

Project No.	12322.001	**Date Drilled**	4-10-19
Project	Paradise Ranch	**Logged By**	JDO\SGO
Drilling Co.	Roy Brothers Drilling	**Hole Diameter**	28"
Drilling Method	LoDrill - varieslb - Kelly Bar - 12" Drop	**Ground Elevation**	1065'
Location	See Figure 2	**Sampled By**	JDO

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
1035	30			R4	15			SM		
			B: N70W, 4SW							
1030	35									
			B: N72E, 4SE							
1025	40			R5	19			SM		
									@42.8' gradational contact, harder and coarser oxidized sandstone containing calcite	
1020	45									
			B: N54E, 5SE						@46.5', siltstone-claystone-sandstone beds are cross-bedded with shallow dip	
1015	50			R6	20			SM		
			B: N82W, 6SW							
1010	55									
			B: N72E, 5SE						@55.6' Contact of largely sanstone dominant above, and claystone dominant below 55.6'-T.D., CLAYSTONE - interbedded with siltstone and fine sandstone. Sandstone is oxidized, shale at 64' depth.	
1005	60									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG BA-2

Project No.	12322.001	**Date Drilled**	4-10-19
Project	Paradise Ranch	**Logged By**	JDO\SGO
Drilling Co.	Roy Brothers Drilling	**Hole Diameter**	28"
Drilling Method	LoDrill - varieslb - Kelly Bar - 12" Drop	**Ground Elevation**	1065'
Location	See Figure 2	**Sampled By**	JDO

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
									This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
1005	60		B: N72E, 4SE	R7	22			SM-CL		
1000	65									
									Total depth of 66 feet Logged to 64 feet No groundwater encountered Backfilled with soil cuttings	
995	70									
990	75									
985	80									
980	85									
975	90									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG BA-3

Project No.	12322.001	**Date Drilled**	4-11-19
Project	Paradise Ranch	**Logged By**	JDO\SGO
Drilling Co.	Roy Brothers Drilling	**Hole Diameter**	28"
Drilling Method	LoDrill - varieslb - Kelly Bar - 12" Drop	**Ground Elevation**	1055'
Location	See Figure 2	**Sampled By**	JDO

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
1055	0								@surface: grasses **Puente Formation, Soquel Member (Tps)** 0-14', SANDSTONE - gray with orange to dark gray, massive and mostly unoxidized between fine grained beds. Interbedded siltstone-claystone with sandstone beds largely oxidized, beds are 4-10 inches thick -very weathered in top 2 feet	
			B: N80W, 11N							
1050	5		B: N80E, 10N	R1	9			SM-CL	@4.5', interbedded silty claystone bed ~6" thick, with sheared white clay (~0.25" thick) @5' sample: SILTY SANDSTONE interbedded with silt stone and sandstone, light orange brown, moist, fine to medium sand, nonplastic, fractured clasts of hard claystone	
			B: N80E, 9N							
1045	10		B/S: N55E, 13N	R2 BULK	12			SM-CL	@10' sample: SILTY SANDSTONE interbedded with silt stone and sandstone, light orange brown, moist, fine to medium sand, nonplastic, fractured clasts of hard claystone @10', slight shearing at sandstone/claystone contact in claystone, (0.25" thick white clay)	
			B: N60E, 22N						14'-34', SILTSTONE and CLAYSTONE beds with sandstone - cross-bedded, varying shallow dips	
1040	15									
									@18', some oxide stained surfaces along vertical fractures	
1035	20		B: N47E, 16NW	R3	15			CL-SM	@20' sample: SILTY CLAYSTONE interbedded with sandstone, gray to gray brown, moist, fine to medium sand, nonplastic, sampler tip was well bedded @20', discontinuous lenses of sandstone up to 1.5" thick, up to 1/4 around boring	
			B: N35E, 22NW						@24', some sandstone beds dipping more steaply	
1030	25									
1025	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG BA-3

Project No.	12322.001	**Date Drilled**	4-11-19
Project	Paradise Ranch	**Logged By**	JDO\SGO
Drilling Co.	Roy Brothers Drilling	**Hole Diameter**	28"
Drilling Method	LoDrill - varieslb - Kelly Bar - 12" Drop	**Ground Elevation**	1055'
Location	See Figure 2	**Sampled By**	JDO

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
1025	30		B/S: N60E, 20-60N	R4	16			CL-SM	@30' sample: SILTY CLAYSTONE interbedded with sandstone, gray to gray brown, moist, fine to medium sand, nonplastic @30', coarser oxidized sandstone above, with soft claystone below dipping steeply, up to 60N @31', shear surfaces apparent while picking claystone, surfaces appear to be similar to bedding less sandstone beds, claystone beds are soft and non continuous @32', sheared, pulverized zone in claystone	
			C: N10W, 22SW						34'-39', SANDSTONE - fine grained, massive @34.5', contact of soft and dark sheared claystone area above, and coarse massive sandstone below, contact is irregular	
1020	35									
									@39', lower contact of coarse sandstone above, and siltstone-claystone dominant below	
1015	40			R5	21			SM-CL	39'-T.D., SILSTONE, CLAYSTONE, SANDSTONE - Cross bedded, more continuous bedding than above @40' sample: SILTY SANDSTONE interbedded with silty claystone, light brown to gray brown, moist, fine to medium sand, nonplastic, oxidized	
1010	45		B: N80E, 14S							
1005	50			R6	22			SM-CL	@50' sample: SILTY SANDSTONE interbedded with silty claystone, olive brown to gray brown, moist, fine to medium sand, nonplastic, fragment of hard, well bedded claystone	
			B: N25W, 7SW							
1000	55								remained consistant untill this point, dips appear to be shallowing	
			B/S: N20W, 5SW							
995	60									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
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- DS DIRECT SHEAR
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GEOTECHNICAL BORING LOG BA-3

Project No.	12322.001	**Date Drilled**	4-11-19
Project	Paradise Ranch	**Logged By**	JDO\SGO
Drilling Co.	Roy Brothers Drilling	**Hole Diameter**	28"
Drilling Method	LoDrill - varieslb - Kelly Bar - 12" Drop	**Ground Elevation**	1055'
Location	See Figure 2	**Sampled By**	JDO

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	Soil Description	Type of Tests
995	60			R7	22			SM-CL	@60' sample: SILTY SANDSTONE interbedded with silty claystone, olive brown to gray brown, moist, fine to medium sand, nonplastic, fragment of hard, well bedded claystone	
									Total depth of 63 feet Logged to 56 feet No groundwater encountered Backfilled with soil cuttings	
990	65									
985	70									
980	75									
975	80									
970	85									
965	90									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
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GEOTECHNICAL BORING LOG BA-3A

Project No.	12322.001	**Date Drilled**	5-9-19
Project	Paradise Ranch	**Logged By**	JDO\SGO
Drilling Co.	Tri Valley Drilling	**Hole Diameter**	28"
Drilling Method	Bucket Auger - varieslb - Kelly Bar - 12" Drop	**Ground Elevation**	1058'
Location	See Figure 2	**Sampled By**	JDO

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0								@surface: grasses **Puente Formation, Soquel Member (Tps)** 0-5.5', SANDSTONE - weathered, siltstone and claystone interbeds, irregularly oriented contacts	
1055										
	5								5.5'-18.4', SANDSTONE - light brown with orange brown (oxidation), ine to medium grained, with siltstone and claystone interbeds, weakly bedded to massive -fractured, but not sheared, mottled claystone/siltstone/sandstone beds	
1050										
	10		C: N55E, 14NW N57E, 10NW						@10', Sharp contact between sandstone (above) and claystone (below), no shearing -near verticle fractures, down to ~15'	
1045			N83E, 13N						-sandstone is weakly bedded -sharp contact, no shearing	
	15									
1040			B/C: N70E, 13NW						18.4'-31', CLAYSTONE, SILTSTONE, SANDSTONE interbeds, oxidized, frequent white precipitates/clay minerals within thin beds, some beds are cross bedded, but most are fairly continuous around boring @19-24', Pods of discontinuous and irregular layers of sandstone	
	20									
1035									-heavy cross bedding in sandstone/siltstone/claystone interbeds	
	25		E-W, 20N							
1030			N88E, 20N							
	30									

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SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
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GEOTECHNICAL BORING LOG BA-3A

Project No.	12322.001	**Date Drilled**	5-9-19
Project	Paradise Ranch	**Logged By**	JDO\SGO
Drilling Co.	Tri Valley Drilling	**Hole Diameter**	28"
Drilling Method	Bucket Auger - varieslb - Kelly Bar - 12" Drop	**Ground Elevation**	1058'
Location	See Figure 2	**Sampled By**	JDO

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
									This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
	30									
1025			N82W, 12N						31'-34', SANDSTONE with siltstone and claystone interbeds, some white clay within some beds	
	35		N80E, 22N						34'-39.5', CLAYSTONE and SILTSTONE with fine sandstone interbeds, heavily cross bedded	
1020										
	40		N65E, 20NW						39.5'-48', SANDSTONE with interbedded silt and clay beds, sandstone is massive to weakly bedded, fine to medium grained with some course grained zones, oxidized @39.5, contact of cross bedded claystone/siltstone/sandstone (above), and massive sandstone below. Sandstone is approximately 1-foot-thick, with sharp, irregular, oxidized upper and lower contacts dipping to north @43-46', deformed clay layers in sandstone beds	
1015										
	45									
1010			C: N77E, 20N						@48', contact of course sandstone (above) and claystone (below). ~3" thick zone of sheared clay at interface of sand 48'-57', CLAYSTONE interbedded with irregular sandstone lenses, cross bedded	
	50									
1005			N72E, 11NW							
	55									
1000			N33W, 6SW N45W, 7SW N80W,	BULK					@57.3', distressed, "blobby" oxidized sandstone beds within claystone 57'-69', SANDSTONE and CLAYSTONE - dark gray (anoxic). thin, well bedded	
	60									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
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- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG BA-3A

Project No.	12322.001	**Date Drilled**	5-9-19
Project	Paradise Ranch	**Logged By**	JDO\SGO
Drilling Co.	Tri Valley Drilling	**Hole Diameter**	28"
Drilling Method	Bucket Auger - varieslb - Kelly Bar - 12" Drop	**Ground Elevation**	1058'
Location	See Figure 2	**Sampled By**	JDO

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
	60		7S N45W, 5SW						-Interbedded, dark gray anoxic clay with oxidized sand beds. Cross bedded, but consistant around boring	
995			N40W, 4SW							
	65		N25W, 7SW							
990				R1	31/6"			SM	@68' sample: SANDY SILTSTONE with some clay, dark gray to orange, slightly moist, fine sand, nonplastic, platy, hard, oxidized, finely bedded	
	70		C: N15W, 10SW						@69.2', contact of mostly oxidized (above) and mostly anoxic (below) 69'-T.D., CLAYSTONE and SANDSTONE beds, mostly anoxic, dark gray to black clay with dark blue gray sand beds, intact beds are mostly continuous, some cross bedding, visable detailed bedding structures in sands	
985			N17W, 8SW	BULK						
	75								@75-77.5', Area with a few small oxidized fractures, bedding slightly distorted	
980										
	80		N10W, 3SW	R2	23 28			SM-SC	@81' sample: SILTY SANDSTONE interbedded with clay, dark gray to blue gray, moist, fine sand, nonplastic, thinly bedded, platy, anoxic	
975			N45W, 10SW						-a few small oxidized fractures	
	85									
970			C/B: N20W, 4SW						@87', seepage out of fractures in fine sandstone beds @~88-89', chunks of clay in spoils containing siltstone clasts. Clasts are subgrounded to subangular, appears to be erosional	
	90									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
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- SG SPECIFIC GRAVITY
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GEOTECHNICAL BORING LOG BA-3A

Project No.	12322.001	**Date Drilled**	5-9-19
Project	Paradise Ranch	**Logged By**	JDO\SGO
Drilling Co.	Tri Valley Drilling	**Hole Diameter**	28"
Drilling Method	Bucket Auger - varieslb - Kelly Bar - 12" Drop	**Ground Elevation**	1058'
Location	See Figure 2	**Sampled By**	JDO

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	90			R3	6 14			CL-SM	@90' sample: CLAYEY SILTSTONE interbedded with sandstone, dark gray to blue gray, moist, fine to medium sand, nonplastic, thinly bedded, platy, anoxic	
965			N10W, 7SW							
	95									
960			N30E, 3NW							
			N30E, 7NW							
	100									
955										
	105								Total depth of 105 feet Logged to 102 feet Seapage encountered at 87' Backfilled with soil cuttings	
950										
	110									
945										
	115									
940										
	120									

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
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- SA SIEVE ANALYSIS
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- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG BA-4

Project No.	12322.001	**Date Drilled**	4-12-19
Project	Paradise Ranch	**Logged By**	JDO\SGO
Drilling Co.	Roy Brothers Drilling	**Hole Diameter**	28"
Drilling Method	LoDrill - varieslb - Kelly Bar - 12" Drop	**Ground Elevation**	1120'
Location	See Figure 2	**Sampled By**	JDO

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
1120	0			BULK-1					@surface: grasses **Puente Formation, Soquel Member (Tps)** 0-19', SANDSTONE - light gray (unoxidized) to brown/ reddish brown (weathered and oxidized), mostly massive to weakly bedded, fluvial cross bedding, irregular surfaces, mostly fine to medium grained with coarser grained zones, minor claystone and siltstone interbeds	
1115	5			R1	9			SM	@5' sample: SILTY SANDSTONE, light orange brown, moist, fine to coarse sand, nonplastic, trace claystone fragments @5' continuous infilled fissure ~1/4" thick @7', sandstone beds offset and fractured, dips of beds are shallow @9' claystone-siltstone beds offset by fractures	
1110	10		~B: N40W, 12SW	R2	10			SM	@10' sample: SILTY SANDSTONE, light tan to orange, moist, fine to medium sand, nonplastic, weakly bedded with oxidized beds, trace gray claystone fragments	
1105	15									
1100	20		~B: N70E, 4S	R3	15			SM	19'-33', SILTSTONE, CLAYSTONE, SANDSTONE interbeds. More fine grained dominant. Beds are not completely continuous. Some beds appear to have offset, some beds crossbedded, others are fractured, beds appear distressed in this zone, maybe @19.5', coarse, massive sandstone with pieces of suspended and fractured claystone in it, mostly claystone beds below @20' sample: SILTY CLAYSTONE, light tan, moist, fine to medium sand, nonplastic, mostly unoxidized, some coarse sandstone @22.5', relatively continuous claystone bed	
1095	25									
1090	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG BA-4

Project No.	12322.001	**Date Drilled**	4-12-19
Project	Paradise Ranch	**Logged By**	JDO\SGO
Drilling Co.	Roy Brothers Drilling	**Hole Diameter**	28"
Drilling Method	LoDrill - varieslb - Kelly Bar - 12" Drop	**Ground Elevation**	1120'
Location	See Figure 2	**Sampled By**	JDO

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	Soil Description	Type of Tests
1090	30			R4	12			SM-CL	@30' sample: SILTY SANDSTONE interbedded with siltstone-claystone, light orange tan to dark gray, moist, fine to medium sand, nonplastic	
			B: N20E, 11W						33'-T.D., CLAYSTONE - dark gray with thin oxidized sandtone beds, appear fairly continuous, not as distressed as above zone	
1085	35		B: N86W, 5SW							
			B/C: N85E, 10S							
1080	40			R5 BULK-2	15			CL-SM	@40' sample: SILTSTONE and CLAYSTONE interbedded with sandstone, olive brown to gray brown, moist, fine to medium sand, nonplastic, oxidized @41' fractured, slightly sheared zone ~5" thick	
			SH: ~N48W, 16SW							
			B/C: N75W, 10S							
1075	45									
			B: N75E, 12SE							
1070	50			R6	20			CL-SM	@50' sample: SILTSTONE and CLAYSTONE interbedded with some fine sands, olive brown to gray brown, moist, fine to medium sand, nonplastic, oxidized @51' Very dark claystone, continuous-fine sand beds above and below	
			B: N80E, 5S							
1065	55									
			B: N45E, 6SE						@56', interbedded claystone with oxidized sand beds up 1" thick, cross bedded, appears to be dipping shallow, most beds appear near-continuous	
									@59', unoxidized sandstone	
1060	60									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

-200	% FINES PASSING	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

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GEOTECHNICAL BORING LOG BA-4

Project No.	12322.001	**Date Drilled**	4-12-19
Project	Paradise Ranch	**Logged By**	JDO\SGO
Drilling Co.	Roy Brothers Drilling	**Hole Diameter**	28"
Drilling Method	LoDrill - varieslb - Kelly Bar - 12" Drop	**Ground Elevation**	1120'
Location	See Figure 2	**Sampled By**	JDO

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
1060	60			R7	23			CL-SM	@60' sample: SILTSTONE and CLAYSTONE interbedded with some fine sands, olive brown to gray brown, moist, fine to medium sand, nonplastic, oxidized	
1055	65								Total depth of 64 feet Logged to 56 feet No groundwater encountered Backfilled with soil cuttings	
1050	70									
1045	75									
1040	80									
1035	85									
1030	90									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
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- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG BA-5

Project No.	12322.001	**Date Drilled**	5-8-19
Project	Paradise Ranch	**Logged By**	JDO\SGO
Drilling Co.	Tri Valley Drilling	**Hole Diameter**	28"
Drilling Method	Bucket Auger - varieslb - Kelly Bar - 12" Drop	**Ground Elevation**	1080'
Location	See Figure 2	**Sampled By**	JDO

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
1080	0								@surface: grasses **Puente Formation, Soquel Member (Tps)** 0-6.6', SILTSTONE and CLAYSTONE, interbedded with fine sandstone beds, highly weathered, fractured	
				BULK						
1075	5									
									6.6'-86.5', SANDSTONE to SILTY SANDSTONE interbedded with siltstone and claystone beds; sandstone is light gray to tan, weakly bedded to massive, oxidized, mostly fine to medium grained with areas of coarse sand, mostly friable, small areas that are well cemented, semi-frequent fractures in top 20 feet . Siltstone and claystone interbeds are olive to gray with orange, thinly bedded, often with irregular contacts, frequently cross bedded with fine sand beds	
1070	10		N30W, 5SW	R1	2 4			SP	@6.8', irregular contact (depositional), small fracture and offset at contact, weak bedding in sand (below) @10' sample: SANDSTONE, light gray to tan, moist, mostly fine to medium sand, nonplastic	
			N30W, 14SW						approximately 2" claystone interbed, slightly offset	
			N24W, 18SW						@13-14', well cemented zone, fractured	
1065	15									
									sandstone is weakly bedded to massive	
1060	20			R2	2 5			SM	@20' sample: SILTY SANDSTONE, tan to light brown, moist, mostly fine to medium sand, nonplastic, oxidized, weakly bedded	
			N20W, 17SW	BULK						
									@23', non-continuous clay nodules	
1055	25									
			N25W, 15SW						@27', series of claystone interbeds, irregular upper contact, no shearing	
			N14W, 16SW							
1050	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG BA-5

Project No.	12322.001	**Date Drilled**	5-8-19
Project	Paradise Ranch	**Logged By**	JDO\SGO
Drilling Co.	Tri Valley Drilling	**Hole Diameter**	28"
Drilling Method	Bucket Auger - varieslb - Kelly Bar - 12" Drop	**Ground Elevation**	1080'
Location	See Figure 2	**Sampled By**	JDO

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
									This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
1050	30			R3	3 7			SP	@30' sample: SANDSTONE, tan, moist, mostly fine to medium sand, nonplastic, trace fines, weakly bedded	
			N25W, 15SW						@34', continuous silty claystone beds, irregular contacts	
1045	35								@36-41.3', area of 1-2" thick near-vertical fractures, infilled with silica	
1040	40			R4	6 7			SP	@40' sample: SANDSTONE, tan, moist, mostly fine to medium sand, nonplastic, trace fines, weakly bedded	
			N28W, 14SW						@41'-43', claystone with sandstone interbeds, fractured, some offset, nodules, appears to be rip-up clasts from soft sediment deformation	
1035	45									
			N50W, 14SW							
1030	50		N13W, 16SW N20W, 16SW	R5	5 16			SM	@50' sample: SILTY SANDSTONE, tan to orange-tan, moist, mostly fine to medium sand, nonplastic, manganese, some interbedded siltstone/claystone	
									@54', well cemented, near-horizontal, oxidized sandstone layer	
1025	55		N43W, 15SW							
			N50W, 14SW							
1020	60									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
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- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
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GEOTECHNICAL BORING LOG BA-5

Project No.	12322.001	**Date Drilled**	5-8-19
Project	Paradise Ranch	**Logged By**	JDO\SGO
Drilling Co.	Tri Valley Drilling	**Hole Diameter**	28"
Drilling Method	Bucket Auger - varieslb - Kelly Bar - 12" Drop	**Ground Elevation**	1080'
Location	See Figure 2	**Sampled By**	JDO

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
1020	60			R6	32/6"			SM-SC	@60' sample: SANDSTONE with interbedded clayey siltstone, light brown to gray brown with orange, moist, mostly fine to medium sand, nonplastic, sandstone is oxidized	
1015	65		N20W, 15SW						@64.5', interbedded claystone and siltstone beds with sandstone, top beds are slightly sheared and weak, discontinuous (~1/3 around boring), sandstone beds below exhibit continuous structure	
1010	70		N30W, 13SW	R7	15/6"			SM-SC	@69.5', rip-up clasts in clay beds @70' sample: SANDSTONE interbedded with siltstone and claystone, orange brown to gray, moist, mostly fine to medium sand, nonplastic, most sandstone beds are oxidized, more sandstone than siltstone and claystone @72-80', area of massive sandstone	
				BULK						
1005	75									
1000	80		N25W, 18SW N8W, 9SW	R8	8 25			SM-SC	@79.5', continuous siltstone, claystone and sandstone beds with irregular (depositional) contacts and visible structure @80' sample: SILTSTONE/CLAYSTONE interbedded with sand, gray brown to orange brown, moist, mostly fine to medium sand, nonplastic	
995	85		N10W, 13SW	BULK					-becomes very moist	
									@86.5, Contact of oxidized (above) and anoxic clay and sand beds (below). No shearing at contact 86.5'- T.D., CLAYSTONE interbedded with sandstone and silty sandstone; area of anoxic conditions, dark gray to black claystone interbedded with blue-gray sandstone beds. Beds are largely continuous and consistant around boring, minor areas	
			N18W, 14SW	BULK						
990	90									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
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- DS DIRECT SHEAR
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- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
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GEOTECHNICAL BORING LOG BA-5

Project No.	12322.001	**Date Drilled**	5-8-19
Project	Paradise Ranch	**Logged By**	JDO\SGO
Drilling Co.	Tri Valley Drilling	**Hole Diameter**	28"
Drilling Method	Bucket Auger - varieslb - Kelly Bar - 12" Drop	**Ground Elevation**	1080'
Location	See Figure 2	**Sampled By**	JDO

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
990	90			R9	9 17			SM-SC	showing distress, some cross bedding, common irregular contacts between sandstone and claystone (depositional), minor hard shale beds @90' sample: SANDY CLAYSTONE/shale, dark gray, moist, thinly bedded, nonplastic, thinly bedded, platy, hard, unoxidized	
985	95		N-S, 8W							
			N45W, 7SW							
980	100			R10	9 13			SM	@100' sample: SILTY SANDSTONE, gray, moist, fine to medium sand, nonplastic	
			N3W, 22W							
975	105									
			N22W, 13SW							
970	110			R11				CL-SC	@110' sample: SANDY CLAYSTONE/shale, dark gray to blue gray, moist, fine sand, nonplastic, thinly bedded, unoxidized, some fine sandstone beds	
									during logging, pooling water in boring rose to 114'	
965	115									
				BULK						
960	120									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
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GEOTECHNICAL BORING LOG BA-5

Project No.	12322.001	**Date Drilled**	5-8-19
Project	Paradise Ranch	**Logged By**	JDO\SGO
Drilling Co.	Tri Valley Drilling	**Hole Diameter**	28"
Drilling Method	Bucket Auger - varieslb - Kelly Bar - 12" Drop	**Ground Elevation**	1080'
Location	See Figure 2	**Sampled By**	JDO

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
									This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
960	120			R12	8 14			CL-SC	@120' sample: SANDY CLAYSTONE/shale, dark gray to blue gray, very moist, fine sand, nonplastic, thinly bedded, unoxidized, some fine sand beds, hit groundwater at sample	
									Total depth of 121 feet Logged to 114 feet Groundwater encountered at 120' bgs on 5/8/19, rose to 114' bgs by 5/9/19 @1:09pm Backfilled with soil cuttings	
955	125									
950	130									
945	135									
940	140									
935	145									
930	150									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
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GEOTECHNICAL BORING LOG HS-1

Project No.	12322.001	**Date Drilled**	4-11-19
Project	Chino HIlls Paradise Ranch	**Logged By**	BER
Drilling Co.	2R	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	970'
Location	see Figure 2	**Sampled By**	BER

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
970	0			B-1					@surface: minor grass **Undocumented Artificial Fill (Afu)**	
				R-1	2 3 4	98	7	SM SW	@2.5' Silty SAND, loose, brown, moist, nonplastic, 25% fines (field estimate), rootlets, trace plastic trash, lower half of sample: SAND, light brown, moist, non plastic, very loose, medium grained	
965	5			R-2	2 2 2	94	9	SM	**Alluvium (Qal)** @5' Silty SAND, loose, brown to light brown, moist, medium sand, nonplastic	
960	10			R-3	5 7 9	110	15	CH	@10' Sandy CLAY, stiff, dark brown, moist, high plasticity	
955	15			R-4	2 4 5	106	13	SM	@15' Silty SAND, loose, brown, moist, nonplastic, 40% fines (field estimate)	
950	20			R-5	4 7 9	104	21	CH	@20' Sandy CLAY, stiff, dark brown, very moist, medium to high plasticity	
									@22'3" groundwater encountered	
945	25			R-6	3 4 5	103	22	CH	@25' CLAY with sand, firm, dark brown, moist, high plasticity, wet in sampler tip	
940	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
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- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG HS-1

Project No.	12322.001	**Date Drilled**	4-11-19
Project	Chino HIlls Paradise Ranch	**Logged By**	BER
Drilling Co.	2R	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	970'
Location	see Figure 2	**Sampled By**	BER

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
940	30			R-7	4 4 7	100	27	CH SP	@30' Sandy CLAY, firm, grayish brown, wet, high plasticity, sampler tip:SAND, grayish brown, wet, non plastic	
935	35			R-8	5 5 8	99	26	SC	@35' Clayey SAND, loose, grayish brown, wet (saturated), no to low plasticity, 45% fines (field estimate)	
									Puente Formation, Soquel Member (Tps)	
930	40			R-9	4 5 7	101	25		@40' SILTSTONE/CLAYSTONE, firm, dark gray, moist, low plasticity, medium dry strength, laminated sampler tip:CLAYSTONE, orangish brown, moist, high plasticity, medium-high dry strength	
925	45			R-10	20 50/6"	102	22		@45' SANDSTONE & SILTSTONE/CLAYSTONE, very dense, alternating strata Sandstone: reddish brown, moist, non plastic Siltstone/Claystone: gray, moist, non plastic, high dry strength	
									Total depth drilled: 46 feet **Groundwater encountered at 22'3"** **Backfilled with soil cuttings on 4/11/2019**	
920	50									
915	55									
910	60									

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
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- SE SAND EQUIVALENT
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GEOTECHNICAL BORING LOG HS-2

Project No. 12322.001
Project Chino HIlls Paradise Ranch
Drilling Co. 2R
Drilling Method Hollow Stem Auger - 140lb - Autohammer - 30" Drop
Location see Figure 2

Date Drilled 4-11-19
Logged By BER
Hole Diameter 8"
Ground Elevation 980'
Sampled By BER

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
980	0			B-1					@surface: moderately tall grass **Undocumented Artificial Fill (Afu)**	
				R-1	4 4 3	101	16	SM ML	@2.5' Silty SAND with gravel, light brown, dry, nonplastic, 35% fines (field estimate) **Alluvium (Qal)** @2.8' Sandy SILT with clay, firm, dark brown, moist, nonplastic	
975	5			R-2	2 5 7	93	4	SM	@5' Silty SAND, loose, light brown, slightly moist, very fine sand, nonplastic, 15-20% fines (field estimate), poorly sorted	
970	10			R-3	4 6 9	87	10	ML	@10' Sandy SILT, stiff, light brown, dry, nonplastic, some gravel, 1/8-inch average gravel size	
965	15			R-4	6 10 10	96	4	SM	@15' Silty SAND, medium dense, brown, slightly moist, fine sand, nonplastic, 35-40% fines (field estimate)	
960	20			S-5	push 1 2			ML	@20' Sandy Clayey SILT, soft, brown, very moist to wet, low plasticity @22' groundwater encountered	
955	25			R-6	3 3 5	102	22	SW	@25' SAND, loose, light brown, wet (saturated), coarse sand, nonplastic	
950	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

* * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * *

GEOTECHNICAL BORING LOG HS-2

Project No.	12322.001	**Date Drilled**	4-11-19
Project	Chino HIlls Paradise Ranch	**Logged By**	BER
Drilling Co.	2R	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	980'
Location	see Figure 2	**Sampled By**	BER

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
950	30			S-7	5 8 8			SW	@30' same as above, medium dense, 3-inch claytone layer mid sample	
945	35			R-8	7 12 14	114	14	SM	@35' Silty SAND, medium dense, light brown, wet, coarse sand, nonplastic, 30% fines (field estimate)	
940	40			R-9	50/6"	102	26	SW	@40' SAND, very dense, light brown, wet, very coarse sand, nonplastic, <u>lower half of sample:</u>see below **<u>Puente Formation, Soquel Member (Tps)</u>** SILTSTONE, gray, moist, non plastic, stratified, very dense	
935	45			R-10	50/5"	109	18		@45' SANDTONE, very dense, dark gray to dark brown, wet, medium sand, nonplastic, massive, no bedding apparent	
930	50			R-11	50/4"	101	22		@50' same as above **Total depth drilled: 50'4"** **Groundwater encountered at 22 feet** **Backfilled with soil cuttings on 411/2019**	
925	55									
920	60									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG HS-3

Project No.	12322.001	**Date Drilled**	4-11-19
Project	Chino HIlls Paradise Ranch	**Logged By**	BER
Drilling Co.	2R	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	995'
Location	see Figure 2	**Sampled By**	BER

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	Soil Description	Type of Tests
995	0			B-1					@surface: short grass **Artificial Fill (Afu)**	
				R-1	5 6 7	110	18	CL	@2.5' Sandy Silty CLAY, dark brown, slightly moist, low plasticity **Alluvium (Qal)** @2.75' Sandy CLAY with gravel, stiff, brown, moist, low to medium plasticity, 1/8-inch average gravel size	
990	5			R-2	4 4 5	108	16		@5' same as above, firm	
985	10			R-3	5 5 8	106	11	SM	@10' Silty SAND, loose, brown, moist, nonplastic, 35-40% fines (field estimate)	
980	15			R-4	5 7 8	106	16	ML	@15' Sandy Clayey SILT, stiff, brown, slightly moist, low plasticity	
975	20			S-5	2 3 3			CL	@20' Silty CLAY, firm, brown, slightly moist, low plasticity	
970	25			R-6	5 5 6	104	14		@25' Sandy Silty CLAY, firm, brown, moist, no to low plasticity	
965	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG HS-3

Project No. 12322.001
Project Chino HIlls Paradise Ranch
Drilling Co. 2R
Drilling Method Hollow Stem Auger - 140lb - Autohammer - 30" Drop
Location see Figure 2
Date Drilled 4-11-19
Logged By BER
Hole Diameter 8"
Ground Elevation 995'
Sampled By BER

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
965	30			S-7	2 2 4			CL	@30' Sandy CLAY, firm, brown, wet, low to medium plasticity	
									@33' groundwater encountered	
960	35			R-8	6 10 12	108	18	SW	@35' SAND, medium dense, light brown, wet, medium to coarse sand, nonplastic	
955	40			S-9	2 6 7				@40' same as above, loose, very wet (saturated)	
950	45			R-10	50/6"	115	17		@45' same as above, very dense, sampler tip: see below **<u>Puente Formation, Soquel Member (Tps)</u>** @45.4' SANDSTONE, stratified	
945	50			R-11	50/6"	110	19		@50' SANDSTONE, very dense, dark gray, moist, fine sand, nonplastic, high dry strength **Total depth drilled: 50'6"** **Groundwater encountered at 33 feet** **Backilled with soil cuttings on 4/11/2019**	
940	55									
935	60									

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG HS-4

Project No.	12322.001	**Date Drilled**	4-11-19
Project	Chino HIlls Paradise Ranch	**Logged By**	BER
Drilling Co.	2R	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	1010'
Location	see Figure 2	**Sampled By**	BER

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
1010	0			B-1					@surface: 1/2"-1" gravel **Artificial Fill (Afu)**	
				R-1	4 6 7			ML	@2.5' Sandy SILT, stiff, dark brown to brown, moist, nonplastic, mottled	
1005	5			R-2	6 10 8			GW	@5' GRAVEL with sand, medium dense, gray, wet (saturated), sewer odor	
									@10' did not sample, encountered odorous gravel of leach field	
1000	10								**Total depth drilled: 10 feet** **No groundwater encountered, wet (saturated) leachfield water encontered at 5 feet** **Backfilled with soil cuttings on 4/11/2019**	
995	15									
990	20									
985	25									
980	30									

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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APPENDIX C

Laboratory Test Data

Borehole	Depth	Liquid Limit	Plastic Limit	Plasticity Index	Maximum Size (mm)	%<#200 Sieve	Class-ification	Water Content (%)	Dry Density (pcf)	Satur-ation (%)	Void Ratio
HS-1	2.5							7.3	98.5		
HS-1	5.0							9.5	93.6		
HS-1	10.0							14.9	109.8		
HS-1	15.0							13.1	106.4		
HS-1	20.0							21.0	104.0		
HS-1	25.0							22.5	103.1		
HS-1	30.0							26.7	99.5		
HS-1	35.0							25.6	99.2		
HS-1	40.0							25.4	100.7		
HS-1	45.0							22.3	102.4		
HS-2	2.5							16.0	101.3		
HS-2	5.0							3.9	92.5		
HS-2	10.0							9.8	87.4		
HS-2	15.0							3.8	96.1		
HS-2	25.0							22.0	101.9		
HS-2	35.0							14.2	114.1		
HS-2	40.0							25.8	102.1		
HS-2	45.0							18.2	108.9		
HS-2	50.0							21.5	101.4		
HS-3	2.5							16.1	109.7		
HS-3	5.0							15.9	108.1		
HS-3	10.0							11.2	106.1		
HS-3	15.0							16.2	105.6		
HS-3	25.0							13.9	103.9		
HS-3	35.0							17.5	107.8		
HS-3	45.0							17.0	115.2		
HS-3	50.0							19.1	109.9		

US_LAB_SUMMARY 12322.001 HS LOGS.GPJ ROCKLOG2012.GDT 5/30/19

Leighton

Summary of Laboratory Results

Project Name: Chino HIlls Paradise Ranch

Project Number: 12322.001

Date: 5/30/2019 6:32:41 PM

Figure No. 1

PARTICLE-SIZE ANALYSIS OF SOILS

ASTM D 422

Leighton

Project Name:	Paradise Ranch	Tested By:	GB/GEB	Date:	05/22/19
Project No.:	12322.001	Data Input By:	J. Ward	Date:	05/30/19
Boring No.:	BA3				
Sample No.:	R4	Depth (feet):	30.0		
Soil Identification:	Light olive brown fat clay with sand (CH)s				

		Soil Type
% Gravel	**0**	**(CH)s**
% Sand	**17**	
% Fines	**83**	

			Moisture Content of Total Air-Dry Soil	Moisture Content of Air-Dry Soil Passing #10	After Hydrometer & Wet Sieve ret. in #200 Sieve
Specific Gravity (Assumed)	2.70	Wt.of Air-Dry Soil + Cont.(g)	0.00	118.68	
Correction for Specific Gravity	0.99	Dry Wt. of Soil + Cont. (g)	0.00	118.10	84.85
Wt.of Air-Dry Soil + Cont. (g)	311.64	Wt. of Container No.___ (g)	1.00	59.21	76.57
Wt. of Container	39.05	Moisture Content (%)	0.00	0.98	
Dry Wt. of Soil (g)	272.59	Wt. of Dry Soil (g)			8.28

Coarse Sieve

U.S. Sieve	Cumulative Wt. Of Dry Soil Retained (g)	% Passing
3"	0.00	100.0
1½"	0.00	100.0
3/4"	0.00	100.0
3/8"	0.00	100.0
No. 4	0.95	99.7
No. 10	1.12	99.6
Pan		

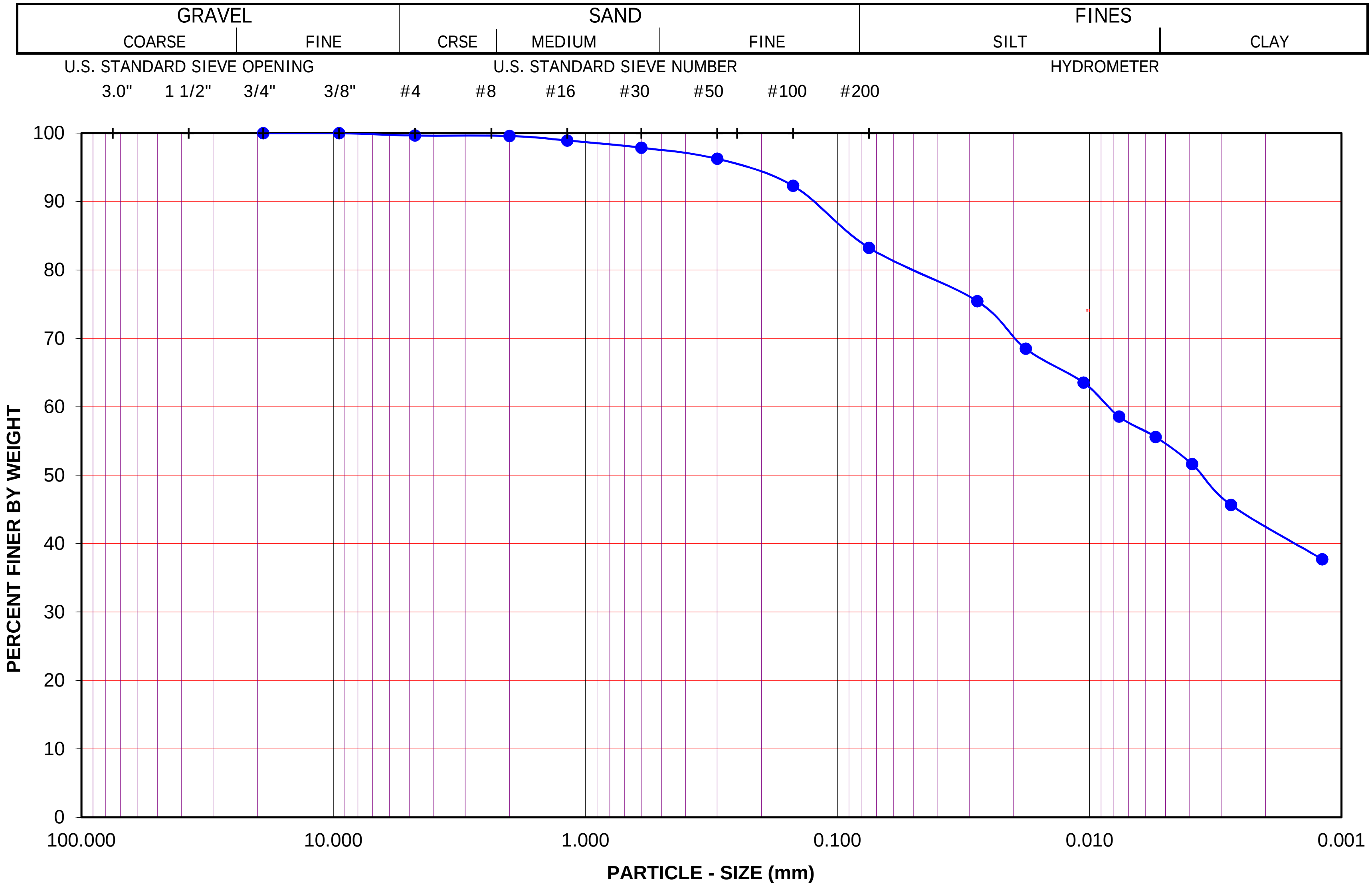
Sieve after Hydrometer & Wet Sieve

U.S. Sieve Size	Cumulative Wt. Of Dry Soil Retained (g)	% Passing	% Total Sample
No. 10	0.00	100.0	99.6
No. 16	0.33	99.3	98.9
No. 30	0.86	98.3	97.9
No. 50	1.67	96.6	96.2
No. 100	3.64	92.7	92.3
No. 200	8.16	83.6	83.3
Pan			

Hydrometer Wt. of Air-Dry Soil (g) 50.25 Wt. of Dry Soil (g) 49.76

Deflocculant 125 cc of 4% Solution

Date	Time	Elapsed Time (min)	Water Temperature (°C)	Composite Correction 152H	Actual Hydrometer Readings	% Total Sample (%)	Soil Particle Diameter (mm)
23-May-19	6:58	0		8.0			
	7:00	2	21.9	8.0	46.0	75.4	0.0279
	7:03	5	22.0	8.0	42.5	68.5	0.0179
	7:13	15	22.2	8.0	40.0	63.5	0.0106
	7:28	30	22.5	8.0	37.5	58.6	0.0076
	7:58	60	22.7	8.0	36.0	55.6	0.0055
	8:58	120	22.9	8.0	34.0	51.6	0.0039
	11:08	250	23.9	8.0	31.0	45.7	0.0027
24-May-19	6:58	1440	22.9	8.0	27.0	37.7	0.0012



Project Name: Paradise Ranch

Project No.: 12322.001

Boring No.: BA3

Sample No.: R4

Depth (feet): 30.0

Soil Type : (CH)s

Soil Identification: Light olive brown fat clay with sand (CH)s

GR:SA:FI : (%) 0 : 17 : 83

Leighton

PARTICLE - SIZE DISTRIBUTION ASTM D 422

May-19

PARTICLE-SIZE ANALYSIS OF SOILS

ASTM D 422

Project Name: Paradise Ranch | Tested By: GB/GEB | Date: 05/22/19

Project No.: 12322.001 | Data Input By: J. Ward | Date: 05/30/19

Boring No.: BA4

Sample No.: R6 | Depth (feet): 50.0

Soil Identification: Light olive brown elastic silt with sand (MH)s

		Soil Type
% Gravel	**0**	**(MH)s**
% Sand	**18**	
% Fines	**82**	

			Moisture Content of Total Air-Dry Soil	Moisture Content of Air-Dry Soil Passing #10	After Hydrometer & Wet Sieve ret. in #200 Sieve
Specific Gravity (Assumed)	2.70	Wt.of Air-Dry Soil + Cont.(g)	0.00	103.81	
Correction for Specific Gravity	0.99	Dry Wt. of Soil + Cont. (g)	0.00	103.22	89.43
Wt.of Air-Dry Soil + Cont. (g)	232.41	Wt. of Container No.___ (g)	1.00	61.91	79.30
Wt. of Container	39.47	Moisture Content (%)	0.00	1.43	
Dry Wt. of Soil (g)	192.94	Wt. of Dry Soil (g)			10.13

Coarse Sieve

U.S. Sieve	Cumulative Wt. Of Dry Soil Retained (g)	% Passing
3"	0.00	100.0
1½"	0.00	100.0
3/4"	0.00	100.0
3/8"	0.00	100.0
No. 4	0.00	100.0
No. 10	0.07	100.0
Pan		

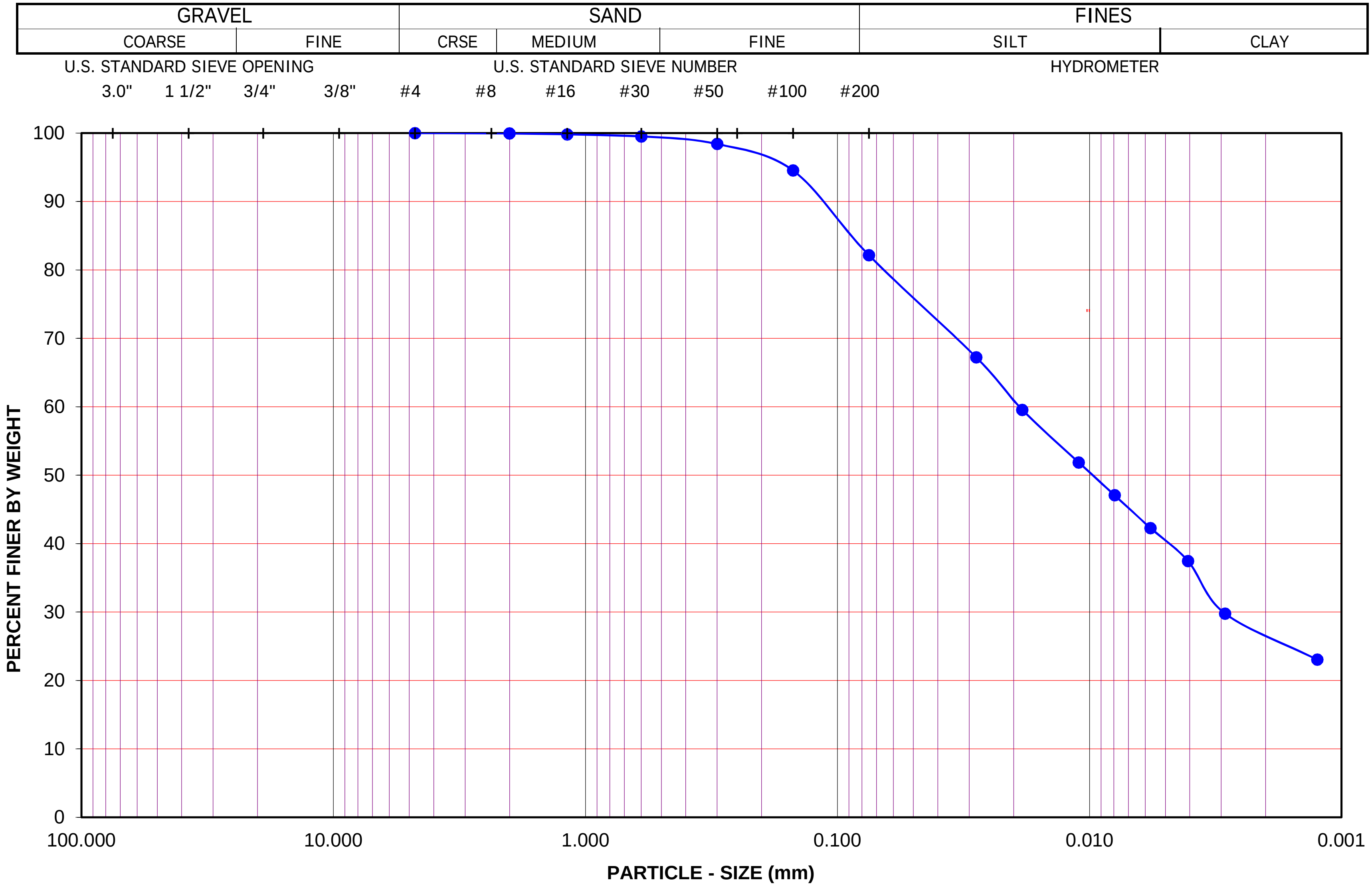
Sieve after Hydrometer & Wet Sieve

U.S. Sieve Size	Cumulative Wt. Of Dry Soil Retained (g)	% Passing	% Total Sample
No. 10	0.00	100.0	100.0
No. 16	0.08	99.8	99.8
No. 30	0.23	99.6	99.5
No. 50	0.80	98.4	98.4
No. 100	2.80	94.6	94.5
No. 200	9.19	82.2	82.2
Pan			

Hydrometer Wt. of Air-Dry Soil (g) 52.35 Wt. of Dry Soil (g) 51.61

Deflocculant 125 cc of 4% Solution

Date	Time	Elapsed Time (min)	Water Temperature (°C)	Composite Correction 152H	Actual Hydrometer Readings	% Total Sample (%)	Soil Particle Diameter (mm)
23-May-19	7:02	0		8.0			
	7:04	2	22.2	8.0	43.0	67.2	0.0281
	7:07	5	22.3	8.0	39.0	59.6	0.0185
	7:17	15	22.5	8.0	35.0	51.9	0.0110
	7:32	30	22.6	8.0	32.5	47.1	0.0079
	8:02	60	22.8	8.0	30.0	42.3	0.0057
	9:02	120	23.0	8.0	27.5	37.5	0.0041
	11:12	250	23.4	8.0	23.5	29.8	0.0029
24-May-19	7:02	1440	22.8	8.0	20.0	23.1	0.0012



Project Name: Paradise Ranch

Project No.: 12322.001

Boring No.: BA4 | Sample No.: R6

Depth (feet): 50.0 | Soil Type : (MH)s

Soil Identification: Light olive brown elastic silt with sand (MH)s

GR:SA:FI : (%) **0 : 18 : 82**

Leighton

PARTICLE - SIZE DISTRIBUTION ASTM D 422

May-19

Leighton

EXPANSION INDEX of SOILS

ASTM D 4829

Project Name:	Paradise Ranch	Tested By:	A. Santos	Date:	05/23/19
Project No.:	12322.001	Checked By:	J. Ward	Date:	05/30/19
Boring No.:	HS-2	Depth (ft.):	0-5		
Sample No.:	B-1				
Soil Identification:	Brown sandy silty clay s(CL-ML)				

Dry Wt. of Soil + Cont.	(g)	1000.00
Wt. of Container No.	(g)	0.00
Dry Wt. of Soil	(g)	1000.00
Weight Soil Retained on #4 Sieve		0.00
Percent Passing # 4		100.00

MOLDED SPECIMEN		Before Test	After Test
Specimen Diameter	(in.)	4.01	4.01
Specimen Height	(in.)	1.0000	1.0260
Wt. Comp. Soil + Mold	(g)	596.60	420.69
Wt. of Mold	(g)	205.60	0.00
Specific Gravity (Assumed)		2.70	2.70
Container No.		O	O
Wet Wt. of Soil + Cont.	(g)	776.20	626.29
Dry Wt. of Soil + Cont.	(g)	698.60	557.54
Wt. of Container	(g)	0.00	205.60
Moisture Content	(%)	11.11	19.53
Wet Density	(pcf)	117.9	123.7
Dry Density	(pcf)	106.2	103.5
Void Ratio		0.588	0.629
Total Porosity		0.370	0.386
Pore Volume	(cc)	76.7	82.0
Degree of Saturation (%) [S_{meas}]		**51.0**	83.8

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
05/23/19	11:00	1.0	0	0.3970
05/23/19	11:10	1.0	10	0.3950
Add Distilled Water to the Specimen				
05/23/19	11:15	1.0	5	0.4010
05/24/19	7:15	1.0	1205	0.4230
05/24/19	9:00	1.0	1310	0.4230

Expansion Index (EI_{meas}) = ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	**28**

ATTERBERG LIMITS

ASTM D 4318

Project Name:	Paradise Ranch	Tested By:	R. Manning	Date:	05/23/19
Project No. :	12322.001	Input By:	G. Bathala	Date:	05/24/19
Boring No.:	BA3	Checked By:	J. Ward		
Sample No.:	R4	Depth (ft.)	30.0		

Soil Identification: Light olive brown fat clay with sand (CH)s

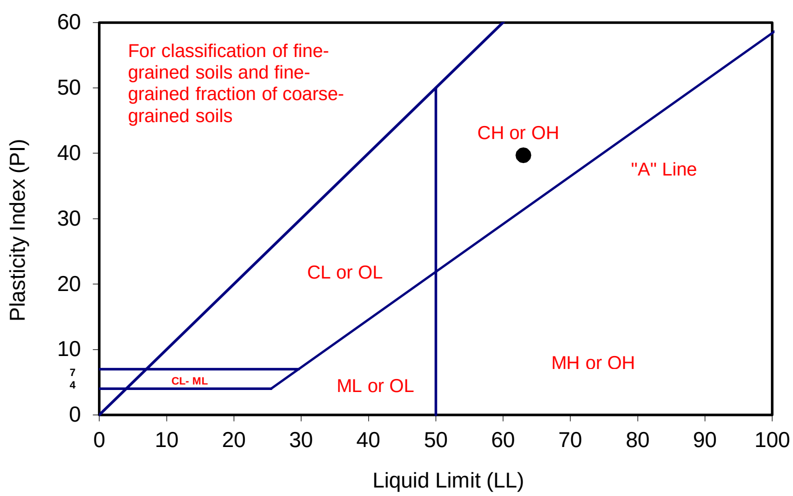
TEST	PLASTIC LIMIT		LIQUID LIMIT			
NO.	1	2	1	2	3	4
Number of Blows [N]			35	27	19	
Wet Wt. of Soil + Cont. (g)	18.08	18.49	23.37	22.76	22.78	
Dry Wt. of Soil + Cont. (g)	16.75	17.21	19.72	19.24	19.05	
Wt. of Container (g)	11.05	11.71	13.63	13.61	13.42	
Moisture Content (%) [Wn]	23.33	23.27	59.93	62.52	66.25	

Liquid Limit	**63**
Plastic Limit	**23**
Plasticity Index	**40**
Classification	**CH**

PI at "A" - Line = 0.73(LL-20) 31.39

One - Point Liquid Limit Calculation

$LL = Wn(N/25)^{0.121}$



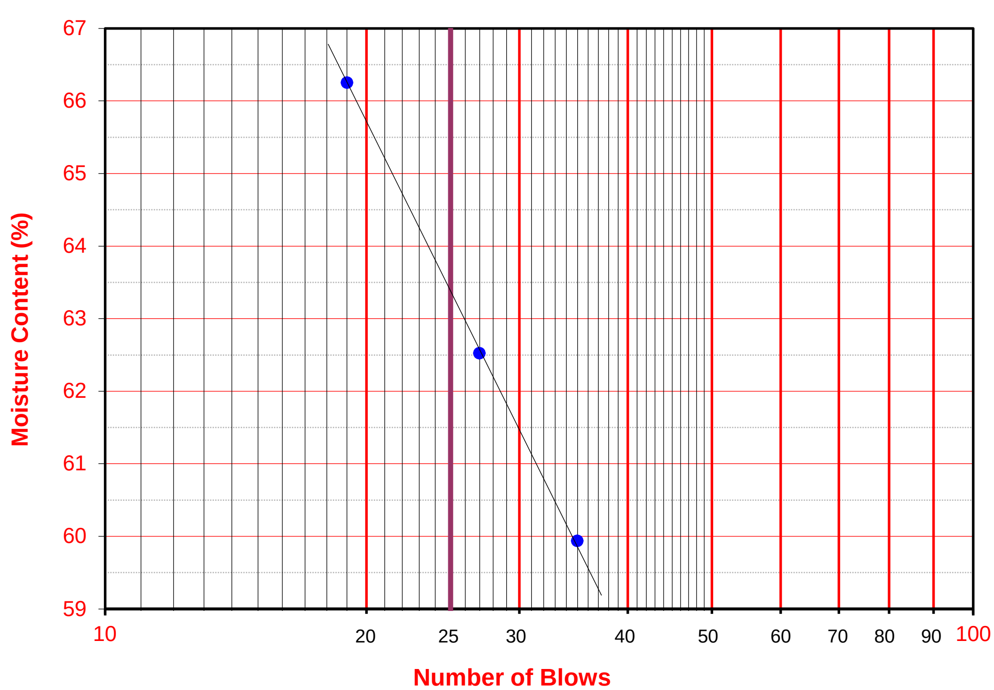
PROCEDURES USED

[ ] Wet Preparation
Multipoint - Wet

[X] Dry Preparation
Multipoint - Dry

[X] Procedure A
Multipoint Test

[ ] Procedure B
One-point Test



ATTERBERG LIMITS

ASTM D 4318

Leighton

Project Name:	Paradise Ranch	Tested By:	R. Manning	Date:	05/23/19
Project No. :	12322.001	Input By:	G. Bathala	Date:	05/24/19
Boring No.:	BA4	Checked By:	J. Ward		
Sample No.:	R6	Depth (ft.)	50.0		

Soil Identification: Light olive brown elastic silt with sand (MH)s

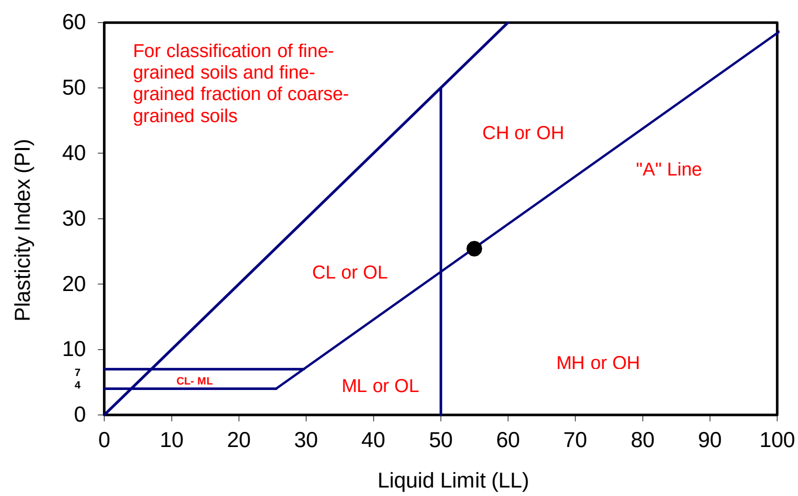
TEST NO.	PLASTIC LIMIT 1	PLASTIC LIMIT 2	LIQUID LIMIT 1	LIQUID LIMIT 2	LIQUID LIMIT 3	LIQUID LIMIT 4
Number of Blows [N]			35	25	19	
Wet Wt. of Soil + Cont. (g)	18.45	18.27	23.19	23.76	24.49	
Dry Wt. of Soil + Cont. (g)	16.78	16.68	19.89	20.13	20.58	
Wt. of Container (g)	11.15	11.30	13.49	13.56	13.88	
Moisture Content (%) [Wn]	29.66	29.55	51.56	55.25	58.36	

Liquid Limit	**55**
Plastic Limit	**30**
Plasticity Index	**25**
Classification	**MH**

PI at "A" - Line = 0.73(LL-20) 25.55

One - Point Liquid Limit Calculation

$LL = Wn(N/25)^{0.121}$



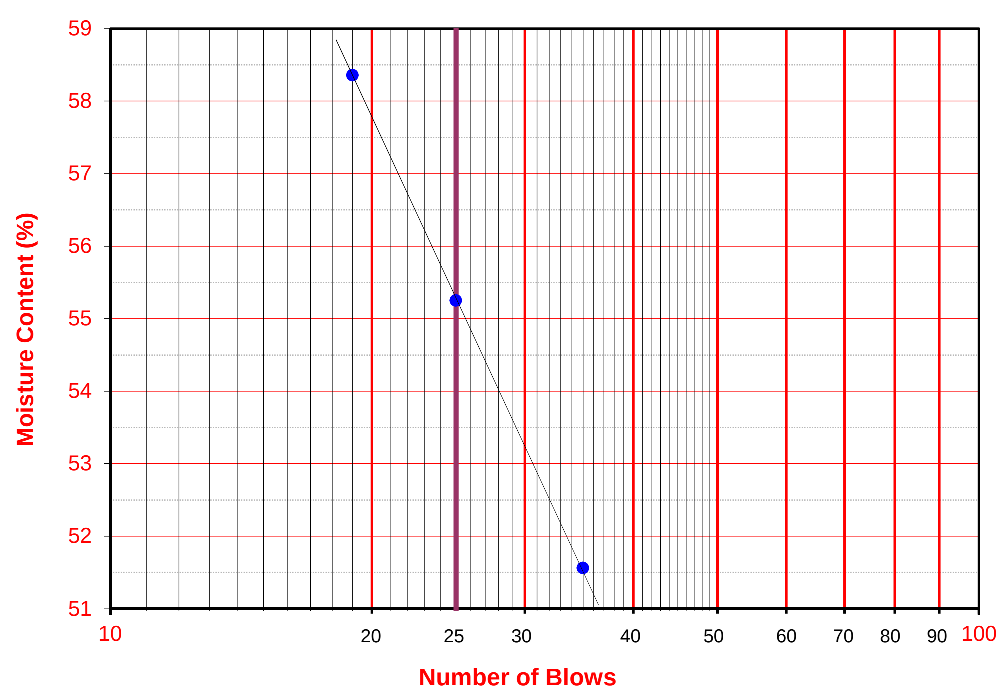
PROCEDURES USED

[ ] Wet Preparation Multipoint - Wet

[X] Dry Preparation Multipoint - Dry

[X] Procedure A Multipoint Test

[ ] Procedure B One-point Test



ATTERBERG LIMITS

ASTM D 4318

Project Name:	Paradise Ranch	Tested By:	R. Manning	Date:	05/23/19
Project No. :	12322.001	Input By:	G. Bathala	Date:	05/24/19
Boring No.:	HS-1	Checked By:	J. Ward		
Sample No.:	R-6	Depth (ft.)	25.0		
Soil Identification:	Dark brown lean clay (CL)				

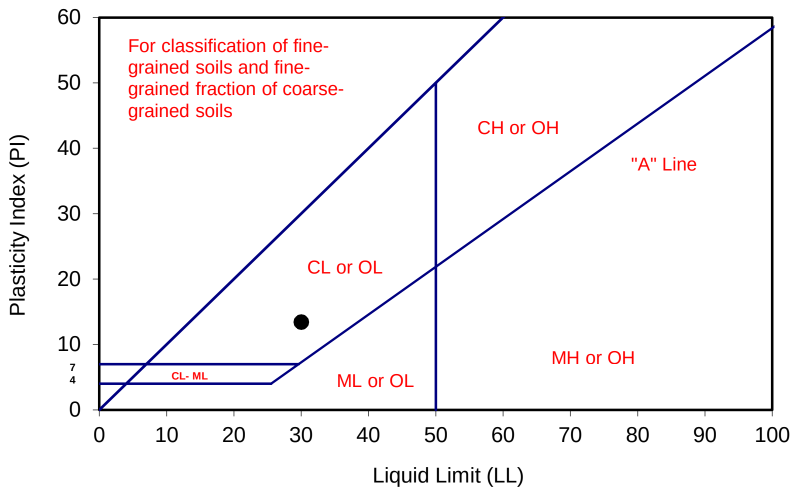
TEST	PLASTIC LIMIT		LIQUID LIMIT			
NO.	1	2	1	2	3	4
Number of Blows [N]			35	26	20	
Wet Wt. of Soil + Cont. (g)	18.45	18.37	25.33	24.23	24.49	
Dry Wt. of Soil + Cont. (g)	17.42	17.36	22.66	21.73	21.91	
Wt. of Container (g)	11.27	11.21	13.49	13.47	13.68	
Moisture Content (%) [Wn]	16.75	16.42	29.12	30.27	31.35	

Liquid Limit	**30**
Plastic Limit	**17**
Plasticity Index	**13**
Classification	**CL**

PI at "A" - Line = 0.73(LL-20) 7.3

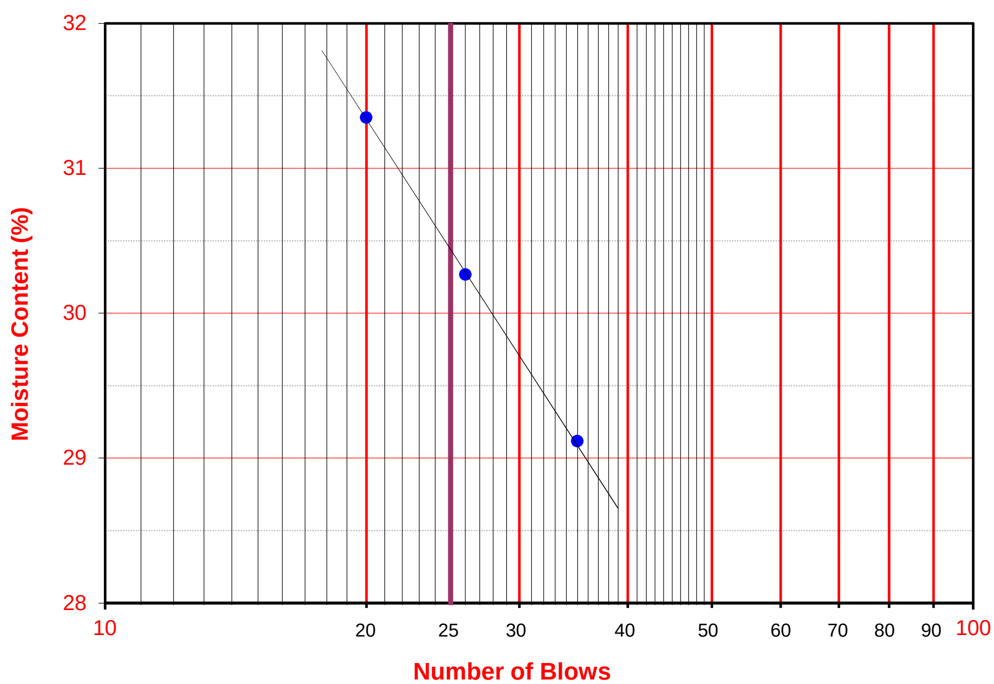
One - Point Liquid Limit Calculation

$LL = Wn(N/25)^{0.121}$



PROCEDURES USED

- [ ] Wet Preparation Multipoint - Wet
- [X] Dry Preparation Multipoint - Dry
- [X] Procedure A Multipoint Test
- [ ] Procedure B One-point Test



ATTERBERG LIMITS

ASTM D 4318

Project Name:	Paradise Ranch	Tested By:	R. Manning	Date:	05/23/19
Project No. :	12322.001	Input By:	G. Bathala	Date:	05/24/19
Boring No.:	HS-3	Checked By:	J. Ward		
Sample No.:	S-5	Depth (ft.)	20.0		
Soil Identification:	Yellowish brown lean clay (CL)				

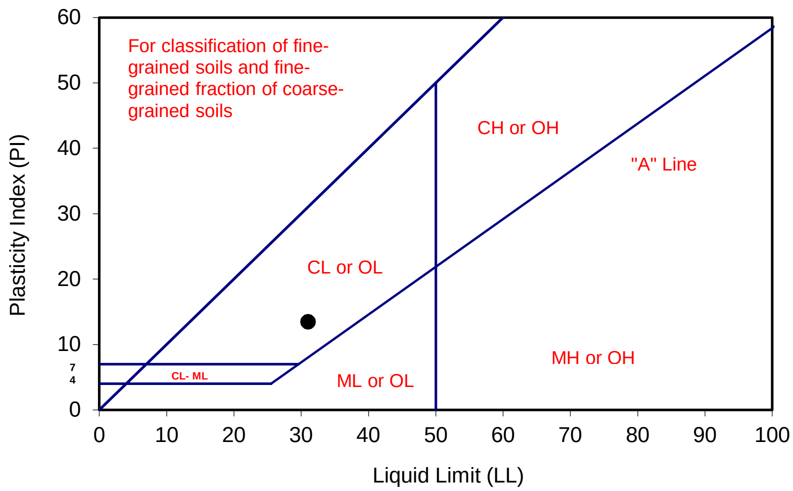
TEST	PLASTIC LIMIT		LIQUID LIMIT			
NO.	1	2	1	2	3	4
Number of Blows [N]			35	23	18	
Wet Wt. of Soil + Cont. (g)	19.75	19.76	23.54	24.44	25.55	
Dry Wt. of Soil + Cont. (g)	18.48	18.47	21.30	21.85	22.63	
Wt. of Container (g)	11.22	11.12	13.74	13.47	13.40	
Moisture Content (%) [Wn]	17.49	17.55	29.63	30.91	31.64	

Liquid Limit	**31**
Plastic Limit	**18**
Plasticity Index	**13**
Classification	**CL**

PI at "A" - Line = 0.73(LL-20) 8.03

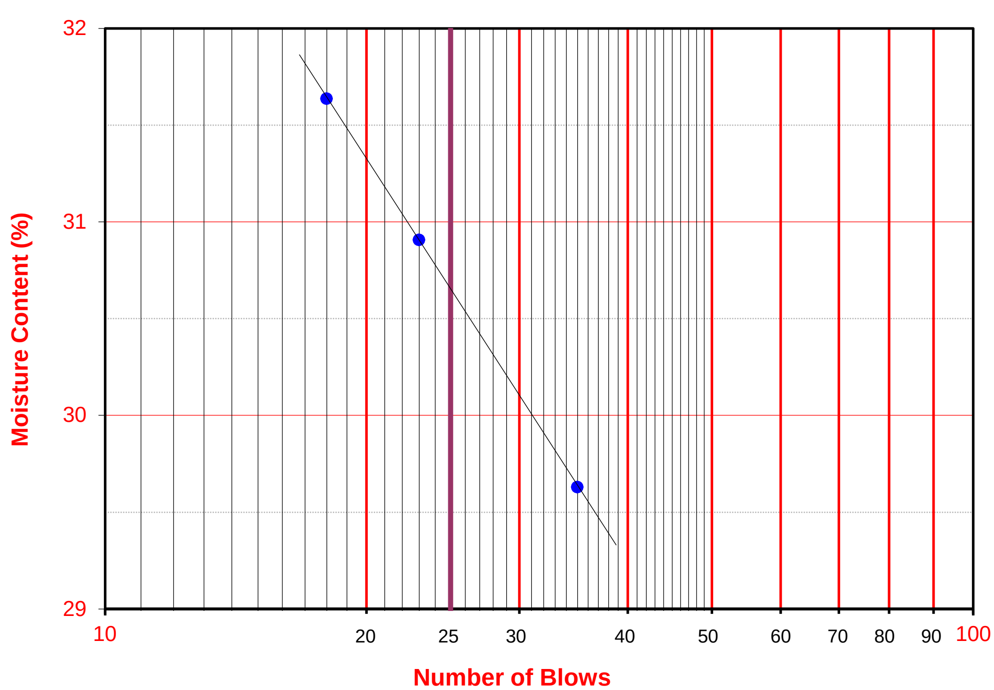
One - Point Liquid Limit Calculation

$LL = Wn(N/25)^{0.121}$



PROCEDURES USED

[ ]	Wet Preparation Multipoint - Wet
[X]	Dry Preparation Multipoint - Dry
[X]	Procedure A Multipoint Test
[ ]	Procedure B One-point Test



MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Leighton

Project Name:	Paradise Ranch	Tested By:	S. Dansby	Date:	05/22/19
Project No.:	12322.001	Input By:	J. Ward	Date:	05/30/19
Boring No.:	HS-2	Depth (ft.):	0-5		
Sample No.:	B-1				
Soil Identification:	Brown sandy silty clay s(CL-ML)				

Preparation Method: [X] Moist [ ] Dry — [X] Mechanical Ram [ ] Manual Ram

Mold Volume (ft³) 0.03320 — *Ram Weight = 10 lb.; Drop = 18 in.*

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	3686	3813	3857	3801		
Weight of Mold (g)	1830	1830	1830	1830		
Net Weight of Soil (g)	1856	1983	2027	1971		
Wet Weight of Soil + Cont. (g)	425.9	401.8	376.7	393.9		
Dry Weight of Soil + Cont. (g)	397.5	367.5	337.6	346.5		
Weight of Container (g)	39.5	39.5	38.2	39.1		
Moisture Content (%)	7.93	10.46	13.06	15.42		
Wet Density (pcf)	123.2	131.7	134.6	130.9		
Dry Density (pcf)	114.2	119.2	119.1	113.4		

Maximum Dry Density (pcf) 119.9 **Optimum Moisture Content (%)** 11.7

PROCEDURE USED

[X] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

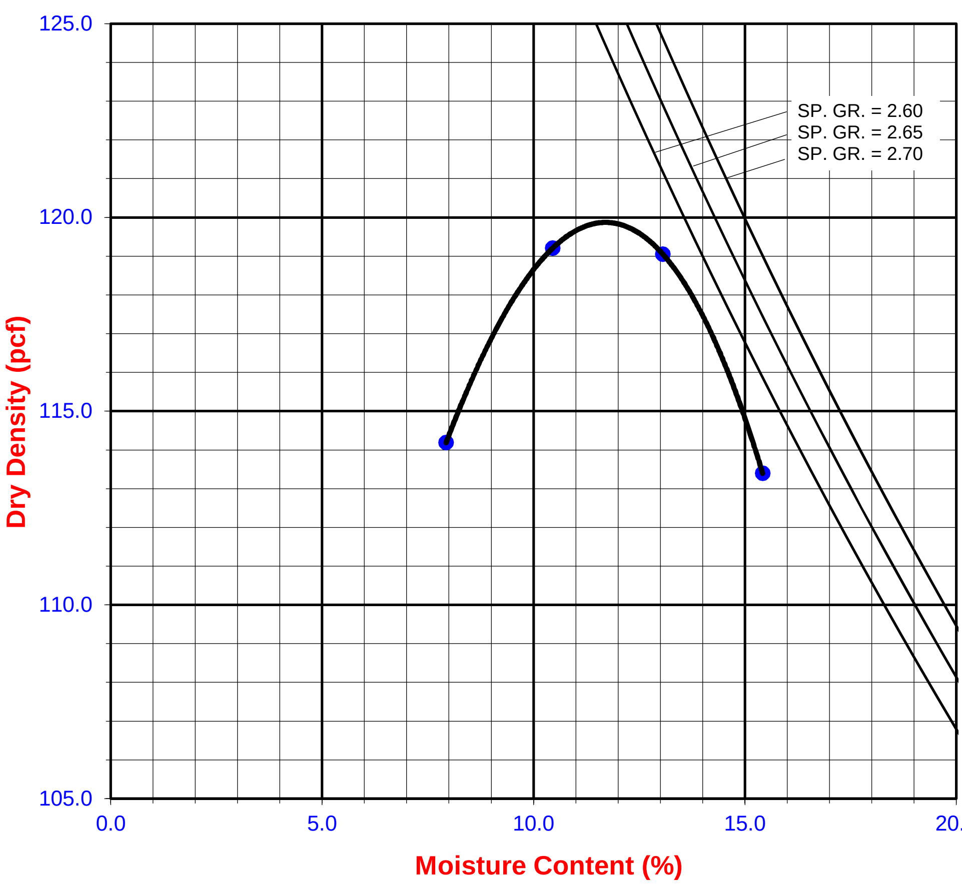
[ ] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:

GR:SA:FI

Atterberg Limits:

LL,PL,PI



DIRECT SHEAR TEST

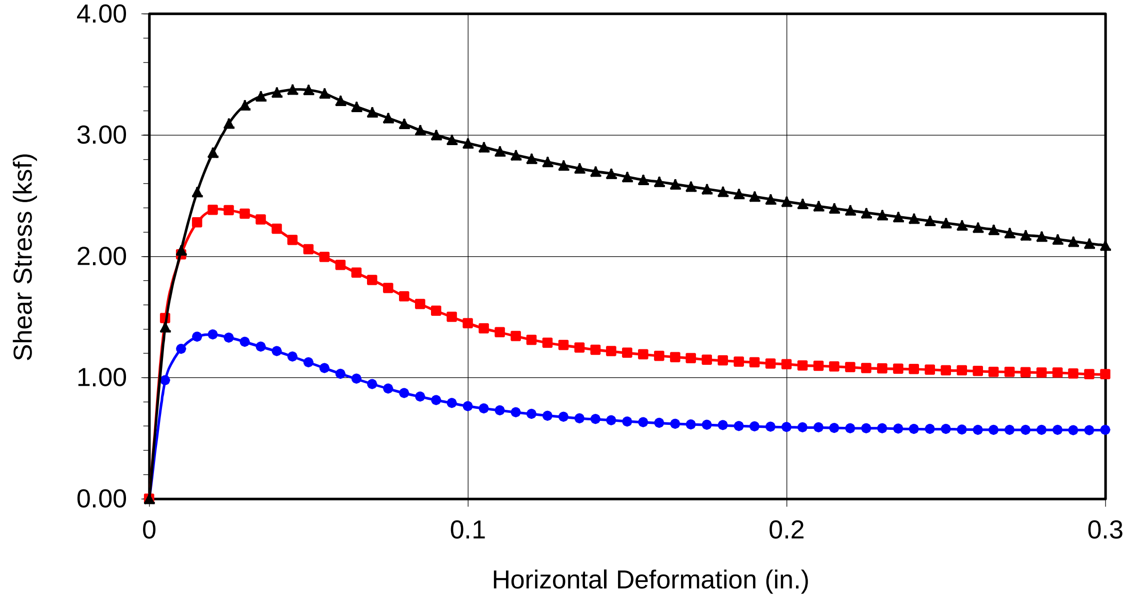
Consolidated Drained - ASTM D 3080

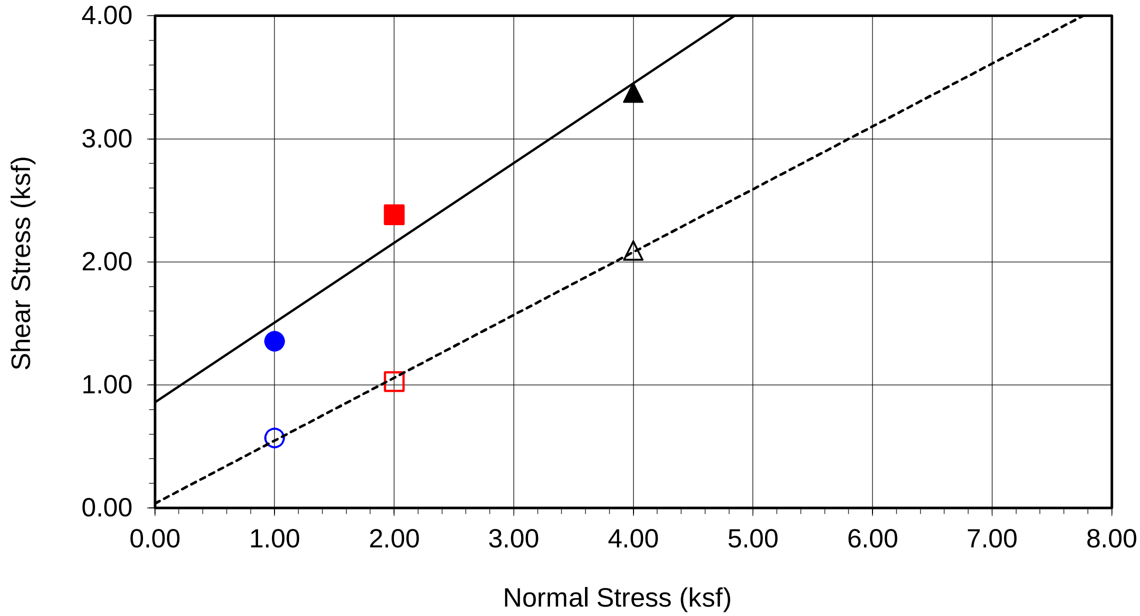
Leighton

Project Name:	Paradise Ranch	Tested By:	G. Bathala	Date:	05/21/19
Project No.:	12322.001	Checked By:	J. Ward	Date:	05/30/19
Boring No.:	BA3	Sample Type:	Ring		
Sample No.:	R4	Depth (ft.):	30.0		

Soil Identification: Light olive brown fat clay with sand (CH)s

Sample Diameter(in):	2.415	2.415	2.415
Sample Thickness(in.):	1.000	1.000	1.000
Weight of Sample + ring(gm):	184.00	183.78	188.48
Weight of Ring(gm):	43.53	41.77	45.80
Before Shearing			
Weight of Wet Sample+Cont.(gm):	377.96	377.96	377.96
Weight of Dry Sample+Cont.(gm):	311.64	311.64	311.64
Weight of Container(gm):	39.05	39.05	39.05
Vertical Rdg.(in): Initial	0.2809	0.0000	0.2508
Vertical Rdg.(in): Final	0.2653	0.0057	0.2535
After Shearing			
Weight of Wet Sample+Cont.(gm):	206.17	209.58	215.84
Weight of Dry Sample+Cont.(gm):	167.70	172.24	179.29
Weight of Container(gm):	62.03	65.19	71.71
Specific Gravity (Assumed):	2.70	2.70	2.70
Water Density(pcf):	62.43	62.43	62.43





Boring No.	**BA3**
Sample No.	**R4**
Depth (ft)	**30**
Sample Type:	Ring

Soil Identification:
Light olive brown fat clay with sand (CH)s

Strength Parameters

	C (psf)	ϕ (°)
Peak	859	33
Ultimate	37	27

Normal Stress (kip/ft²)	1.000	2.000	4.000
Peak Shear Stress (kip/ft²)	● 1.355	■ 2.383	▲ 3.376
Shear Stress @ End of Test (ksf)	○ 0.569	□ 1.028	△ 2.091
Deformation Rate (in./min.)	0.0017	0.0017	0.0017
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	24.33	24.33	24.33
Dry Density (pcf)	94.0	95.0	95.4
Saturation (%)	82.7	84.8	85.7
Soil Height Before Shearing (in.)	1.0156	1.0057	0.9973
Final Moisture Content (%)	36.4	34.9	34.0

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DIRECT SHEAR TEST RESULTS
Consolidated Drained - ASTM D 3080

Project No.: 12322.001

Paradise Ranch

05-19

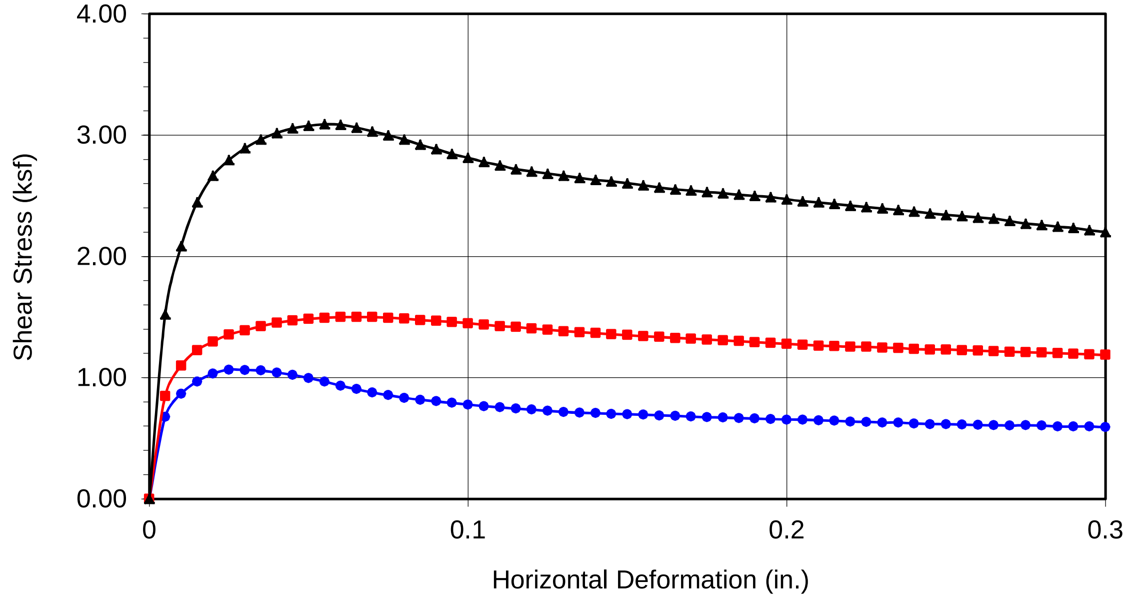
DIRECT SHEAR TEST

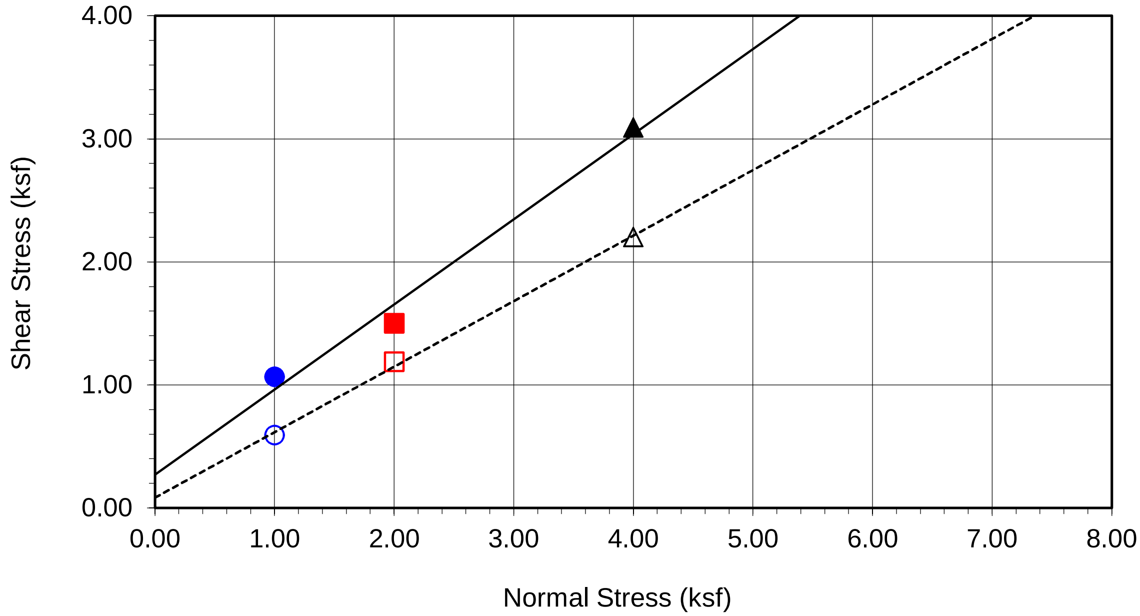
Consolidated Drained - ASTM D 3080

Project Name: Paradise Ranch
Project No.: 12322.001
Boring No.: BA4
Sample No.: R6
Soil Identification: Light olive brown elastic silt with sand (MH)s

Tested By: G. Bathala — Date: 05/21/19
Checked By: J. Ward — Date: 05/30/19
Sample Type: Ring
Depth (ft.): 50.0

Sample Diameter(in):	2.415	2.415	2.415
Sample Thickness(in.):	1.000	1.000	1.000
Weight of Sample + ring(gm):	184.42	181.23	186.80
Weight of Ring(gm):	46.41	41.94	43.21
Before Shearing			
Weight of Wet Sample+Cont.(gm):	277.65	277.65	277.65
Weight of Dry Sample+Cont.(gm):	232.41	232.41	232.41
Weight of Container(gm):	39.47	39.47	39.47
Vertical Rdg.(in): Initial	0.0000	0.2348	0.0000
Vertical Rdg.(in): Final	0.0109	0.2368	-0.0079
After Shearing			
Weight of Wet Sample+Cont.(gm):	201.71	209.89	206.30
Weight of Dry Sample+Cont.(gm):	166.05	175.49	174.26
Weight of Container(gm):	58.67	66.82	59.92
Specific Gravity (Assumed):	2.70	2.70	2.70
Water Density(pcf):	62.43	62.43	62.43





Boring No.	**BA4**
Sample No.	**R6**
Depth (ft)	**50**
Sample Type:	Ring

Soil Identification:
Light olive brown elastic silt with sand (MH)s

Strength Parameters

	C (psf)	ϕ (°)
Peak	271	35
Ultimate	85	28

Normal Stress (kip/ft²)	1.000	2.000	4.000
Peak Shear Stress (kip/ft²)	● 1.066	■ 1.500	▲ 3.090
Shear Stress @ End of Test (ksf)	○ 0.591	□ 1.188	△ 2.201
Deformation Rate (in./min.)	0.0017	0.0017	0.0017
Initial Sample Height (in.)	1.000	1.000	1.000
Diameter (in.)	2.415	2.415	2.415
Initial Moisture Content (%)	23.45	23.45	23.45
Dry Density (pcf)	93.0	93.8	96.7
Saturation (%)	77.9	79.5	85.3
Soil Height Before Shearing (in.)	1.0109	0.9980	0.9921
Final Moisture Content (%)	33.2	31.7	28.0

Leighton

DIRECT SHEAR TEST RESULTS
Consolidated Drained - ASTM D 3080

Project No.: 12322.001

Paradise Ranch

05-19

DS BA4, R6 @ 50

Leighton

TESTS for SULFATE CONTENT CHLORIDE CONTENT and pH of SOILS

Project Name:	Paradise Ranch	Tested By :	G. Berdy	Date:	05/22/19
Project No. :	12322.001	Input By:	J. Ward	Date:	05/30/19

Boring No.	HS-2			
Sample No.	B-1			
Sample Depth (ft)	0-5			
Soil Identification:	Brown s(CL-ML)			
Wet Weight of Soil + Container (g)	204.07			
Dry Weight of Soil + Container (g)	203.40			
Weight of Container (g)	36.58			
Moisture Content (%)	0.40			
Weight of Soaked Soil (g)	100.06			

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	11			
Crucible No.	19			
Furnace Temperature (°C)	860			
Time In / Time Out	8:15/9:00			
Duration of Combustion (min)	45			
Wt. of Crucible + Residue (g)	19.8500			
Wt. of Crucible (g)	19.8472			
Wt. of Residue (g) (A)	0.0028			
PPM of Sulfate (A) x 41150	115.22			
PPM of Sulfate, Dry Weight Basis	**116**			

CHLORIDE CONTENT, DOT California Test 422

ml of Extract For Titration (B)	15			
ml of AgNO3 Soln. Used in Titration (C)	0.4			
PPM of Chloride (C -0.2) * 100 * 30 / B	40			
PPM of Chloride, Dry Wt. Basis	**40**			

pH TEST, DOT California Test 643

pH Value	**7.57**			
Temperature °C	21.6			

SOIL RESISTIVITY TEST

DOT CA TEST 643

Project Name:	Paradise Ranch	Tested By :	O. Figueroa Date: 05/28/19
Project No. :	12322.001	Input By:	J. Ward Date: 05/30/19
Boring No.:	HS-2	Depth (ft.) :	0-5
Sample No. :	B-1		

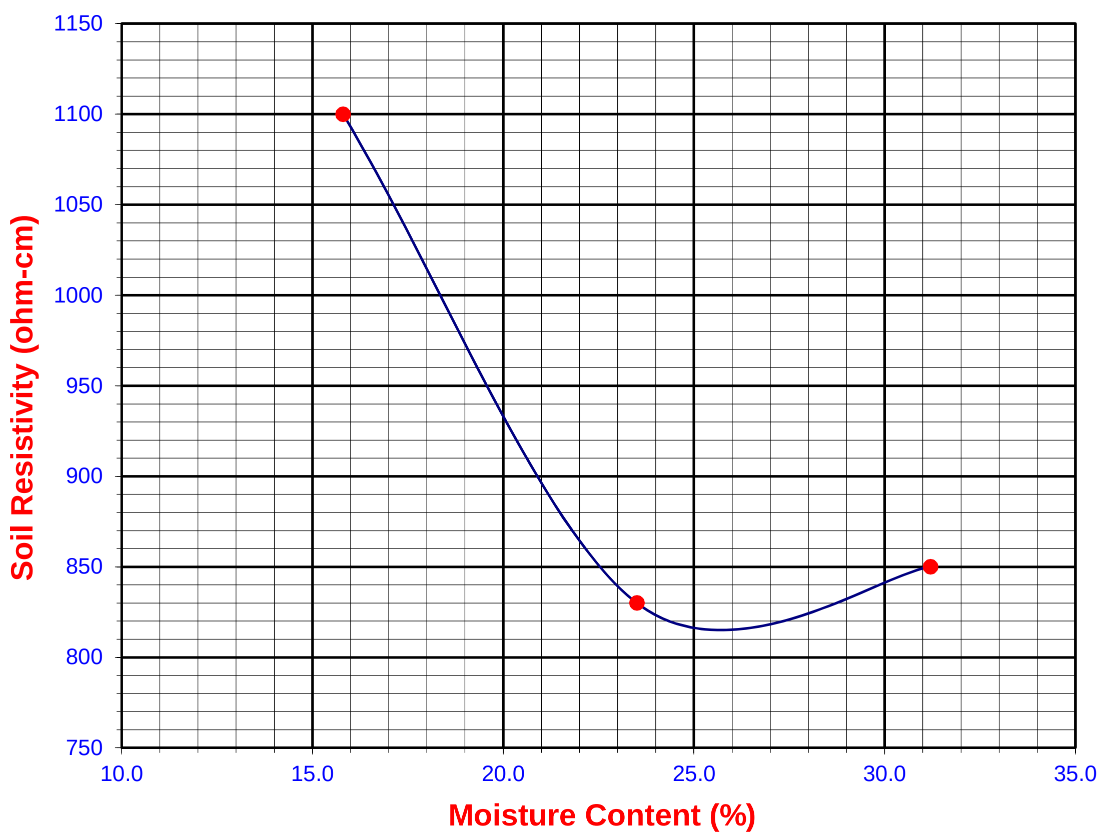
Soil Identification:* Brown s(CL-ML)

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	20	15.80	1100	1100
2	30	23.50	830	830
3	40	31.20	850	850
4				
5				

Moisture Content (%) (MCi)	0.40
Wet Wt. of Soil + Cont. (g)	204.07
Dry Wt. of Soil + Cont. (g)	203.40
Wt. of Container (g)	36.58
Container No.	
Initial Soil Wt. (g) (Wt)	130.38
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
815	**25.7**	**116**	**40**	**7.57**	**21.6**



APPENDIX D

Infiltration Testing

Results of Well Permeameter, from USBR 7300-89 Method.

Leighton

Project: 12322.001 Chino Hills Paradise Ranch

Exploration #/Location: *HS-1*

Depth Boring drilled to (ft): 10'

Tested by: BER

USCS Soil Type in test zone: SM

Weather (start to finish): sunny

Liquid Used/pH: H2O from spicket

Measured boring diameter 8 in. 4 Well Radius, "r"

Approx Depth to GW below GS 22 ft

Well Prep: straight drilled to 10', caved to 8.5', tamped to 9.5', placed gravel at bottom to 9', place perforated casing, filled outside casing with gravel to 5'

Initial estimated Depth to Water Surface (in.): 57.451

Average depth of water in well, "h" (in.): 56.549

approx. h/r: 14.1

Tu (Fig. 8): 17.2 ft

Tu>3h?: yes, OK

	ft	in.	Total (in.)	
Depth to Bot of well (or top of soil over Bentonite)	9.5 ft		114	
Pilot Tube stickup (+ is above ground)	3.5 ft		42	
Depth to top of sand outside of casing from top of pilot tube	8.5 ft			
Depth to top of float assembly from top of pilot tube	7. ft		84	42 Depth below GS (in.)
Float Assembly ID	D			
Float assembly Extension length (in.)		34		

Diameter of barrels (in.): 22.5

No. of Supply barrels: 1

Total Area of barrels (in.^2): 397.4

Field Data / **Calculations**

Date / Start Date	Time / Start time:	Water Level in Supply Barrel (in.)	Depth to WL in Boring (measured from top of pilot tube) ft	in.	Water Temp (deg F)	Comments	Δt (min)	Total Elapsed Time (min.)	Depth to WL in well (in.)	h, Height of Water in Well (in.)	Δh (in.)	Avg. h	Vol Change (in.^3) from supply	Vol Change from Δh	Vol Change Total	Flow (in^3/ min)	q, Flow (in^3/ hr)	V (Fig 9)	K20, Coef. Of Perme-ability at 20 deg C (in./hr)	Infiltration Rate [flow/surf area] (in./hr) (FS=1)
-																				
4/11/19	10:53	28.5	8.24		74			6.3E+07	56.9	57.1										
4/11/19	11:23	28.125	8.23		77		30	6.3E+07	56.8	57.2	0.12	57	149	-2	147	5	293	0.9	0.03	**0.17**
4/11/19	12:57	27.125	8.28		81		94	6.3E+07	57.4	56.6	-0.6	57	397	12	409	4	261	0.8	0.03	**0.15**
4/11/19	14:45	26	8.29		79		108	6.3E+07	57.5	56.5	-0.12	57	447	2	449	4	250	0.8	0.03	**0.14**
4/11/19	16:13	25.25	8.29		78		88	6.3E+07	57.5	56.5	0	57	298	0	298	3	203	0.9	0.02	**0.12**

template updated: 9/28/2018

APPENDIX E

Table of Slopes

TABLE OF SLOPES

Four significant design cut and fill slopes are present within the development. These slopes range from approximately 50 feet to 180 feet in height. The anticipated conditions of these slopes are discussed below.

<u>Slope 1 – Design Cut Slope with Natural Slope Above</u>

Slope Location:	Southern End of Development in the Hillside West of the Development
Geotechnical Cross Section:	A-A’
Direction Slope Faces:	East-Northeast
Maximum Height and Gradient:	215’+/-; 2:1 (H:V) to 2:5
Anticipated Geotechnical Conditions:	The design cut portion of the slope is a maximum of approximately 180 feet tall and the natural slope above extends approximately 35 feet in height above the design cut slope. Sandstone, siltstone, shale, and claystone interbeds of the Puente formation, Soquel member dipping variably towards the north, west and south (neutral to the slope to into the slope) at angles ranging from 3 to 22 degrees with localized folding as steep as approximately 60 degrees.
Remedial Measures:	This slope is expected to be grossly stable as designed. However, the slope is anticipated to include areas that are surficially unstable due to local out of slope bedding component.. To reduce the potential for surficial instability, the slope should be stabilized by construction of a 30-foot wide stability fill founded in a 5-foot-deep key. A key bottom subdrain should be constructed at the base on the backcut in the key. Typical subdrains should be provided along the backcut as filling progresses. The

backcut may be excavated at an inclination of 2:1 to an elevation of approximately 1090 feet and 1.5:1 above to daylight. The backcut should be mapped in detail during grading. If more adverse conditions are present, additional stability measures may be recommended.

Fill soils placed during slope stability keyway and fill buttress construction should be placed at a minimum 95 percent of the maximum dry density with 1 to 3 percentage points above optimum moisture content.

Slope 2 - Design Cut Slope with Natural Slope Above

Slope Location:	Central Portion of Development in the Hillside West of the Development
Geotechnical Cross Section:	B-B’
Direction Slope Faces:	East-Northeast
Maximum Height and Gradient:	200’ +/-; 2:1 (H:V) to 3:1
Anticipated Geotechnical Conditions:	The design cut portion of the slope is a maximum of approximately 50 feet tall and the natural slope above extends approximately 130 feet in height above the design cut slope. The slope is expected to expose Sandstone, siltstone, and claystone of the Puente Formation, dipping towards the south and southeast (oblique to the slope) at angles ranging from 3 to25 degrees.
Remedial Measures:	The slope is expected to be grossly stable as designed. However, oblique bedding with slight out-of-slope components is exposed is anticipated, and slope may be surficially

unstable. To reduce the potential for surficial instability, the slope should be stabilized by construction of a 15-foot wide stability fill founded in a 3-foot-deep key. A key bottom subdrain should be constructed at the base on the backcut in the key. Typical subdrains should be provided along the backcut as filling progresses. The backcut may be excavated at an inclination of 2:1 or flatter. The backcut should be mapped in detail during grading. If more adverse conditions are present, additional stability measures may be recommended.

Fill soils placed during slope stability keyway and fill buttress construction should be placed at a minimum 95 percent of the maximum dry density with 1 to 3 percentage points above optimum moisture content.

Slope 3 - Design Cut Slope

Slope Location:	Northern End of Development in the Hillside West of the Development
Geotechnical Cross Section:	C-C’
Direction Slope Faces:	North
Maximum Height and Gradient:	200’ +/-; 2:1 (H:V) to 3:1
Anticipated Geotechnical Conditions:	The design cut portion of the slope is a maximum of approximately 80 feet tall and the natural slope above extends approximately 110 feet in height above the design cut slope. This slope is expected to expose silty sandstone of the Puente formation, Soquel member. Bedding is expected to dip into-slope at 10 to 21 degrees.

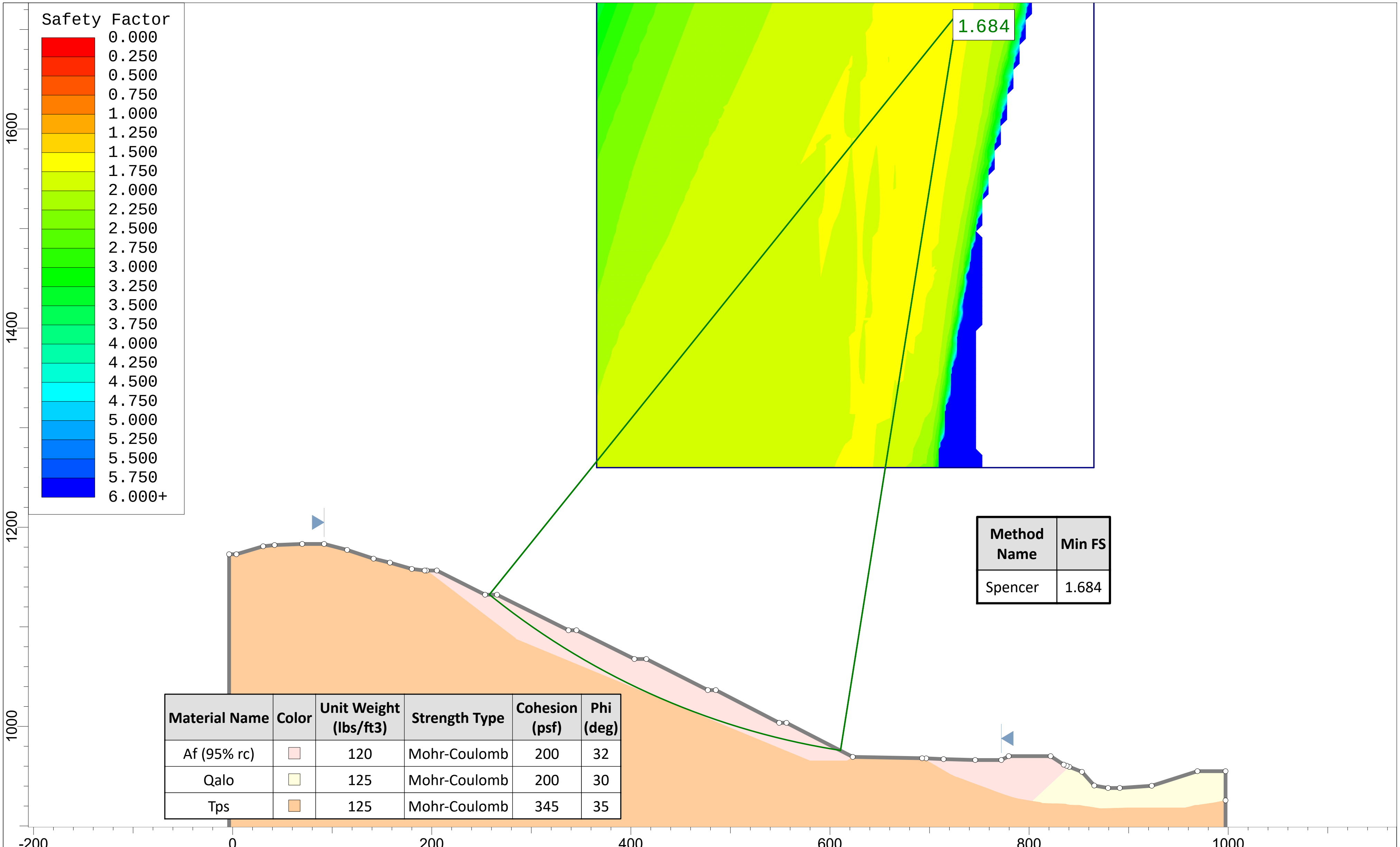
Remedial Measures:	This slope is expected to be grossly stable as designed. If folded or fractured materials are exposed, slope may be surficially unstable. Slopes should be mapped in detail during grading. If adverse geologic conditions are exposed, stability measures may be recommended.

Slope 4 – Design Fill Slope

Slope Location:	Northern and Western Edge of the Development
Geotechnical Cross Section:	D-D’
Direction Slope Faces:	North and north-northeast
Maximum Height and Gradient:	50’ +/- fill slope; 2:1 (H:V) to 2.4:1
Anticipated Geotechnical Conditions:	Slope 4 design fill slope underlain by older alluvium. Remedial removals of older alluvium are anticipated to extend to bedrock. Maximum remedial removal depths are expected to reach 45 feet below original ground surface.
Remedial Measures:	The composite fill and natural slope is expected to be grossly and surficially stable as designed. Slope area should be mapped in detail during grading. If adverse geologic conditions are exposed, stability measures may be recommended.

APPENDIX F

Slope Stability Analysis



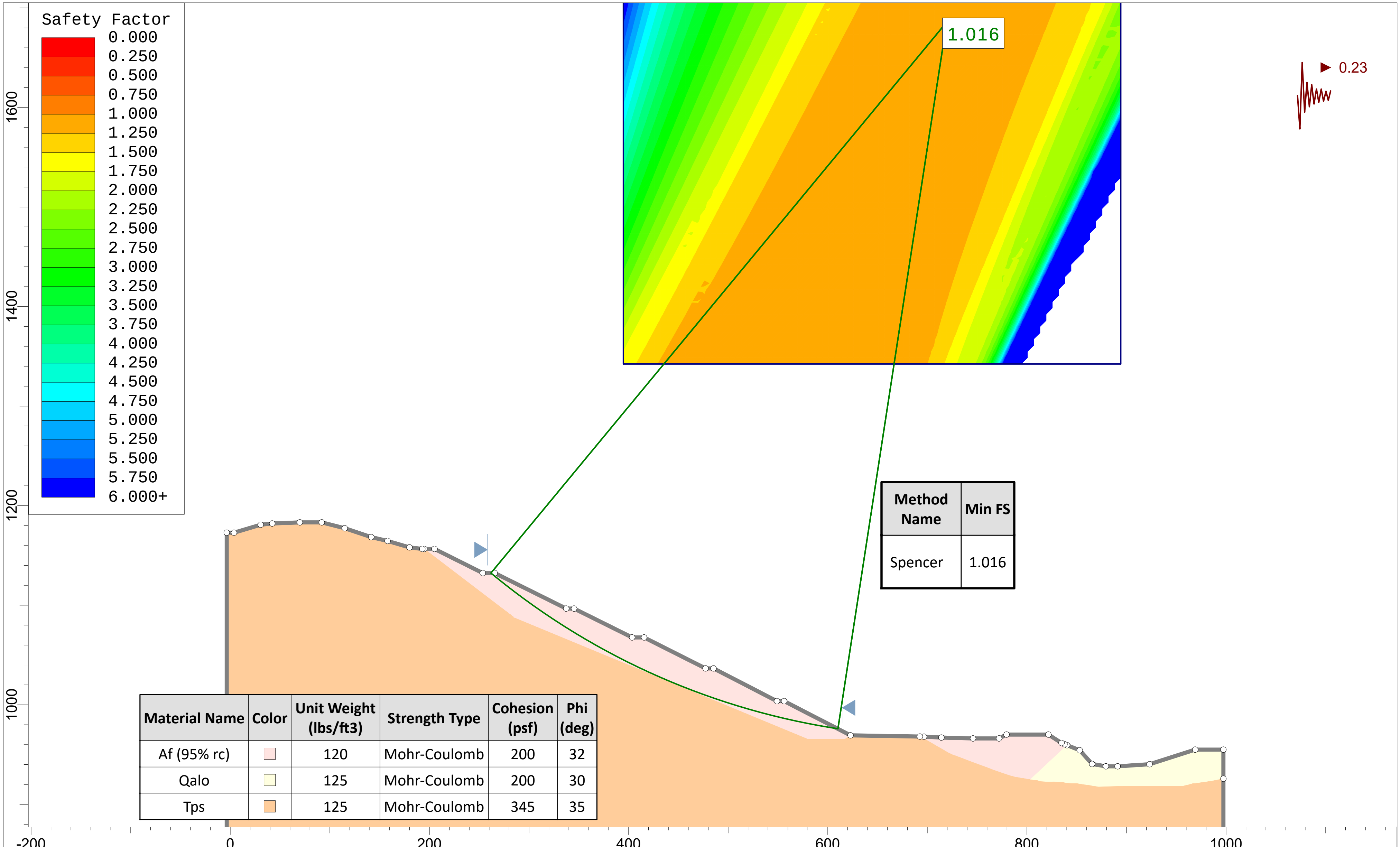
Method Name	Min FS
Spencer	1.684

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Af (95% rc)		120	Mohr-Coulomb	200	32
Qalo		125	Mohr-Coulomb	200	30
Tps		125	Mohr-Coulomb	345	35

Leighton

SLIDEINTERPRET 8.023

Project	12322.001 Paradise Ranch Residential Development
Analysis Description	Global Stability - Section A-A' - Static
Drawn By	LP/JDH
Scale	1:1600
Company	Leighton Consulting, Inc.
Date	6/20/2019
File Name	Section A-A'_Multiple_6.20.19.slmd



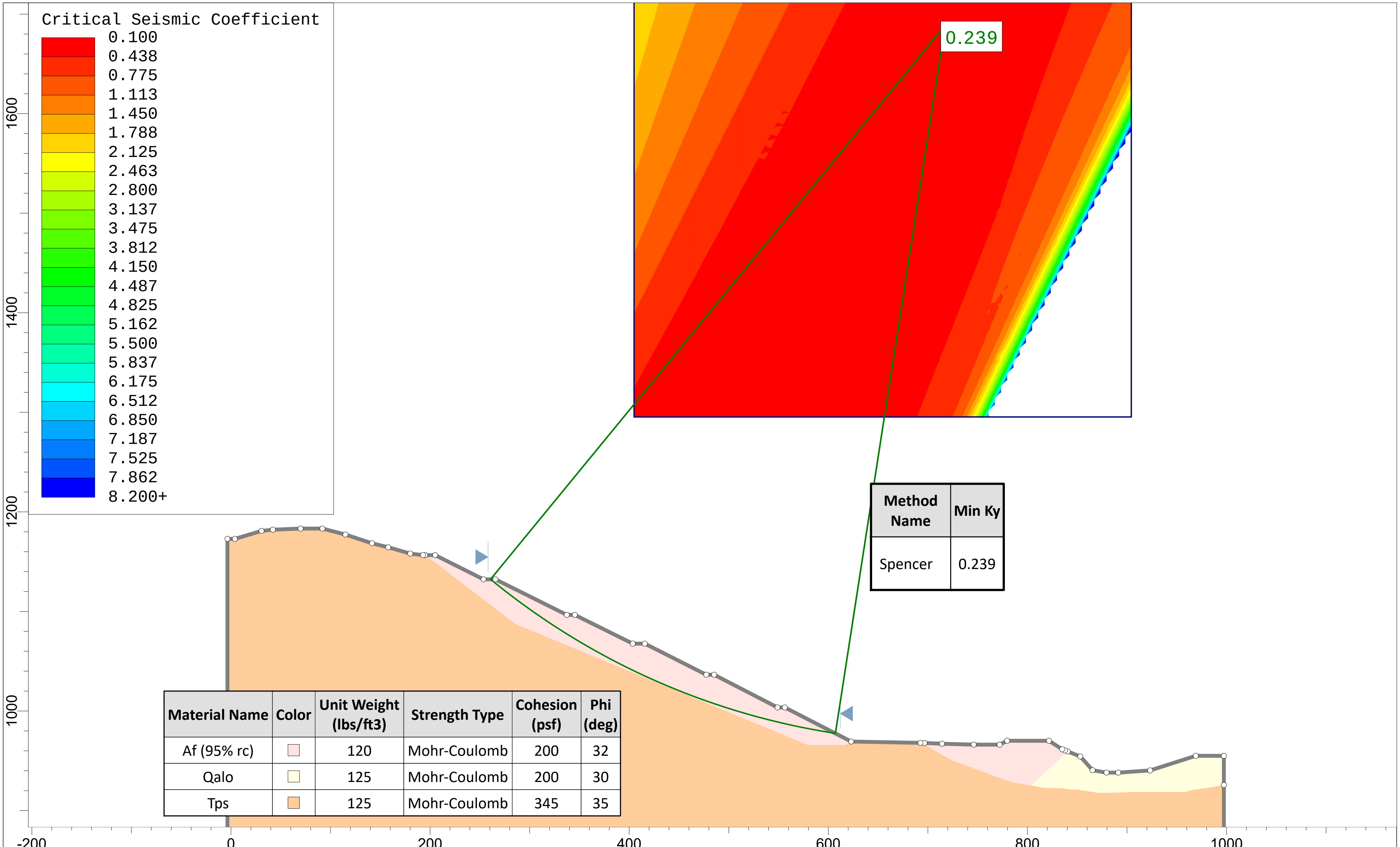
Method Name	Min FS
Spencer	1.016

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Af (95% rc)		120	Mohr-Coulomb	200	32
Qalo		125	Mohr-Coulomb	200	30
Tps		125	Mohr-Coulomb	345	35

Leighton

SLIDEINTERPRET 8.023

Project	12322.001 Paradise Ranch Residential Development
Analysis Description	Global Stability - Section A-A' - Pseudo-Static
Drawn By	LP/JDH
Scale	1:1600
Company	Leighton Consulting, Inc.
Date	6/20/2019
File Name	Section A-A'_Multiple_6.20.19.slmd



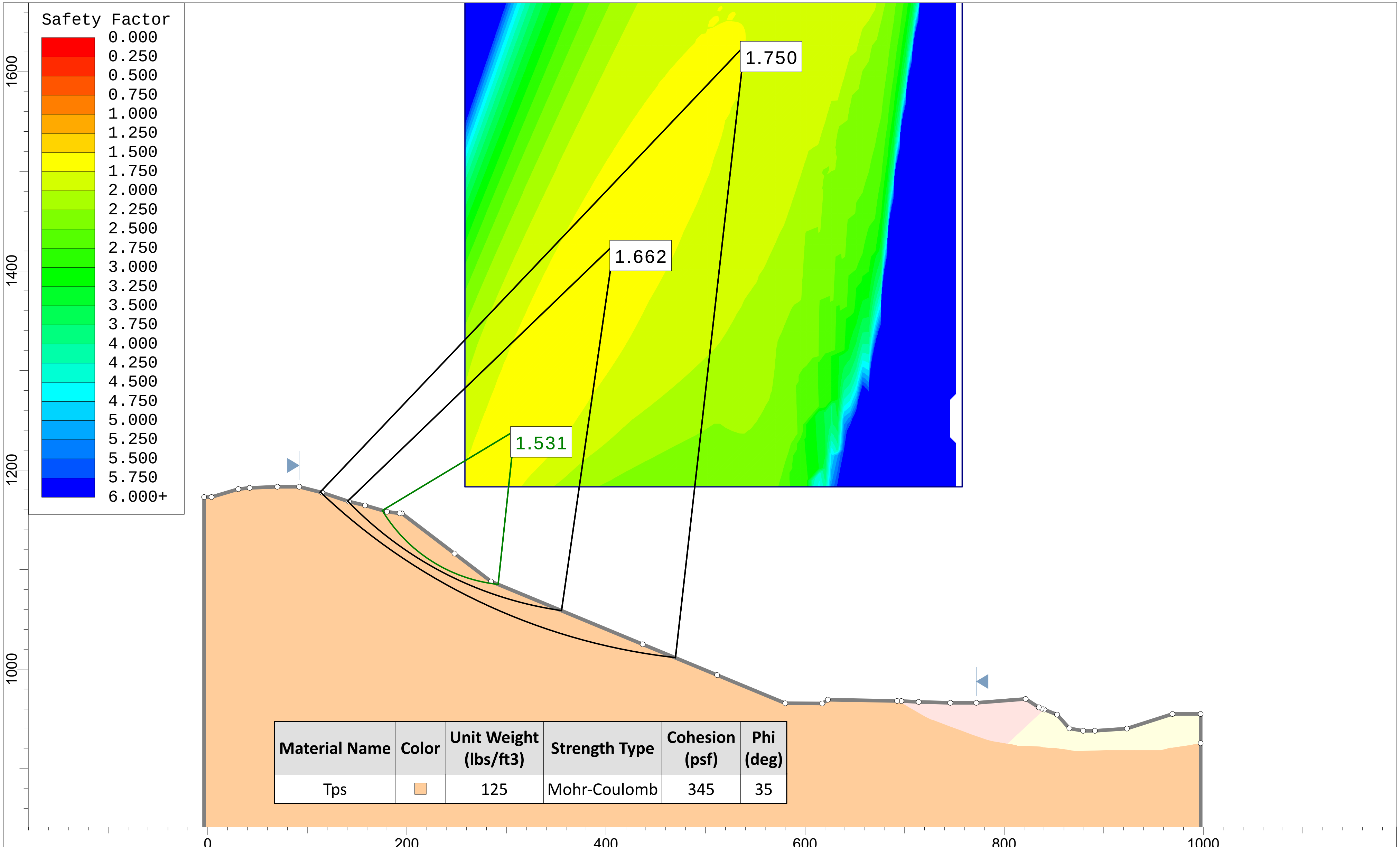
Method Name	Min Ky
Spencer	0.239

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Af (95% rc)		120	Mohr-Coulomb	200	32
Qalo		125	Mohr-Coulomb	200	30
Tps		125	Mohr-Coulomb	345	35

Leighton

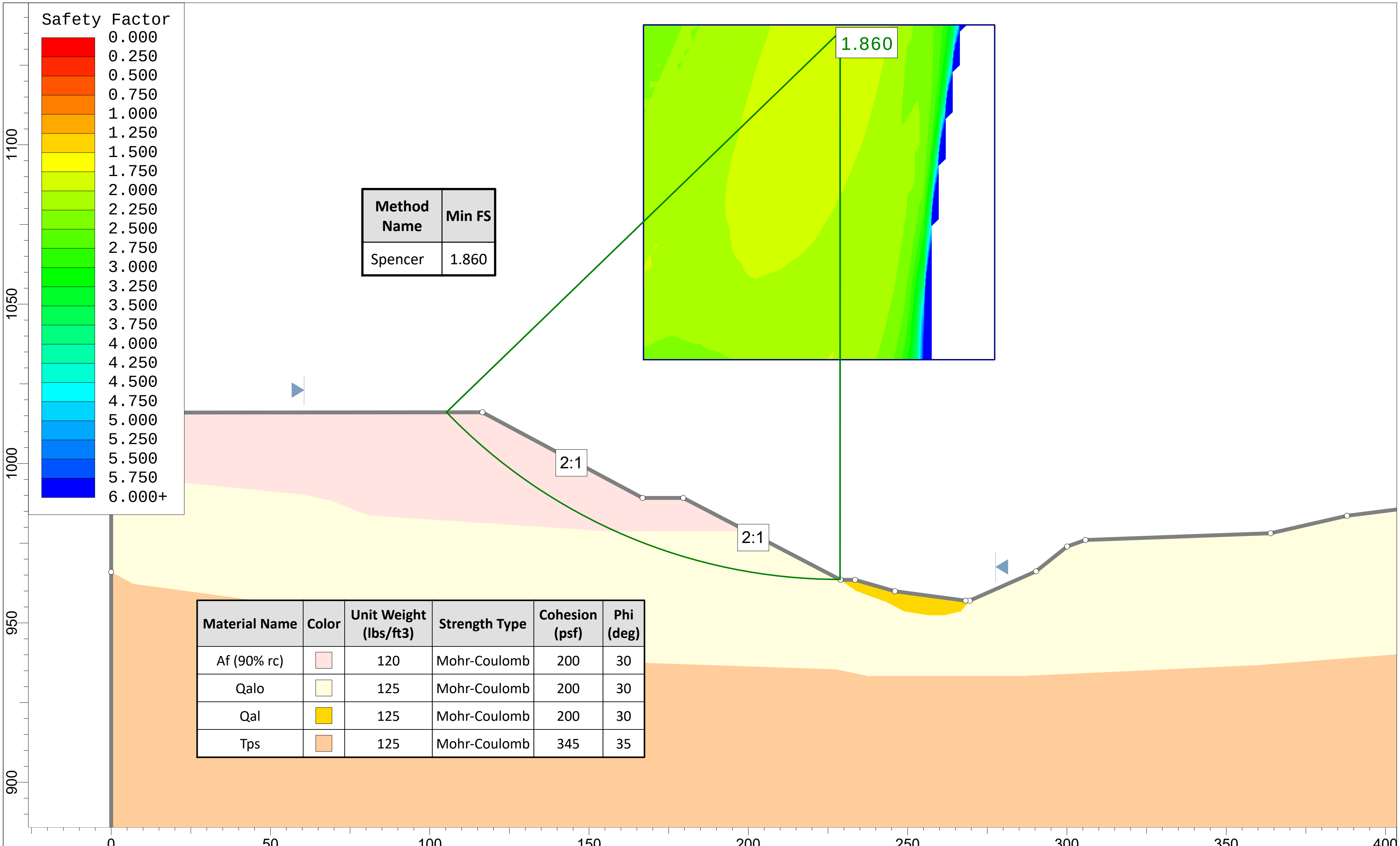
SLIDEINTERPRET 8.023

Project	12322.001 Paradise Ranch Residential Development		
Analysis Description	Global Stability - Section A-A' - Critical Acceleration for FS=1.0		
Drawn By LP/JDH	*Scale* 1:1600	*Company*	Leighton Consulting, Inc.
Date 6/20/2019		*File Name*	Section A-A'_Multiple_6.20.19.slmd



Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Tps		125	Mohr-Coulomb	345	35

Leighton	*Project* 12322.001 Paradise Ranch Residential Development		
	Analysis Description Global Stability - Section A-A' - Temporary		
	Drawn By LP/JDH	*Scale* 1:1600	*Company* Leighton Consulting, Inc.
SLIDEINTERPRET 8.023	*Date* 6/20/2019		*File Name* Section A-A'_Multiple_6.20.19.slmd



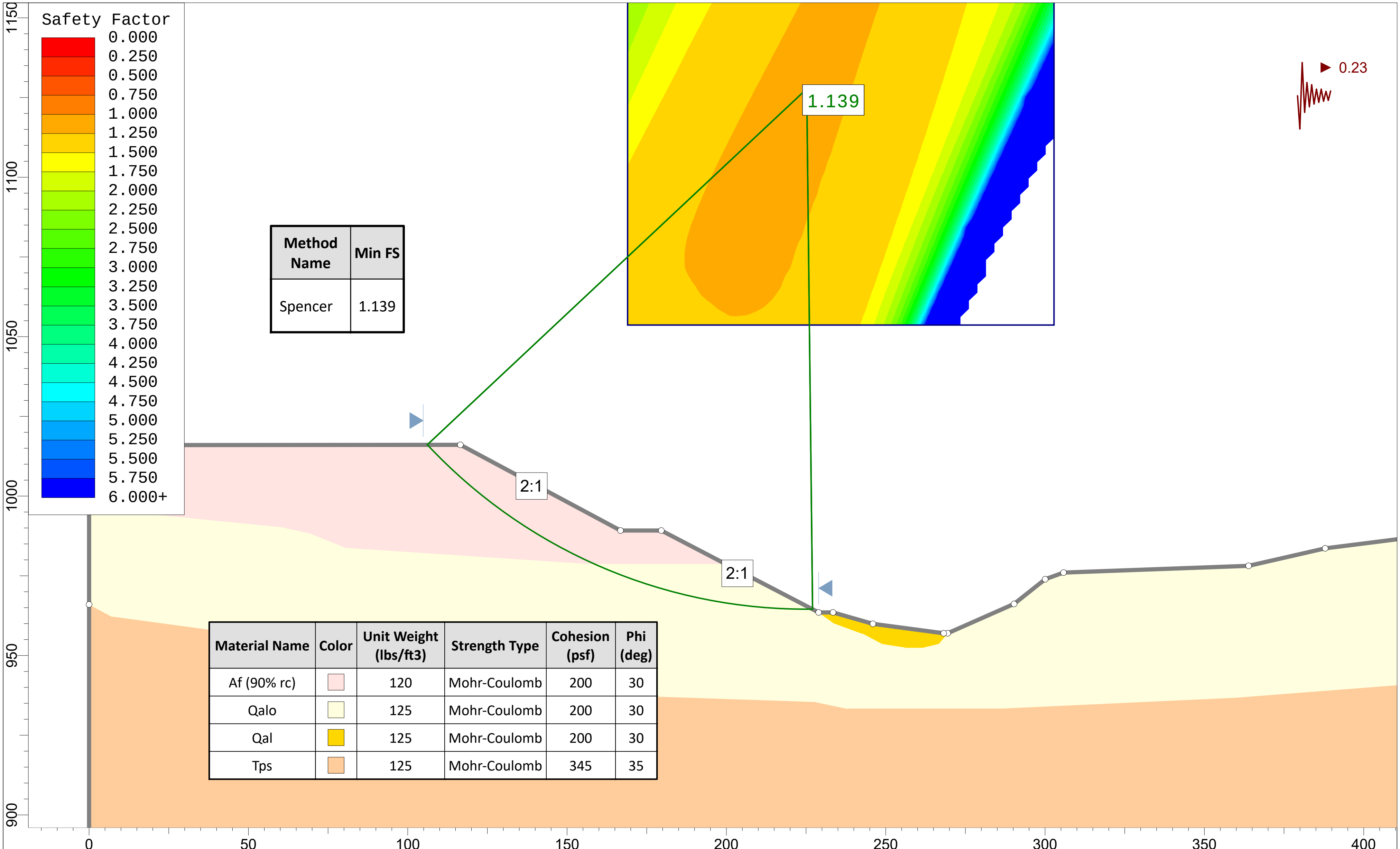
Method Name	Min FS
Spencer	1.860

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Af (90% rc)		120	Mohr-Coulomb	200	30
Qalo		125	Mohr-Coulomb	200	30
Qal		125	Mohr-Coulomb	200	30
Tps		125	Mohr-Coulomb	345	35

Leighton

SLIDEINTERPRET 8.023

Project	12322.001 Paradise Ranch Residential Development		
Analysis Description	Section D-D' - Global Stability - Static		
Drawn By LP/JDH	*Scale* 1:500	*Company*	Leighton Consulting, Inc.
Date	6/20/2019	*File Name*	Section D-D'_Multiple_6.20.19.slmd



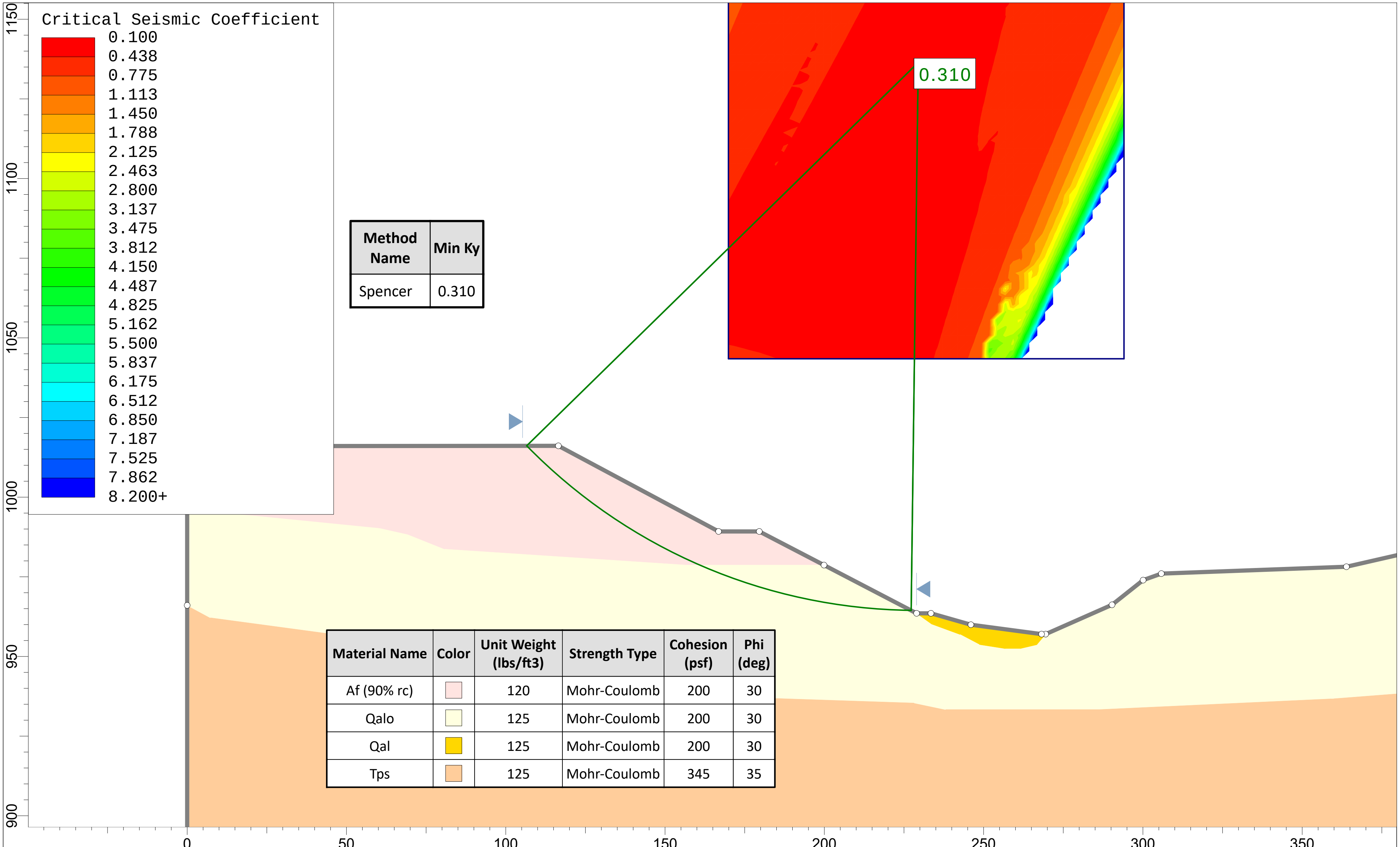
Method Name	Min FS
Spencer	1.139

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Af (90% rc)		120	Mohr-Coulomb	200	30
Qalo		125	Mohr-Coulomb	200	30
Qal		125	Mohr-Coulomb	200	30
Tps		125	Mohr-Coulomb	345	35

Leighton

SLIDEINTERPRET 8.023

Project	12322.001 Paradise Ranch Residential Development
Analysis Description	Section D-D' - Global Stability - Pseudo Static
Drawn By	LP/JDH
Scale	1:500
Company	Leighton Consulting, Inc.
Date	6/20/2019
File Name	Section D-D'_Multiple_6.20.19.slmd



Method Name	Min Ky
Spencer	0.310

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)
Af (90% rc)		120	Mohr-Coulomb	200	30
Qalo		125	Mohr-Coulomb	200	30
Qal		125	Mohr-Coulomb	200	30
Tps		125	Mohr-Coulomb	345	35

Leighton

SLIDEINTERPRET 8.023

Project	12322.001 Paradise Ranch Residential Development
Analysis Description	Section D-D' - Global Stability - Critical Acceleration for FS=1.0
Drawn By	LP/JDH
Scale	1:500
Company	Leighton Consulting, Inc.
Date	6/20/2019
File Name	Section D-D'_Multiple_6.20.19.slmd

APPENDIX G

Summary of Seismic and Liquefaction Analysis

Summary of Liquefaction Susceptibility Analysis: SPT Method

Liquefaction Method: Youd and Idriss (2001). Seismic Settlement Method: Tokimatsu and Seed (1987) and Martin and Lew (1999).

Project: TTLC Chino Hills Paradise Ranch
Project No.: 12322

Leighton

Boring No.	Approx. Layer Depth (ft)	SPT Depth (ft)	Approx Layer Thick-ness (ft)	Plasticity ("n"=non susc. to liq.)	Estimated Fines Cont (%)	γ_t (pcf)	N_m or B (blows/ft)	Sampler Type (enter 2 if mod CA Ring)	Cs	N_m (corrected for Cs and ring->SPT) (blows/ft)	Exist σ_{vo}' (psf)	$(N_1)_{60}$	$(N_1)_{60CS}$	$CRR_{7.5}$	Design σ_{vo}' (psf)	$CSR_{7.5}$	CSR_M	Liquefaction Factor of Safety	$(N_1)_{60CS}$ (for Settle-ment) (blows/ft)	Dry Sand Strain (%) (Tok/ Seed 87) (%)	Sat Sand Strain (%) (Tok/ Seed 87) (%)	Seismic Sett. of Layer (in.)	Cummulative Seismic Settlement (in.)
FILL	0 to 8	5	8		35	120	20	1	1.2	24.0	600	42.3	55.8	>Range	600	0.55	0.38	**NonLiq**	55.8	0.07		0.06	1.5
FILL	8 to 13	10	5		35	120	20	1	1.2	24.0	1200	37.2	49.7	>Range	1200	0.55	0.38	**NonLiq**	49.7	0.06		0.04	1.4
FILL	13 to 18	15	5		35	120	20	1	1.2	24.0	1800	30.4	41.5	>Range	1800	0.54	0.37	**NonLiq**	41.5	0.04		0.03	1.4
FILL	18 to 23	20	5		35	120	20	1	1.2	24.0	2400	29.4	40.3	>Range	2400	0.53	0.37	**NonLiq**	40.3	0.08		0.05	1.4
FILL	23 to 28	25	5		35	120	20	1	1.2	24.0	3000	26.3	36.6	>Range	3000	0.53	0.37	**NonLiq**	36.6	0.38		0.23	1.3
FILL	28 to 33	30	5		35	120	20	1	1.2	24.0	3600	25.3	35.3	>Range	3600	0.52	0.36	**NonLiq**	35.3	0.19		0.12	1.1
FILL	33 to 38	35	5		35	120	20	1	1.2	24.0	4200	23.4	33.1	>Range	4200	0.50	0.34	**NonLiq**	33.1	0.23		0.14	1.0
FILL	38 to 43	40	5		35	120	20	1	1.2	24.0	4800	21.9	31.3	>Range	4800	0.47	0.33	**NonLiq**	31.3	0.28		0.17	0.8
FILL	43 to 48	45	5		35	120	20	1	1.2	24.0	5400	20.6	29.8	0.453	5400	0.45	0.31	**NonLiq**	29.8	0.56		0.34	0.7
FILL	48 to 52	50	5		35	120	20	1	1.2	24.0	6000	19.6	28.5	0.388	6000	0.43	0.30	**NonLiq**	28.5	0.61		0.33	0.3
HS-1	0 to 4	3	4		20	105	7	2	1	4.6	315	8.0	12.3	0.134	315	0.56	0.38	**NonLiq**	12.3	1.36		0.65	6.2
HS-1	4 to 8	5	4		20	102	4	2	1	2.6	522	4.6	8.6	0.101	522	0.55	0.38	**NonLiq**	8.6	3.22		1.35	5.5
HS-1	8 to 13	10	5		55	126	16	2	1	10.4	1092	16.9	25.3	0.298	1092	0.55	0.38	**NonLiq**	25.3	0.53		0.32	4.2
HS-1	13 to 18	15	5		20	120	9	2	1	5.9	1707	7.6	11.8	0.130	1707	0.54	0.37	**NonLiq**	11.8	1.68		1.01	3.8
HS-1	18 to 23	20	5	n	55	125	16	2	1	10.4	2320	13.0	20.6	>Range	2319.5	0.53	0.37	**NonLiq**	20.6			0.00	2.8
HS-1	23 to 28	25	5	n	60	126	9	2	1	5.9	2760	6.7	13.0	>Range	2759.8	0.56	0.39	**NonLiq**	13.0			0.00	2.8
HS-1	28 to 33	30	5	n	55	127	11	2	1	7.2	3080	8.1	14.8	>Range	3080.3	0.60	0.42	**NonLiq**	14.8			0.00	2.8
HS-1	33 to 38	35	5		45	126	13	2	1	8.5	3401	9.2	16.0	0.170	3400.8	0.62	0.43	**0.40**	11.2		2.43	1.46	2.8
HS-1	38 to 43	40	5		60	126	12	2	1	7.8	3719	8.1	14.7	0.157	3718.8	0.62	0.43	**0.37**	12.1		2.29	1.37	1.4
HS-1	43 to 47	45	5		60	124	80	2	1	52.0	4032	51.8	67.1	>Range	4031.8	0.61	0.42	**NonLiq**	67.1			0.00	0.0
HS-2	0 to 4	3	4		35	117	7	2	1	4.6	351	8.0	14.6	0.156	351	0.56	0.38	**NonLiq**	14.6	1.35		0.65	5.7
HS-2	4 to 8	5	4		20	96	12	2	1	7.8	564	13.8	18.5	0.197	564	0.55	0.38	**NonLiq**	18.5	1.19		0.50	5.0
HS-2	8 to 13	10	5		45	95	15	2	1	9.8	1042	16.2	24.5	0.282	1041.5	0.55	0.38	**NonLiq**	24.5	0.51		0.31	4.5
HS-2	13 to 18	15	5		35	99	20	2	1	13.0	1527	17.9	26.5	0.324	1526.5	0.54	0.37	**NonLiq**	26.5	0.80		0.48	4.2
HS-2	18 to 23	20	5	n	50	99	3	1	1.2	3.6	2022	4.8	10.8	>Range	2021.5	0.53	0.37	**NonLiq**	10.8			0.00	3.8
HS-2	23 to 28	25	5		8	124	8	2	1	5.2	2392	6.4	6.8	0.086	2391.8	0.57	0.39	**0.22**	6.4		3.38	2.03	3.8
HS-2	28 to 33	30	5		8	124	16	1	1.2	19.2	2700	23.4	24.0	0.273	2699.8	0.62	0.43	**0.64**	23.4		1.36	0.82	1.7
HS-2	33 to 38	35	5		30	130	26	2	1	16.9	3023	19.4	27.1	0.342	3022.8	0.63	0.44	**0.78**	21.4		1.51	0.91	0.9
HS-2	38 to 43	40	5		10	128	80	2	1	52.0	3356	56.7	58.8	>Range	3355.8	0.63	0.44	**NonLiq**	58.8			0.00	0.0
HS-2	43 to 48	45	5		10	128	80	2	1	52.0	3684	54.2	56.2	>Range	3683.8	0.63	0.44	**NonLiq**	56.2			0.00	0.0
HS-2	48 to 52	50	5		10	123	80	2	1	52.0	3999	52.0	54.0	>Range	3999.3	0.62	0.43	**NonLiq**	54.0			0.00	0.0

Boring No.	Approx. Layer Depth (ft)	SPT Depth (ft)	Approx Layer Thick-ness (ft)	Plasticity ("n"=non susc. to liq.)	Estimated Fines Cont (%)	γ_t (pcf)	N_m or B (blows/ft)	Sampler Type (enter 2 if mod CA Ring)	Cs	N_m (corrected for Cs and ring->SPT) (blows/ft)	Exist σ_{vo}' (psf)	$(N_1)_{60}$	$(N_1)_{60CS}$	**$CRR_{7.5}$**	Design σ_{vo}' (psf)	$CSR_{7.5}$	CSR_M	**Liquefaction Factor of Safety**	$(N_1)_{60CS}$ (for Settle-ment) (blows/ft)	Dry Sand Strain (%) (Tok/ Seed 87) (%)	Sat Sand Strain (%) (Tok/ Seed 87) (%)	Seismic Sett. of Layer (in.)	**Cummulative Seismic Settlement** (in.)
HS-3	0 to 4	3	4		55	127	13	2	1	8.5	381	14.9	22.9	0.255	381	0.56	0.38	**NonLiq**	22.9	0.42		0.20	5.3
HS-3	4 to 8	5	4		55	125	9	2	1	5.9	633	10.3	17.4	0.185	633	0.55	0.38	**NonLiq**	17.4	0.61		0.26	5.1
HS-3	8 to 13	10	5		55	118	13	2	1	8.5	1241	12.9	20.5	0.221	1240.5	0.55	0.38	**NonLiq**	20.5	0.79		0.47	4.9
HS-3	13 to 18	15	5		35	116	15	2	1	9.8	1826	12.3	19.7	0.212	1825.5	0.54	0.37	**NonLiq**	19.7	0.93		0.56	4.4
HS-3	18 to 23	20	5		50	116	6	1	1.2	7.2	2406	8.8	15.6	0.166	2405.5	0.53	0.37	**NonLiq**	15.6	1.26		0.76	3.8
HS-3	23 to 28	25	5	n	60	118	11	2	1	7.2	2991	7.9	14.4	>Range	2990.5	0.53	0.37	**NonLiq**	14.4	0.00		0.00	3.1
HS-3	28 to 33	30	5		60	118	6	1	1.2	7.2	3581	7.6	14.1	0.151	3580.5	0.52	0.36	**NonLiq**	14.1	1.73		1.04	3.1
HS-3	33 to 38	35	5		55	127	22	2	1	14.3	4068	14.2	22.0	0.242	4068.2	0.51	0.36	**0.68**	18.2		1.59	0.95	2.0
HS-3	38 to 43	40	5		10	127	13	1	1.2	15.6	4391	14.9	16.1	0.171	4391.2	0.52	0.36	**0.47**	15.9		1.81	1.09	1.1
HS-3	43 to 48	45	5		10	134	80	2	1	52.0	4732	47.8	49.7	>Range	4731.7	0.52	0.36	**NonLiq**	49.7			0.00	0.0
HS-3	48 to 52	50	5		5	134	80	2	1	52.0	5090	46.1	46.1	>Range	5089.7	0.52	0.36	**NonLiq**	46.1			0.00	0.0

Liquefaction Susceptibility Analysis: SPT Method

Based on Youd and Idriss (2001), Martin and Lew (1999).

Project: TTLC Chino Hills Paradise Ranch

Project No.: 12322.001

Leighton

General Boring Information:

Boring No.	Existing GW Depth (ft)	Design GW Depth (ft)	Design Fill Height (ft)	Ground Surface Elev (ft)	
HS-1	22	22	0		-22
HS-2	22	22	0		-22
HS-3	33	33	0		-33
FILL	55	55	0		-55
					0
					0
					0
					0

General Parameters:		
a_{max} =	0.86g	MCE
M_W =	6.5	
MSF eq:	1	(Idriss, 2001)
MSF =	1.44	
Hammer Efficiency =	83	%
C_E =	1.38	
C_B =	1	
$C_{S(SPT)}$ =	1.2	
$C_{S(ring)}$ =	1	
Rod Stickup (feet) =	3	
Ring sample correction =	0.65	

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Input

Edition

Dynamic: Conterminous U.S. 2008 (v3.3.

Spectral Period

Peak ground acceleration

Latitude

Decimal degrees

33.96057

Time Horizon

Return period in years

475

Longitude

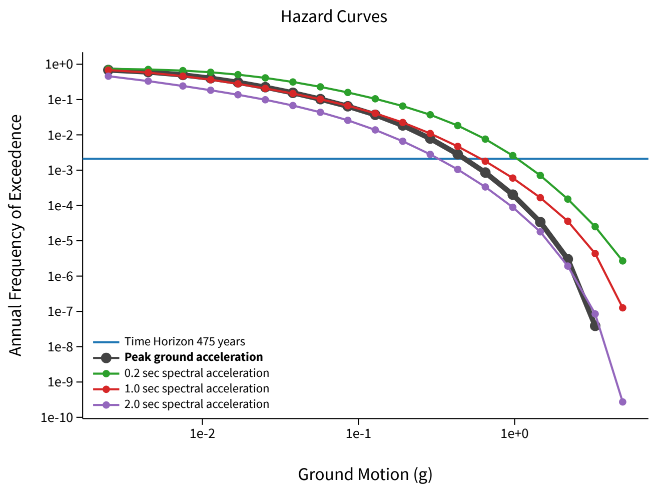
Decimal degrees, negative values for western longitudes

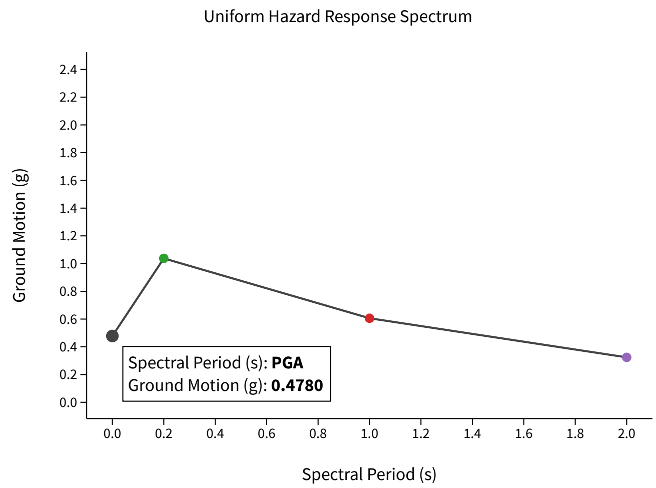
-117.77825

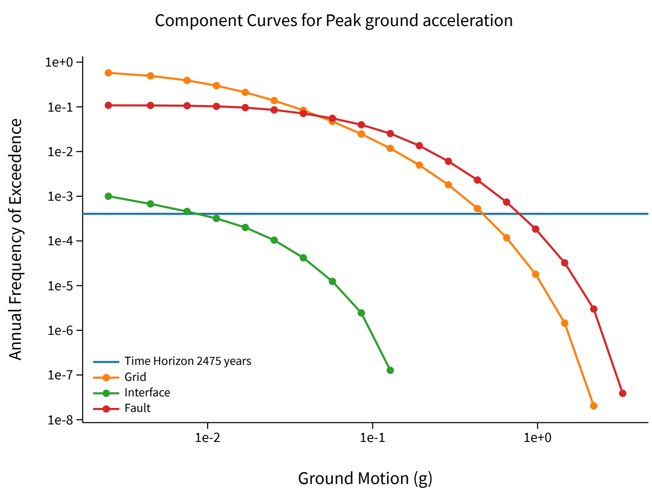
Site Class

259 m/s (Site class D)

Hazard Curve





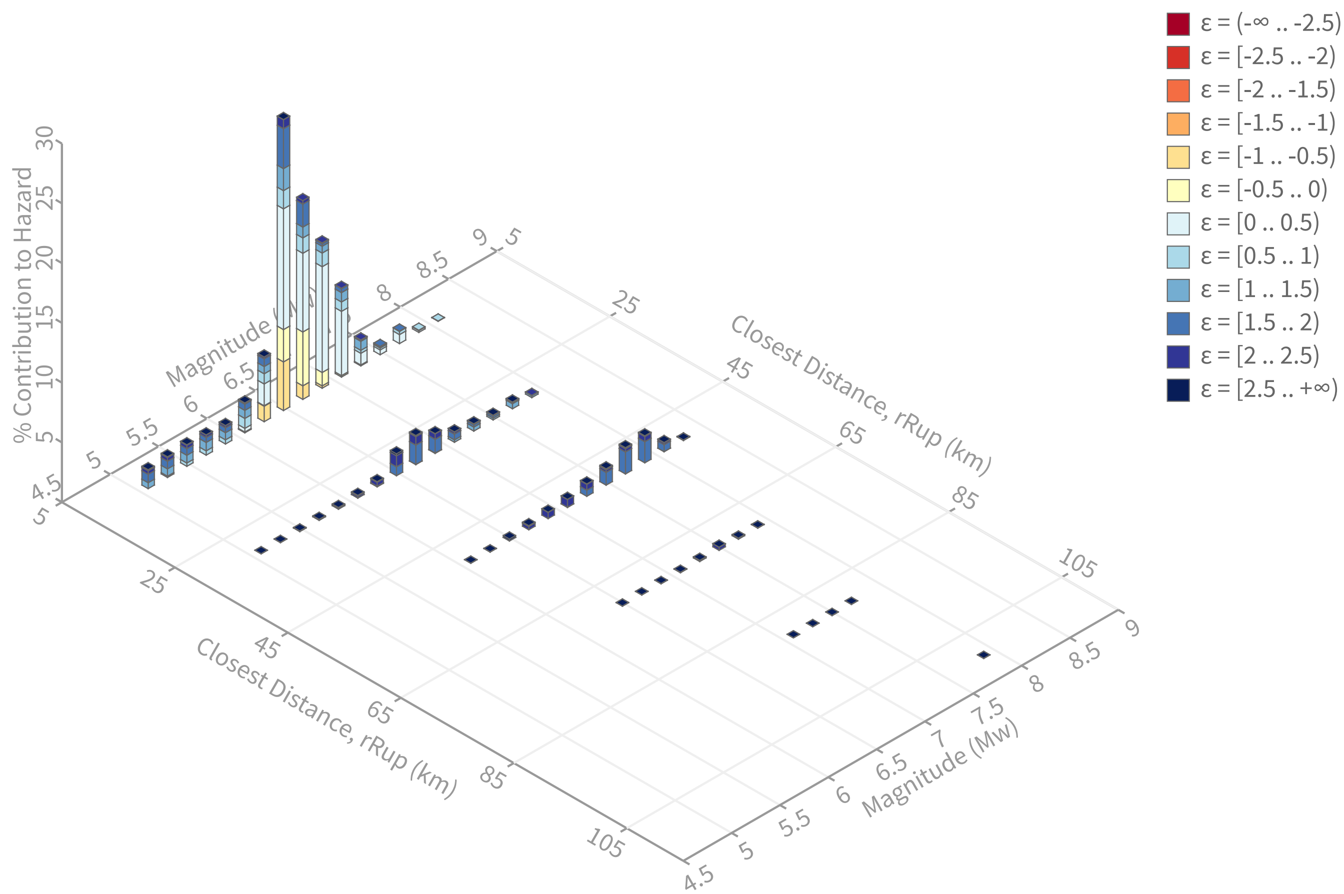


View Raw Data

Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 475 yrs
Exceedance rate: 0.0021052632 yr^{-1}
PGA ground motion: 0.47795419 g

Recovered targets

Return period: 515.16457 yrs
Exceedance rate: 0.0019411273 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 0.1 %

Mean (for all sources)

r: 13.53 km
m: 6.7
ε_0: 0.81 σ

Mode (largest r-m bin)

r: 8.19 km
m: 6.5
ε_0: 0.39 σ
Contribution: 24.33 %

Mode (largest ε_0 bin)

r: 5.22 km
m: 6.49
ε_0: 0.12 σ
Contribution: 10.1 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

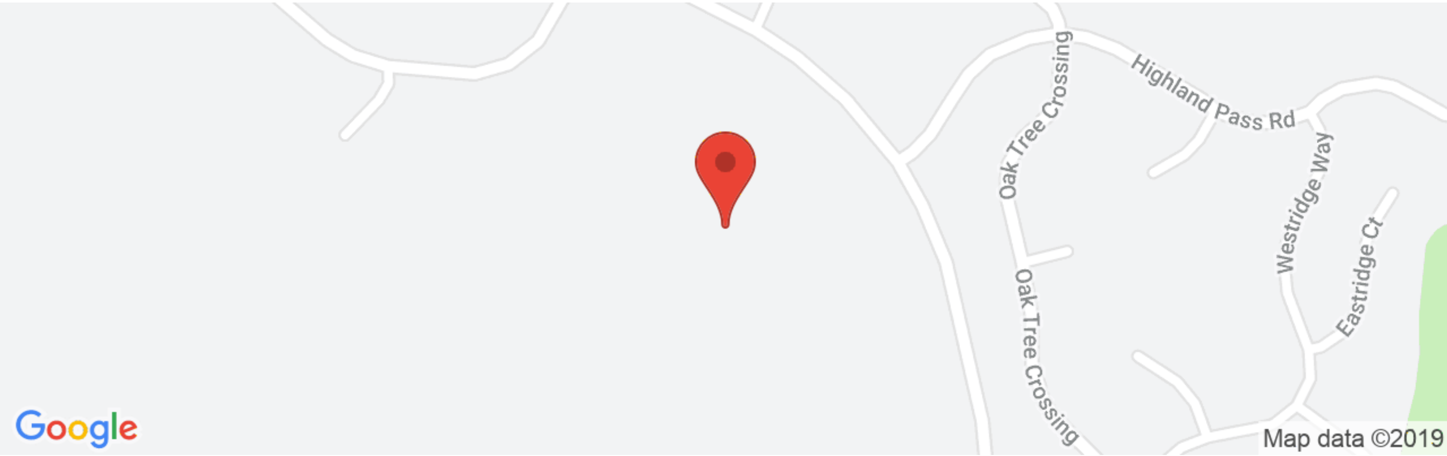
Epsilon keys

ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
bFault.ch	Fault							31.86
Chino - alt 1		4.72	6.49	-0.24	117.708°W	33.965°N	85.14	10.26
Chino - alt 2		5.67	6.67	-0.05	117.710°W	33.972°N	78.16	7.89
Cucamonga		18.88	6.60	1.82	117.729°W	34.125°N	13.94	4.36
Puente Hills (Coyote Hills)		10.05	6.70	0.78	117.867°W	33.898°N	229.65	2.20
Puente Hills		9.65	7.05	0.39	117.867°W	33.927°N	245.49	1.92
San Jose		12.14	6.59	1.43	117.838°W	34.060°N	333.41	1.18
bFault.gr	Fault							19.16
Chino - alt 1		4.73	6.47	-0.17	117.708°W	33.965°N	85.14	5.91
Chino - alt 2		5.69	6.59	0.03	117.710°W	33.972°N	78.16	5.37
Cucamonga		19.80	6.55	1.87	117.729°W	34.125°N	13.94	2.52
Puente Hills (Coyote Hills)		11.29	6.62	0.95	117.867°W	33.898°N	229.65	1.24
aFault_MoBal	Fault							16.02
Elsinore : W		5.74	6.92	0.31	117.792°W	33.907°N	192.11	9.96
aFault_aPriori_D2.1	Fault							14.49
Elsinore : W		5.74	6.94	0.30	117.792°W	33.907°N	192.11	6.72
Elsinore : GI		22.72	6.81	1.83	117.590°W	33.829°N	130.07	1.36
CAmap.24.ch.in (opt)	Grid							5.49
PointSourceFinite: -117.778, 34.001		6.82	5.69	0.98	117.778°W	34.001°N	0.00	1.45
CAmap.21.ch.in (opt)	Grid							5.49
PointSourceFinite: -117.778, 34.001		6.84	5.68	0.99	117.778°W	34.001°N	0.00	1.44
CAmap.21.gr.in (opt)	Grid							2.64
CAmap.24.gr.in (opt)	Grid							2.64
aFault_unseg	Fault							2.08
Elsinore		7.55	7.42	0.56	117.792°W	33.907°N	192.11	1.81

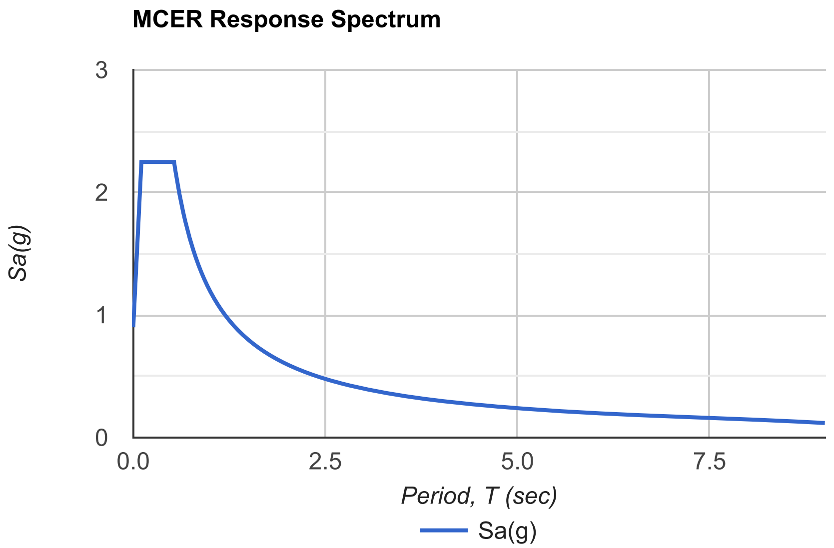
Latitude, Longitude: 33.960574, -117.778257

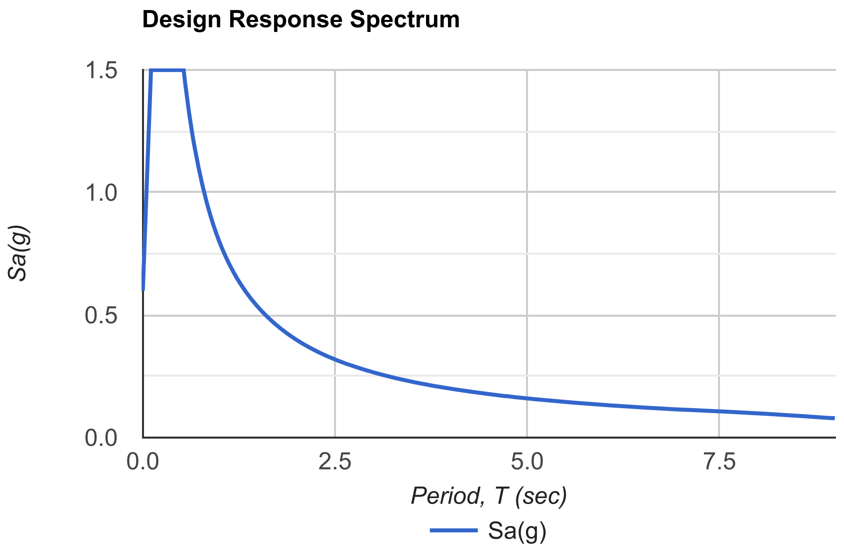


Date	6/5/2019, 3:52:01 PM
Design Code Reference Document	ASCE7-10
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	2.248	MCE_R ground motion. (for 0.2 second period)
S_1	0.796	MCE_R ground motion. (for 1.0s period)
S_{MS}	2.248	Site-modified spectral acceleration value
S_{M1}	1.194	Site-modified spectral acceleration value
S_{DS}	1.499	Numeric seismic design value at 0.2 second SA
S_{D1}	0.796	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	E	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	1.5	Site amplification factor at 1.0 second
PGA	0.859	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.859	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	2.248	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	2.375	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.998	Factored deterministic acceleration value. (0.2 second)
S1RT	0.796	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.815	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.906	Factored deterministic acceleration value. (1.0 second)
PGAd	1.127	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.947	Mapped value of the risk coefficient at short periods
C_{R1}	0.977	Mapped value of the risk coefficient at a period of 1 s

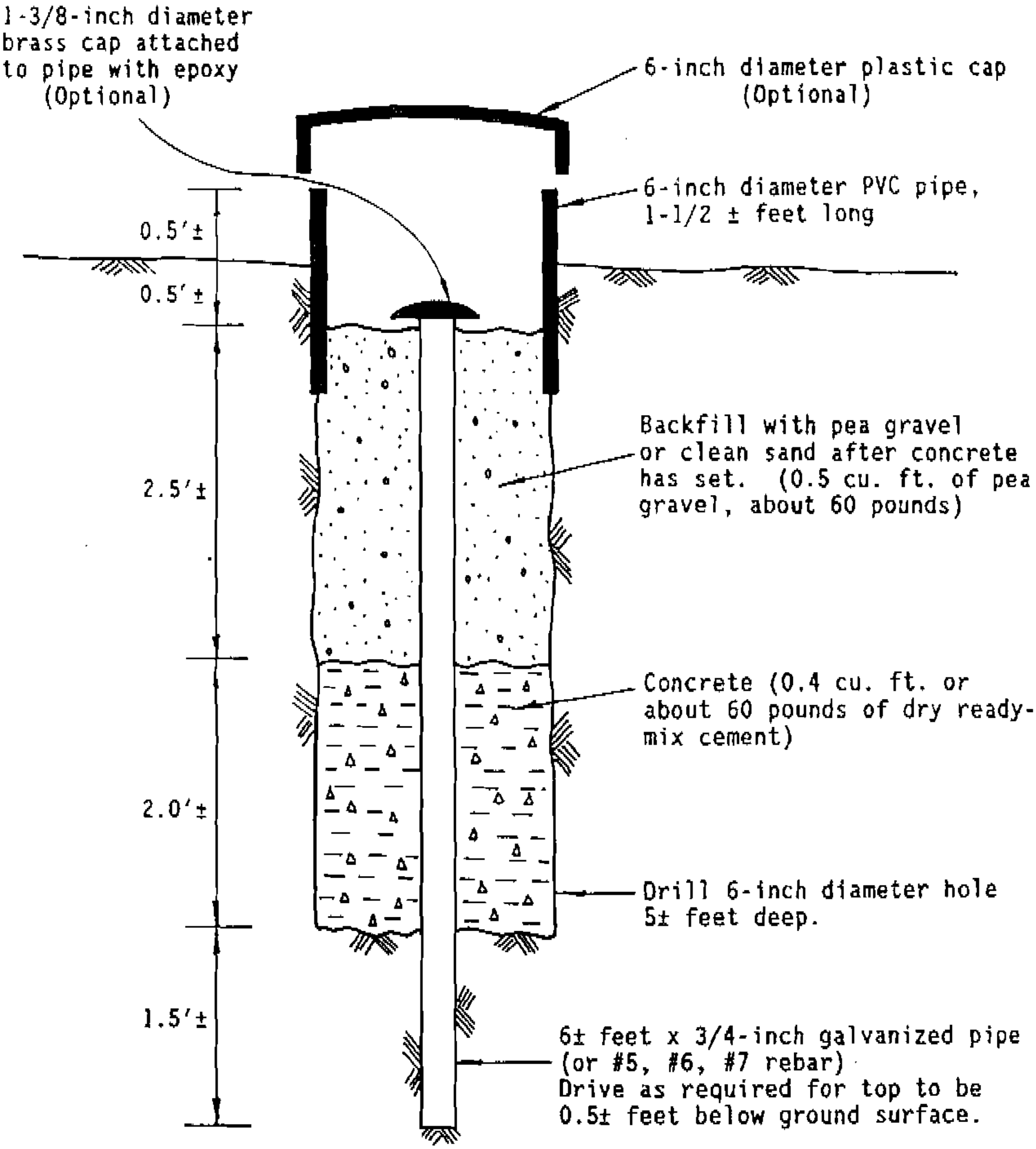

MCER Response Spectrum
3
2
1
0
Sa(g)
0.0
2.5
5.0
7.5
Period, T (sec)
Sa(g)


Design Response Spectrum
1.5
1.0
0.5
0.0
Sa(g)
0.0
2.5
5.0
7.5
Period, T (sec)
Sa(g)

DISCLAIMER

APPENDIX H

Settlement Monument Details



1. Drill a 6±-inch diameter hole 5± feet deep (using either a hand-auger or drill rig).
2. Drive a 6±-foot long 3/4-inch (ID) galvanized pipe (or #5, #6 or #7 rebar) 1.5± feet into the bottom of the hole (top of the pipe or rebar should be 0.5± feet below surrounding ground surface).
3. Fill bottom 2± feet of hole with concrete (0.4± ft.^{3} or 60± lbs. of dry ready-mix concrete).
4. After the concrete has set, backfill the hole with gravel or clean sand to 0.5± feet below surrounding ground surface (0.5 ft.^{3} or 60± lbs).
5. Place a 1.5±-foot long, 6-inch diameter PVC pipe into the hole (prior to backfilling the last ½ foot of gravel).
6. Attach a 1-3/8-inch diameter brass cap to the top of the galvanized pipe (or rebar) with epoxy (optional).
7. Place a 6-inch diameter plastic cap on top of the PVC pipe (optional).

SURFACE SETTLEMENT MONUMENT DETAIL

Figure No. ______

APPENDIX I

General Earthwork and Grading Specifications

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

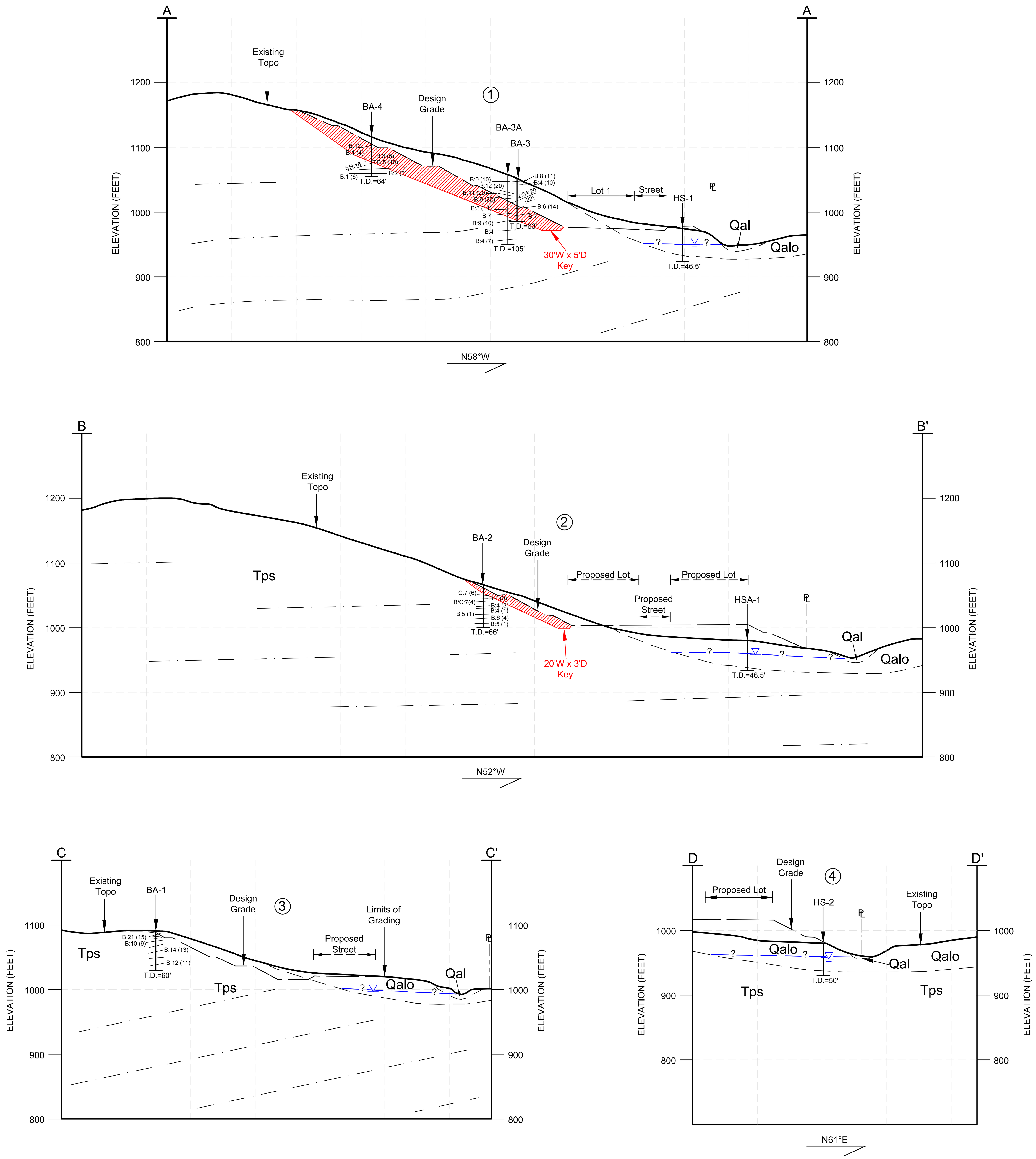
Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org


Plate-1
GEOTECHNICAL MAP
Paradise Ranch Residential Development
West of Canyon Hills Road and South of Esquilime and Alpine Drives
Chino Hills, California
Leighton
Proj: 12322.001
Eng/Geol: JDH/SGO
Scale: 1"=100'
Date: July 2019
N
0 100 200
SCALE FEET
LEGEND
Qal ALLUVIUM
Qalo OLDER ALLUVIUM
Tps PUENTE FORMATION, SOQUEL MEMBER
4 SLOPE NUMBER
5-10 REMEDIAL REMOVALS (FT.)
KEYWAY
BEDDING ATTITUDE
JOINT ATTITUDE
SHEAR ATTITUDE
BA-5 APPROXIMATE LOCATION OF BUCKET AUGER BORING
HS-3 Qalo 0-45' Tps 45'-T.D. T.D.50' @33' APPROXIMATE LOCATION OF HOLLOW-STEM AUGER BORING
GEOLOGIC CONTACT
CUT/FILL/EXISTING LINE
D D' GEOLOGIC CROSS SECTION
APPROXIMATE LIMITS OF THIS PROJECT
SSM APPROXIMATE LOCATION OF SURFACE FILL SETTLEMENT MONUMENT
VILLAGE DRIVE
EIGER COURT
ESQUILIME DRIVE
ALPINE COURT
SPRING CREEK WAY
BA-1
BA-2
BA-3
BA-3A
BA-4
BA-5
HS-4 Afu 0-10' T.D.10'
HS-3 Qalo 0-45' Tps 45'-T.D. T.D.50' @33'
HS-2 Qalo 0-40' Tps 40'-T.D. T.D.50' @22'
HS-1 Qalo 0-40' Tps 40'-T.D. T.D.46.5' @22'
SSM
Qalo
Qcol
Tps
20-30
5-10
45
40
10-15
15-20
20'W x 3'D Key
30'W x 5'D Key
15'W x 3'D Key
A A'
B B'
C C'
D D'
1
2
3
4



LEGEND

BA-2 T.D.=66'	BORING SHOWING TOTAL DEPTH
	GROUNDWATER
	APPROXIMATE GEOLOGIC CONTACT
Qal	ALLUVIUM
Qalo	OLDER ALLUVIUM
Tps	PUENTE FORMATION, SOQUEL MEMBER
4	SLOPE NUMBER

GEOLOGIC CROSS-SECTIONS A-A' THOURGH D-D'

Paradise Ranch Residential Development
West of Canyon Hills Road and South of
Esquilime and Alpine Drives
Chino Hills, California

PLATE 2

Proj: 12322.001	Eng/Geol: JDH/SGO
Scale: 1"=100'	Date: June 2019

Drafted By: MAM Checked By:

Leighton

PHASE I ENVIRONMENTAL SITE ASSESSMENT,
PARADISE RANCH DEVELOPMENT,
WEST OF CANYON HILLS ROAD AND SOUTH OF
ESQUILIME DRIVE,
CITY OF CHINO HILLS, CALIFORNIA

Prepared For:

TTLC CHINO HILLS – PARADISE RANCH, L.L.C.
2372 Morse Avenue, Suite 618
Irvine, California 92614

Project No. 12322.002

July 16, 2019

July 16, 2019

Project No. 12322.002

To: TTLC Chino Hills – Paradise Ranch, L.L.C.
2372 Morse Avenue, Suite 618
Irvine, California 92614

Attention: Mr. Robert Flitton

Subject: Phase I Environmental Site Assessment, Paradise Ranch Development, 16200 Canyon Hills Road, City of Chino Hills, California

Leighton and Associates, Inc. (Leighton) is pleased to present this Phase I Environmental Site Assessment Report for the proposed Paradise Ranch Development located at 16200 Canyon Hills Road in the City of Chino Hills, California. The San Bernardino County Assessor's Office designates this parcel as Assessor Parcel Numbers (APNs) 1000-051-09 and -1000-051-19. Leighton declares that, to the best of our professional knowledge and belief, we meet the definition of Environmental Professional as defined in §312.10 of 40 Code of Federal Regulations (CFR) 312, and the ASTM International (ASTM) Standard E1527-13.

Leighton has the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the Site. Leighton has developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

If you have questions regarding this report, please contact us. We appreciate the opportunity to be of service to Lewis Retail Centers, Inc.

Respectfully submitted,

LEIGHTON AND ASSOCIATES, INC.

Zachary Freeman, PG 9460
Project Geologist

Distribution: (1) Addressee

TABLE OF CONTENTS

List of Accompanying Illustrations and Appendices

1.0 INTRODUCTION

1.1 Authorization

Leighton and Associates, Inc. (Leighton) performed a Phase I Environmental Site Assessment (ESA) for the proposed Paradise Ranch Development site, assessor parcel numbers (APNs) 1000-051-09 and 1000-051-19 located at 16200 Canyon Hills Road, in the City of Chino Hills, California (Site – Figure 1) in accordance with TTLC Chino Hills – Paradise Ranch, L.L.C.'s (Client) authorization.

1.2 Purpose

The purpose of the Phase I ESA was to identify, to the extent feasible and pursuant to the processes prescribed in ASTM International (ASTM) E1527-13, recognized environmental conditions (RECs), historical RECs (HRECs), or controlled RECs (CRECs) in connection with the Site.

- RECs are defined, according to ASTM E1527-13 as "*the presence or likely presence of any hazardous substances or petroleum products in, on, or at a property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment. De minimis conditions are not RECs."*

- HRECs are defined, according to ASTM E1527-13 as "*a past release of any hazardous substances or petroleum products that has occurred in connection with the property and has been addressed to the satisfaction of the applicable regulatory authority or meeting unrestricted use criteria established by a regulatory authority, without subjecting the property to any required controls.*"

- CRECs are defined, according to ASTM E1527-13 as "*a REC resulting from a past release of hazardous substances or petroleum products that has been addressed to the satisfaction of the applicable regulatory authority, with hazardous substances or petroleum products allowed to remain in place subject to the implementation of required controls.*" (ASTM E1527-13, 2013).

1.3 Scope of Work

The scope of work was performed in accordance with Leighton's proposal and included the following tasks:

- A reconnaissance-level visit of the subject site for evidence of the release(s) of hazardous materials and petroleum products and to assess the potential for onsite releases of hazardous materials and petroleum products;
- Records review (including review of previous environmental reports, selected governmental databases, and historical review);
- Interviews; and
- Preparation of a report presenting our findings.

1.4 Significant Assumptions

Leighton assumes that the purpose of this Phase I ESA is to provide appropriate inquiry into the previous ownership and use of the subject site so that the Client may qualify for the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) landowner liability protections as defined in CERCLA, 42 USC §9601(35)(B). Leighton also assumes that the information provided by the Client and its agents, regulatory database provider, and regulatory agencies is true and reliable.

1.5 Limitations and Exceptions

Leighton performed the Phase I ESA in conformance with the scope and limitations of ASTM Practice E1527-13 of the subject site. There were no exceptions to, or deletions from, this practice.

This Phase I ESA was conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions.

The observations and conclusions presented in this report are professional opinions based on the scope of activities, work schedule, and information obtained through the Phase I ESA described herein. Opinions presented herein apply to property conditions existing at the time of our study and cannot necessarily be taken to apply to property conditions or changes that we are not aware of or have not had the opportunity to evaluate. It must be recognized that conclusions drawn from these data are limited to the amount, type, distribution, and integrity of the information collected at the time of the investigation, and the methods utilized to collect and evaluate the data. Although Leighton has taken steps to obtain true copies of available information, we make no representation or warranty with respect to the accuracy or completeness of the information provided by others.

This practice does not address whether requirements in addition to all appropriate inquiry have been met in order to qualify for the landowner liability protections including the continuing obligation not to impede the integrity and effectiveness of activity and use limitations, or the duty to take reasonable steps to prevent releases, or the duty to comply with legally required release reporting obligations. Users should also be aware that there are likely to be other legal obligations with regard to hazardous substances or petroleum products discovered on the subject site that are not addressed in this practice and that may pose risks of civil and/or criminal sanctions for non-compliance.

1.6 Special Terms and Conditions

The scope of work for this Phase I ESA did not include non-scope considerations, such as, but not limited to, those listed in Section 13 of ASTM E1527-13. The scope of work for this Phase I ESA did not include non-scope items such as testing of electrical equipment for the presence of polychlorinated biphenyls (PCBs) or collection of other environmental samples, such as, soil, water, building materials, paint or other media; assessment of natural hazards such as naturally occurring asbestos, radon gas, methane gas, or mold; assessment of the potential presence of radionuclides, biological agents, or lead in drinking water; assessment of indoor air quality (such as vapor intrusion assessment); or assessment of nonchemical hazards such as the potential for damage from earthquakes or floods, or the presence of endangered species or wildlife habitats. This Phase I ESA also did not include an extensive assessment of the environmental compliance status of the subject site or of businesses operating at the subject site, or a health-based risk assessment.

1.7 User Reliance

This report is for the exclusive use of the Client and the Client’s lender. Use of this report by any other party shall be for informational purposes only at such party’s sole risk. If other persons or entities wish to rely upon this report, Leighton will require that such parties agree in writing to Leighton's contract terms.

1.8 Important Information about Geoenvironmental Reports

The Client is referred to Appendix G regarding important information provided by the Geoprofessional Business Association (GBA) on geoenvironmental studies and reports.

2.0 SITE DESCRIPTION

2.1 Location and Legal Description

The subject site is located at 16200 Canyon Hills Road in the City of Chino Hills, California (Figure 1). The San Bernardino County Assessor's office designates the subject site as APNs 1000-051-09 and 1000-051-19.

2.2 Property and Vicinity General Characteristics

The subject site is occupied by a working ranch. The land adjacent to the east of Canon Hills Road and north of Esquilime Drive is developed for residential use. The land northwest and west of the subject site is undeveloped.

2.3 Current Use of the Subject Property

The subject site is currently a working ranch.

2.4 Descriptions of Structures, Roads and Other Improvements on the Property

The subject site consists of 82.6 acres of vacant land with several structures related to the ranching operations near the northeast corner of the subject site. Onsite structures include three residences, two equipment storage garages, a stable, two barns, a small bunk house, a storage shed, goat pens, a stable, a chicken coop, livestock shelters, and a horse training corral.

The following utilities currently or will provide service to the subject site.

Natural Gas:	Southern California Gas Company
Source of Potable Water:	City of Chino Hills
Electric:	Southern California Edison
Sewage Disposal:	City of Chino Hills
Solid Waste Disposal:	Republic Services

2.5 Current Uses of Adjoining Properties

The subject property is bordered on the east by Canyon Hills Road. East of Canyon Hills Road the land is developed for residential use. The adjoining properties to the north and south are residential. The adjoining property to the, west is undeveloped.

3.0 USER PROVIDED INFORMATION

The user of this Phase I ESA is identified as TTLC Chino Hills – Paradise Ranch, L.L.C. A Phase I ESA User Questionnaire Form was completed by Mr. Robert Flitton, Regional Director of Southern California for TTLC Chino Hills – Paradise Ranch, L.L.C., regarding the subject site. A copy of this questionnaire is provided in Appendix C.

3.1 Environmental Liens or Activity and Use Limitations

Mr. Flitton indicated that he was not aware of environmental liens or activity and use limitations (AULs) filed or recorded for the subject property.

3.2 Specialized Knowledge

Mr. Flitton was not aware of specialized knowledge for the subject property or nearby properties.

3.3 Commonly Known or Reasonably Ascertainable Information

Mr. Flitton was not aware of commonly known or reasonably ascertainable information related to specific chemicals used, or environmental cleanups at the subject property.

3.4 Valuation Reduction for Environmental Issues

Mr. Flitton indicated that the purchase price being paid for the subject site is based on fair market value.

3.5 Owner, Property Manager, and Occupant Information

A Phase I ESA owner questionnaire form was completed by Mr. Phillip Gentile, Jr. owner of the subject property. Mr. Gentile's interview information is provided in Section 6.0.

3.6 Reason for Performing Phase I and Limited Phase II ESA

According to Mr. Flitton, the reason for performing this Phase I ESA was for entitlement of the subject property.

3.7 Other

Additional information was not provided to Leighton.

4.0 RECORDS REVIEW

4.1 Physical Setting Source(s)

Leighton reviewed pertinent maps and readily available literature for information on the physiography and hydrogeology of the subject site. A summary of this information is presented in the following subsections.

4.1.1 <u>Topography</u>

The subject site is located in Section 25 and 36 of Township 2 South, Range 9 West of the San Bernardino Baseline and Meridian. Topographic map coverage of the subject site vicinity is provided by the United States Geological Survey (USGS) “Yorba Linda Quadrangle” (2012). The elevation of the subject site ranges from approximately 1,000 feet to approximately 1,100 feet above mean sea level and slopes moderately steeply to the northeast.

4.1.2 <u>Surface Water</u>

Surface water was not observed on the subject site. The Carbon Canyon Wash is located approximately 1,000 feet southeast of the subject site. Lyons Canyon wash is located approximately 0.75 mile southwest of the subject site. The Santa Ana River is located approximately 6.9 miles south of the subject site.

4.1.3 <u>Geology and Soils</u>

The subject site is located on the eastern Puente Hills. The Puente Hills are located where the Peninsular Ranges geomorphic province interacts with the Transverse Ranges geomorphic province. This is an area where the lateral strain of the Elsinore Fault Zone in the Peninsular Ranges to the south is accommodated by the faults and folds bounding and within the east-west trending Puente Hills to the north.

The Puente Hills are a structural block, north of the Whittier fault and southwest of the Chino fault, that uplifted and emerged in the Pleistocene. This uplift is a result of north-south compression that is accommodated by the Puente Hills blind thrust fault (Grant and Gath, 2007). The relief of the Puente Hills is a result of a history of uplift and erosion. During Quaternary uplift, erosion rates of the streams in the Puente Hills increased, and gullies were incised in existing broad canyons. These gullies decrease in depth upstream, and, in general, streams that flow towards the southwest are longer than those flowing to the north and northeast. This pattern of gully depth and the asymmetrical pattern of the older broad canyons indicate that the Puente Hills block tilted towards the northeast during Quaternary uplift (Durham and Yerkes, 1964).

Mapped surficial units include artificial fill, young alluvium, colluvium, older alluvium, and landslide debris (Dibblee and Ehrenspeck, 2001).

4.1.4 Hydrogeology

The subject site is located within the Puente Hills. The Puente Hills consist of impermeable bedrock and divide the Upper Santa Ana Valley groundwater basin on the east from the Orange County Coastal Plain and San Gabriel Valley Basins on the west.

4.1.5 Oil and Gas Fields

Leighton reviewed the California Department of Conservation, Division of Oil, Gas, and Geothermal Resources (DOGGR), Online Mapping System, on April 15, 2019 (DOGGR, 2019). Evidence of oil wells or oil field-related facilities was not indicated on the subject property.

Leighton also reviewed the DOGGR Regional Wildcat Map W1-5 for wells not on the Division maps. No wells were identified on the subject site.

4.2 Standard Environmental Record Sources

A search of selected government databases was conducted by Leighton using the GeoSearch Radius Report environmental database report system. Details and descriptions of the database search are provided in the GeoSearch report. The report meets the government records search requirements of ASTM E1527-13 Standard Practice for Environmental Property Assessments: Phase I Environmental Property Assessment Process. The database listings were reviewed within the specified radii established by the ASTM E1527-13. A copy of this report is included in Appendix D.

4.2.1 <u>Subject Property</u>

The subject site was not identified in the GeoSearch database report.

4.2.2 <u>Offsite</u>

No sites with the potential to adversely impact the subject site were identified within the specified search radii.

4.2.3 <u>Vapor Encroachment</u>

Leighton completed a screening assessment for potential vapor encroachment conditions in general accordance with ASTM E2600-15. Based on the information obtained during completion of this Phase I ESA, there does not appear to be a Vapor Encroachment Condition at the Site.

4.2.4 <u>Regulatory Agency Contacts</u>

Leighton requested regulatory records from the agencies listed below for the address associated with the subject site.

<u>Department of Toxic Substances Control (DTSC)</u>

On June 1, 2019, a file review request was forwarded to the Department of Toxic Substances Control (DTSC), Cypress Office and the DTSC, Chatsworth Office via email. On June 14, 2019, Leighton received a letter from the DTSC – Cypress Office stating that no records were found for the subject site. On June 16, 2019, Leighton received a letter from the DTSC – Chatsworth Office stating that no records were found for the subject site.

Leighton searched the DTSC's Envirostor online database. No active or closed cases were identified for the subject site or adjacent properties.

<u>Santa Ana Regional Water Quality Control Board (SARWQCB)</u>

On June 1, 2019, a file review request was forwarded to the Santa Ana Regional Water Resources Control Board (SARWQCB) via email. On June 3, 2019, Leighton received an email from the SARWQCB stating that no records were found for the subject property.

Leighton searched the State Water Resources Control Board's Geotracker online database. No active or closed cases were identified for the subject site or adjacent properties.

<u>South Coast Air Quality Management District</u>

Leighton searched the South Coast Air Quality Management District (SCAQMD) Facility Inventory Detail (FIND) online database. No permits or air emissions were identified for the subject site within the SCAQMD FIND database.

<u>San Bernardino County Fire Protection District</u>

On May 30, 2019, a file review request was forwarded to the San Bernardino County Fire Protection District (SBCFD) via email. Leighton has not received a response from the SBCFD.

<u>Radon</u>

The California Department of Public Health maintains a database of indoor radon levels that are sorted by zip code. According to the most recent update prepared on February 2016, 49 tests were completed in the subject site's zip code of 91709 and zero tests exceeded 4pCi/L. Therefore, there is low potential for elevated levels of radon at the subject site.

Radon is not regulated within the State of California. Nonetheless, the California Department of Public Health (CDPH) and the United States Environmental Protection Agency (US EPA) both recommend a threshold of 4 picocuries per liter (pCi/L) above which certain precautions be taken to mitigate radon buildup in structures.

4.2.5 <u>Other Reports</u>

Leighton was not provided with other reports to review.

4.3 Historical Use Information on the Property

Leighton reviewed selected historical information on the subject site. These references were reviewed for evidence of activities, which would suggest the presence of hazardous substances at the subject site and to evaluate the potential for the subject site to be impacted by offsite sources of contamination. The following paragraphs are a chronological summary of the review.

4.3.1 <u>Aerial Photographs</u>

Historical aerial photographs were reviewed for information regarding past subject site uses. References are provided in Appendix A; copies of the aerial photographs are included in Appendix F.

Historical Aerial Photograph Review		
Dates	Onsite	Adjacent Sites
1927	Vacant native land	Vacant native land, structures and a road are visible east of the subject site.
1939, 1946, and 1953,	Primarily vacant native land, two small structures are visible at the north end of the subject site.	A horse track appears to be visible northeast of the subject site.
1960, 1966, 1972, and 1980	Additional structures barns and corrals appear to have been added to the north end subject site	The surrounding land does not appear to have changed significantly.
1988 to 1994	The subject site does not appear to have changed.	Residential development is visible east of the subject site.

2002, 2004, 2005, 2009, 2010, 2012, 2014, and 2016	A barn and several small livestock shelters appear to have been added	Additional residential development is visible north of the subject site.

4.3.2 Historical Topographic Maps

Historical topographic maps were reviewed to obtain information regarding past subject site uses. References are provided in Appendix A and a copy of the topographic map report is included in Appendix F.

Historical Topographic Map Review		
Dates	Onsite	Adjacent Sites
1896, 1898, 1901, 1902, and 1942	Vacant	Vacant
1949, 1950,	A road is depicted on the eastern and northern portions of the subject site	A road and a few scattered small structures are depicted south of the subject site.
1964, 1972, 1981	Four structures are depicted on the north end of the subject site near the road. A water tank is also depicted on the subject site.	Water tanks are depicted south and east of the subject site.
2012	No roads or structures are depicted on the subject site.	Several roads are depicted east and north of the subject site.

4.3.3 Fire Insurance Maps

According to the report by GeoSearch, Fire Insurance Map coverage is not available for the subject site.

Fire insurance maps are detailed city plans showing building footprints, construction details, use of structure, street address, etc. The maps were designed to assist fire insurance agents in determining the degree of hazard associated with a particular property. Fire Insurance Maps were produced from approximately 1867 to the present for commercial, industrial, and residential sections of approximately 12,000 cities and towns in the United States.

4.3.4 Historical City Directories

City Directories have been published for cities and towns across the US since the 1700s. Originally a list of residents, the City Directory developed into a tool for locating individuals and businesses in particular. For each street address listed, the directory recorded the name of the resident or business that operated from this addresses. While City Directory coverage is usually comprehensive for major cities, it may be sporadic for rural areas and small towns. The purpose of the City Directory research was to attempt to identify the businesses that were historically located at the subject site and adjacent addresses. A summary of the city directory listings for nonresidential addresses near the subject site are listed below. The city directory report is included in Appendix F.

16200 Canyon Hills Road	
Prior to 2011	No Listings
2011-2016	Phillip Gentile

The surrounding offsite addresses were residential in nature.

4.3.5 Other Historical Sources

Additional resources were not researched as a part of this assessment.

4.3.6 Summary of Historical Land Use

Based on historical records, land usage is summarized as follows:

Time Period	Land Usage	Reference
Prior to 1896	Unknown	None Available
1896 to 1939	Vacant	Topographic Maps and Aerial Photograph
1939 to 2019	Ranch	Aerial Photographs, Topographic Maps, and Site Reconnaissance.

5.0 SITE RECONNAISSANCE

5.1 Methodology and Limiting Conditions

On April 19, 2019, a representative of Leighton conducted a reconnaissance–level assessment of the subject site. The subject site reconnaissance consisted of observing and documenting existing conditions of the subject site and nature of the neighboring development. Photographs of the subject site are presented in Appendix B and their view directions are noted on Figure 3. Items noted during the property reconnaissance are also depicted on Figure 3.

5.2 General Property Setting

The subject site is occupied by a working ranch. Thirteen structures of various types including two single-family residences (Appendix B, Photos 3, 4, and 19), two small barns (Appendix B, Photos 12, 13, 16, and 17), three livestock shelters (Appendix B, Photos 5, 20, and 23), two sheds used for the storage of vehicles and equipment (Appendix B, Photos 6 and 20), a chicken coop (Appendix B, Photos 2 and 9), a stable (Appendix B, Photo 1) a mobile home, and a small bunk house (Appendix B, Photo 22) are present on the northeastern portion of the Site.

A single residence and detached garage are also located south of the ranch area (Figure 2). The residence is the home of Mr. Philip Gentile, owner of the Site. Mr. Gentile stated that his house was not to be included in the property transfer and was not included in the site reconnaissance.

The land adjacent to the east of Canon Hills Road and north of Esquilime Drive is developed for residential use. The land south and west of the subject site is undeveloped.

5.3 Exterior and Interior Observations

5.3.1 <u>Hazardous Substances, Drums, and Other Chemical Containers</u>

Various small containers of diesel fuel and motor oil were observed in the vehicle storage areas (Appendix B, Photos 6, 7, 8, and 10). Two large plastic drums were observed in the tool shed adjacent to the chicken coop. According to Mr. Gentile, the drums were used to hold chicken feed (Appendix B, Photo 11). Three empty 55-gallon drums were located adjacent to a barn on the northeast portion of the subject site (Appendix B, Photo 14). According to Mr. Gentile, the drums are used as movable barriers when corralling or transporting livestock.

5.3.2 Storage Tanks

Two portable storage tanks were observed on the south side of the chicken coop. Mr. Gentile stated that the tanks are used to hold and transport water for the animals (Appendix B, Photo 2). Two propane aboveground storage tanks were observed east of the red house (Appendix B, Photo 3).

5.3.3 Polychlorinated Biphenyls (PCBs)

One pole-mounted transformer was observed on the subject site (Appendix B, Photo 15). The transformer appeared to be in good condition and was not leaking. No staining was observed beneath the transformer.

PCBs were once used as industrial chemicals whose high stability contributed to both their commercial usefulness and their long-term deleterious environmental and health effects. PCBs can be present in coolants or lubricating oils used in older electrical transformers, hydraulic systems, and other similar equipment. In 1979, the USEPA generally prohibited the domestic manufacture of PCBs in electrical capacitors, electrical transformers, vacuum pumps, hydraulic pumps, and gas turbines.

5.3.4 Waste Disposal

Refuse collection is provided by the City of Chino Hills. Hazardous wastes are not produced on the subject site.

5.3.5 Dumping

Evidence of dumping was not observed on the subject site (Photos 1 through 18, Appendix B).

5.3.6 Pits, Ponds, Lagoons, Septic Systems, Wastewater, Drains, Cisterns, and Sumps

Evidence of pits, ponds, lagoons, and sumps was not observed on the subject site. A large concrete cistern is located on the north central portion of the subject site. According to Mr. Gentile, the cistern was used to store water for livestock (Appendix B, Photo 18).

Mr. Gentile stated that a septic system and leach field is located on the northeastern portion of the subject site between the two residences (Figure 3).

5.3.7 Pesticide Use

Small quantities of household pesticides were observed in the storage shed adjacent to the chicken coop (Appendix B, Photo 10), however, evidence of large scale pesticide application was not observed.

Based on the age of the residences and barns on the subject site, organochlorine pesticide (OCP) termiticides may have been applied to the soils beneath or surrounding the residences and barns on the subject site.

5.3.8 Staining, Discolored Soils, Corrosion

Soil staining was observed southwest of the stables in an area used to store a backhoe (Appendix B, Photo 21).

A small patch of stained soil was also observed within the vehicle storage shed on the northeast side of the subject site (Appendix B, Photo 8). The staining appeared to be *de minimis* in nature.

5.3.9 Stressed Vegetation

Evidence of stressed vegetation, other than that expected in a drought, was not observed on the subject site.

5.3.10 Unusual Odors

Unusual odors were not detected on the subject site.

5.3.11 Onsite Wells

Evidence of onsite wells was not observed.

5.3.12 Other Observations

No other items of environmental significance were observed on the subject site.

6.0 INTERVIEWS

Leighton conducted interviews with persons having knowledge of current or past subject site usage. Interviews were conducted either orally or in the form of a written questionnaire. Written responses are included as Appendix C.

6.1 Interview with Owner

On April 16, 2019, Mr. Philip Gentile, owner of the subject site completed the Phase I ESA Owner/Site Contact Interview Form for the subject site. Mr. Gentile was also interviewed during the site reconnaissance. Mr. Gentile was not aware of environmental concerns currently associated with the subject site or surrounding properties. Mr. Gentile stated that the residences on the subject site are on septic systems. The septic leach field is located between the two residences on the northeastern portion of the Site. The mobile home also located on the northern portion of the subject site is unoccupied and is used for storage of documents and dry goods.

No other property owners were interviewed by Leighton.

6.2 Interview with Site/Property Manager

See Section 6.1.

6.3 Interviews with Occupants

See Section 6.1.

6.4 Interviews with Local Government Officials

Leighton did not interview employees with local government agencies to request information regarding historic and current uses of the subject site with the exception of those noted in Section 4.2.

6.5 Interviews with Others

Leighton did not conduct additional interviews for this Phase I ESA.

7.0 FINDINGS

Leighton performed a Phase I ESA for the property located at 16200 Canyon Hills Road, Assessor Parcel Numbers 1000-051-09 and 1000-051-19 in the City of Chino Hills, San Bernardino County, California (subject property – Figure 1) in accordance Lewis Retail Centers' authorization.

We have performed a Phase I ESA in conformance with the scope and limitations of ASTM E1527-13 for the subject property. Exceptions to, or deletions from, this practice are described in Section 1.5 of this report.

7.1 Onsite

Historically, the subject site was vacant land from prior to 1896 until approximately 1939. Mr. Gentile stated that the oldest structure on the subject site, the red barn (Figure 3) dates from approximately 1914, however, development is not visible in aerial photographs until 1939. According to Mr. Gentile, the subject site has been used as a ranch since approximately 1914.

The subject site consists of two parcels, 82.6 acres of land.

Based on the age of the residences and barns on the subject site, organochlorine pesticide (OCP) termiticides may have been applied to the soils beneath or surrounding the residences and barns on the subject site. Evidence of large scale pesticide use was not observed however small quantities of household pesticides were observed on the site.

The residences, red barn, hay barn, vehicle storage sheds and animal shelters may have been painted with lead-based paint in the past. When lead-based paint deteriorates it flakes off of structures and collects in the surrounding soil. Rainwater can also leach lead from lead-based paint allowing the lead to be deposited in the soils surrounding the structure.

The other structures on the subject site appear to have been constructed after the ban on lead-based paint in the United States.

Mr. Gentile stated that a septic system and leach field was present between the two residences on the northeastern portion of the Site.

Minor soil staining was observed on the ground in the vehicle storage shed on the northwest corner of the Site. The staining appears de minimis in nature.

Soil staining was also identified southeast of the stables in an area used to park a backhoe.

A search of selected government databases was conducted by Leighton using the GeoSearch Radius Report environmental database report system. Details of the database search along with descriptions of each database researched are provided in the GeoSearch report included in Appendix D. The report meets the government records search requirements of ASTM E1527-05 Standard Practice for Environmental Property Assessments: Phase I Environmental Property Assessment Process. The database listings were reviewed within the specified radii established by the ASTM E1527-05. The subject site was not identified in the GeoSearch database report.

7.2 Offsite

Historically, the adjacent properties were undeveloped.

Currently, the subject property is bordered by residential development to the north, east, and south. Vacant land borders the subject property to the northwest and west.

Environmental concerns were not identified in the GeoSearch Radius Report for the properties located in the vicinity of the subject site.

7.3 Data Gaps

Data gaps were identified by Leighton:

- At the time of this report, Leighton had not received a response from the San Bernardino County Fire Protection District Hazardous Materials Division.

Based on the subject site history and use, it is Leighton's opinion that this data gap is not significant to identifying recognized environmental conditions on the subject site.

8.0 OPINION

8.1 Onsite

The two residences, hay barn, and chicken coop constitute RECs at the subject site. The structures are of sufficient age that there is the potential that organochlorine pesticide (OCP) termiticides may have been applied to the soils beneath or surrounding these structures and that the structures may have been painted with lead-based paint. The red barn may also have been painted with lead-based paint, however, the lower approximately 4 feet of the structure is constructed of concrete therefore, it is unlikely that the soils beneath or surrounding the structure were treated with OCP termiticides.

The soil staining in the back hoe parking area southwest of the stable constitutes a REC at the subject site. The stained soils have the potential to be impacted with petroleum hydrocarbons (TPH) and/or semi-volatile organic compounds (SVOCs).

The septic system and leach field between the residences on the northeastern portion of the subject site constitutes a REC based on the unknown nature of the materials that may have been disposed of in sinks and toilets during the existence of the two residences. The leach field has the potential to have been impacted by heavy metals (Title 22 metals), TPH, SVOCs, volatile organic compounds (VOCs) and OCPs.

While not a REC, the structures on the subject site have the potential to contain asbestos containing building materials, lead-based paint, or other Universal Waste Rule items.

8.2 Offsite

No offsite RECs, HRECs, or CRECs were identified that would negatively impact the subject site.

9.0 CONCLUSIONS

Leighton has performed a Phase I ESA in conformance with the scope and limitations of ASTM E1527-13 for the proposed Paradise Ranch development located at 16200 Canyon Hills Road, Assessor Parcel Numbers 1000-051-09 and -1000-051-19 in the City of Chino Hills, San Bernardino County, California. This assessment has revealed no RECs, HRECs, or CRECs in connection with the subject site with the exception of the following:

- The two residences, the red barn were constructed prior to 1979 and may have been painted with lead-based paint which may have impacted the surface soils surrounding the structures with lead.

- The two residences, hay barn, and chicken coop were constructed prior to 1989, the surrounding and underlying soils may have been treated with OCP termiticides at the time of, or subsequent to their construction.

- The stained soil area southeast of the stables may be impacted with TPH or SVOCs related to the release of motor oil and/or hydraulic fluid from the backhoe that is stored at that location.

- The septic system and leach field servicing located between, and servicing the two residences onsite have the potential to be impacted with Title 22 metals, TPH, SVOCs, VOCs, and OCPs.

Leighton recommends the following:

- Sampling for OCPs around the residences, hay barn, and chicken coop.

- Sampling for lead from lead-based paints around the residences, the red barn, hay barn, chicken coop, and vehicle storage sheds.

- Sampling for TPH and SVOCs within the area of stained soil southwest of the stables.

- Sampling for Title 22 metals, TPH, SVOCs, VOCs, and OCPs in the leach field located between the residences.

- A pre-demolition lead and asbestos survey should be performed on the on-site structures prior to their demolition and redevelopment of the Site.

In general, observations should be made by a qualified environmental professional during future property development for areas of possible contamination such as, but not limited to, the presence of underground facilities, buried debris, waste drums and tanks, asbestos containing materials, stained soil or odorous soils. Should such materials be encountered, further investigation and analysis may be necessary at that time.

10.0 DEVIATIONS

Leighton did not deviate from or alter the scope of work, as defined in Section 1.3 of this report. Significant data gaps were not identified that affect the ability of Leighton to identify recognized environmental conditions at the subject site.

11.0 ADDITIONAL SERVICES

Leighton did not perform work outside the scope of work as defined in Section 1.3 of this report.

12.0 QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONALS

12.1 Corporate

Leighton is a California corporation, providing geotechnical and environmental consulting services throughout California. We are solely a consulting firm without interests in real property other than our offices in Southern California. We provide professional environmental consulting services including application of science and engineering to environmental compliance, hazardous materials/waste assessment and cleanup, and management of hazardous, solid and industrial waste. Phase I Environmental Property Assessments are a part of this practice area and have been conducted by us.

12.2 Individual

The qualifications of the Project Manager and the other Leighton environmental professionals involved in this Phase I ESA meet the Leighton corporate requirements for performing Phase I ESAs as specified by ASTM E1527-13.

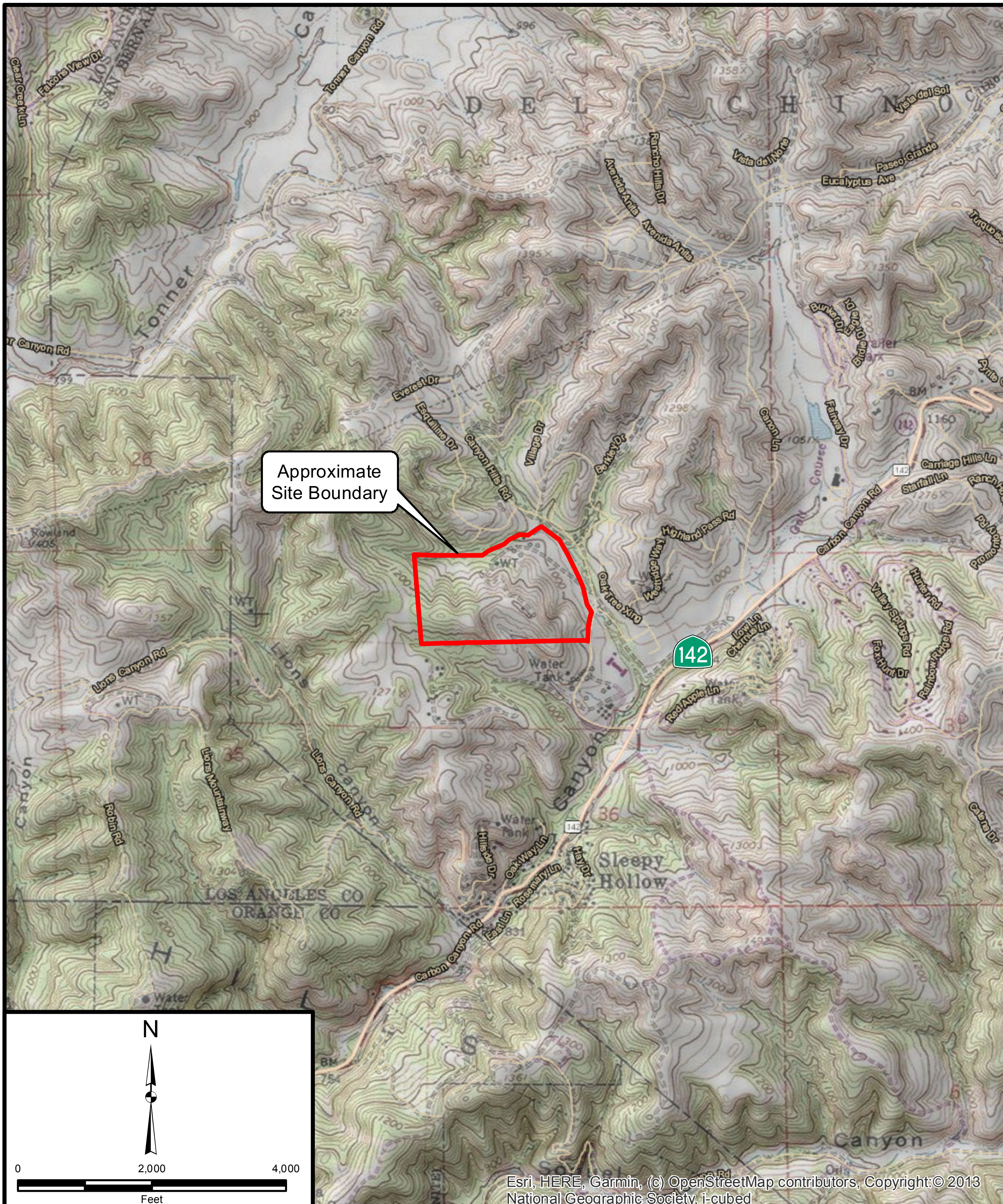
12.3 Environmental Professional Statement

I declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined by §312.10 of 40 CFR Part 312.

I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject site. I have developed and performed all the appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

Zachary Freeman, PG 9460
(Expires 6/30/21)
Project Geologist

PROFESSIONAL GEOLOGIST
ZACHARY A. FREEMAN
No.9460
STATE OF CALIFORNIA



Project: 12322.002	Eng/Geol: ZAF
Scale: 1 " = 2,000 '	Date: July 2019

Base Map: ESRI ArcGIS Online 2019

Author: Leighton Geomatics (mmurphy)

SITE LOCATION MAP

Paradise Ranch Residential Development
West of Canyon Hills Road and South of
Esquilime and Alpine Drives
Chino Hills, California

Figure 1

Leighton

Map Saved as V:\Drafting\12322\001\Maps\12322-001_F01_SLM_2019-06-04.mxd on 6/4/2019 5:47:24 PM

Proj: 12322.002	Eng/Geol: ZAF	**SITE PLAN** TTLC Chino Hills - Paradise Ranch Development 16200 Canyon Hills Road Chino Hills, California	FIGURE 2
Scale: 1" = 250'	Date: July 2019		Leighton
Drafted by: ZAF / Checked by: ZAF	Image: Google		

Proj: 12322.002	Eng/Geol: ZAF
Scale: 1" = 80'	Date: July 2019
Drafted by: ZAF / Checked by: ZAF	Image: Google

SITE PLAN DETAIL

TTLC Chino Hills - Paradise Ranch Development
16200 Canyon Hills Road
Chino Hills, California

FIGURE 3

Leighton

APPENDIX A
REFERENCES

APPENDIX A

References

ASTM International, 2013, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, Designation E1527-13, dated November 06, 2013.

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GeoSearch, Historical Aerials Package, dated April 16, 2019.

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APPENDIX B

SITE RECONNAISSANCE PHOTOS

Leighton and Associates, Inc.		**PHOTOGRAPHIC RECORD** **April 19, 2019**
Client Name: TTLC Chino Hills – Paradise Ranch L.L.C.	**Site Location: 16200 Canyon Hills Road, Chino Hills, California**	**Project No. 12322.002**

Photo No. 1	
View of Direction of Photo: Northwest	
Description: View of the stables on the northeast portion of the Site.	

Photo No. 2	
View of Direction of Photo: Southeast	
Description: View of the chicken coop on the northeastern portion of the Site.	

Leighton and Associates, Inc.		**PHOTOGRAPHIC RECORD** **April 19, 2019**
Client Name: TTLC Chino Hills – Paradise Ranch L.L.C.	**Site Location: 16200 Canyon Hills Road, Chino Hills, California**	**Project No. 12322.002**

Photo No. 3	
View of Direction of Photo: Southwest	
Description: View of one of the residences on the Site	

Photo No. 4	
View of Direction of Photo: Northeast	
Description: View of the other residence on the Site	

Leighton and Associates, Inc.	**PHOTOGRAPHIC RECORD** **April 19, 2019**	
Client Name: TTLC Chino Hills – Paradise Ranch L.L.C.	**Site Location: 16200 Canyon Hills Road, Chino Hills, California**	**Project No. 12322.002**

Photo No. 5	
View of Direction of Photo: South	
Description: One of the goat pens and shelter structure on the northeast portion of the Site.	

Photo No. 6	
View of Direction of Photo: Southwest	
Description: View of the inside of one of two vehicle storage structures on the Site.	

Photo No. 7

View of Direction of Photo:
Northeast

Description:
Diesel fuel cans within the vehicle storage structure.

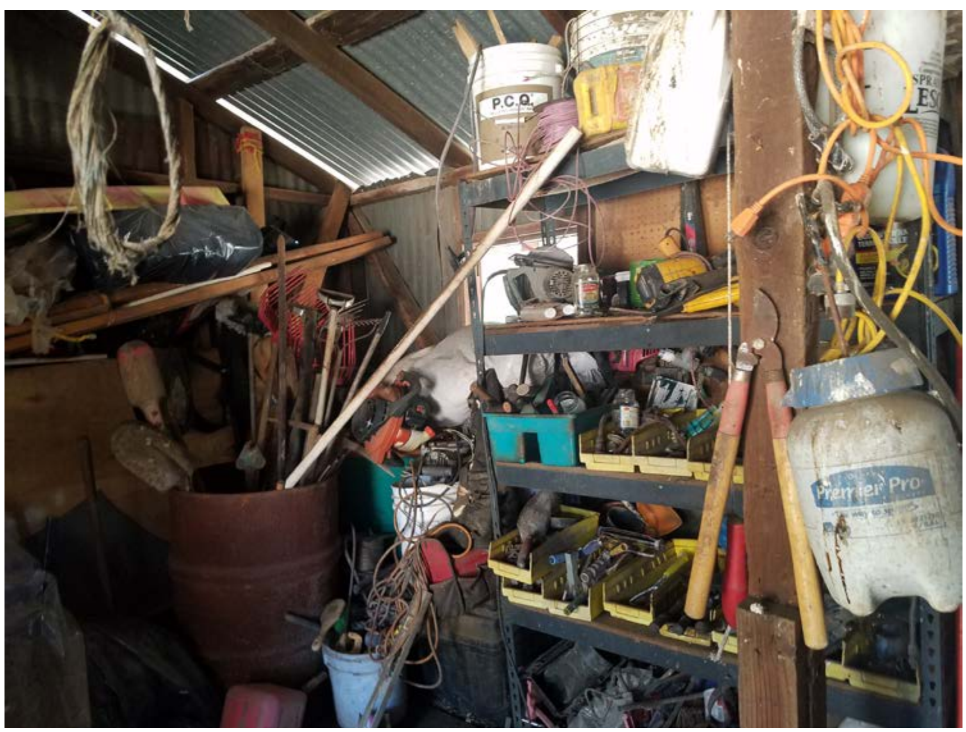
Photo No. 8

View of Direction of Photo:
Northwest

Description:
Soil staining within the vehicle storage structure.

Leighton and Associates, Inc.	**PHOTOGRAPHIC RECORD** **April 19, 2019**	
Client Name: TTLC Chino Hills – Paradise Ranch L.L.C.	**Site Location: 16200 Canyon Hills Road, Chino Hills, California**	**Project No. 12322.002**

Photo No. 9	
View of Direction of Photo: Southwest	
Description: View of the fenced area surrounding the chicken coop.	

Photo No. 10	
View of Direction of Photo: East	
Description: Interior of a tool storage shed attached to the chicken coop structure.	

Leighton and Associates, Inc.	**PHOTOGRAPHIC RECORD** **April 19, 2019**	
Client Name: TTLC Chino Hills – Paradise Ranch L.L.C.	**Site Location: 16200 Canyon Hills Road, Chino Hills, California**	**Project No. 12322.002**

Photo No. 11

View of Direction of Photo:
East

Description:
Empty drums in the chicken coop tool storage shed containing chicken feed.

Photo No. 12

View of Direction of Photo:
Southeast

Description:
Barn located on the east side of the Site

Photo No. 13

View of Direction of Photo:
Southast

Description:
Interior of the barn on the east side of the Site.

Photo No. 14

View of Direction of Photo:
Northwest

Description:
Empty drums adjacent to the north of the barn. According to the owner, the drums are used as movable barriers when corralling and moving animals.

Leighton and Associates, Inc.

PHOTOGRAPHIC RECORD
April 19, 2019

Client Name: TTLC Chino Hills – Paradise Ranch L.L.C.	**Site Location: 16200 Canyon Hills Road, Chino Hills, California**	**Project No. 12322.002**

Photo No. 15	
View of Direction of Photo: Southwest	
Description: Pole-mounted transformer located on the northwestern portion of the Site.	

Photo No. 16	
View of Direction of Photo: North	
Description: Hay barn located north of the two residences on the Site.	

Leighton and Associates, Inc.		**PHOTOGRAPHIC RECORD** **April 19, 2019**
Client Name: TTLC Chino Hills – Paradise Ranch L.L.C.	**Site Location: 16200 Canyon Hills Road, Chino Hills, California**	**Project No. 12322.002**

Photo No. 17	
View of Direction of Photo: Northeast	
Description: Interior of the hay barn.	

Photo No. 18	
View of Direction of Photo: North	
Description: Concrete water cistern containing water from recent rains. The cistern was formerly used to store water for livestock.	

Photo No. 19	
View of Direction of Photo: West	
Description: Area containing the septic system and leach field servicing the two residences on the Site.	

Photo No. 20	
View of Direction of Photo: Northwest	
Description: Vehicle and tool storage building located on the northwest portion of the Site	

Leighton and Associates, Inc.	**PHOTOGRAPHIC RECORD** **April 19, 2019**	
Client Name: TTLC Chino Hills – Paradise Ranch L.L.C.	**Site Location: 16200 Canyon Hills Road, Chino Hills, California**	**Project No. 12322.002**

Photo No. 21	
View of Direction of Photo: Northwest	
Description: Backhoe parking area southeast of the stable building.	

Photo No. 22	
View of Direction of Photo: East	
Description: Bunk house located east of the stable building.	

Leighton and Associates, Inc.

PHOTOGRAPHIC RECORD

April 19, 2019

Client Name: TTLC Chino Hills – Paradise Ranch L.L.C.	**Site Location: 16200 Canyon Hills Road, Chino Hills, California**	**Project No. 12322.002**

Photo No. 23	
View of Direction of Photo: Northwest	
Description: Livestock shelter and pasture on the northeast side of the Site.	

Photo No. 24	
View of Direction of Photo: Southwest	
Description: View across the western portion of the Site.	

APPENDIX C

CLIENT SUPPLIED DOCUMENTATION

Leighton

Phase I ESA Users Questionnaire

Project Name: Paradise Ranch Development

Complete and Correct Address(es) of the Property and APN(s):

16200 Canyon Hills Drive

User Company Name:	**User Name/Title:**
TTLC Chino Hills - Paradise Ranch LLC	Robert Flitton

User Phone/Email: rflitton@truelifecompanies.com 909-500-7998

Interviewee Name and Relationship to Project:

Robert Flitton - Regional Director Southern California

Site Owner: Philip Gentile

Reason Phase I is required:

Due diligence for property acquisition

Type of property:

Rural/Ranch

Type of property transaction (e.g., Sale, purchase, exchange):

Purchase

Any scope of services beyond the ASTM Practice E 1527:

None

All Parties that will rely on the Phase I report:

TTLC Chino Hills - Paradise Ranch LLC and Lender

Name and Contact Information for Site Contact:

Philip Gentile 714-307-2778

Any special terms or conditions:

None

Any other pertinent knowledge or experience with the property (e.g., prior reports, documents, correspondence concerning the environmental conditions of the property):

None

(1). Environmental cleanup liens that are filed or recorded against the site (40 CFR 312.25).

Did a search of recorded land title records (or judicial records where appropriate identify any environmental liens filed or recorded against the property under federal, tribal, state or local law? Yes | ✔ No

If Yes, Describe:

(2). Activity and land use limitations (AULs) that are in place on the site or that have been filed or recorded in a registry (40 CFR 312.26).

Did a search of recorded land title records (or judicial records where appropriate) identify any AULs, such as engineering controls, land use restrictions or institutional controls that are in place at the property and/or have been filed or recorded against the property under federal, tribal, state or local law? Yes | ✔ No

If Yes, Describe:

(3). Specialized knowledge or experience of the person seeking to qualify for the Landowners Liability Protections (LLP) (40 CFR 312.28).

Do you have any specialized knowledge or experience related to the property or the property or nearby properties? For example, are you involved in the same line of business as the current or former occupants of the property or an adjoining property so that you would have specialized knowledge of the chemicals and processes used by this type of business?
Yes | ✔ No

If Yes, Describe:

(4). Relationship of the purchase price to the fair market value of the property if it were not contaminated (40 DRF 312.29).

Does the purchase price being paid for this property reasonably reflect the fair market value of the property?

✔ Yes | No

If you conclude that there is a difference, have you considered whether the lower purchase price is because contamination is known or believed to be present at the property? Yes | No

If Yes, Describe:

(5). Commonly known or reasonable ascertainable information about the property (40 CFR 312.30).

Are you aware of commonly known or *reasonably ascertainable* information about the property that would help the *environmental professional* to identify conditions indicative of releases or threatened releases? For example, as user,

(a.) Do you know the past uses of the property? ✔ Yes | No

(b.) Do you know of specific chemicals that are present or once were present at the property? Yes | ✔ No

(c.) Do you know of spills or other chemical releases that have taken place at the property? Yes | ✔ No

(d.) Do you know of any environmental cleanups that have taken place at the property? Yes | ✔ No

If Yes, Describe:

(6). The degree of obviousness of the presence of likely presence of contamination at the property, and the ability to detect the contamination by appropriate investigation (40 CFR 312.31).

Based on your knowledge and experience related to the *property*, are there any *obvious* indicators that point to the presence or likely presence of contamination at the *property?* Yes | ✔ No

If Yes, Describe:

Signature Date

Leighton

Phase I ESA Owner/Site Contact Interview Form

Interviewee Name: Philip Gentile **Title:** owner

Address: 16220 Canyon Hills Rd **Phone:** 714 3072778

Relationship to Property: owner

Name of Property Owner: Philip Gentile Living Trust

Address of Property Owner: Same

Site Name: Gentile ranch

Property Address:

Previous Street Names/Numbers:

General Business Type/Present Property Use: Horse and Cow Grazing

Property Utilization during Ownership: ~~Residen~~ Residential

Assessor Parcel #: **Grant Total Square Footage:**

Total # of Buildings: 3 **Date Built:** 1914

Name and Address of Past Owners (include dates of ownership):

I have owned the property for 20 years

Past Property Uses (include dates): Cow Grazing for the last 100 years

Source of Potable Water Supply (municipal/groundwater wells): city

Sewage Disposal (municipal/septic) (provide name of utility): Septic

Means of Heating/Cooling (gas, electric, heating oil, etc.): gas & Electric

Fuel Source for Heating/Air Conditioning (provide name of utility): Edison

Neighboring Property Types (commercial/industrial/residential): Residential

Current Uses of Adjoining Properties: **North:** ~~Residential~~ Residential

South: "

East: "

West: "

ARE THERE NOW, OR HAVE THERE BEEN IN THE PAST, ANY OF THESE ITEMS ONSITE OR ON ADJACENT PROPERTIES:

ITEM	YES	NO	UNK	ADJACENT PROPERTY
• Hazardous Materials		✓		
• Hazardous Waste		✓		
• MSDS Sheets		✓		
• Underground Storage Tanks (USTs)		✓		
• Aboveground Storage Tanks (ASTs)		✓		
• Vent Pipes, fill pipes, or access ways indicating a fill pipe to an underground storage area		✓		
• Odors		✓		
• Drums		✓		
• Electrical or hydraulic equipment known to contain Polychlorinated Biphenyls (PCBs)		✓		
• Stained soil or surfaces		✓		
• Drains		✓		
• Sumps		✓		
• Clarifier		✓		
• Pits, ponds, or lagoons		✓		
• Stressed vegetation		✓		
• Areas for dumping solid waste (landfill)		✓		
• Wastewater		✓		
• Wells (groundwater, oil, and/or gas)		✓		
• Septic Systems	✓	~~✓~~		
• Fill Material (if fill material is on site, please state source of fill)		✓		

ADDITIONAL QUESTIONS:	YES	NO	UNK	REMARKS
Has the Site been used as any of the following: gas station, motor repair facility, commercial printing facility, metal plating, dry cleaners, photo developing laboratory, junkyard, or landfill, or as a waste treatment, storage, disposal, processing, or recycling facility? If so, state which type of facility.		✓		
Are you aware of any Phase I or Phase II environmental site assessments, soil sampling reports, geotechnical or geologic reports, environmental compliance audit reports, environmental permits, registrations for USTs or ASTs, community right-to-know plans, environmental safety plans or reports regarding hazardous waste generation for the Site?		✓		
Do you know of any notices or correspondence from any government agency relating to past or current violations of environmental laws with respect to the Site or relating to environmental liens encumbering the Site?		✓		
Do you know of any pending, threatened, or past litigation or administrative proceedings relevant to hazardous substances or petroleum products in, on or from the Site?		✓		
Do you know of any notices from any governmental entity regarding any possible violation of environmental laws or possible liability relating to hazardous substances or petroleum products?		✓		
Do you know of any environmental concerns associated with the Site? If so please state in remarks column.		✓		
Do you know of any environmental concerns associated with any adjacent or nearby properties? If so please state in remarks column.		✓		

Additional Comments:

Preparer presents that to the best of the preparer's knowledge the above statements and facts are true and correct, and to the best of the preparer's actual knowledge no material facts have been suppressed or misstated.

4-16-19

Signature

Date

Leighton

APPENDIX D

ENVIRONMENTAL RADIUS REPORT

GeoSearch
On time. On target. In touch.™

Radius Report

GeoLens by GeoSearch

Target Property:

Chino Hills Paradise Ranch
Canyon Hills Road and Esquilime Drive
Chino Hills, San Bernardino County, California 91709

Prepared For:

Leighton & Associates

Order #: 124732
Job #: 288203
Project #: 12322.002
PO #: 12322.002
Date: 04/15/2019

Table of Contents

Disclaimer

This report was designed by GeoSearch to meet or exceed the records search requirements of the All Appropriate Inquiries Rule (40 CFR ï¿½312.26) and the current version of the ASTM International E1527, Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process or, if applicable, the custom requirements requested by the entity that ordered this report. The records and databases of records used to compile this report were collected from various federal,state and local governmental entities. It is the goal of GeoSearch to meet or exceed the 40 CFR ï¿½312.26 and E1527 requirements for updating records by using the best available technology. GeoSearch contacts the appropriate governmental entities on a recurring basis. Depending on the frequency with which a record source or database of records is updated by the governmental entity, the data used to prepare this report may be updated monthly, quarterly, semi-annually, or annually.

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Target Property Summary

Target Property Information

Chino Hills Paradise Ranch
Canyon Hills Road and Esquilime Drive
Chino Hills, California 91709

Coordinates
Area centroid (-117.78032, 33.9591066)
1,185 feet above sea level

USGS Quadrangle
Yorba Linda, CA

Geographic Coverage Information

County/Parish: San Bernardino (CA) , Los Angeles (CA) , Orange (CA)
ZipCode(s):
Chino Hills CA: 91709
Diamond Bar CA: 91765
Brea CA: 92823

Database Summary

FEDERAL LISTING

Standard Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
EMERGENCY RESPONSE NOTIFICATION SYSTEM	ERNSCA	0	0	TP/AP
FEDERAL ENGINEERING INSTITUTIONAL CONTROL SITES	EC	0	0	TP/AP
LAND USE CONTROL INFORMATION SYSTEM	LUCIS	0	0	TP/AP
RCRA SITES WITH CONTROLS	RCRASC	0	0	TP/AP
RESOURCE CONSERVATION & RECOVERY ACT - GENERATOR	RCRAGR09	0	0	0.1250
RESOURCE CONSERVATION & RECOVERY ACT - NON-GENERATOR	RCRANGR09	0	0	0.1250
BROWNFIELDS MANAGEMENT SYSTEM	BF	0	0	0.5000
DELISTED NATIONAL PRIORITIES LIST	DNPL	0	0	0.5000
NO LONGER REGULATED RCRA NON-CORRACTS TSD FACILITIES	NLRRCRAT	0	0	0.5000
RESOURCE CONSERVATION & RECOVERY ACT - NON-CORRACTS TREATMENT, STORAGE & DISPOSAL FACILITIES	RCRAT	0	0	0.5000
SUPERFUND ENTERPRISE MANAGEMENT SYSTEM	SEMS	0	0	0.5000
SUPERFUND ENTERPRISE MANAGEMENT SYSTEM ARCHIVED SITE INVENTORY	SEMSARCH	0	0	0.5000
NATIONAL PRIORITIES LIST	NPL	0	0	1.0000
NO LONGER REGULATED RCRA CORRECTIVE ACTION FACILITIES	NLRRCRAC	0	0	1.0000
PROPOSED NATIONAL PRIORITIES LIST	PNPL	0	0	1.0000
RESOURCE CONSERVATION & RECOVERY ACT - CORRECTIVE ACTION FACILITIES	RCRAC	0	0	1.0000
RESOURCE CONSERVATION & RECOVERY ACT - SUBJECT TO CORRECTIVE ACTION FACILITIES	RCRASUBC	0	0	1.0000
SUB-TOTAL		0	0	

Additional Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
AEROMETRIC INFORMATION RETRIEVAL SYSTEM / AIR FACILITY SUBSYSTEM	AIRSAFS	0	0	TP/AP
BIENNIAL REPORTING SYSTEM	BRS	0	0	TP/AP
CERCLIS LIENS	SFLIENS	0	0	TP/AP
CLANDESTINE DRUG LABORATORY LOCATIONS	CDL	0	0	TP/AP
EPA DOCKET DATA	DOCKETS	0	0	TP/AP
ENFORCEMENT AND COMPLIANCE HISTORY INFORMATION	ECHOR09	0	0	TP/AP
FACILITY REGISTRY SYSTEM	FRSCA	0	0	TP/AP

Database Summary

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
HAZARDOUS MATERIALS INCIDENT REPORTING SYSTEM	HMIRSR09	0	0	TP/AP
INTEGRATED COMPLIANCE INFORMATION SYSTEM (FORMERLY DOCKETS)	ICIS	0	0	TP/AP
INTEGRATED COMPLIANCE INFORMATION SYSTEM NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM	ICISNPDES	0	0	TP/AP
MATERIAL LICENSING TRACKING SYSTEM	MLTS	0	0	TP/AP
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM	NPDESR09	0	0	TP/AP
PCB ACTIVITY DATABASE SYSTEM	PADS	0	0	TP/AP
PERMIT COMPLIANCE SYSTEM	PCSR09	0	0	TP/AP
SEMS LIEN ON PROPERTY	SEMSLIENS	0	0	TP/AP
SECTION SEVEN TRACKING SYSTEM	SSTS	0	0	TP/AP
TOXIC SUBSTANCE CONTROL ACT INVENTORY	TSCA	0	0	TP/AP
TOXICS RELEASE INVENTORY	TRI	0	0	TP/AP
ALTERNATIVE FUELING STATIONS	ALTFUELS	0	0	0.2500
FEMA OWNED STORAGE TANKS	FEMAUST	0	0	0.2500
HISTORICAL GAS STATIONS	HISTPST	0	0	0.2500
INTEGRATED COMPLIANCE INFORMATION SYSTEM DRYCLEANERS	ICISCLEANERS	0	0	0.2500
MINE SAFETY AND HEALTH ADMINISTRATION MASTER INDEX FILE	MSHA	0	0	0.2500
MINERAL RESOURCE DATA SYSTEM	MRDS	0	0	0.2500
OPEN DUMP INVENTORY	ODI	0	0	0.5000
SURFACE MINING CONTROL AND RECLAMATION ACT SITES	SMCRA	0	0	0.5000
URANIUM MILL TAILINGS RADIATION CONTROL ACT SITES	USUMTRCA	0	0	0.5000
DEPARTMENT OF DEFENSE SITES	DOD	0	0	1.0000
FORMER MILITARY NIKE MISSILE SITES	NMS	0	0	1.0000
FORMERLY USED DEFENSE SITES	FUDS	0	0	1.0000
FORMERLY UTILIZED SITES REMEDIAL ACTION PROGRAM	FUSRAP	0	0	1.0000
RECORD OF DECISION SYSTEM	RODS	0	0	1.0000

SUB-TOTAL		0	0	

Database Summary

STATE (CA) LISTING

Standard Environmental Records

Database	**Acronym**	**Locatable**	**Unlocatable**	**Search Radius (miles)**
DTSC DEED RESTRICTIONS	DTSCDR	0	0	TP/AP
ABOVE GROUND STORAGE TANKS	ABST	0	0	0.2500
ABOVEGROUND STORAGE TANKS PRIOR TO JANUARY 2008	AST2007	0	0	0.2500
HISTORICAL UNDERGROUND STORAGE TANKS	HISTUST	0	0	0.2500
STATEWIDE ENVIRONMENTAL EVALUATION AND PLANNING SYSTEM	SWEEPS	0	0	0.2500
UNDERGROUND STORAGE TANKS	USTCUPA	0	0	0.2500
BROWNFIELD SITES	BF	0	0	0.5000
CALSITES DATABASE	CALSITES	0	0	0.5000
GEOTRACKER CLEANUP SITES	CLEANUPSITES	0	0	0.5000
LEAKING UNDERGROUND STORAGE TANKS	LUST	0	0	0.5000
SOLID WASTE INFORMATION SYSTEM SITES	SWIS	0	0	0.5000
VOLUNTARY CLEANUP PROGRAM	VCP	0	0	0.5000
ENVIROSTOR CLEANUP SITES	ENVIROSTOR	0	0	1.0000
ENVIROSTOR PERMITTED AND CORRECTIVE ACTION SITES	ENVIROSTORPCA	0	0	1.0000

SUB-TOTAL		0	0	

Additional Environmental Records

Database	**Acronym**	**Locatable**	**Unlocatable**	**Search Radius (miles)**
CALIFORNIA HAZARDOUS MATERIAL INCIDENT REPORT SYSTEM	CHMIRS	0	0	TP/AP
CLANDESTINE DRUG LABS	CDL	0	0	TP/AP
EMISSIONS INVENTORY DATA	EMI	0	0	TP/AP
HAZARDOUS WASTE TANNER SUMMARY	HWTS	0	0	TP/AP
LAND DISPOSAL SITES	LDS	0	0	TP/AP
MILITARY CLEANUP SITES	MCS	0	0	TP/AP
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM FACILITIES	NPDES	0	0	TP/AP
RECORDED ENVIRONMENTAL CLEANUP LIENS	LIENS	0	0	TP/AP
CALIFORNIA MEDICAL WASTE MANAGEMENT PROGRAM FACILITY LIST	MWMP	0	0	0.2500
DTSC REGISTERED HAZARDOUS WASTE TRANSPORTERS	DTSCHWT	0	0	0.2500
DRY CLEANER FACILITIES	CLEANER	0	0	0.2500
MINES LISTING	MINES	0	0	0.2500

Database Summary

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
SPILLS, LEAKS, INVESTIGATION & CLEANUP RECOVERY LISTING	SLIC	0	0	0.2500
CORTESE LIST	CORTESE	0	0	0.5000
EXPEDITED REMOVAL ACTION PROGRAM SITES	ERAP	0	0	0.5000
HISTORICAL CORTESE LIST	HISTCORTESE	0	0	0.5000
LISTING OF CERTIFIED DROPOFF, COLLECTION, AND COMMUNITY SERVICE PROGRAMS	DROP	0	0	0.5000
LISTING OF CERTIFIED PROCESSORS	PROC	0	0	0.5000
NO FURTHER ACTION DETERMINATION	NFA	0	0	0.5000
RECYCLING CENTERS	SWRCY	0	0	0.5000
REFERRED TO ANOTHER LOCAL OR STATE AGENCY	REF	0	0	0.5000
SITES NEEDING FURTHER EVALUATION	NFE	0	0	0.5000
WASTE MANAGEMENT UNIT DATABASE	WMUDS	0	0	0.5000
TOXIC PITS CLEANUP ACT SITES	TOXPITS	0	0	1.0000

SUB-TOTAL		0	0	

Database Summary

LOCAL LISTING

Standard Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
CITY OF LOS ANGELES CUPA ABOVE GROUND PETROLEUM STORAGE TANKS	LAFDAST	0	0	0.2500
CITY OF LOS ANGELES CUPA UNDERGROUND STORAGE TANKS	LAFDUST	0	0	0.2500
SUB-TOTAL		0	0	

Additional Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
CITY OF LOS ANGELES CUPA HAZARDOUS MATERIALS SITES	LAFDHMS	0	0	TP/AP
LOS ANGELES COUNTY HAZARDOUS MATERIALS SYSTEM	LAHMS	0	0	TP/AP
LOS ANGELES COUNTY SITE MITIGATION LIST	LASM	0	0	TP/AP
ORANGE COUNTY HAZARDOUS WASTE FACILITIES	OCHWFAC	0	0	TP/AP
ORANGE COUNTY ABOVEGROUND PETROLEUM STORAGE TANKS	OCAPST	0	0	0.2500
ORANGE COUNTY UNDERGROUND STORAGE TANKS	OCUST	0	0	0.2500
SAN BERNARDINO COUNTY HAZARDOUS SITE LISTING	SBFD	0	0	0.2500
SAN BERNARDINO COUNTY MEDICAL WASTE FACILITY LIST	SBMW	0	0	0.2500
WELL INVESTIGATIONS PROGRAM CASE LIST	WIP	0	0	0.2500
LOS ANGELES COUNTY CUPA	LACCUPA	0	0	0.5000
LOS ANGELES COUNTY SOLID WASTE FACILITIES	LASWF	0	0	0.5000
ORANGE COUNTY INDUSTRIAL SITE CLEANUPS	OCISC	0	0	0.5000
ORANGE COUNTY LEAKING UNDERGROUND STORAGE TANKS	OCLUST	0	0	0.5000
ORANGE COUNTY NON-PETROLEUM UNDERGROUND STORAGE TANK CASES	OCNPUST	0	0	0.5000
SAN GABRIEL VALLEY AREAS OF CONCERN	AOC	0	0	1.0000
SUB-TOTAL		0	0	

TRIBAL LISTING

Standard Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
UNDERGROUND STORAGE TANKS ON TRIBAL LANDS	USTR09	0	0	0.2500
ILLEGAL DUMP SITES ON THE TORRES MARTINEZ RESERVATION	TORRESDUMPSITES	0	0	0.5000
LEAKING UNDERGROUND STORAGE TANKS ON TRIBAL LANDS	LUSTR09	0	0	0.5000
OPEN DUMP INVENTORY ON TRIBAL LANDS	ODINDIAN	0	0	0.5000
SUB-TOTAL		0	0	

Additional Environmental Records

Database	Acronym	Locatable	Unlocatable	Search Radius (miles)
INDIAN RESERVATIONS	INDIANRES	0	0	1.0000
SUB-TOTAL		0	0	

TOTAL		0	0	

Database Radius Summary

FEDERAL LISTING

*Standard environmental records are displayed in **bold**.*

Acronym	Search Radius (miles)	TP/AP (0 - 0.02)	1/8 Mile (> TP/AP)	1/4 Mile (> 1/8)	1/2 Mile (> 1/4)	1 Mile (> 1/2)	> 1 Mile	Total
AIRSAFS	0.0200	0	NS	NS	NS	NS	NS	0
BRS	0.0200	0	NS	NS	NS	NS	NS	0
CDL	0.0200	0	NS	NS	NS	NS	NS	0
DOCKETS	0.0200	0	NS	NS	NS	NS	NS	0
EC	**0.0200**	**0**	**NS**	**NS**	**NS**	**NS**	**NS**	**0**
ECHOR09	0.0200	0	NS	NS	NS	NS	NS	0
ERNSCA	**0.0200**	**0**	**NS**	**NS**	**NS**	**NS**	**NS**	**0**
FRSCA	0.0200	0	NS	NS	NS	NS	NS	0
HMIRSR09	0.0200	0	NS	NS	NS	NS	NS	0
ICIS	0.0200	0	NS	NS	NS	NS	NS	0
ICISNPDES	0.0200	0	NS	NS	NS	NS	NS	0
LUCIS	**0.0200**	**0**	**NS**	**NS**	**NS**	**NS**	**NS**	**0**
MLTS	0.0200	0	NS	NS	NS	NS	NS	0
NPDESR09	0.0200	0	NS	NS	NS	NS	NS	0
PADS	0.0200	0	NS	NS	NS	NS	NS	0
PCSR09	0.0200	0	NS	NS	NS	NS	NS	0
RCRASC	**0.0200**	**0**	**NS**	**NS**	**NS**	**NS**	**NS**	**0**
SEMSLIENS	0.0200	0	NS	NS	NS	NS	NS	0
SFLIENS	0.0200	0	NS	NS	NS	NS	NS	0
SSTS	0.0200	0	NS	NS	NS	NS	NS	0
TRI	0.0200	0	NS	NS	NS	NS	NS	0
TSCA	0.0200	0	NS	NS	NS	NS	NS	0
RCRAGR09	**0.1250**	**0**	**0**	**NS**	**NS**	**NS**	**NS**	**0**
RCRANGR09	**0.1250**	**0**	**0**	**NS**	**NS**	**NS**	**NS**	**0**
ALTFUELS	0.2500	0	0	0	NS	NS	NS	0
FEMAUST	0.2500	0	0	0	NS	NS	NS	0
HISTPST	0.2500	0	0	0	NS	NS	NS	0
ICISCLEANERS	0.2500	0	0	0	NS	NS	NS	0
MRDS	0.2500	0	0	0	NS	NS	NS	0
MSHA	0.2500	0	0	0	NS	NS	NS	0
BF	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
DNPL	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
NLRRCRAT	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
ODI	0.5000	0	0	0	0	NS	NS	0
RCRAT	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**

Database Radius Summary

Acronym	*Search Radius (miles)*	*TP/AP (0 - 0.02)*	*1/8 Mile (> TP/AP)*	*1/4 Mile (> 1/8)*	*1/2 Mile (> 1/4)*	*1 Mile (> 1/2)*	*> 1 Mile*	*Total*
SEMS	***0.5000***	***0***	***0***	***0***	***0***	***NS***	***NS***	***0***
SEMSARCH	***0.5000***	***0***	***0***	***0***	***0***	***NS***	***NS***	***0***
SMCRA	*0.5000*	*0*	*0*	*0*	*0*	*NS*	*NS*	*0*
USUMTRCA	*0.5000*	*0*	*0*	*0*	*0*	*NS*	*NS*	*0*
DOD	*1.0000*	*0*	*0*	*0*	*0*	*0*	*NS*	*0*
FUDS	*1.0000*	*0*	*0*	*0*	*0*	*0*	*NS*	*0*
FUSRAP	*1.0000*	*0*	*0*	*0*	*0*	*0*	*NS*	*0*
NLRRCRAC	***1.0000***	***0***	***0***	***0***	***0***	***0***	***NS***	***0***
NMS	*1.0000*	*0*	*0*	*0*	*0*	*0*	*NS*	*0*
NPL	***1.0000***	***0***	***0***	***0***	***0***	***0***	***NS***	***0***
PNPL	***1.0000***	***0***	***0***	***0***	***0***	***0***	***NS***	***0***
RCRAC	***1.0000***	***0***	***0***	***0***	***0***	***0***	***NS***	***0***
RCRASUBC	***1.0000***	***0***	***0***	***0***	***0***	***0***	***NS***	***0***
RODS	*1.0000*	*0*	*0*	*0*	*0*	*0*	*NS*	*0*
SUB-TOTAL		*0*	*0*	*0*	*0*	*0*	*0*	*0*

Database Radius Summary

STATE (CA) LISTING

Standard environmental records are displayed in ***bold****.*

Acronym	Search Radius (miles)	TP/AP (0 - 0.02)	1/8 Mile (> TP/AP)	1/4 Mile (> 1/8)	1/2 Mile (> 1/4)	1 Mile (> 1/2)	> 1 Mile	Total
CDL	0.0200	0	NS	NS	NS	NS	NS	0
CHMIRS	0.0200	0	NS	NS	NS	NS	NS	0
DTSCDR	**0.0200**	**0**	**NS**	**NS**	**NS**	**NS**	**NS**	**0**
EMI	0.0200	0	NS	NS	NS	NS	NS	0
HWTS	0.0200	0	NS	NS	NS	NS	NS	0
LDS	0.0200	0	NS	NS	NS	NS	NS	0
LIENS	0.0200	0	NS	NS	NS	NS	NS	0
MCS	0.0200	0	NS	NS	NS	NS	NS	0
NPDES	0.0200	0	NS	NS	NS	NS	NS	0
ABST	**0.2500**	**0**	**0**	**0**	**NS**	**NS**	**NS**	**0**
AST2007	**0.2500**	**0**	**0**	**0**	**NS**	**NS**	**NS**	**0**
CLEANER	0.2500	0	0	0	NS	NS	NS	0
DTSCHWT	0.2500	0	0	0	NS	NS	NS	0
HISTUST	**0.2500**	**0**	**0**	**0**	**NS**	**NS**	**NS**	**0**
MINES	0.2500	0	0	0	NS	NS	NS	0
MWMP	0.2500	0	0	0	NS	NS	NS	0
SLIC	0.2500	0	0	0	NS	NS	NS	0
SWEEPS	**0.2500**	**0**	**0**	**0**	**NS**	**NS**	**NS**	**0**
USTCUPA	**0.2500**	**0**	**0**	**0**	**NS**	**NS**	**NS**	**0**
BF	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
CALSITES	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
CLEANUPSITES	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
CORTESE	0.5000	0	0	0	0	NS	NS	0
DROP	0.5000	0	0	0	0	NS	NS	0
ERAP	0.5000	0	0	0	0	NS	NS	0
HISTCORTESE	0.5000	0	0	0	0	NS	NS	0
LUST	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
NFA	0.5000	0	0	0	0	NS	NS	0
NFE	0.5000	0	0	0	0	NS	NS	0
PROC	0.5000	0	0	0	0	NS	NS	0
REF	0.5000	0	0	0	0	NS	NS	0
SWIS	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
SWRCY	0.5000	0	0	0	0	NS	NS	0
VCP	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
WMUDS	0.5000	0	0	0	0	NS	NS	0

Database Radius Summary

Acronym	*Search Radius (miles)*	*TP/AP (0 - 0.02)*	*1/8 Mile (> TP/AP)*	*1/4 Mile (> 1/8)*	*1/2 Mile (> 1/4)*	*1 Mile (> 1/2)*	*> 1 Mile*	*Total*
ENVIROSTOR	***1.0000***	***0***	***0***	***0***	***0***	***0***	***NS***	***0***
ENVIROSTORPCA	***1.0000***	***0***	***0***	***0***	***0***	***0***	***NS***	***0***
TOXPITS	*1.0000*	*0*	*0*	*0*	*0*	*0*	*NS*	*0*
SUB-TOTAL		*0*	*0*	*0*	*0*	*0*	*0*	*0*

Database Radius Summary

LOCAL LISTING

*Standard environmental records are displayed in **bold**.*

Acronym	Search Radius (miles)	TP/AP (0 - 0.02)	1/8 Mile (> TP/AP)	1/4 Mile (> 1/8)	1/2 Mile (> 1/4)	1 Mile (> 1/2)	> 1 Mile	Total
LAFDHMS	0.0200	0	NS	NS	NS	NS	NS	0
LAHMS	0.0200	0	NS	NS	NS	NS	NS	0
LASM	0.0200	0	NS	NS	NS	NS	NS	0
OCHWFAC	0.0200	0	NS	NS	NS	NS	NS	0
LAFDAST	**0.2500**	**0**	**0**	**0**	**NS**	**NS**	**NS**	**0**
LAFDUST	**0.2500**	**0**	**0**	**0**	**NS**	**NS**	**NS**	**0**
OCAPST	0.2500	0	0	0	NS	NS	NS	0
OCUST	0.2500	0	0	0	NS	NS	NS	0
SBFD	0.2500	0	0	0	NS	NS	NS	0
SBMW	0.2500	0	0	0	NS	NS	NS	0
WIP	0.2500	0	0	0	NS	NS	NS	0
LACCUPA	0.5000	0	0	0	0	NS	NS	0
LASWF	0.5000	0	0	0	0	NS	NS	0
OCISC	0.5000	0	0	0	0	NS	NS	0
OCLUST	0.5000	0	0	0	0	NS	NS	0
OCNPUST	0.5000	0	0	0	0	NS	NS	0
AOC	1.0000	0	0	0	0	0	NS	0
SUB-TOTAL		0	0	0	0	0	0	0

Database Radius Summary

TRIBAL LISTING

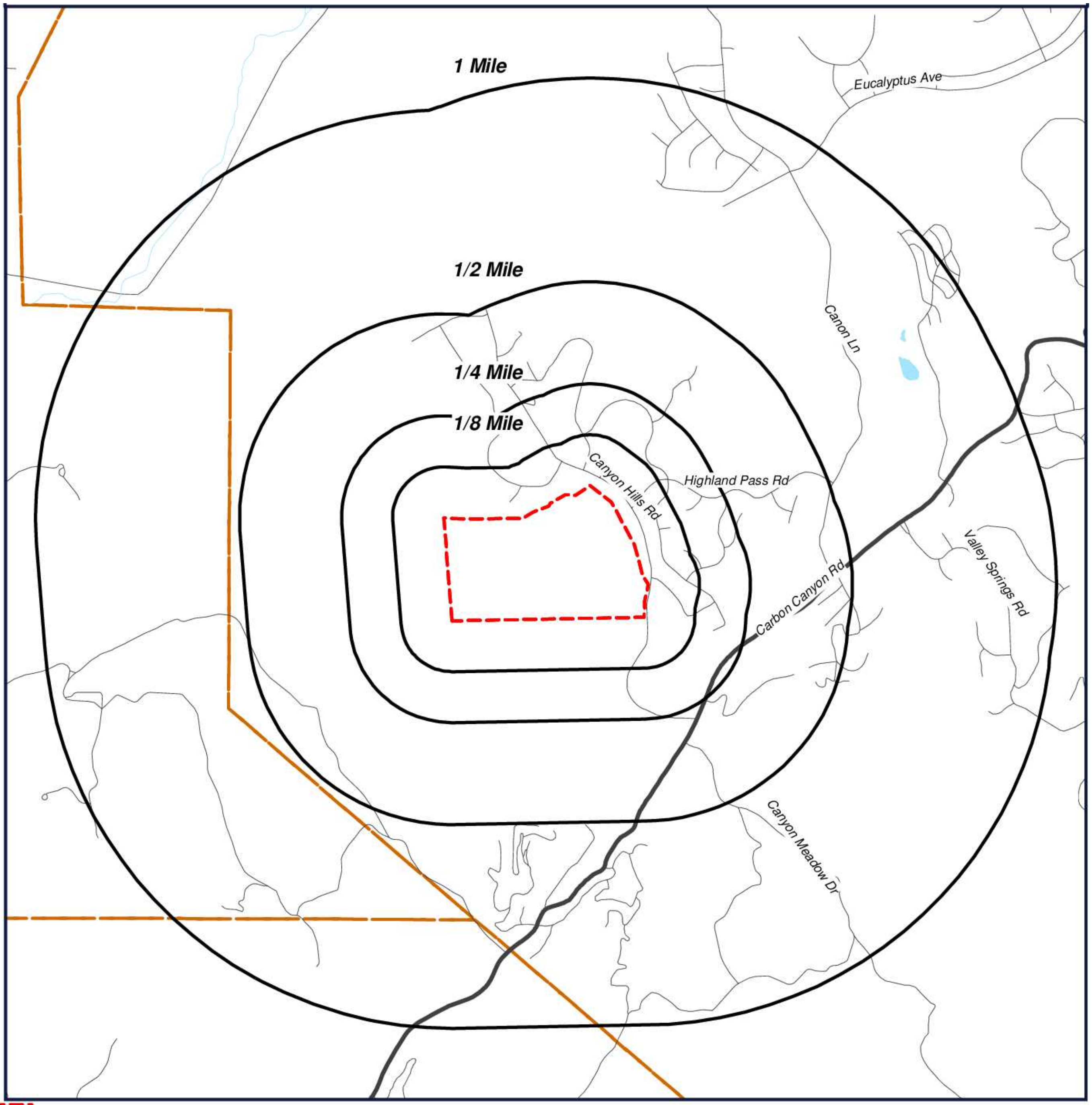
*Standard environmental records are displayed in **bold**.*

Acronym	Search Radius (miles)	TP/AP (0 - 0.02)	1/8 Mile (> TP/AP)	1/4 Mile (> 1/8)	1/2 Mile (> 1/4)	1 Mile (> 1/2)	> 1 Mile	Total
USTR09	**0.2500**	**0**	**0**	**0**	**NS**	**NS**	**NS**	**0**
LUSTR09	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
ODINDIAN	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
TORRESDUMPSITES	**0.5000**	**0**	**0**	**0**	**0**	**NS**	**NS**	**0**
INDIANRES	1.0000	0	0	0	0	0	NS	0
SUB-TOTAL		0	0	0	0	0	0	0

TOTAL		0	0	0	0	0	0	0

NOTES:
NS = NOT SEARCHED
TP/AP = TARGET PROPERTY/ADJACENT PROPERTY

Radius Map 1

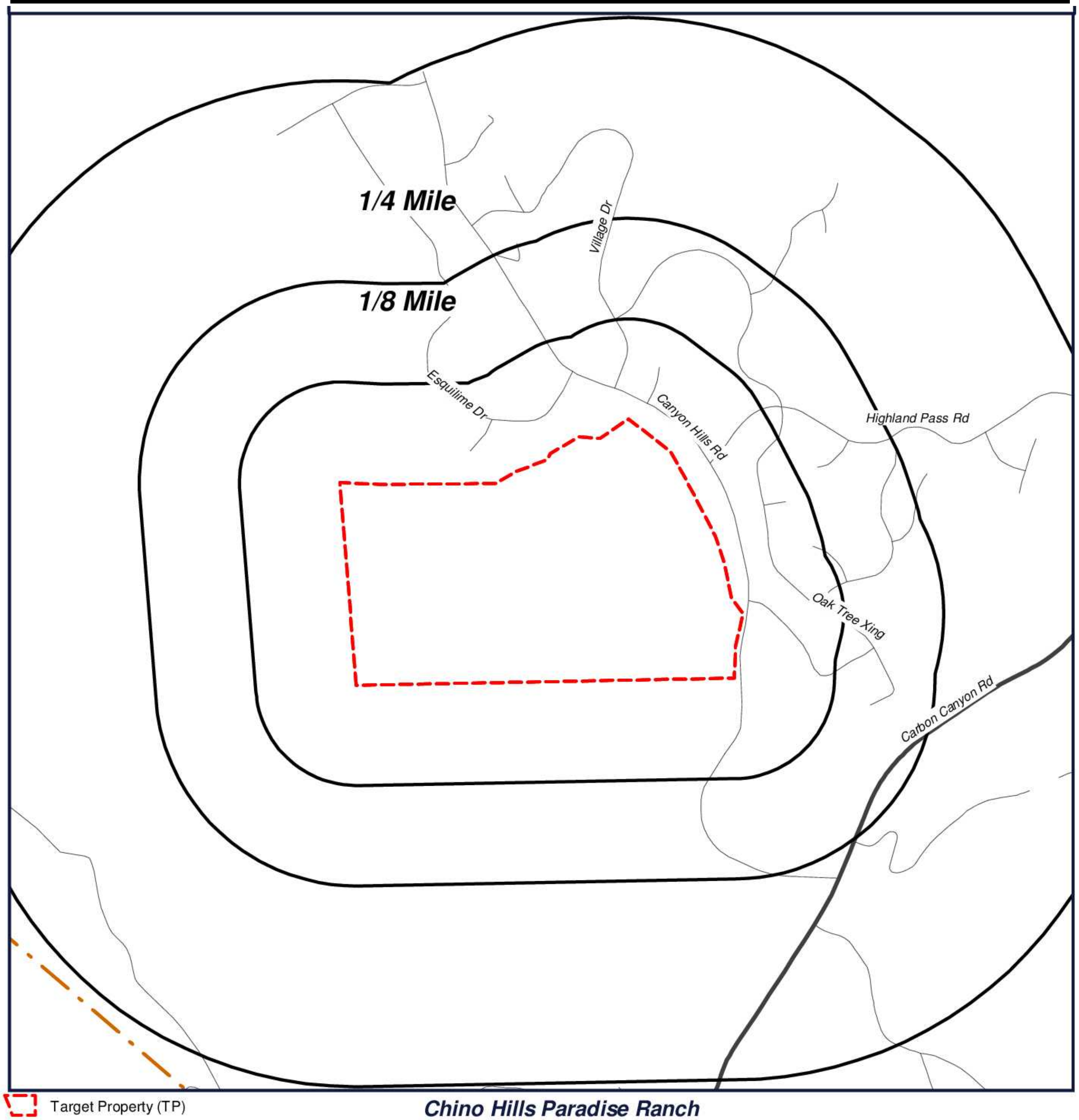


Target Property (TP)

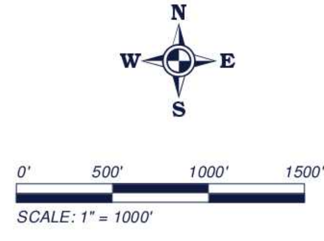
Chino Hills Paradise Ranch
Canyon Hills Road and
Esquilime Drive
Chino Hills, California
91709

[Click here to access Satellite view]

Radius Map 2

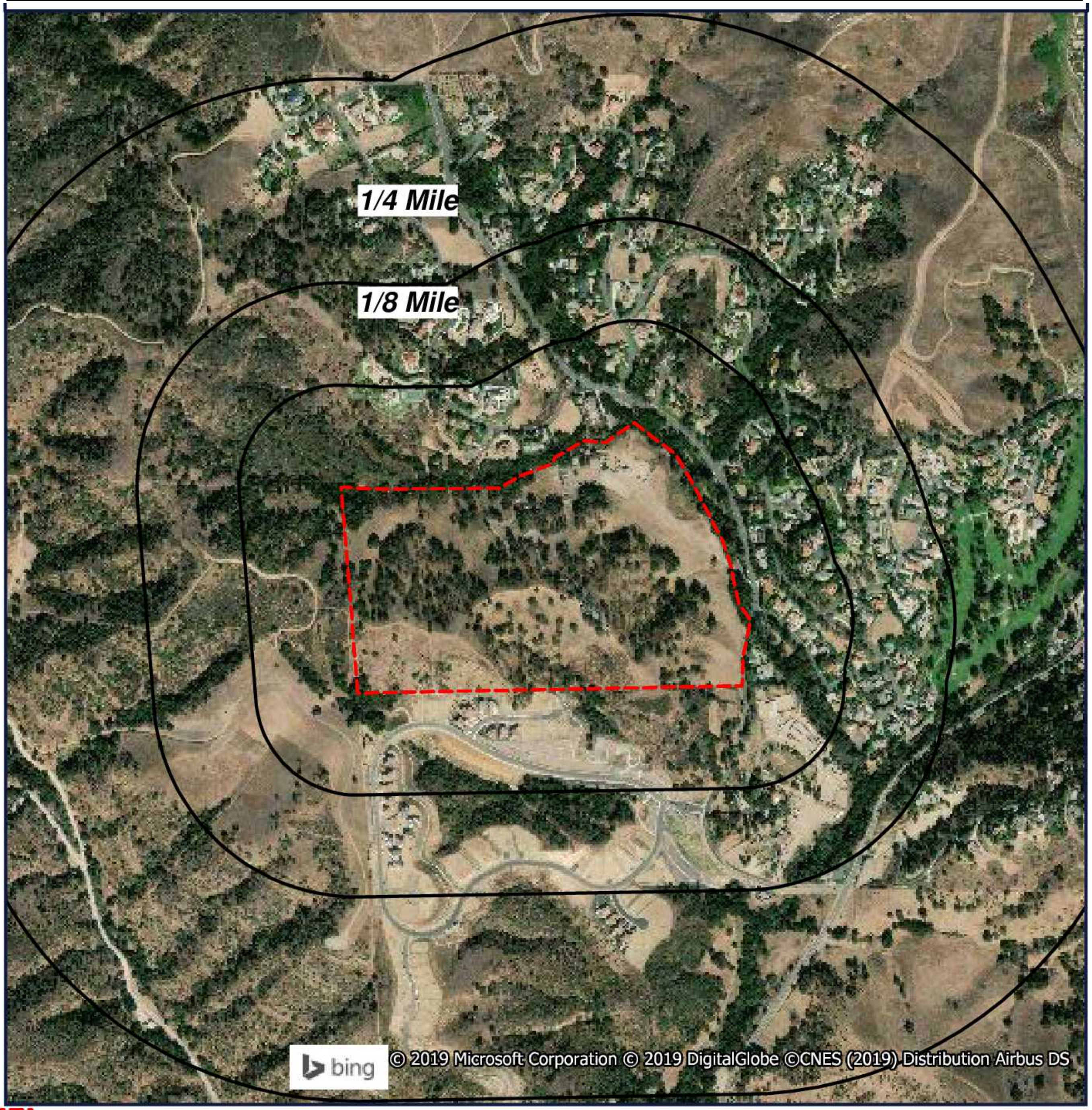


Chino Hills Paradise Ranch
Canyon Hills Road and
Esquilime Drive
Chino Hills, California
91709



[*Click here to access Satellite view*]

Ortho Map



Target Property (TP)

Quadrangle(s): Yorba Linda
Chino Hills Paradise Ranch
Canyon Hills Road and
Esquilime Drive
Chino Hills, California
91709

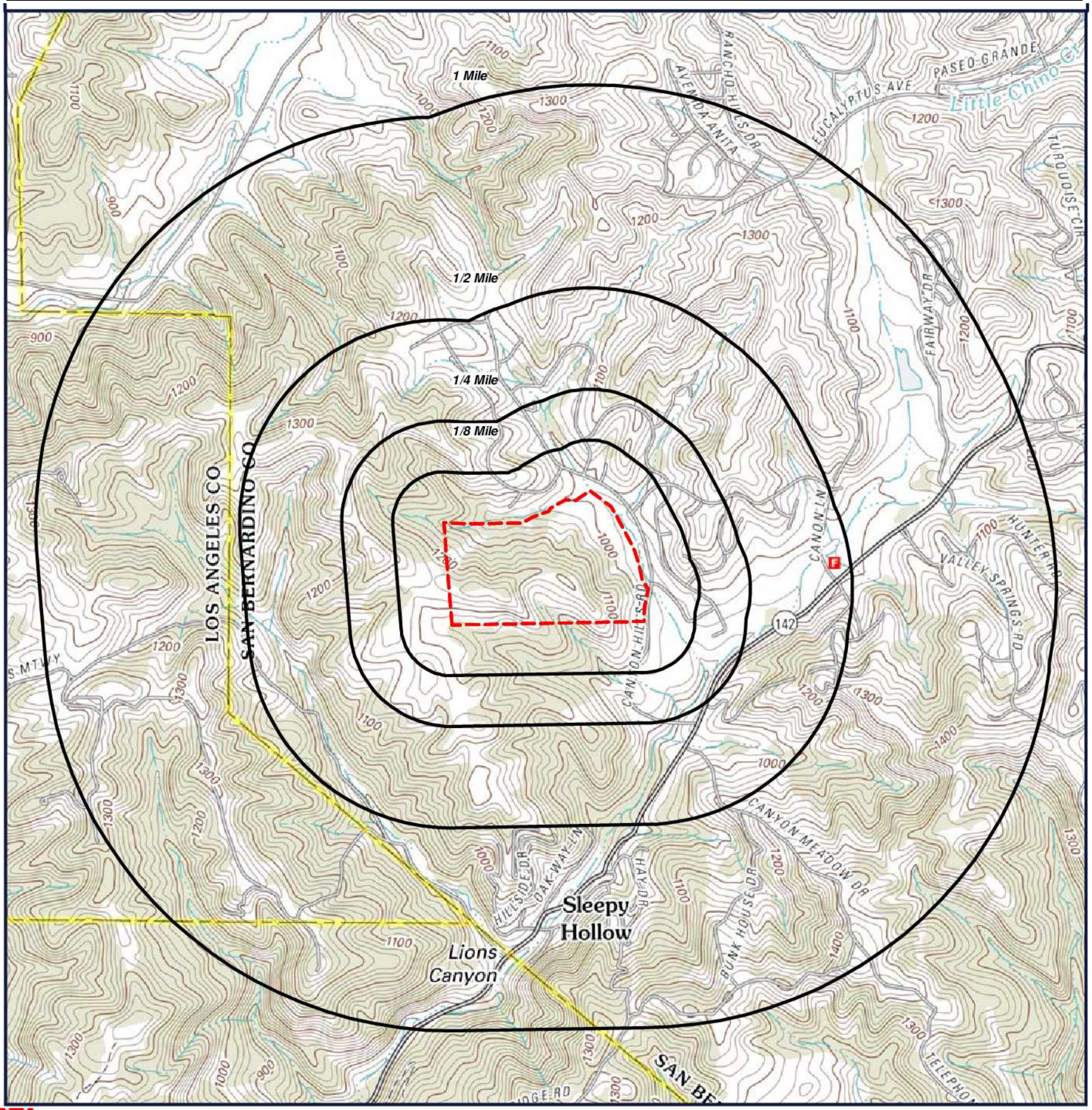
N W E S

0' 500' 1000' 1500'

SCALE: 1" = 1000'

Click here to access Satellite view

Topographic Map



Target Property (TP)

Quadrangle(s): Yorba Linda
Source: USGS, 05/15/2012
Chino Hills Paradise Ranch
Canyon Hills Road and
Esquilime Drive
Chino Hills, California
91709

N W E S

0' 1000' 2000' 3000'

SCALE: 1" = 2000'

[Click here to access Satellite view]

Located Sites Summary

No Records Found.

Elevation Summary

Elevations are collected from the USGS 3D Elevation Program 1/3 arc-second (approximately 10 meters) layer hosted at the NGTOC. .

Target Property Elevation: 1185 ft.

*NOTE: Standard environmental records are displayed in **bold**.*

No Records Found.

Unlocated Sites Summary

This list contains sites that could not be mapped due to limited or incomplete address information.

No Records Found

Environmental Records Definitions - FEDERAL

AIRSAFS Aerometric Information Retrieval System / Air Facility Subsystem

VERSION DATE: 10/20/14

The United States Environmental Protection Agency (EPA) modified the Aerometric Information Retrieval System (AIRS) to a database that exclusively tracks the compliance of stationary sources of air pollution with EPA regulations: the Air Facility Subsystem (AFS). Since this change in 2001, the management of the AIRS/AFS database was assigned to EPA's Office of Enforcement and Compliance Assurance.

BRS Biennial Reporting System

VERSION DATE: 12/31/15

The United States Environmental Protection Agency (EPA), in cooperation with the States, biennially collects information regarding the generation, management, and final disposition of hazardous wastes regulated under the Resource Conservation and Recovery Act of 1976 (RCRA), as amended. The Biennial Report captures detailed data on the generation of hazardous waste from large quantity generators and data on waste management practices from treatment, storage and disposal facilities. Currently, the EPA states that data collected between 1991 and 1997 was originally a part of the defunct Biennial Reporting System and is now incorporated into the RCRAInfo data system.

CDL Clandestine Drug Laboratory Locations

VERSION DATE: 10/05/17

The U.S. Department of Justice ("the Department") provides this information as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments. The Department does not establish, implement, enforce, or certify compliance with clean-up or remediation standards for contaminated sites; the public should contact a state or local health department or environmental protection agency for that information.

DOCKETS EPA Docket Data

VERSION DATE: 12/22/05

The United States Environmental Protection Agency Docket data lists Civil Case Defendants, filing dates as far back as 1971, laws broken including section, violations that occurred, pollutants involved, penalties assessed and superfund awards by facility and location. Please refer to ICIS database as source of current data.

EC Federal Engineering Institutional Control Sites

VERSION DATE: 08/03/15

This database includes site locations where Engineering and/or Institutional Controls have been identified as part of a selected remedy for the site as defined by United States Environmental Protection Agency official remedy decision documents. A site listing does not indicate that the institutional and engineering controls are currently in place nor will be in place once the remedy is complete; it only indicates that the decision to include either of them in the remedy is documented as of the completed date of the document. Institutional controls are actions, such as legal controls, that help minimize the potential for human exposure to contamination by ensuring appropriate land or resource use. Engineering controls include caps, barriers, or other device engineering to prevent access, exposure, or continued migration of contamination.

ECHOR09 Enforcement and Compliance History Information

VERSION DATE: 03/09/19

The U.S. Environmental Protection Agency's Enforcement and Compliance History Online (ECHO) database, provides compliance and enforcement information for facilities nationwide. This database includes facilities regulated as Clean Air Act stationary sources, Clean Water Act direct dischargers, Resource Conservation and Recovery Act hazardous waste handlers, Safe Drinking Water Act public water systems along with other data, such as Toxics Release Inventory releases.

ERNSCA Emergency Response Notification System

VERSION DATE: 10/28/18

This National Response Center database contains data on reported releases of oil, chemical, radiological, biological, and/or etiological discharges into the environment anywhere in the United States and its territories. The data comes from spill reports made to the U.S. Environmental Protection Agency, U.S. Coast Guard, the National Response Center and/or the U.S. Department of Transportation.

FRSCA Facility Registry System

VERSION DATE: 10/09/18

The United States Environmental Protection Agency's Office of Environmental Information (OEI) developed the Facility Registry System (FRS) as the centrally managed database that identifies facilities, sites or places subject to environmental regulations or of environmental interest. The Facility Registry System replaced the Facility Index System or FINDS database.

HMIRSR09 Hazardous Materials Incident Reporting System

VERSION DATE: 09/30/18

The HMIRS database contains unintentional hazardous materials release information reported to the U.S. Department of Transportation located in EPA Region 9. This region includes the following states: Arizona, California, Hawaii, Nevada, and the territories of Guam and American Samoa.

ICIS Integrated Compliance Information System (formerly DOCKETS)

VERSION DATE: 03/09/19

ICIS is a case activity tracking and management system for civil, judicial, and administrative federal Environmental Protection Agency enforcement cases. ICIS contains information on federal administrative and federal judicial cases under the following environmental statutes: the Clean Air Act, the Clean Water Act, the Resource Conservation and Recovery Act, the Emergency Planning and Community Right-to-Know Act - Section 313, the Toxic Substances Control Act, the Federal Insecticide, Fungicide, and Rodenticide Act, the Comprehensive Environmental Response, Compensation, and Liability Act, the Safe Drinking Water Act, and the Marine Protection, Research, and Sanctuaries Act.

ICISNPDES Integrated Compliance Information System National Pollutant Discharge Elimination System

VERSION DATE: 07/09/17

Authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. This database is provided by the U.S. Environmental Protection Agency.

LUCIS Land Use Control Information System

VERSION DATE: 09/01/06

The LUCIS database is maintained by the U.S. Department of the Navy and contains information for former Base Realignment and Closure (BRAC) properties across the United States.

MLTS Material Licensing Tracking System

VERSION DATE: 06/29/17

MLTS is a list of approximately 8,100 sites which have or use radioactive materials subject to the United States Nuclear Regulatory Commission (NRC) licensing requirements. Disclaimer: Due to agency regulations and policies, this database contains applicant/licensee location information which may or may not be related to the physical location per MLTS site.

NPDESR09 National Pollutant Discharge Elimination System

VERSION DATE: 04/01/07

Authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. The NPDES database was collected from the U.S. Environmental Protection Agency (EPA) from December 2002 through April 2007. Refer to the PCS and/or ICIS-NPDES database as source of current data. This database includes permitted facilities located in EPA Region 9. This region includes the following states: Arizona, California, Hawaii, Nevada, and the territories of Guam and American Samoa.

PADS PCB Activity Database System

VERSION DATE: 09/14/18

PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the U.S. Environmental Protection Agency of such activities.

PCSR09 Permit Compliance System

VERSION DATE: 08/01/12

The Permit Compliance System is used in tracking enforcement status and permit compliance of facilities controlled by the National Pollutant Discharge Elimination System (NPDES) under the Clean Water Act and is maintained by the United States Environmental Protection Agency's Office of Compliance. PCS is designed to support the NPDES program at the state, regional, and national levels. This database includes permitted facilities located in EPA Region 9. This region includes the following states: Arizona, California, Hawaii, Nevada, and the territories of Guam and American Samoa. PCS has been modernized, and no longer exists. National Pollutant Discharge Elimination System (ICIS-NPDES) data can now be found in Integrated Compliance Information System (ICIS).

RCRASC RCRA Sites with Controls

VERSION DATE: 02/22/19

The Resource Conservation and Recovery Act (RCRA) gives the U.S. Environmental Protection Agency (EPA) the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. This listing refers to facilities with institutional controls in place.

SEMSLIENS SEMS Lien on Property

VERSION DATE: 08/13/18

The U.S. Environmental Protection Agency's (EPA) Office of Solid Waste and Emergency Response, Office of Superfund Remediation and Technology Innovation (OSRTI), has implemented The Superfund Enterprise Management System (SEMS), formerly known as CERCLIS (Comprehensive Environmental Response, Compensation and Liability Information System) to track and report on clean-up and enforcement activities taking place at Superfund sites. SEMS represents a joint development and ongoing collaboration between Superfund's Remedial, Removal, Federal Facilities, Enforcement and Emergency Response programs. This is a listing of SEMS sites with a lien on the property.

SFLIENS CERCLIS Liens

VERSION DATE: 06/08/12

A Federal CERCLA ("Superfund") lien can exist by operation of law at any site or property at which United States Environmental Protection Agency has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties. This database contains those CERCLIS sites where the Lien on Property action is complete. Please refer to the SEMSLIENS database as source of current data.

SSTS Section Seven Tracking System

VERSION DATE: 02/01/17

The United States Environmental Protection Agency tracks information on pesticide establishments through the Section Seven Tracking System (SSTS). SSTS records the registration of new establishments and records pesticide production at each establishment. The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) requires that production of pesticides or devices be conducted in a registered pesticide-producing or device-producing establishment. ("Production" includes formulation, packaging, repackaging, and relabeling.)

TRI Toxics Release Inventory

VERSION DATE: 12/31/16

The Toxics Release Inventory, provided by the United States Environmental Protection Agency, includes data on toxic chemical releases and waste management activities from certain industries as well as federal and tribal facilities. This inventory contains information about the types and amounts of toxic chemicals that are released each year to the air, water, and land as well as information on the quantities of toxic chemicals sent to other facilities for further waste management.

TSCA Toxic Substance Control Act Inventory

VERSION DATE: 12/31/12

The Toxic Substances Control Act (TSCA) was enacted in 1976 to ensure that chemicals manufactured, imported, processed, or distributed in commerce, or used or disposed of in the United States do not pose any unreasonable risks to human health or the environment. TSCA section 8(b) provides the United States Environmental Protection Agency authority to "compile, keep current, and publish a list of each chemical substance that is manufactured or processed in the United States." This TSCA Chemical Substance Inventory contains non-confidential information on the production amount of toxic chemicals from each manufacturer and importer site.

RCRAGR09 Resource Conservation & Recovery Act - Generator

VERSION DATE: 12/17/18

The Resource Conservation and Recovery Act (RCRA) gives the U.S. Environmental Protection Agency (EPA) the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. This listing refers to facilities currently generating hazardous waste. EPA Region 9 includes the following states: Arizona, California, Hawaii, Nevada, and the territories of Guam and American Samoa.

RCRANGR09 Resource Conservation & Recovery Act - Non-Generator

VERSION DATE: 12/17/18

The Resource Conservation and Recovery Act (RCRA) gives the U.S. Environmental Protection Agency (EPA) the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. This listing refers to facilities classified as non-generators. Non-Generators do not presently generate hazardous waste. EPA Region 9 includes the following states: Arizona, California, Hawaii, Nevada, and the territories of Guam and American Samoa.

ALTFUELS Alternative Fueling Stations

VERSION DATE: 03/01/19

Nationwide list of alternative fueling stations made available by the U.S. Department of Energy's Office of Energy Efficiency & Renewable Energy. Includes Bio-diesel stations, Ethanol (E85) stations, Liquefied Petroleum Gas (Propane) stations, Ethanol (E85) stations, Natural Gas stations, Hydrogen stations, and Electric Vehicle Supply Equipment (EVSE).

FEMAUST FEMA Owned Storage Tanks

VERSION DATE: 12/01/16

This is a listing of FEMA owned underground and aboveground storage tank sites. For security reasons, address information is not released to the public according to the U.S. Department of Homeland Security.

HISTPST Historical Gas Stations

VERSION DATE: NR

This historic directory of service stations is provided by the Cities Service Company. The directory includes Cities Service filling stations that were located throughout the United States in 1930.

ICISCLEANERS Integrated Compliance Information System Drycleaners

VERSION DATE: 03/09/19

This is a listing of drycleaner facilities from the Integrated Compliance Information System (ICIS). The U.S. Environmental Protection Agency (EPA) tracks facilities that possess NAIC and SIC codes that classify businesses as drycleaner establishments.

MRDS Mineral Resource Data System

VERSION DATE: 03/15/16

MRDS (Mineral Resource Data System) is a collection of reports describing metallic and nonmetallic mineral resources throughout the world. Included are deposit name, location, commodity, deposit description, geologic characteristics, production, reserves, resources, and references. This database contains the records previously provided in the Mineral Resource Data System (MRDS) of USGS and the Mineral Availability System/Mineral Industry Locator System (MAS/MILS) originated in the U.S. Bureau of Mines, which is now part of USGS.

MSHA Mine Safety and Health Administration Master Index File

VERSION DATE: 03/15/19

The Mine dataset lists all Coal and Metal/Non-Metal mines under MSHA's jurisdiction since 1/1/1970. It includes such information as the current status of each mine (Active, Abandoned, NonProducing, etc.), the current owner and operating company, commodity codes and physical attributes of the mine. Mine ID is the unique key for this data. This information is provided by the United States Department of Labor - Mine Safety and Health Administration (MSHA).

BF Brownfields Management System

VERSION DATE: 03/31/19

Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. The United States Environmental Protection Agency maintains this database to track activities in the various brown field grant programs including grantee assessment, site cleanup and site redevelopment. This database included tribal brownfield sites.

DNPL Delisted National Priorities List

VERSION DATE: 02/06/19

This database includes sites from the United States Environmental Protection Agency's Final National Priorities List (NPL) where remedies have proven to be satisfactory or sites where the original analyses were inaccurate, and the site is no longer appropriate for inclusion on the NPL, and final publication in the Federal Register has occurred.

NLRRCRAT No Longer Regulated RCRA Non-CORRACTS TSD Facilities

VERSION DATE: 12/17/18

This database includes RCRA Non-Corrective Action TSD facilities that are no longer regulated by the United States Environmental Protection Agency or do not meet other RCRA reporting requirements. This listing includes facilities that formerly treated, stored or disposed of hazardous waste.

ODI Open Dump Inventory

VERSION DATE: 06/01/85

The open dump inventory was published by the United States Environmental Protection Agency. An “open dump” is defined as a facility or site where solid waste is disposed of which is not a sanitary landfill which meets the criteria promulgated under section 4004 of the Solid Waste Disposal Act (42 U.S.C. 6944) and which is not a facility for disposal of hazardous waste. This inventory has not been updated since June 1985.

RCRAT Resource Conservation & Recovery Act - Non-CORRACTS Treatment, Storage & Disposal Facilities

VERSION DATE: 12/17/18

The Resource Conservation and Recovery Act (RCRA) gives the U.S. Environmental Protection Agency (EPA) the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. This listing refers to facilities recognized as hazardous waste treatment, storage, and disposal sites (TSD).

SEMS Superfund Enterprise Management System

VERSION DATE: 03/11/19

The U.S. Environmental Protection Agency's (EPA) Office of Solid Waste and Emergency Response, Office of Superfund Remediation and Technology Innovation (OSRTI), has implemented The Superfund Enterprise Management System (SEMS), formerly known as CERCLIS (Comprehensive Environmental Response, Compensation and Liability Information System) to track and report on clean-up and enforcement activities taking place at Superfund sites. SEMS represents a joint development and ongoing collaboration between Superfund's Remedial, Removal, Federal Facilities, Enforcement and Emergency Response programs.

SEMSARCH Superfund Enterprise Management System Archived Site Inventory

VERSION DATE: 03/11/19

The U.S. Environmental Protection Agency’s (EPA) Superfund Enterprise Management System Archived Site Inventory (List 8R Archived) replaced the CERCLIS NFRAP reporting system in 2015. This listing reflects sites at which the EPA has determined that assessment has been completed and no further remedial action is planned under the Superfund program.

SMCRA Surface Mining Control and Reclamation Act Sites

VERSION DATE: 03/19/19

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by the Office of Surface Mining Reclamation and Enforcement (OSMRE) to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of AML impacts, as well as, information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

USUMTRCA Uranium Mill Tailings Radiation Control Act Sites

VERSION DATE: 03/04/17

The Legacy Management Office of the Department of Energy (DOE) manages radioactive and chemical waste, environmental contamination, and hazardous material at over 100 sites across the U.S. The L.M. Office manages this database of sites registered under the Uranium Mill Tailings Control Act (UMTRCA).

DOD Department of Defense Sites

VERSION DATE: 12/01/14

This information originates from the National Atlas of the United States Federal Lands data, which includes lands owned or administered by the Federal government. Army DOD, Army Corps of Engineers DOD, Air Force DOD, Navy DOD and Marine DOD areas of 640 acres or more are included.

FUDS Formerly Used Defense Sites

VERSION DATE: 06/01/15

The Formerly Used Defense Sites (FUDS) inventory includes properties previously owned by or leased to the United States and under Secretary of Defense Jurisdiction, as well as Munitions Response Areas (MRAs). The remediation of these properties is the responsibility of the Department of Defense. This data is provided by the U.S. Army Corps of Engineers (USACE), the boundaries/polygon data are based on preliminary findings and not all properties currently have polygon data available. DISCLAIMER: This data represents the results of data collection/processing for a specific USACE activity and is in no way to be considered comprehensive or to be used in any legal or official capacity as presented on this site. While the USACE has made a reasonable effort to insure the accuracy of the maps and associated data, it should be explicitly noted that USACE makes no warranty, representation or guaranty, either expressed or implied, as to the content, sequence, accuracy, timeliness or completeness of any of the data provided herein. For additional information on Formerly Used Defense Sites please contact the USACE Public Affairs Office at (202) 528-4285.

FUSRAP Formerly Utilized Sites Remedial Action Program

VERSION DATE: 03/04/17

The U.S. Department of Energy (DOE) established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from the Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations. The DOE Office of Legacy Management (LM) established long-term surveillance and maintenance (LTS&M) requirements for remediated FUSRAP sites. DOE evaluates the final site conditions of a remediated site on the basis of risk for different future uses. DOE then confirms that LTS&M requirements will maintain protectiveness.

NLRRCRAC	No Longer Regulated RCRA Corrective Action Facilities
VERSION DATE: 12/17/18	

This database includes RCRA Corrective Action facilities that are no longer regulated by the United States Environmental Protection Agency or do not meet other RCRA reporting requirements.

NMS	Former Military Nike Missile Sites
VERSION DATE: 12/01/84	

This information was taken from report DRXTH-AS-IA-83A016 (Historical Overview of the Nike Missile System, 12/1984) which was performed by Environmental Science and Engineering, Inc. for the U.S. Army Toxic and Hazardous Materials Agency Assessment Division. The Nike system was deployed between 1954 and the mid-1970's. Among the substances used or stored on Nike sites were liquid missile fuel (JP-4); starter fluids (UDKH, aniline, and furfuryl alcohol); oxidizer (IRFNA); hydrocarbons (motor oil, hydraulic fluid, diesel fuel, gasoline, heating oil); solvents (carbon tetrachloride, trichloroethylene, trichloroethane, stoddard solvent); and battery electrolyte. The quantities of material a disposed of and procedures for disposal are not documented in published reports. Virtually all information concerning the potential for contamination at Nike sites is confined to personnel who were assigned to Nike sites. During deactivation most hardware was shipped to depot-level supply points. There were reportedly instances where excess materials were disposed of on or near the site itself at closure. There was reportedly no routine site decontamination.

NPL	National Priorities List
VERSION DATE: 02/06/19	

This database includes United States Environmental Protection Agency (EPA) National Priorities List sites that fall under the EPA's Superfund program, established to fund the cleanup of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action.

PNPL	Proposed National Priorities List
VERSION DATE: 02/06/19	

This database contains sites proposed to be included on the National Priorities List (NPL) in the Federal Register. The United States Environmental Protection Agency investigates these sites to determine if they may present long-term threats to public health or the environment.

RCRAC	Resource Conservation & Recovery Act - Corrective Action Facilities
VERSION DATE: 12/17/18	

The Resource Conservation and Recovery Act (RCRA) gives the U.S. Environmental Protection Agency (EPA) the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. This listing refers to facilities with corrective action activity.

RCRASUBC	Resource Conservation & Recovery Act - Subject to Corrective Action Facilities
VERSION DATE: 12/17/18	

The Resource Conservation and Recovery Act (RCRA) gives the U.S. Environmental Protection Agency (EPA) the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to RCRA enabled EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. This listing refers to facilities subject to corrective actions.

RODS	Record of Decision System
VERSION DATE: 02/06/19	

These decision documents maintained by the United States Environmental Protection Agency describe the chosen remedy for NPL (Superfund) site remediation. They also include site history, site description, site characteristics, community participation, enforcement activities, past and present activities, contaminated media, the contaminants present, and scope and role of response action.

CDL Clandestine Drug Labs

VERSION DATE: 12/31/17

The California Department of Toxic Substance Control (DTSC) maintains this listing of illegal drug laboratories. DTSC maintains a limited cost-tracking database to manage and pay appropriate contractor invoices for removal costs. The data source is an expenditure report with the contractors' invoice information and the reported removal action locations. The reported location information may or may not include the actual location of the illegal drug lab for several reasons. First, DTSC receives the location information verbally from law enforcement or local environmental health officials in the initial request for emergency support. Second, DTSC does not verify the information received and does not perform "data cleaning" or other measures to ensure data quality. Third, the location information may not be the actual location of an illegal drug lab or any hazardous substance release to the environment. The initial report may have provided the location of the nearest identifiable address to an illegal drug lab or mobile lab or abandonment of illegal drug lab wastes, or a nearby meeting location for the contractor. Please note the DTSC does not guarantee the accuracy of the address or location information or the condition of the location listed. The listing of an address or location in this database does not indicate that any illegal drug lab materials were or were not present there, and does not constitute a determination that the address or location either requires or does not require additional cleanup work or mitigation action.

CHMIRS California Hazardous Material Incident Report System

VERSION DATE: 10/24/18

The California Hazardous Material Incident Report System list is maintained by the California Governor's Office of Emergency Services (OES). This list contains all spills called in to the California OES Warning Center for a specific year since 1993.

DTSCDR DTSC Deed Restrictions

VERSION DATE: 01/06/19

The California Department of Toxic Substances Control (DTSC) maintains this listi of sites with deed restrictions. According to the DTSC, restricted land use indicates whether the site or area within the site has an environmental restriction recorded and/or other institutional control preventing certain types of land use or activities. The land use restrictions listed under the site management requirements are only an abbreviated summary of the land use restrictions, and may not encompass all restrictions and notification requirements placed on a property. For complete land use restriction information please contact the DTSC to review associated Land Use Restriction documents.

EMI Emissions Inventory Data

VERSION DATE: 12/31/16

This list of Emissions Inventory Data is maintained by the California Environmental Protection Agency California Environmental Agency Air Resources Board. This list includes criteria pollutant data and toxic data. Please note gas stations, print shops, autobody shops, and dry cleaners are not included in this list.

HWTS Hazardous Waste Tanner Summary

VERSION DATE: 12/31/17

The Hazardous Waste Tanner Summary is maintained by the California Department of Toxic Substances Control (DTSC). This list includes data extracted from the copies of hazardous waste manifests received each year by the DTSC.

LDS Land Disposal Sites

VERSION DATE: 01/09/19

This list of Land Disposal sites (Landfills) is a subset of the GeoTracker Cleanup Sites database, maintained by the California State Water Resources Control Board. Sites are queried from GeoTracker by case type = Land Disposal Site.

LIENS Recorded Environmental Cleanup Liens

VERSION DATE: 11/16/18

The California Department of Toxic Substance Control (DTSC) maintains this list of liens placed upon real properties. A lien is utilized by the DTSC to obtain reimbursement from responsible parties for costs associated with the remediation of contaminated properties.

MCS Military Cleanup Sites

VERSION DATE: 01/09/19

This list of Military sites is a subset of the GeoTracker Cleanup Sites database maintained by the California State Water Resources Control Board. Sites are queried from GeoTracker by case type = Military Cleanup Sites. This list includes : Military UST sites; Military Privatized sites; and Military Cleanup sites (formerly known as DoD non UST).

NPDES National Pollutant Discharge Elimination System Facilities

VERSION DATE: 03/03/19

This list of active, historical, and terminated National Pollutant Discharge Elimination System Facilities permits is maintained by the California Environmental Protection Agency State Water Resources Control Board. This data includes storm water general permit enrollees that are active or have been active within the past three years. Please note there can be multiple listings for a single permit due to multiple dischargers, multiple facilities, and/or multiple address listings. Please use the Regulatory Measure ID to identify duplicates, as this is a unique identifier for each permit.

ABST Above Ground Storage Tanks

VERSION DATE: 03/10/19

This database, provided by the California Environmental Protection Agency's (CalEPA) Regulated Site Portal, contains aboveground petroleum storage tank facilities originating from the California Environmental Reporting System (CERS). These facilities store petroleum in aboveground storage tanks with oversight by local agencies. As of January 1, 2008, Assembly Bill No. 1130 of the Aboveground Petroleum Storage Act (APSA) authorized the Certified Unified Program Agencies to implement and administer the requirements of the APSA. CalEPA Data Disclaimer: Information displayed in the portal is collected from separate agency databases and displayed unaltered. Information that is considered confidential, trade secret, or is otherwise protected by the agency that manages the database is not loaded into the portal. For more detail about information displayed in the portal, please visit the data source sites. Please refer to AST2007 database for aboveground storage tank information obtained from the California State Water Resources Control Board prior to 2008 APSA requirements.

AST2007 Aboveground Storage Tanks Prior to January 2008

VERSION DATE: 12/01/07

This database contains aboveground storage tank facilities registered with the California State Water Resources Control Board (SWRCB) between 2007 and 2003. Since 2006, tanks were required to contain a minimum (even as cumulative) of 1320 gallons to be in the program. As of January 1, 2008, the SWRCB no longer maintains a list of registered aboveground storage tanks, due to effective Assembly Bill No. 1130 (Laird) of the Aboveground Petroleum Storage Act (APSA). This Bill authorized the Certified Unified Program Agencies to implement and administer the requirements of the APSA. Please refer to ABST database as a current source for aboveground petroleum storage tank data.

CLEANER Dry Cleaner Facilities

VERSION DATE: 06/20/18

This list of dry cleaners is maintained by the California Department of Toxic Substances Control (DTSC). Data is extracted from the DTSC Hazardous Waste Tracking System. This list includes dry cleaner facilities that have registered EPA identification numbers. These facilities are categorized by SIC codes (7211, 7212, 7213, 7215, 7216, 7217, 7218, 7219). This database may also include facilities other than dry cleaners who also register with these same NAICS Codes. Not all companies report their NAICS/SIC Codes to the DTSC, therefore this database may exclude registered dry cleaner facilities with incomplete classification information.

DTSCHWT DTSC Registered Hazardous Waste Transporters

VERSION DATE: 02/03/19

The California Department of Toxic Substances Control maintains this list of Registered Hazardous Waste Transporters.

HISTUST Historical Underground Storage Tanks

VERSION DATE: 12/31/87

The Hazardous Substance Storage Container Database is a historical list of Underground Storage Tank sites, compiled from tank survey and registration information collected at one time between 1984 and 1987 by the State Water Resources Control Board. The hazardous substances stored within these tanks includes, but not restricted to, petroleum products, industrial solvents, and other materials.

MINES Mines Listing

VERSION DATE: 01/27/19

This list includes mine site locations extracted from the Mines Online database, maintained by the California Department of Conservation. Mines Online (MOL) is an interactive web map designed with GIS features that provide information such as the mine name, mine status, commodity sold, location, and other mine specific data.

MWMP California Medical Waste Management Program Facility List

VERSION DATE: 02/06/19

This list of Medical Waste Management Program Facilities is maintained by the California Department of Public Health. The Medical Waste Management Program (MWMP) regulates the generation, handling, storage, treatment, and disposal of medical waste by providing oversight for the implementation of the Medical Waste Management Act (MWMA). The MWMP permits and inspects all medical waste off-site treatment facilities, medical waste transporters, and medical waste transfer stations. This list contains transporters, treatment, and transfer facilities.

SLIC Spills, Leaks, Investigation & Cleanup Recovery Listing

VERSION DATE: 06/16/08

These records are maintained by the California Regional Water Quality Control Board (RWQCB). This list includes contaminated sites that impact groundwater or have the potential to impact ground water. Please refer to CLEANUPSITES database as source of current data.

SWEEPS Statewide Environmental Evaluation and Planning System

VERSION DATE: 10/01/94

The Statewide Environmental Evaluation and Planning System (SWEEPS) contains a historical listing of active and inactive underground storage tank locations from the State Water Resources Control Board. The hazardous substances stored within these tanks includes, but not restricted to, petroleum products, industrial solvents, and other materials. Refer to CUPA listing for source of current data.

USTCUPA Underground Storage Tanks

VERSION DATE: 01/17/19

The California State Water Resources Control Board maintains this list of permitted underground storage tanks. Permitted Underground Storage Tank (UST) Facilities includes facilities at which the owner or operator has been issued a permit to operate one or more USTs by the local permitting agency. Permitted UST Facilities are imported weekly from the California Environmental Reporting System (CERS).

BF Brownfield Sites

VERSION DATE: 02/28/19

This database of Brownfield Memorandum of Agreement (MOA) sites is maintained by the California Environmental Protection Agency. The California Department of Toxic Substances Control (CTSC), the State Water Resources Control Board, and the Regional Water Quality Control Boards (RWQCBs) agreed to a Brownfield Memorandum of Agreement (MOA). The MOA limits the oversight of a brownfields site to one agency, establishes procedures and guidelines for identifying the lead agency, calls for a single uniform site assessment procedure, requires all cleanups to address the requirements of the agencies, defines roles and responsibilities, provides for ample opportunity for public involvement, commits agencies to review time frames, and commits agencies to coordinate and communicate on brownfields issues. The Brownfield MOA site list is obtained from the State Water Resources Control Board GeoTracker online database. This list contains both open and completed sites.

CALSITES CALSITES Database

VERSION DATE: 05/01/04

This historical database was maintained by the Department of Toxic Substance Control for more than a decade. CALSITES contains information on Brownfield properties with confirmed or potential hazardous contamination. In 2006, DTSC introduced EnviroStor as the latest Brownfields site database.

CLEANUPSITES GeoTracker Cleanup Sites

VERSION DATE: 01/09/19

This list of GeoTracker Cleanup Sites is maintained by the California State Water Resources Control Board. The database contains contaminated sites that impact groundwater or have the potential to impact ground water, including sites that require cleanup, such as Leaking Underground Storage Tank Sites, Department of Defense Sites, and Cleanup Program Sites. GeoTracker also contains records for various unregulated projects as well as permitted facilities including: Irrigated Lands, Oil and Gas production, operating Permitted USTs, and Land Disposal Sites. GeoTracker portals retrieve records and view integrated data sets from multiple State Water Board programs and other agencies.

CORTESE Cortese List

VERSION DATE: 01/17/19

This list of hazardous waste and substances sites (Cortese List) is maintained by the California Department of Toxic Substances Control (DTSC). The list, or a site’s presence on the list, has bearing on the local permitting process as well as on compliance with the California Environmental Quality Act (CEQA). Because this statute was enacted over twenty years ago, some of the provisions refer to agency activities that were conducted many years ago and are no longer being implemented and, in some cases, the information to be included in the Cortese List does not exist.

DROP Listing of Certified Dropoff, Collection, and Community Service Programs

VERSION DATE: 01/13/19

This list of Certified Dropoff, Collection, and Community Service Programs (non-buyback) operating under the state of California's Beverage Container Recycling Program is maintained by the California Department of Resources Recycling and Recovery.

ERAP Expedited Removal Action Program Sites

VERSION DATE: 01/14/19

This list of Expedited Removal Action Program Sites is a subset of the EnviroStor database, maintained by the California Department of the Toxic Substance Control. Sites are queried from Envirostor by site type = State Response ERAP.

HISTCORTESE Historical Cortese List

VERSION DATE: 11/02/02

This historical listing includes hazardous waste and substances sites designated by the State Water Resources Control Board, the Integrated Waste Board, and the Department of Toxic Substance Control. The Cortese List was utilized by the State, local agencies and developers to comply with the California Environmental Quality Act requirements in providing information about the location of hazardous materials release sites. See CACORTESE for an updated version of this database.

LUST Leaking Underground Storage Tanks

VERSION DATE: 01/09/19

This list of leaking underground storage tanks is a subset of the GeoTracker Cleanup Sites database maintained by the California State Water Resources Control Board. Sites are queried from GeoTracker by case type = LUST Cleanup Site.

NFA No Further Action Determination

VERSION DATE: 12/12/18

This list of No Further Action sites is maintained by the California Department of Toxic Substances Control. This data is queried from the Department of Toxic Substances Control Envirostor online database.

NFE Sites Needing Further Evaluation

VERSION DATE: 12/12/18

This list of Inactive - Needs Evaluation sites is maintained by the California Department of Toxic Substances Control. These are unconfirmed contaminated properties that need further assessment. This data is queried from the Department of Toxic Substances Control Evirostor online database.

PROC Listing of Certified Processors

VERSION DATE: 02/10/19

This list of Certified Processors that are operating under the state of California's Beverage Container Recycling Program is maintained by the California Department of Resources Recycling and Recovery.

REF Referred to Another Local or State Agency

VERSION DATE: 12/13/18

This Referred to Another Local or State Agency list, maintained by the California Department of Toxic Substances Control (DTSC), contains properties where contamination has not been confirmed and which were determined as not requiring direct Department of Toxic Substance Control Site Mitigation Program action or oversight. Accordingly, these sites have been referred to another state or local regulatory agency. This data is extracted from the DTSC Envirostor online database and is queried by Status = "Refer state and local agencies".

SWIS Solid Waste Information System Sites

VERSION DATE: 01/07/19

This list of Solid Waste Information System Sites is extracted from the Solid Waste Information System (SWIS) database, maintained by the California Department of Resources Recycling and Recovery. The SWIS database includes information on solid waste facilities, operations, and disposal sites located in California. The types of facilities found in this database include landfills, transfer stations, material recovery facilities, composting sites, transformation facilities, waste tire sites, and closed disposal sites.

SWRCY Recycling Centers

VERSION DATE: 02/11/19

This list of Certified Recycling Centers that are operating under the state of California's Beverage Container Recycling Program is maintained by the California Department of Resources Recycling and Recovery.

VCP Voluntary Cleanup Program

VERSION DATE: 01/14/19

This list of Voluntary Cleanup Sites is a subset of the Envirostor database maintained by the California Department of Toxic Substance Control. Sites are queried from Envirostor by site type = Voluntary Cleanup.

WMUDS Waste Management Unit Database

VERSION DATE: 01/01/00

The Waste Management Unit Database System tracks and inventories waste management units. CCR Title 27 contains criteria stating that Waste Management Units are classified according to their ability to contain wastes. Containment shall be determined by geology, hydrology, topography, climatology, and other factors relating to the ability of the Unit to protect water quality. Water Code Section 13273.1 requires that operators submit a water quality solid waste assessment test (SWAT) report to address leak status. The WMUDS was last updated by the State Water Resources control board in 2000.

ENVIROSTOR EnviroStor Cleanup Sites

VERSION DATE: 01/14/19

This list of Envirostor Cleanup Sites is maintained by the California Department of Toxic Substances Control (DTSC). DTSC has developed the EnviroStor database system to evaluate and track sites with confirmed or potential contamination and sites where further investigation may be necessary. This EnviroStor database of cleanup sites contains the following: Federal Superfund sites (National Priorities List (NPL)); State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites. Sites where DTSC has made a "No Action Required" determination are not included in this database, as these sites had assessments that revealed no evidence of recognized environmental conditions in connection with the property.

ENVIROSTORPCA EnviroStor Permitted and Corrective Action Sites

VERSION DATE: 01/17/19

The California Department of Toxic Substance Control maintains this list of Hazardous Waste sites in their Envirostor online database. This list contains: 1) data pertaining to the Hazardous Waste Sites tracked in Envirostor; 2) the completed activities for Hazardous Waste Units; 3) the completed activities for Hazardous Waste Units undergoing closure; 4) completed maintenance activities; 5) the various "aliases" for a project (Some examples are: alt project name, alt address, EPA ID, etc.).

TOXPITS Toxic Pits Cleanup Act Sites

VERSION DATE: 07/01/95

Toxic Pits are sites with possible contamination of hazardous substances where cleanup is necessary. This listing is no longer updated by the State Water Resources Control Board.

LAFDHMS City of Los Angeles CUPA Hazardous Materials Sites

VERSION DATE: 01/01/19

The City of Los Angeles Fire Department provides this list of active and inactive hazardous material sites.

LAHMS Los Angeles County Hazardous Materials System

VERSION DATE: 02/16/06

The Los Angeles County Department of Public Works maintains this listing of Industrial Waste and Underground Storage Tank sites.

LASM Los Angeles County Site Mitigation List

VERSION DATE: 01/30/19

The Los Angeles County Site Mitigation List is maintained by the County of Los Angeles Fire Department.

OCHWFAC Orange County Hazardous Waste Facilities

VERSION DATE: 02/04/19

This list of hazardous waste facilities is maintained by the Orange County Health Care Agency. The listing contains any businesses or persons that generate hazardous waste in any capacity.

LAFDAST City of Los Angeles CUPA Above Ground Petroleum Storage Tanks

VERSION DATE: 01/01/19

The City of Los Angeles Fire Department provides this list of active and inactive aboveground storage tanks.

LAFDUST City of Los Angeles CUPA Underground Storage Tanks

VERSION DATE: 01/01/19

The City of Los Angeles Fire Department maintains this list of active and inactive underground storage tanks.

OCAPST Orange County Aboveground Petroleum Storage Tanks

VERSION DATE: 02/04/19

This list of aboveground petroleum storage tanks is maintained by the Orange County Health Care Agency.

OCUST Orange County Underground Storage Tanks

VERSION DATE: 02/04/19

This list of underground storage tanks is maintained by the Orange County Health Care Agency.

SBFD	San Bernardino County Hazardous Site Listing
VERSION DATE: 11/13/18	

This list of permitted hazardous sites is maintained by the San Bernardino County Fire Department. Active, inactive, fee exempt, and pending sites are included on this list.

SBMW	San Bernardino County Medical Waste Facility List
VERSION DATE: 03/31/14	

This list of San Bernardino County medical waste facilities is maintained by the County of San Bernardino Department of Public Health Medical Waste Program. The Medical Waste Program regulates generators of medical waste based on the Medical Waste Management Act. The program inspects medical waste facilities, facilities with on-site medical waste treatment units, and common storage areas annually. This program also investigates complaints regarding mishandling of medical waste and facilities that may be operating without a valid health permit. Some facilities that may generate medical waste include hospitals, skilled nursing facilities, blood banks, and doctors, dental and veterinarian offices.

WIP	Well Investigations Program Case List
VERSION DATE: 07/01/09	

The Well Investigations Case List for the San Gabriel and San Fernando Valley Cleanup Programs is maintained by the State Water Resources Control Board.

LACCUPA	Los Angeles County CUPA
VERSION DATE: 03/13/19	

This list of Los Angeles County industrial waste and underground storage tank sites managed by the Los Angeles County Department of Public Works CUPA. Closed, permitted, remediated, and suspended permits are all included in this list.

LASWF	Los Angeles County Solid Waste Facilities
VERSION DATE: 09/16/18	

This list of Los Angeles County permitted solid waste sites, closed landfills, and historical dumpsites is maintained by the Los Angeles County Department of Public Works. Sites are extracted from the Solid Waste Information Management System (SWIMS) online database.

OCISC	Orange County Industrial Site Cleanups
VERSION DATE: 02/04/19	

This list of industrial site cleanups is maintained by the Orange County Health Care Agency.

OCLUST Orange County Leaking Underground Storage Tanks

VERSION DATE: 02/04/19

This list of leaking underground storage tanks is maintained by the Orange County Health Care Agency.

OCNPUST Orange County Non-Petroleum Underground Storage Tank Cases

VERSION DATE: 02/04/19

This list of open and closed non-petroleum underground storage tank cases is maintained by the Orange County Health Care Agency.

AOC San Gabriel Valley Areas of Concern

VERSION DATE: 01/01/06

A listing of the San Gabriel Valley Superfund Sites located in Los Angeles County with Volatile Organic Compound groundwater contamination.

Environmental Records Definitions - TRIBAL

USTR09 Underground Storage Tanks On Tribal Lands

VERSION DATE: 10/10/19

This database, provided by the United States Environmental Protection Agency (EPA), contains underground storage tanks on Tribal lands located in EPA Region 9. This region includes the following states: Arizona, California, Hawaii, Nevada, and the territories of Guam and American Samoa.

LUSTR09 Leaking Underground Storage Tanks On Tribal Lands

VERSION DATE: 10/10/18

This database, provided by the United States Environmental Protection Agency (EPA), contains leaking underground storage tanks on Tribal lands located in EPA Region 9. This region includes the following states: Arizona, California, Hawaii, Nevada, and the territories of Guam and American Samoa.

ODINDIAN Open Dump Inventory on Tribal Lands

VERSION DATE: 11/08/06

This Indian Health Service database contains information about facilities and sites on tribal lands where solid waste is disposed of, which are not sanitary landfills or hazardous waste disposal facilities, and which meet the criteria promulgated under section 4004 of the Solid Waste Disposal Act (42 U.S.C. 6944).

TORRESDUMPSITES Illegal Dump Sites on the Torres Martinez Reservation

VERSION DATE: 10/29/07

This listing of illegal dump site locations on the Torres Martinez Reservation is maintained by the United States Environmental Protection Agency, Region IX. These dump sites contain unlawfully discarded household waste such as landscaping and wood wastes with no known soil or groundwater contamination. A majority of the sites have already been cleaned up through the collaborative efforts of the EPA, The California Integrated Waste Management Board and the Torres Martinez Tribe.

INDIANRES Indian Reservations

VERSION DATE: 01/01/00

The Department of Interior and Bureau of Indian Affairs maintains this database that includes American Indian Reservations, off-reservation trust lands, public domain allotments, Alaska Native Regional Corporations and Recognized State Reservations.

APPENDIX E
REGULATORY REQUESTS

Zachary Freeman

From: WB-RB8-FileReview8 <FileReview8@waterboards.ca.gov>
Sent: Thursday, June 06, 2019 3:31 PM
To: Zachary Freeman
Subject: RE: File Search Request

Good afternoon,

After careful review of our records, we show we have no files for the following site:
16200 Canyon Hills Road, Chino, CA 91709

If we can be of further assistance, please do not hesitate to contact us again.

Thank you,
File Review Desk
3737 Main St. Suite 500
Riverside, CA 92501

From: Zachary Freeman <zfreeman@leightongroup.com>
Sent: Wednesday, June 5, 2019 8:45 AM
To: WB-RB8-FileReview8 <FileReview8@waterboards.ca.gov>; CypressFileRoom@DTSC <CypressFileRoom@dtsc.ca.gov>; ChatsworthFileRoom@DTSC <ChatsworthFileRoom@dtsc.ca.gov>
Subject: File Search Request

Leighton and Associates, Inc., is requesting information for the following site:

16200 Canyon Hills Road, Chino, CA 91709

Leighton and Associates, Inc., is requesting any information concerning hazardous waste/materials, underground storage tanks leaking underground storage tanks cleanup, inspections, violations, or any other environmentally sensitive spills, responses or concerns your agency may have on file associated with this site. Thank you for your time and assistance.

Respectfully submitted,

Zach Freeman, PG
Environmental Project Geologist
10532 Acacia Street Suite B-6
Rancho Cucamonga, CA 91786
951-743-2642 Cellular
909-484-2205 Office
Leighton
Solutions You Can Build On

you receive this email in error, please immediately notify the sender by reply e-mail and destroy all copies of the communication and any attachments

Department of Toxic Substances Control

Jared Blumenfeld
Secretary for
Environmental Protection

Meredith Williams, Ph.D.
Acting Director
9211 Oakdale Avenue
Chatsworth, California 91311

Gavin Newsom
Governor

June 6, 2019

Mr. Zach Freeman
Leighton
10532 Acacia Street, Suite B-6
Rancho Cucamonga, CA 91786

16200 Canyon Hills Road, Chino, CA 91709
PR3-060519-02

Dear Mr. Freeman:

We have received your Public Records Act Request for records from the Department of Toxic Substances Control.

After a thorough review of our files we have found that no such records exist at this office pertaining to the site/facility referenced above.

We would also like to inform you about Envirostor, a database that provides information and documents on over 5,000 DTSC cleanup sites. Envirostor can be accessed at: http://www.envirostor.dtsc.ca.gov/public. Also, a computer is available in the Central Files of each DTSC Regional Office for use by community members to view Envirostor.

If you have any questions or would like further information regarding your request, please contact me at (818) 717-6522.

Sincerely,

Glenn Castillo /JVT
Regional Records Coordinator

Department of Toxic Substances Control

Jared Blumenfeld
Secretary for
Environmental Protection

Meredith Williams, Ph.D.
Acting Director
5796 Corporate Avenue
Cypress, California 90630

Gavin Newsom
Governor

June 10, 2019

Zach Freeman
LEIGHTON
10532 Acacia Street, #B-6
Rancho Cucamonga, CA 91786

16200 CANYON HILLS ROAD, CHINO, CA
PR4-060519-1

Dear Ms./Mr. Freeman:

We have received your Public Records Act Request for records from Department of Toxic Substances Control.

After a thorough review of our files we have found that, no such records exist at this office pertaining to the site/facility referenced above.

We would like to inform you about Envirostor, a database that provides information and documents on over 5,000 DTSC cleanup sites. Envirostor can be accessed at: http://www.envirostor.dtsc.ca.gov/public.

If you have any questions, would like further information regarding your request, please contact our Regional Records Coordinator at (714) 484-5337.

Sincerely,

Julie Johnson

Julie Johnson
Regional Records Coordinator
Cypress Administrative Services

APPENDIX F

HISTORICAL RESEARCH DOCUMENTATION

GeoSearch
On time. On target. In touch.™

Historical Aerial Photographs

[***NEW:*** *GeoLens by Geosearch*]

Target Property:

Chino Hills Paradise Ranch
Canyon Hills Road and Esquilime Drive
Chino Hills, San Bernardino, California 91709

Prepared For:

Leighton & Associates

Order #: 124732
Job #: 288206
Project #: 12322.002
Date: 4/16/2019

Target Property Summary

Chino Hills Paradise Ranch
Canyon Hills Road and Esquilime Drive
Chino Hills, San Bernardino, California 91709

USGS Quadrangle: ***Yorba Linda***
Target Property Geometry: ***Area***

Target Property Longitude(s)/Latitude(s):
(-117.784331804, 33.957104890), (-117.776124245, 33.957229477), (-117.776092058, 33.957799016), (-117.775931126, 33.958386350), (-117.776188618, 33.958680015), (-117.776349550, 33.959329635), (-117.776531940, 33.959792375), (-117.777229315, 33.960904719), (-117.777518993, 33.961322957), (-117.778420216, 33.961892469), (-117.779031759, 33.961545423), (-117.779493099, 33.961572119), (-117.780115372, 33.961278464), (-117.780179745, 33.961162781), (-117.780866390, 33.960949213), (-117.781306272, 33.960735644), (-117.783806091, 33.960717846), (-117.784685856, 33.960753441)

Aerial Research Summary

Date	*Source*	*Scale*	*Frame*
2016	***USDA***	***1" = 400'***	***N/A***
2014	***USDA***	***1" = 400'***	***N/A***
2012	***USDA***	***1" = 400'***	***N/A***
2010	***USDA***	***1" = 400'***	***N/A***
2009	***USDA***	***1" = 400'***	***N/A***
2005	***USDA***	***1" = 400'***	***N/A***
2004	***USDA***	***1" = 400'***	***N/A***
06/05/2002	***USGS***	***1" = 400'***	***N/A***
06/01/1994	***USGS***	***1" = 400'***	***N/A***
09/13/1988	***USGS***	***1" = 400'***	***465-52***
11/01/1980	***USGS***	***1" = 400'***	***1-130***
10/25/1972	***USGS***	***1" = 400'***	***2-194***
04/16/1966	***USGS***	***1" = 400'***	***1-52***
07/13/1960	***FAIRCHILD***	***1" = 400'***	***2674***
02/11/1953	***ASCS***	***1" = 400'***	***40-76***
12/29/1946	***USGS***	***1" = 400'***	***8-76***
10/14/1939	***FAIRCHILD***	***1" = 400'***	***178***
12/31/1927	***FAIRCHILD***	***1" = 400'***	***L-267***

N
W E
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Chino Hills Paradise Ranch
USDA
2016

GeoSearch

JOB #: 288206 - 04/16/2019

N
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Chino Hills Paradise Ranch
USDA
2014

GeoSearch

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Chino Hills Paradise Ranch
USDA
2012

GeoSearch

JOB #: 288206 - 04/16/2019

N
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Chino Hills Paradise Ranch
USDA
2010

GeoSearch

JOB #: 288206 - 04/16/2019

N
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E
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Chino Hills Paradise Ranch
USDA
2009

GeoSearch

JOB #: 288206 - 04/16/2019

N
W E
S

Chino Hills Paradise Ranch
USDA
2005

GeoSearch

JOB #: 288206 - 04/16/2019

N
W E
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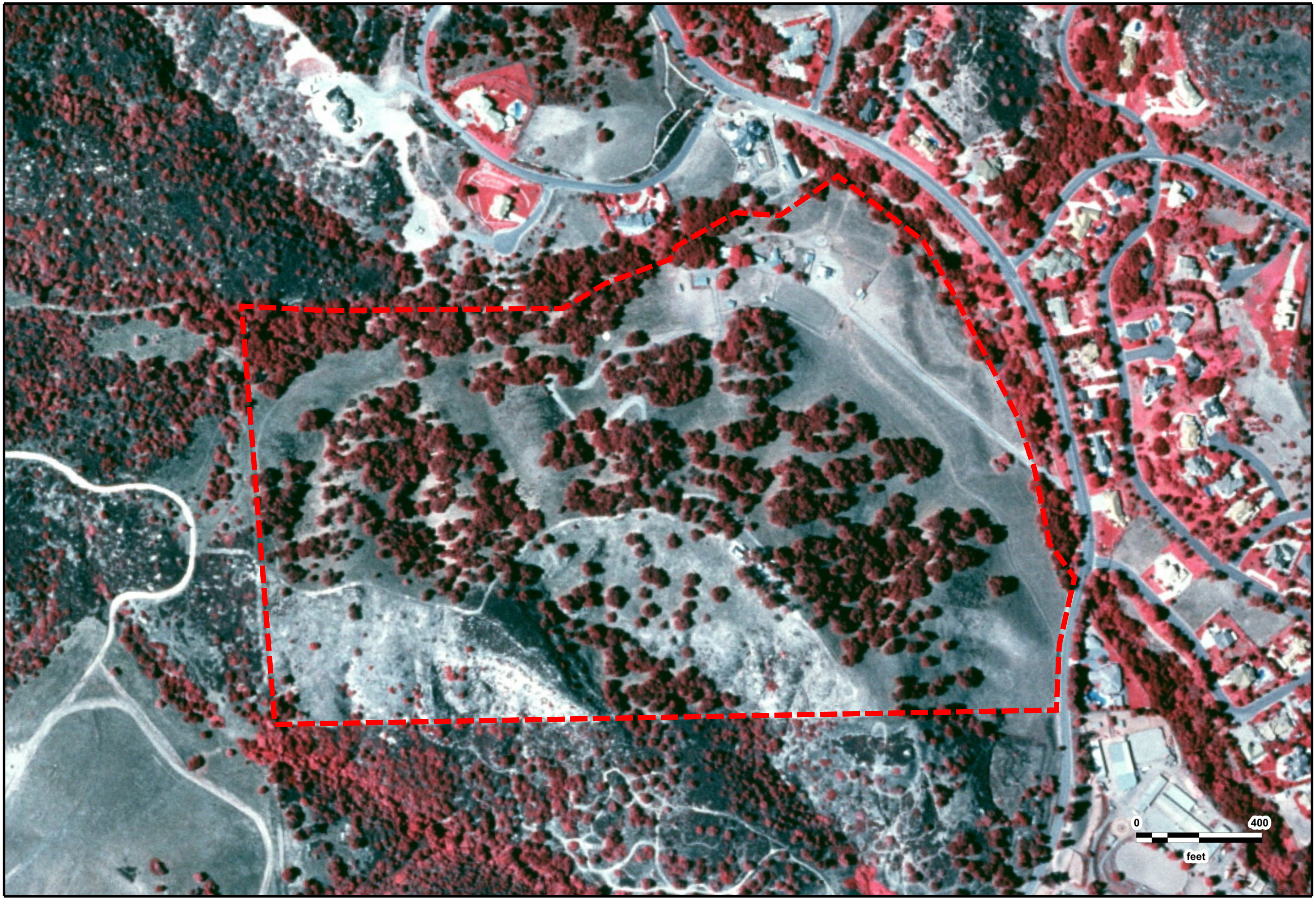
Chino Hills Paradise Ranch
USDA
2004

GeoSearch

JOB #: 288206 - 04/16/2019



N
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Chino Hills Paradise Ranch
USGS
06/05/2002

GeoSearch

JOB #: 288206 - 04/16/2019

N
W
E
S

Chino Hills Paradise Ranch
USGS
06/01/1994

GeoSearch

JOB #: 288206 - 04/16/2019

N
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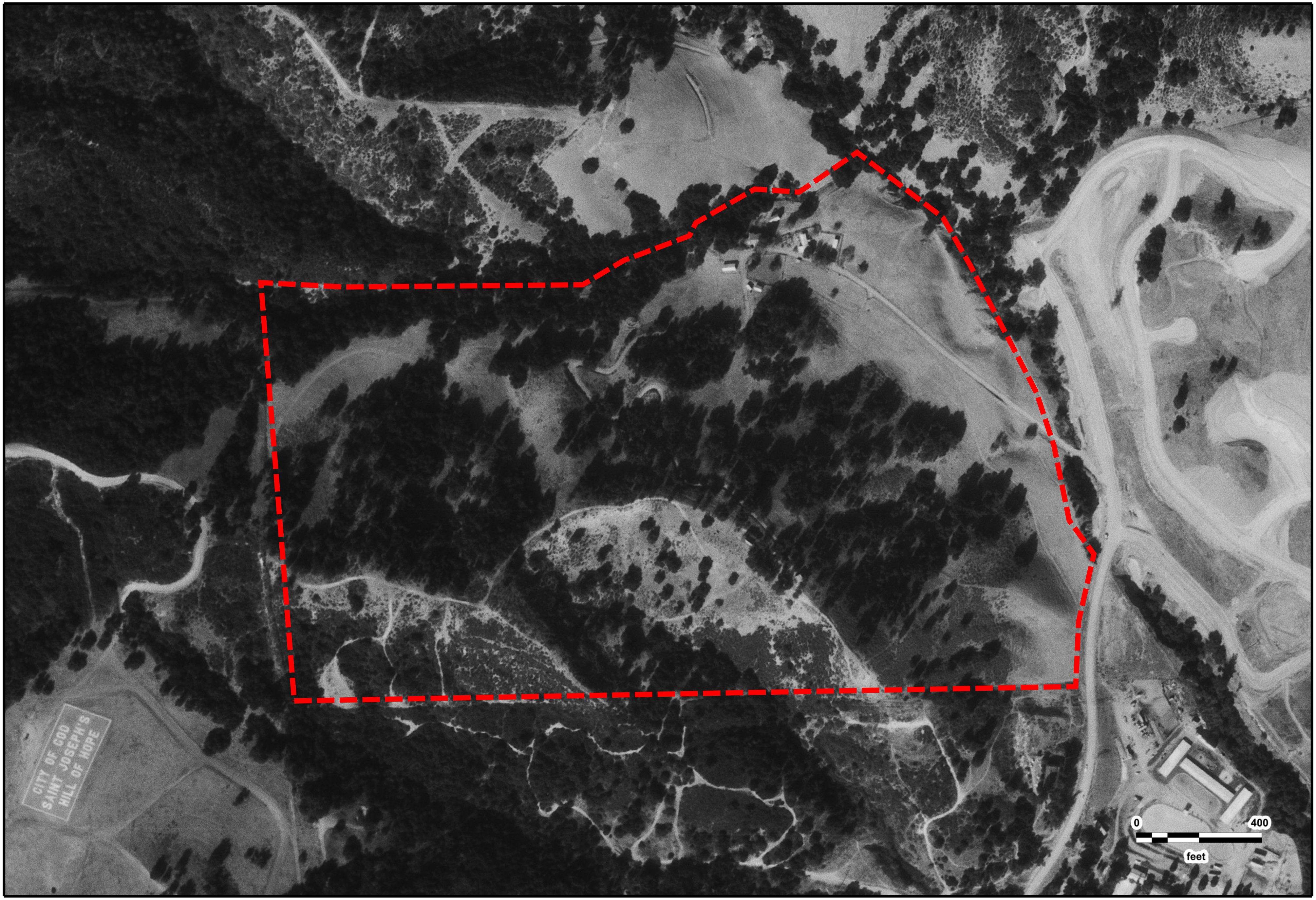
S

Chino Hills Paradise Ranch
USGS
09/13/1988

GeoSearch

JOB #: 288206 - 04/16/2019



N
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E
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Chino Hills Paradise Ranch
USGS
11/01/1980

GeoSearch

JOB #: 288206 - 04/16/2019

N
W E
S

Chino Hills Paradise Ranch
USGS
10/25/1972

GeoSearch

JOB #: 288206 - 04/16/2019

N
W
E
S

Chino Hills Paradise Ranch
USGS
04/16/1966

GeoSearch

JOB #: 288206 - 04/16/2019

N
W
E
S

Chino Hills Paradise Ranch
FAIRCHILD
07/13/1960

GeoSearch

JOB #: 288206 - 04/16/2019

N
W
E
S

Chino Hills Paradise Ranch
ASCS
02/11/1953

GeoSearch

Chino Hills Paradise Ranch
USGS
12/29/1946

GeoSearch

JOB #: 288206 - 04/16/2019

N
W
E
S

Chino Hills Paradise Ranch
FAIRCHILD
10/14/1939

GeoSearch

JOB #: 288206 - 04/16/2019

N
W
E
S

Chino Hills Paradise Ranch
FAIRCHILD
12/31/1927

GeoSearch

JOB #: 288206 - 04/16/2019

GeoSearch

On time. On target. In touch.™

Historical Topographic Maps

NEW: *GeoLens by Geosearch*

Target Property:

Chino Hills Paradise Ranch
Canyon Hills Road and Esquilime Drive
Chino Hills, San Bernardino, California 91709

Prepared For:

Leighton & Associates

Order #: 124732
Job #: 288205
Project #: 12322.002
Date: 4/13/2019

Target Property Summary

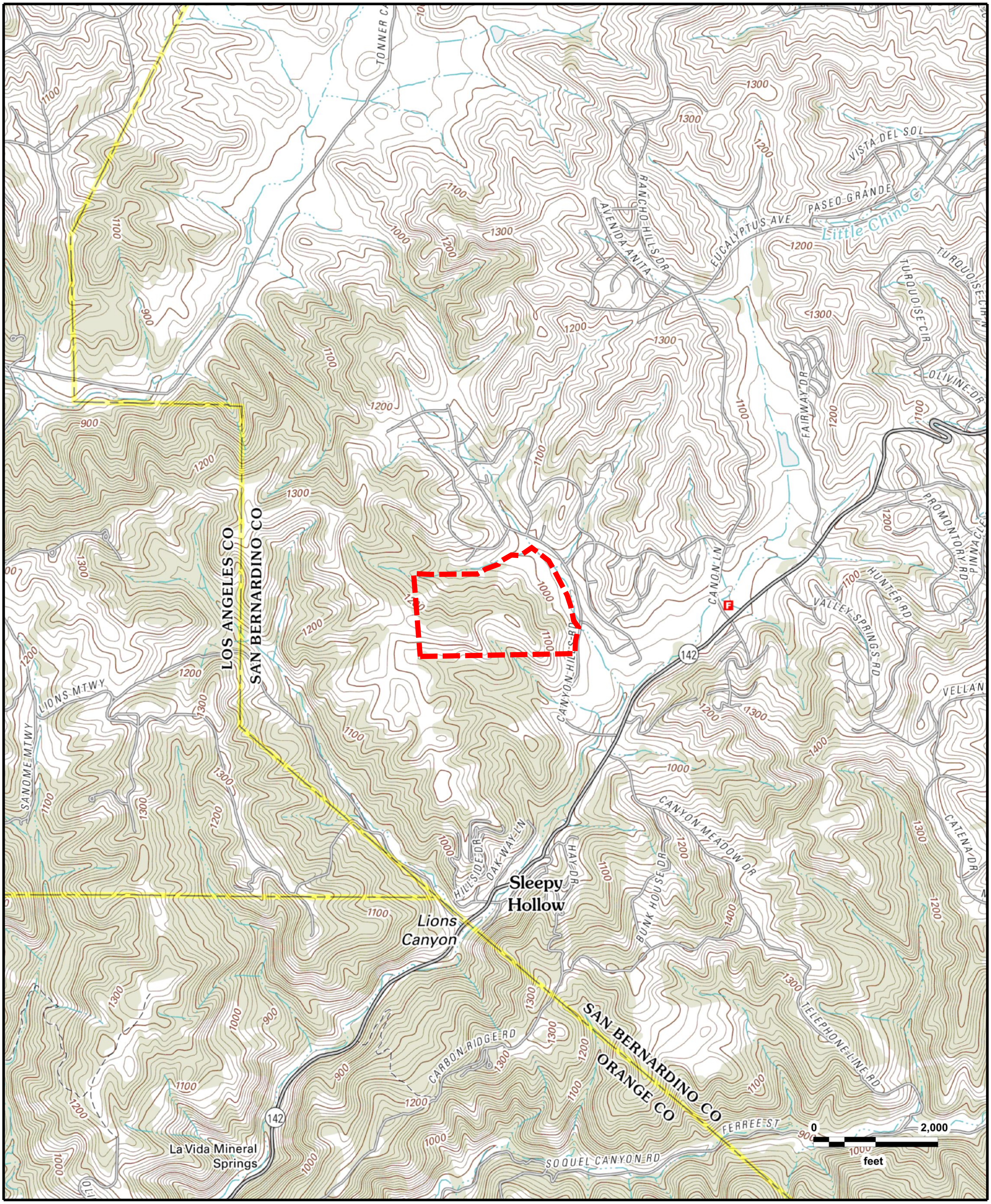
Chino Hills Paradise Ranch
Canyon Hills Road and Esquilime Drive
Chino Hills, San Bernardino, California 91709

USGS Quadrangle: ***Yorba Linda***
Target Property Geometry: ***Area***

Target Property Longitude(s)/Latitude(s):
(-117.784331804, 33.957104890), (-117.776124245, 33.957229477), (-117.776092058, 33.957799016), (-117.775931126, 33.958386350), (-117.776188618, 33.958680015), (-117.776349550, 33.959329635), (-117.776531940, 33.959792375), (-117.777229315, 33.960904719), (-117.777518993, 33.961322957), (-117.778420216, 33.961892469), (-117.779031759, 33.961545423), (-117.779493099, 33.961572119), (-117.780115372, 33.961278464), (-117.780179745, 33.961162781), (-117.780866390, 33.960949213), (-117.781306272, 33.960735644), (-117.783806091, 33.960717846), (-117.784685856, 33.960753441)

Topographic Map Summary

Date	Quadrangle	Scale
2012	***Yorba Linda, CA***	***1" = 2000'***
1964 PHOTOREVISED 1981	***Yorba Linda, CA***	***1" = 2000'***
1964 PHOTOREVISED 1972	***Yorba Linda, CA***	***1" = 2000'***
1950	***Yorba Linda, CA***	***1" = 2000'***
1949	***Yorba Linda, CA***	***1" = 2000'***
1942	***Anaheim, CA***	***1" = 5208'***
1902	***Corona, CA***	***1" = 10420'***
1901	***Anaheim, CA***	***1" = 5208'***
1898	***Anaheim, CA***	***1" = 5208'***
1896	***Anaheim, CA***	***1" = 5208'***



N
W E
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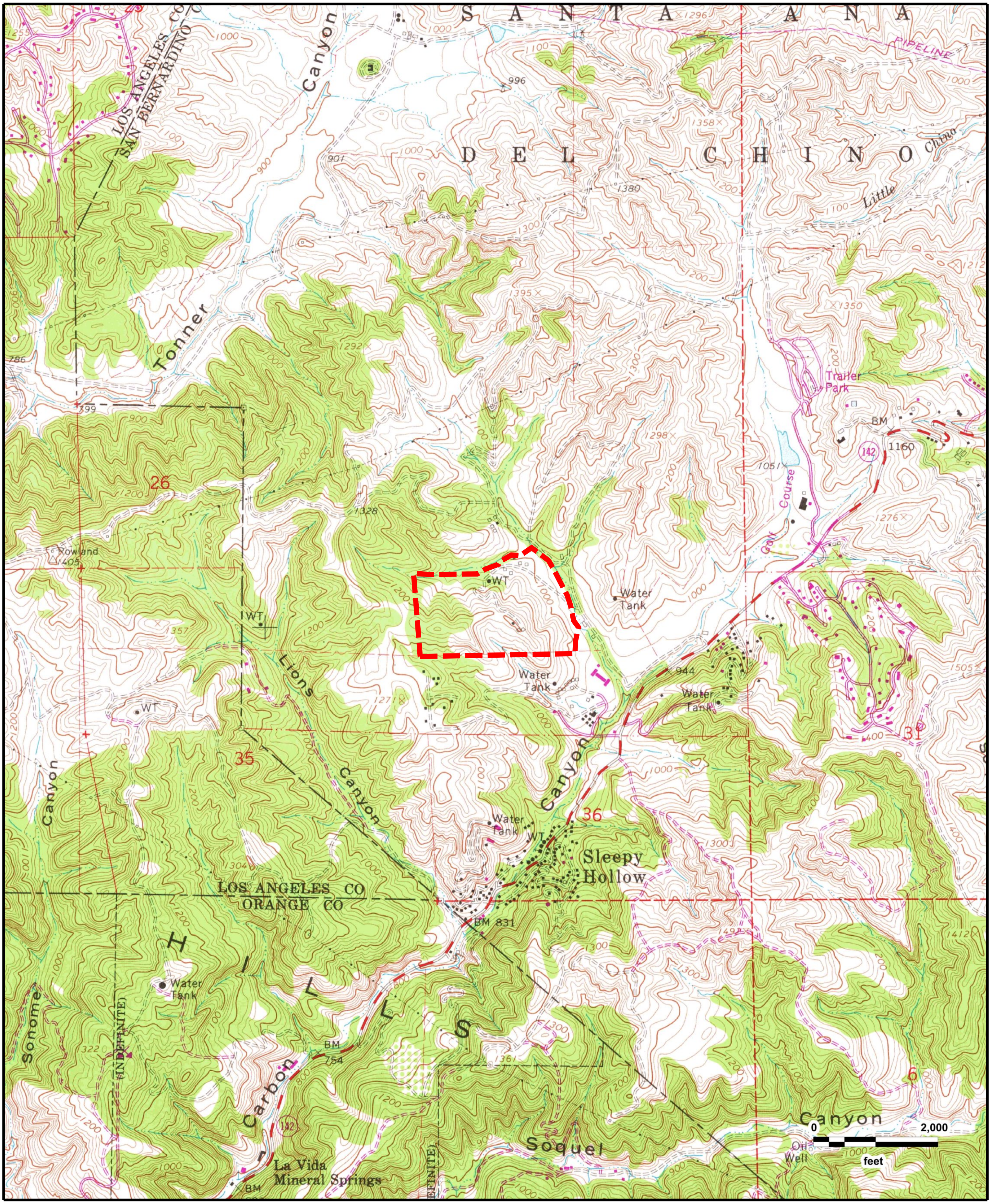
Chino Hills Paradise Ranch
Yorba Linda, CA (2012)

GeoSearch

JOB #: 288205 - 04/13/2019



N
W
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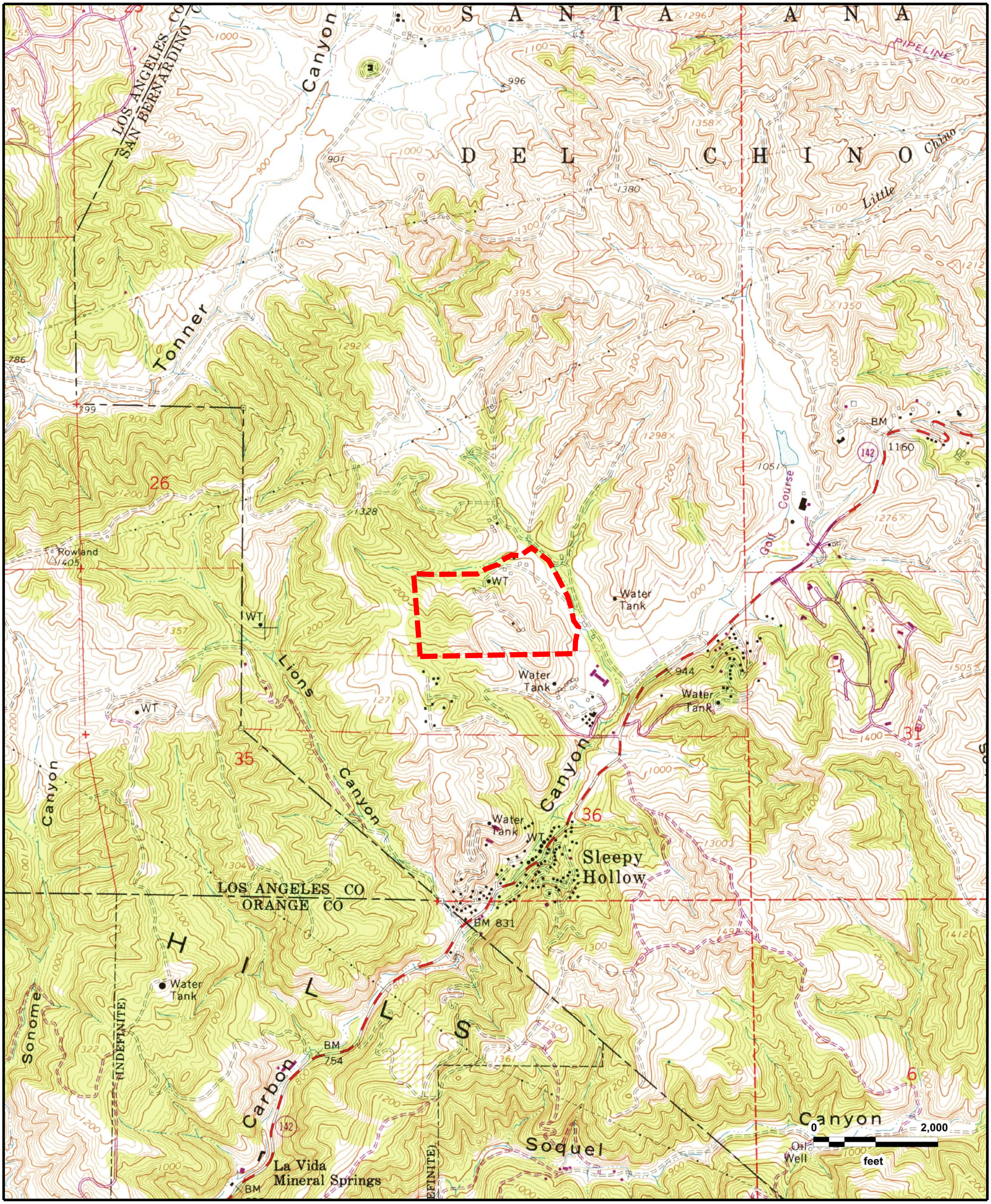
Chino Hills Paradise Ranch
Yorba Linda, CA (1981)

GeoSearch

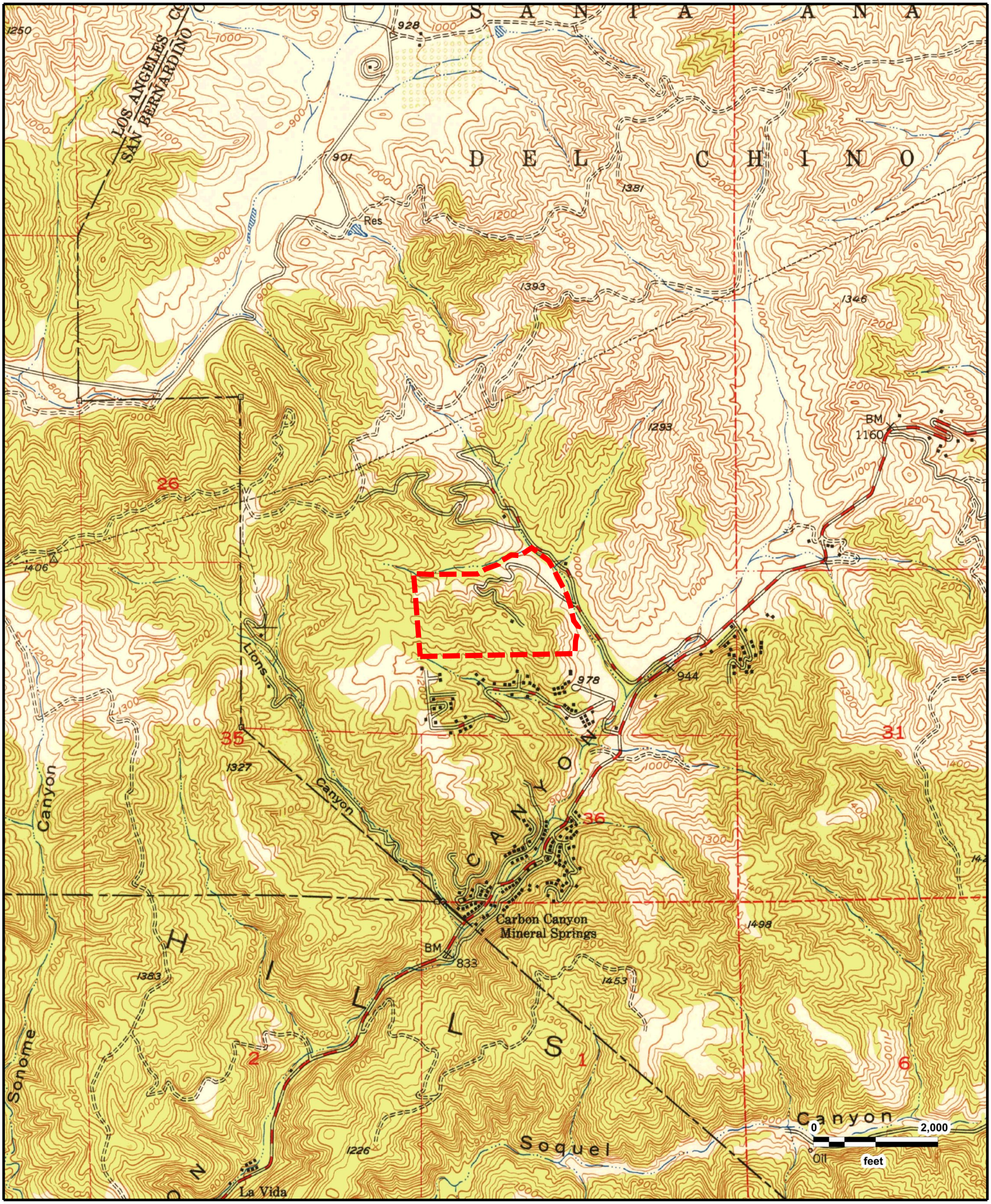
JOB #: 288205 - 04/13/2019



Chino Hills Paradise Ranch
Yorba Linda, CA (1972)

GeoSearch

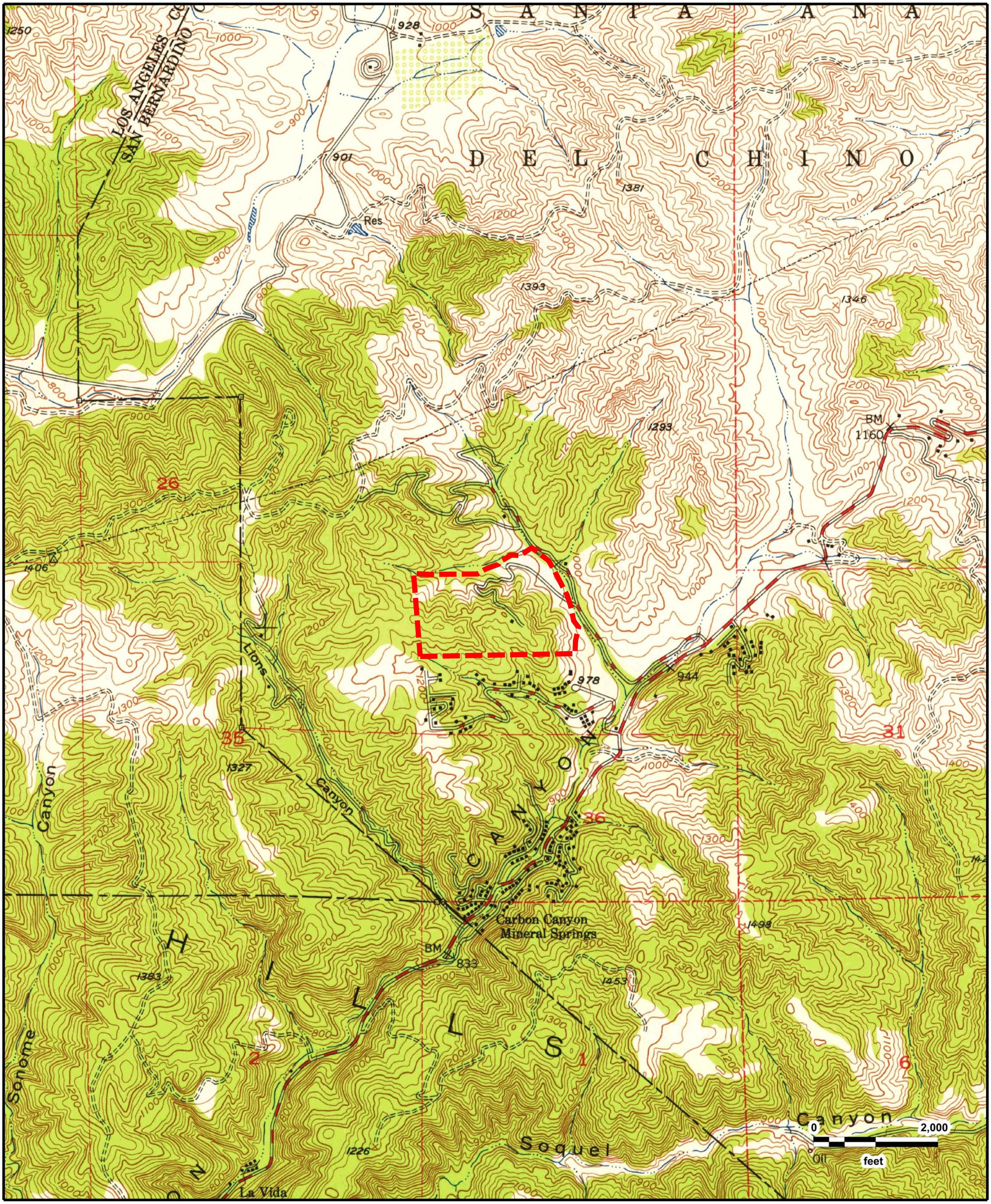
JOB #: 288205 - 04/13/2019



Chino Hills Paradise Ranch
Yorba Linda, CA (1950)

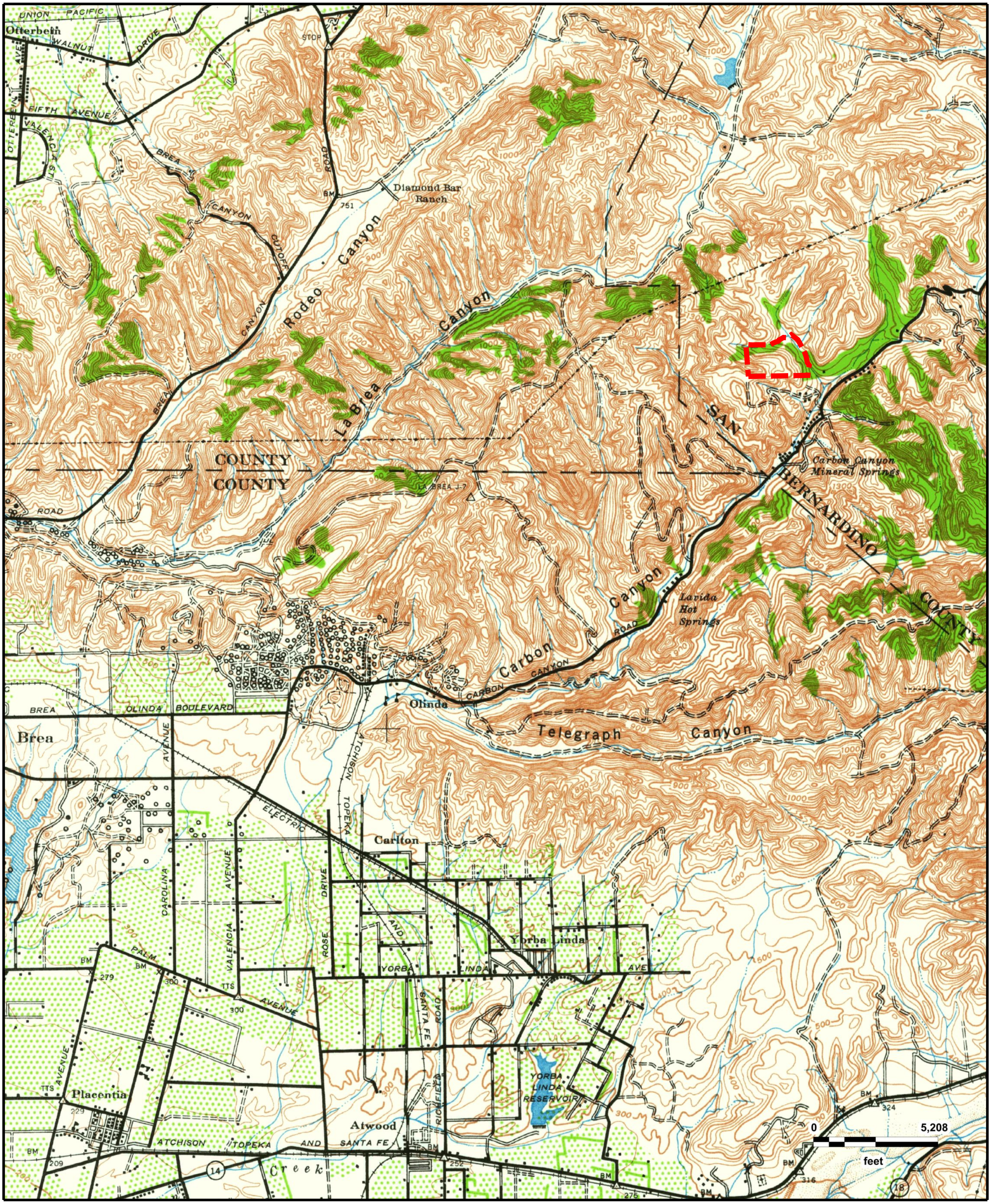
GeoSearch

JOB #: 288205 - 04/13/2019



Chino Hills Paradise Ranch
Yorba Linda, CA (1949)

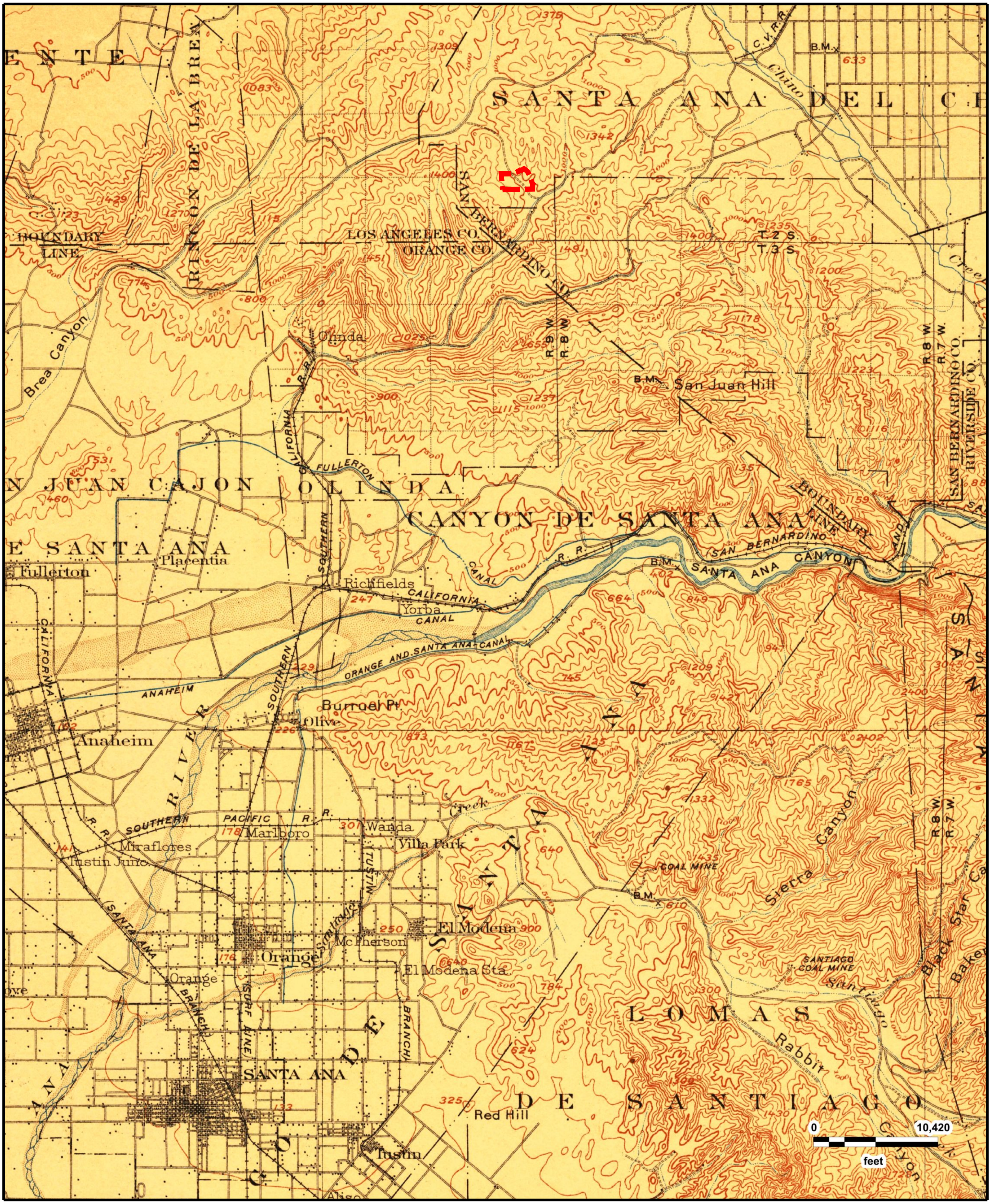
JOB #: 288205 - 04/13/2019



Chino Hills Paradise Ranch
Anaheim, CA (1942)

GeoSearch

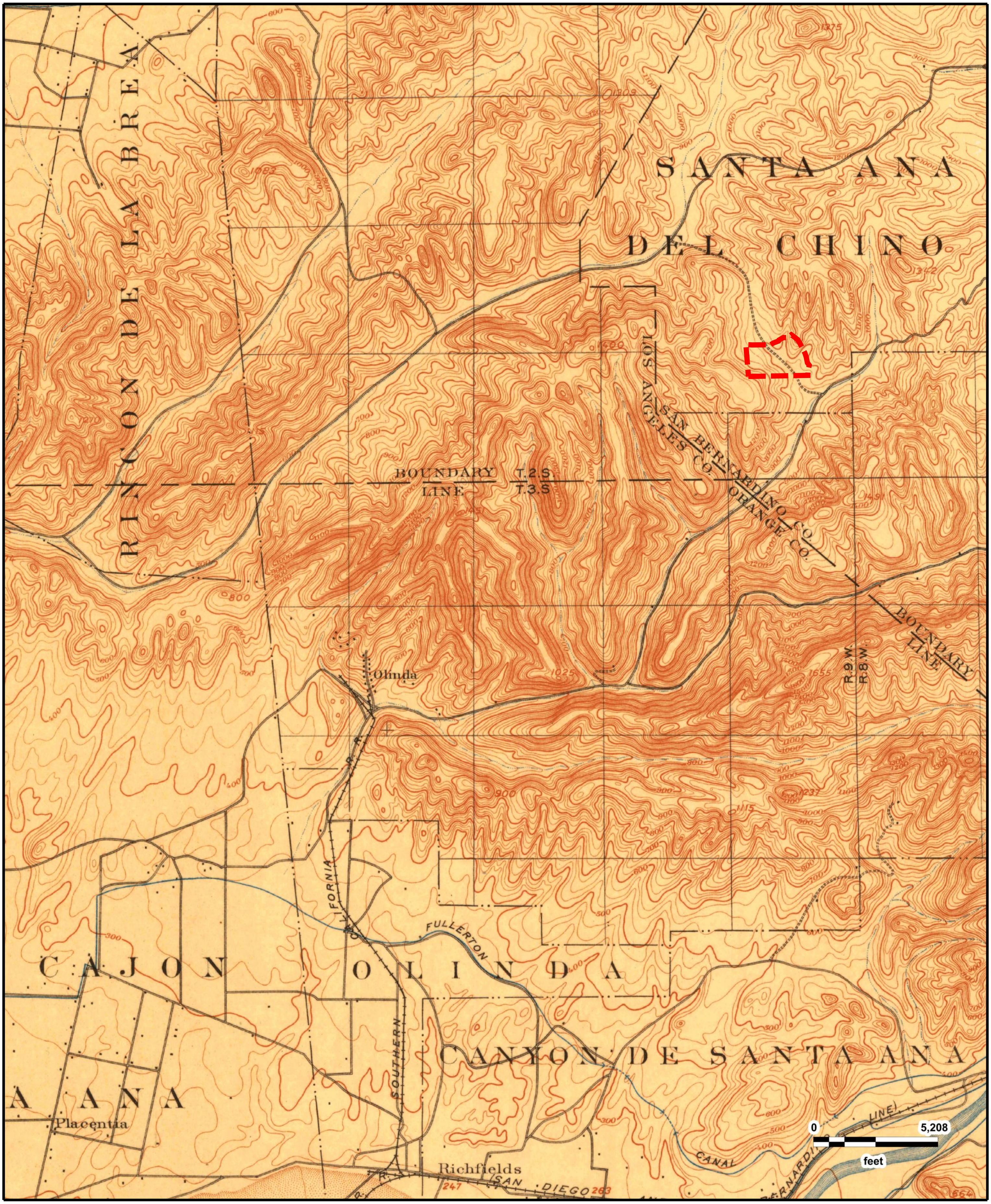
JOB #: 288205 - 04/13/2019



Chino Hills Paradise Ranch
Corona, CA (1902)

GeoSearch

JOB #: 288205 - 04/13/2019



Chino Hills Paradise Ranch
Anaheim, CA (1901)

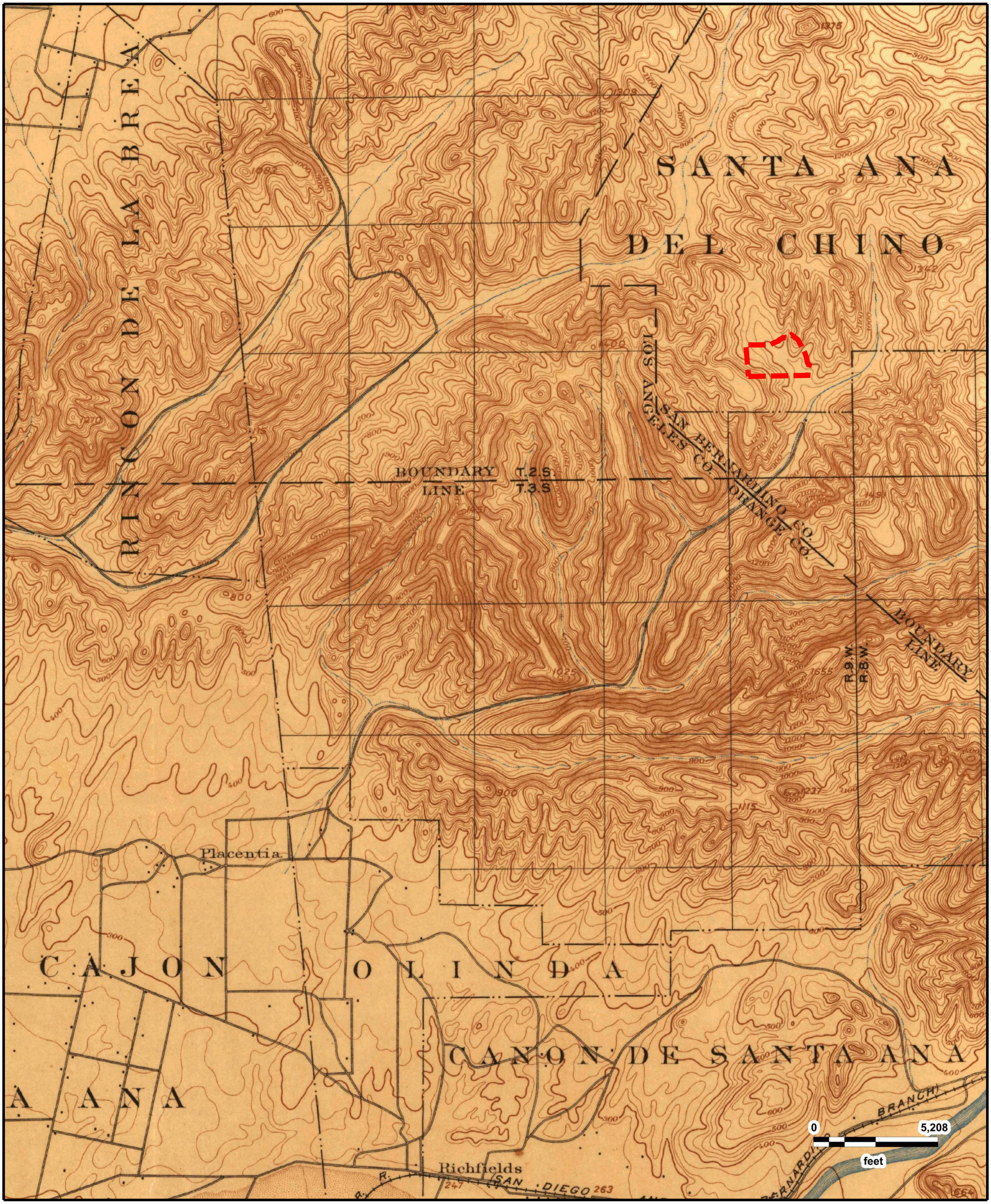
GeoSearch

JOB #: 288205 - 04/13/2019

Chino Hills Paradise Ranch
Anaheim, CA (1898)

GeoSearch

JOB #: 288205 - 04/13/2019



Chino Hills Paradise Ranch
Anaheim, CA (1896)

GeoSearch

JOB #: 288205 - 04/13/2019

Historical By Street Number

Target Property:

Canyon Hills Rd,

Chino Hills, CA 91709

Prepared For:
Leighton & Associates

Order #: 124732

Project #: 12322.002

Date: 4/15/2019

City Directory Historical by Street Number

1 Canyon Hills Rd	No Listing (1996-2000); Street Begins (2005); Street Begins (2011-2016)
16059 Canyon Hills Rd	No Listing (1996-2000); To Han Van (2005); To Ha V (2011-2016)
16200 Canyon Hills Rd	No Listing (1996-2000); Gentile Phillip (2005); Gentile Philip Sr (2011); No Listing (2016)
16213 Canyon Hills Rd	No Listing (1996-2005); Dykier Engineering Inc (2011-2016)
16220 Canyon Hills Rd	No Listing (1996-2000); Gentile Phillip (2005); Picante Sport Fishing (2005-2016); Bernal Victor (2016); Gentile Philip Jr (2016); Pena Reynaldo (2016)
16275 Canyon Hills Rd	No Listing (1996-2000); Rivera Rita (2005); No Listing (2011); Larcabal John (2016)
16475 Canyon Hills Rd	No Listing (1996-2000); Apartments (2005); Baker Kelly (2005); Bartlett Martha J (2005); Dupree Esther (2005); Cee Jay (2011); X [End Of Listings] (2011-2016); Anderberg John (2016)

Comments:

Historical By Street Number

Target Property:

Esquilime Dr,

Chino Hills, CA 91709

Prepared For:
Leighton & Associates

Order #: 124732

Project #: 12322.002

Date: 4/15/2019

City Directory Historical by Street Number

1 Esquilime Dr	No Listing (1996-2000); Street Begins (2005); Street Begins (2011-2016)
15823 Esquilime Dr	No Listing (1996-2011); Le Jia (2016)
15834 Esquilime Dr	No Listing (1996-2000); Cox Rpger (2005); Cox Roger (2011-2016)
15856 Esquilime Dr	No Listing (1996-2011); Bogusch Eric (2016)
15896 Esquilime Dr	No Listing (1996-2000); Wald Michael (2005); No Listing (2011); Poon Betty (2016)
15929 Esquilime Dr	No Listing (1996-2000); No Current Listing (2005); No Listing (2011); Hassan Mark (2016)
15930 Esquilime Dr	No Listing (1996-2011); Scott Vera (2016)
15962 Esquilime Dr	No Listing (1996-2000); Oh Chan (2005); No Listing (2011); Oh Chan (2016)
15994 Esquilime Dr	No Listing (1996-2011); Yong Anthony (2016)
16012 Esquilime Dr	No Listing (1996-2000); Albeanu David (2005); Albeanu David (2011); Colvin William (2016); Susan Colvin (2016)
16023 Esquilime Dr	No Listing (1996-2000); Azimioara Teodod (2005); An Faye (2011); Hui Yan (2016); Zhang Jiyi (2016)
16060 Esquilime Dr	No Listing (1996-2000); Hodson Donald (2005); Hodson Kevin & Kiersten (2011); Hodson Donald (2016); Lee Suzanne (2016)
16084 Esquilime Dr	No Listing (1996-2000); Glenn Carpenter (2005); Kim Inja (2011); X [End Of Listings] (2011-2016); Kim Leslie (2016)
18556 Esquilime Dr	No Listing (1996-2000); Bogusch Eric (2005); No Listing (2011-2016)

Comments:

City Directory Standard Report

Target Property:

Canyon Hills Rd,

Chino Hills, CA 91709

Prepared For:
Leighton & Associates

Order #: 124732

Project #: 12322.002

Date: 4/15/2019

INFOUSA				
SOUTH WEST	2016	**CANYON HILLS RD**		
		1	STREET BEGINS	
		16059	TO HA	
		16213	DYKIER ENGINEERING INC	
		16220	BERNAL VICTOR	
		16220	GENTILE PHILIP JR	
		16220	PENA REYNALDO	
		16220	PICANTE SPORT FISHING	
		16275	LARCABAL JOHN	
		16475	ANDERBERG JOHN	# 3
		16475	X [END OF LISTINGS]	
INFOUSA				
PACIFIC	2011	**CANYON HILLS RD**		
		1	STREET BEGINS	
		16059	TO HA V	
		16200	GENTILE PHILIP SR	
		16213	DYKIER ENGINEERING INC	
		16220	PICANTE SPORT FISHING	
		16475	CEE JAY	# 3
		16475	X [END OF LISTINGS]	
HAINES DIRECTORY				
SAN BERNARDINO CITY & SUBURBAN	2005	**CANYON HILLS RD**		
		1	STREET BEGINS	
		1	X [HIGHLAND PASS RD INTS]	
		16059	TO HAN VAN	
		16059	X [SPRING CREEK WAY INTS]	
		16200	GENTILE PHILLIP	
		16220	GENTILE PHILLIP	
		16220	PICANTE SPORT FISHING	
		16275	RIVERA RITA	
		16475	APARTMENTS	

	16475	BAKER KELLY
	16475	BARTLETT MARTHA J
	16475	DUPREE ESTHER
	16475	X [END OF LISTINGS]

HAINES DIRECTORY

SAN BERNARDINO 2000 CITY & SUBURBAN	**CANYON HILLS RD**	
	1	STREET NOT LISTED

HAINES DIRECTORY

SAN BERNARDINO 1996 CITY & SUBURBAN	**CANYON HILLS RD**	
	1	STREET NOT LISTED

Comment:

City Directory Standard Report

Target Property:

Esquilime Dr,

Chino Hills, CA 91709

Prepared For:
Leighton & Associates

Order #: 124732

Project #: 12322.002

Date: 4/15/2019

INFOUSA

SOUTH WEST	2016	**ESQUILIME DR**	
		1	STREET BEGINS
		15823	LE JIA
		15834	COX ROGER JR
		15856	BOGUSCH ERIC
		15896	POON BETTY
		15929	HASSAN MARK
		15930	SCOTT VERA
		15962	OH CHAN
		15994	YONG ANTHONY
		16012	COLVIN WILLIAM
		16012	SUSAN COLVIN
		16023	HUI YAN
		16023	ZHANG JIYI
		16060	HODSON DONALD
		16060	LEE SUZANNE
		16084	KIM LESLIE
		16084	X [END OF LISTINGS]

INFOUSA

PACIFIC	2011	**ESQUILIME DR**	
		1	STREET BEGINS
		15834	COX ROGER
		16012	ALBEANU DAVID
		16023	AN FAYE
		16060	HODSON KEVIN & KIERSTEN
		16084	KIM INJA
		16084	X [END OF LISTINGS]

HAINES DIRECTORY

SAN BERNARDINO CITY & SUBURBAN	2005	**ESQUILIME DR**	
		1	STREET BEGINS
		15834	COX RPGER

	15896	WALD MICHAEL
	15896	X [EVEREST RD INTS]
	15929	NO CURRENT LISTING
	15962	OH CHAN
	16012	ALBEANU DAVID
	16012	ALBEANU DAVID
	16023	AZIMIOARA TEODOD
	16060	HODSON DONALD
	16084	GLENN CARPENTER
	16084	X [CANYON HILLS RD INTS]
	16084	Y [END OF LISTINGS]
	18556	BOGUSCH ERIC

HAINES DIRECTORY

SAN BERNARDINO 2000 CITY & SUBURBAN	**ESQUILIME DR**	
	1	STREET NOT LISTED

HAINES DIRECTORY

SAN BERNARDINO 1996 CITY & SUBURBAN	**ESQUILIME DR**	
	1	STREET NOT LISTED

Comment:

City Directory Target Property Address

Target Property:

Canyon Hills Rd,

Chino Hills, CA 91709

Prepared For:
Leighton & Associates

Order #: 124732

Project #: 12322.002

Date: 4/15/2019

City Directory Target Property Address

Canyon Hills Rd, Chino Hills, CA 91709

<u>1 CANYON HILLS RD</u>

2016	STREET BEGINS	INFOUSA	SOUTH WEST
2011	STREET BEGINS	INFOUSA	PACIFIC
2005	STREET BEGINS	HAINES DIRECTORY	SAN BERNARDINO CITY & SUBURBAN
2005	X [HIGHLAND PASS RD INTS]	HAINES DIRECTORY	SAN BERNARDINO CITY & SUBURBAN
2000	STREET NOT LISTED	HAINES DIRECTORY	SAN BERNARDINO CITY & SUBURBAN
1996	STREET NOT LISTED	HAINES DIRECTORY	SAN BERNARDINO CITY & SUBURBAN

<u>16059 CANYON HILLS RD</u>

2016	TO HA	INFOUSA	SOUTH WEST
2011	TO HA V	INFOUSA	PACIFIC
2005	TO HAN VAN	HAINES DIRECTORY	SAN BERNARDINO CITY & SUBURBAN
2005	X [SPRING CREEK WAY INTS]	HAINES DIRECTORY	SAN BERNARDINO CITY & SUBURBAN

<u>16200 CANYON HILLS RD</u>

2011	GENTILE PHILIP SR	INFOUSA	PACIFIC
2005	GENTILE PHILLIP	HAINES DIRECTORY	SAN BERNARDINO CITY & SUBURBAN

<u>16213 CANYON HILLS RD</u>

2016	DYKIER ENGINEERING INC	INFOUSA	SOUTH WEST
2011	DYKIER ENGINEERING INC	INFOUSA	PACIFIC

<u>16220 CANYON HILLS RD</u>

2016	BERNAL VICTOR	INFOUSA	SOUTH WEST
2016	GENTILE PHILIP JR	INFOUSA	SOUTH WEST
2016	PENA REYNALDO	INFOUSA	SOUTH WEST
2016	PICANTE SPORT FISHING	INFOUSA	SOUTH WEST
2011	PICANTE SPORT FISHING	INFOUSA	PACIFIC
2005	GENTILE PHILLIP	HAINES DIRECTORY	SAN BERNARDINO CITY & SUBURBAN
2005	PICANTE SPORT FISHING	HAINES DIRECTORY	SAN BERNARDINO CITY & SUBURBAN

<u>16275 CANYON HILLS RD</u>

2016	LARCABAL JOHN	INFOUSA	SOUTH WEST

City Directory Target Property Address

Canyon Hills Rd, Chino Hills, CA 91709

2005	RIVERA RITA		HAINES DIRECTORY	SAN BERNARDINO CITY & SUBURBAN

<u>16475 CANYON HILLS RD</u>

2016	ANDERBERG JOHN	# 3	INFOUSA	SOUTH WEST
2016	X [END OF LISTINGS]		INFOUSA	SOUTH WEST
2011	X [END OF LISTINGS]		INFOUSA	PACIFIC
2011	CEE JAY	# 3	INFOUSA	PACIFIC
2005	APARTMENTS		HAINES DIRECTORY	SAN BERNARDINO CITY & SUBURBAN
2005	BAKER KELLY		HAINES DIRECTORY	SAN BERNARDINO CITY & SUBURBAN
2005	BARTLETT MARTHA J		HAINES DIRECTORY	SAN BERNARDINO CITY & SUBURBAN
2005	DUPREE ESTHER		HAINES DIRECTORY	SAN BERNARDINO CITY & SUBURBAN
2005	X [END OF LISTINGS]		HAINES DIRECTORY	SAN BERNARDINO CITY & SUBURBAN

Comment:

GeoSearch
On time. On target. In touch.™

Fire Insurance Map Abstract

Target Property:
Chino Hills Paradise Ranch
Canyon Hills Road and Esquilime Drive, Chino Hills, CA 91709

Prepared For:
Leighton & Associates

Order #: 124732
Job #: 288209
Project #: 12322.002
Date #: 04/15/19

phone: 888-396-0042 · fax: 512-472-9967 · www.Geo-Search.com

GeoSearch FIM

Date: 04/15/19

GS Job Number: 124732

Company Name: Leighton & Associates

Project Number: 12322.002

Site Information: Chino Hills Paradise Ranch
Canyon Hills Road and Esquilime Drive, Chino Hills, CA 91709

The collections of fire insurance maps listed below were reviewed according to the site information supplied by client. Based on the information provided, no coverage is available.

Library of Congress
University Publications of America
Other Libraries (universities, state, local, etc.).

APPENDIX G

GBA GEOENVIRONMENTAL REPORT

Important Information about This Geoenvironmental Report

Geoenvironmental studies are commissioned to gain information about environmental conditions on and beneath the surface of a site. The more comprehensive the study, the more reliable the assessment is likely to be. But remember: Any such assessment is to a greater or lesser extent based on professional opinions about conditions that cannot be seen or tested. Accordingly, no matter how many data are developed, risks created by unanticipated conditions will always remain. *Have realistic expectations.* Work with your geoenvironmental consultant to manage known and unknown risks. Part of that process should already have been accomplished, through the risk allocation provisions you and your geoenvironmental professional discussed and included in your contract's general terms and conditions. This document is intended to explain some of the concepts that may be included in your agreement, and to pass along information and suggestions to help you manage your risk.

Beware of Change; Keep Your Geoenvironmental Professional Advised

The design of a geoenvironmental study considers a variety of factors that are subject to change. Changes can undermine the applicability of a report's findings, conclusions, and recommendations. *Advise your geoenvironmental professional about any changes you become aware of.* Geoenvironmental professionals cannot accept responsibility or liability for problems that occur because a report fails to consider conditions that did not exist when the study was designed. Ask your geoenvironmental professional about the types of changes you should be particularly alert to. Some of the most common include:

- modification of the proposed development or ownership group,
- sale or other property transfer,
- replacement of or additions to the financing entity,
- amendment of existing regulations or introduction of new ones, or
- changes in the use or condition of adjacent property.

Should you become aware of any change, *do not rely on a geoenvironmental report.* Advise your geoenvironmental professional immediately; follow the professional's advice.

Recognize the Impact of Time

A geoenvironmental professional's findings, recommendations, and conclusions cannot remain valid indefinitely. The more time that passes, the more likely it is that important latent changes will occur. *Do not rely on a geoenvironmental report if too much time has elapsed since it was completed.* Ask your environmental professional to define "too much time." In the case of Phase I Environmental Site Assessments (ESAs), for example, more than 180 days after submission is generally considered "too much."

Prepare To Deal with Unanticipated Conditions

The findings, recommendations, and conclusions of a Phase I ESA report typically are based on a review of historical information, interviews, a site "walkover," and other forms of noninvasive research. When site subsurface conditions are not sampled in any way, the risk of unanticipated conditions is higher than it would otherwise be.

While borings, installation of monitoring wells, and similar invasive test methods can help reduce the risk of unanticipated conditions, *do not overvalue the effectiveness of testing.* Testing provides information about actual conditions only at the precise locations where samples are taken, and only when they are taken. Your geoenvironmental professional has applied that specific information to develop a general opinion about environmental conditions. *Actual conditions in areas not sampled may differ (sometimes sharply) from those predicted in a report.* For example, a site may contain an unregistered underground storage tank that shows no surface trace of its existence. *Even conditions in areas that were tested can change*, sometimes suddenly, due to any number of events, not the least of which include occurrences at adjacent sites. Recognize, too, that *even some conditions in tested areas may go undiscovered,* because the tests or analytical methods used were designed to detect only those conditions assumed to exist.

Manage your risks by retaining your geoenvironmental professional to work with you as the project proceeds. Establish a contingency fund or other means to enable your geoenvironmental professional to respond rapidly, in order to limit the impact of unforeseen conditions. And to help prevent any misunderstanding, identify those empowered to authorize changes and the administrative procedures that should be followed.

Do Not Permit Any Other Party To Rely on the Report

Geoenvironmental professionals design their studies and prepare their reports to meet the specific needs of the clients who retain them, in light of the risk management methods that the client and geoenvironmental professional agree to, and the statutory, regulatory, or other requirements that apply. The study designed for a developer may differ sharply from one designed for a lender, insurer, public agency...or even another developer. *Unless the report specifically states otherwise, it was developed for you and only you.* Do not unilaterally permit any other party to rely on it. The report and the study underlying it may not be adequate for another party's needs, and you could be held liable for shortcomings your geoenvironmental professional was powerless to prevent or anticipate. Inform your geoenvironmental professional when you know or expect that someone else—a third-party—will want to use or rely on the report. *Do not permit third-party use or reliance until you first confer with the geoenvironmental professional who prepared the report.* Additional testing, analysis, or study may be required and, in any event, appropriate terms and conditions should be agreed to so both you and your geoenvironmental professional are protected from third-party risks. *Any party who relies on a geoenvironmental report without the express written permission of the professional who prepared it and the client for whom it was prepared may be solely liable for any problems that arise.*

Avoid Misinterpretation of the Report

Design professionals and other parties may want to rely on the report in developing plans and specifications. They need to be advised, in writing, that their needs may not have been considered when the study's scope was developed, and, even if their needs were considered, they might misinterpret geoenvironmental findings, conclusions, and recommendations. *Commission your geoenvironmental professional to explain pertinent elements of the report to others who are permitted to rely on it, and to review any plans, specifications or other instruments of professional service that incorporate any of the report's findings, conclusions, or recommendations.* Your geoenvironmental professional has the best understanding of the issues involved, including the fundamental assumptions that underpinned the study's scope.

Give Contractors Access to the Report

Reduce the risk of delays, claims, and disputes by giving contractors access to the full report, *providing that it is accompanied by a letter of transmittal that can protect you* by making it unquestionably clear that: 1) the study was not conducted and the report was not prepared for purposes of bid development, and 2) the findings, conclusions, and recommendations included in the report are based on a variety of opinions, inferences, and assumptions and are subject to interpretation. Use the letter to also advise contractors to consult with your geoenvironmental professional to obtain clarifications, interpretations, and guidance (a fee may be required for this service), and that—in any event—they should conduct additional studies to obtain the specific type and extent of information each prefers for preparing a bid or cost estimate. Providing access to the full report, with the appropriate caveats, helps prevent formation of adversarial attitudes and claims of concealed or differing conditions. If a contractor elects to ignore the warnings and advice in the letter of transmittal, it would do so at its own risk. Your geoenvironmental professional should be able to help you prepare an effective letter.

Do Not Separate Documentation from the Report

Geoenvironmental reports often include supplemental documentation, such as maps and copies of regulatory files, permits, registrations, citations, and correspondence with regulatory agencies. If subsurface explorations were performed, the report may contain final boring logs and copies of laboratory data. If remediation activities occurred on site, the report may include: copies of daily field reports; waste manifests; and information about the disturbance of subsurface materials, the type and thickness of any fill placed on site, and fill placement practices, among other types of documentation. *Do not separate supplemental documentation from the report. Do not, and do not permit any other party to redraw or modify any of the supplemental documentation for incorporation into other professionals' instruments of service.*

Understand the Role of Standards

Unless they are incorporated into statutes or regulations, standard practices and standard guides developed by the American Society for Testing and Materials (ASTM) and other recognized standards-developing organizations (SDOs) are little more than aspirational methods agreed to by a consensus of a committee. The committees that develop standards may not comprise those best-qualified to establish methods and, no matter what, no standard method can possibly consider the infinite client- and project-specific variables that fly in the face of the theoretical "standard conditions" to which standard practices and standard guides apply. In fact, these variables can be so pronounced that geoenvironmental professionals who comply with every directive of an ASTM or other standard procedure could run afoul of local custom and practice, thus violating the standard of care. Accordingly, when geoenvironmental professionals indicate in their reports that they have performed a service "in general compliance" with one standard or another, it means they have applied professional judgement in creating and implementing a scope of service designed for the specific client and project involved, and which follows some of the general precepts laid out in the referenced standard. To the extent that a report indicates "general compliance" with a standard, you may wish to speak with your geoenvironmental professional to learn more about what was and was not done. *Do not assume a given standard was followed to the letter.* Research indicates that that seldom is the case.

Realize That Recommendations May Not Be Final

The technical recommendations included in a geoenvironmental report are based on assumptions about actual conditions, and so are preliminary or tentative. Final recommendations can be prepared only by observing actual conditions as they are exposed. For that reason, you should retain the geoenvironmental professional of record to observe construction and/or remediation activities on site, to permit rapid response to unanticipated conditions. *The geoenvironmental professional who prepared the report cannot assume responsibility or liability for the report's recommendations if that professional is not retained to observe relevant site operations.*

Understand That Geotechnical Issues Have Not Been Addressed

Unless geotechnical engineering was specifically included in the scope of professional service, a report is not likely to relate any findings, conclusions, or recommendations about the suitability of subsurface materials for construction purposes, especially when site remediation has been accomplished through the removal, replacement, encapsulation, or chemical treatment of on-site soils. The equipment, techniques, and testing used by geotechnical engineers differ markedly from those used by geoenvironmental professionals; their education, training, and experience are also significantly different. If you plan to build on the subject site, but have not yet had a geotechnical engineering study conducted, your geoenvironmental professional should be able to provide guidance about the next steps you should take. The same firm may provide the services you need.

Read Responsibility Provisions Closely

Geoenvironmental studies cannot be exact; they are based on professional judgement and opinion. Nonetheless, some clients, contractors, and others assume geoenvironmental reports are or certainly should be unerringly precise. Such assumptions have created unrealistic expectations that have led to wholly unwarranted claims and disputes. To help prevent such problems, geoenvironmental professionals have developed a number of report provisions and contract terms that explain who is responsible for what, and how risks are to be allocated. Some people mistake these for "exculpatory clauses," that is, provisions whose purpose is to transfer one party's rightful responsibilities and liabilities to someone else. Read the responsibility provisions included in a report and in the contract you and your geoenvironmental professional agreed to. *Responsibility provisions are not "boilerplate."* They are important.

Rely on Your Geoenvironmental Professional for Additional Assistance

Membership in the Geoprofessional Business Association exposes geoenvironmental professionals to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a geoenvironmental project. Confer with your GBA-member geoenvironmental professional for more information.

GEOPROFESSIONAL BUSINESS ASSOCIATION

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@geoprofessional.org www.geoprofessional.org

PRELIMINARY HYDRAULICS & HYDROLOGY STUDY

PARADISE RANCH
RESIDENTIAL DEVELOPMENT

TRACT MAP #20286

Chino Hills, CA

PREPARE FOR:

TTLC Chino Hills – Paradise Ranch, LLC
2942 Century Place, Suite 121
Costa Mesa, CA 92626

PREPARED BY:

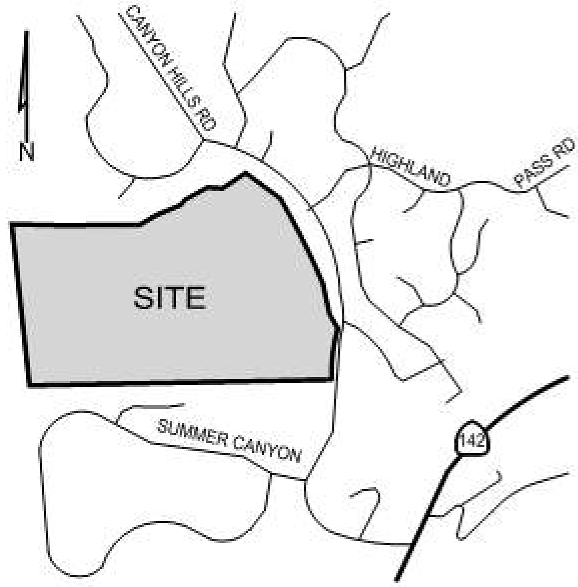
BLUE ENGINEERING & CONSULTING, INC
9320 Baseline Rd Ste. D
RANCHO CUCAMONGA, CA 91701
(909) 248-6557

PREPARED UNDER THE SUPERVISION OF:

ANGEL CESAR, RCE 87222

May, 2021

INDEX:



VICNINITY MAP

I. INTRODUCTION

The proposed project Paradise Ranch Residential Development is an approximately 80.97 acres site located along Canyon Hills Road just north of Summer Canyon Road in the City of Chino Hills, County of San Bernardino, State of California (see attached vicinity map). The site is bordered to the east by Canyon Hills Road, to the south and north with single family homes, to the west by open space wilderness.

II. DESCRIPTION OF THE ONSITE CONDITIONS

The subject site consists of a kidney shaped parcel, approximately 80.97 acres in size. The majority of the site is currently undeveloped. There appears to be a few structures along the north side. Ground surface cover consists of exposed soil.

The site topography varies dramatically throughout the property. The site contains a ridgeline along the south portion of the site. There is an estimate 300 feet of elevation differential across the site. Most of the site's existing flow drains into an existing culvert that goes underneath Canyon Hills Road. South of the ridgeline drains south to Summer Canyon Road.

The project site will be developed into 50 individual lots for single family homes. Phasing is not anticipated for this project. This hydrology report looks at the project at the ultimate condition.

III. OFFSITE HYDROLOGY

Due to the size of the parcel, offsite drainage does occur at multiple locations along the perimeter of the site. Majority of those locations happen outside of the limits of grading will occur. The location where the most offsite drainage does occur, near the limits of grading, is along Canyon Hills Road. This area drains onsite and into the existing channel and through the existing channel.

IV. ONSITE HYDROLOGY

The project is proposing to retain flow within three detention basins that will be located along the westerly limits of the project. Outflow from the detention basins drain into the existing culvert.

Hydrologic calculations for the project were performed using CIVILCADD/CIVIL DESIGN Engineering Software, Version 7.1. Peak Flow and Time of Concentration values for each storm event were obtained for the pre-developed and post-developed condition using the "San Bernardino County Rational Hydrology Program option within the software, as preferred by the City of Chino Hills.

The run-off index, time of concentration, previous fraction and other pertinent information obtained from the rational analysis was then used to generate a post-development Unit Hydrograph for each respective drainage area, as applicable. This was done to compare the existing and proposed condition hydrology mitigation requirements for the 2-year 24-hour, 10-year 24-hour and 100-year 24-hour design storms. The Unit Hydrograph Analysis was performed using the CIVILCADD/CIVILDESIGN Engineering Software previously mentioned.

As appropriate, the resulting Unit Hydrograph was then imported into the CIVILCADD/CIVIL DESIGN Routing Software to perform basin routing and outflow analysis of each detention basin. The final outflow rate from the detention basins was then compared to the existing condition rational method calculation for the 100-year storm event to ensure the project complies with the mitigation requirements for the project.

Design Parameters

- The drainage area is located in Soil Group D according to the USDA NRCS Soil Survey.
- Antecedent Moisture Content (AMC) of I was used for 2-year, II was used for 10-year and III was used for 100-year return frequency storm calculation.
- The onsite drainage area was analyzed for a 10-year and 100-year storm event using Rational Method Analysis per San Bernardino County Hydrology Manual and CIVILCADD/CIVILDESIGN.
- The drainage area is located within a valley area and is assumed to have an Intensity-Duration slope of 0.60 according to section B.8 of the Hydrology Manual.
- The rainfall depth of a 10-year 1-hour storm event is 0.95 inches according to NOAA Atlas 14 Precipitation Frequency Estimates.
- The rainfall depth of a 100-year 1-hour storm event is 1.38 inches according to NOAA Atlas 14 Point Precipitation Frequency Estimates.
- The impervious are assumed to be 50% of the total onsite area, representative of the Residential (5-7 dwl/acre) subarea type.

V. HYDROLOGIC RESULTS

The results from this hydrology analysis demonstrates that the drainage design for the site meets the County of San Bernardino Flood Control standards. Below is a comparison of the pre- and post-developed flows generated onsite prior to any mitigation.

Table 1.1a San Bernardino County Rational Hydrology - Existing

Pre-Development Calculations							
Drainage area	Area (ac)	Frequency	Q (cfs)	Drainage area	Area (ac)	Frequency	Q (cfs)
DA-1	10.00	2 yr	12.482	DA-8	3.82	2 yr	3.754
		10 yr	22.024			10 yr	7.244
		100 yr	34.356			100 yr	11.78
DA-2	9.25	2 yr	9.401	DA-9	0.49	2 yr	0.688
		10 yr	18.277			10 yr	1.232
		100 yr	29.851			100 yr	1.951
DA-3	8.07	2 yr	5.744	Total	72.32	2 yr	51.213
		10 yr	12.88			10 yr	113.326
		100 yr	22.08			100 yr	193.08
DA-4	10.93	2 yr	7.269				
		10 yr	16.739				
		100 yr	28.90				
DA-5	4.99	2 yr	0.878				
		10 yr	4.462				
		100 yr	8.949				
DA-6	8.01	2 yr	3.920				
		10 yr	10.351				
		100 yr	18.546				
DA-7	16.76	2 yr	7.076				
		10 yr	20.126				
		100 yr	36.668				
Stream	68.01	2 yr	46.771				
Total		10 yr	104.85				
		100 yr	179.349				

Table 1.1b San Bernardino County Rational Hydrology - Proposed

Post-Development Calculations (Pre-mitigation)							
Drainage area	Area (ac)	Frequency	Q (cfs)	Drainage area	Area (ac)	Frequency	Q (cfs)
DA-20	2.12	2 yr	2.5	DA-28	2.86	2 yr	3.435
201		10 yr	4.23	212		10 yr	5.798
202		100 yr	6.607	213		100 yr	9.046
DA-21	0.41	2 yr	0.483	DA-29	1.43	2 yr	1.717
202		10 yr	0.818	213		10 yr	2.899
203		100 yr	1.278	214		100 yr	4.523
DA-22	0.44	2 yr	0.519	Confluence	16.30	2 yr	19.977
203		10 yr	0.878			10 yr	33.465
204		100 yr	1.371			100 yr	52.035
Confluence	2.97	2 yr	3.502	DA-30	10	2 yr	12.482
		10 yr	5.93	215		10 yr	22.024
		100 yr	9.256	216		100 yr	34.356
DA-23	1.83	2 yr	2.327	DA-31	9.25	2 yr	9.401
205		10 yr	3.898	216		10 yr	18.278
206		100 yr	6.062	217		100 yr	29.852
DA-24	3.28	2 yr	4.17	DA-32	7.8	2 yr	4.808
206		10 yr	6.987	217		10 yr	11.604
207		100 yr	10.865	218		100 yr	20.628
Confluence	7.799	2 yr	9.916	DA-33	4.56	2 yr	1.153
		10 yr	16.615	218		10 yr	4.668
		100 yr	25.835	219		100 yr	9.272
DA-25	1.07	2 yr	1.411	DA-34	2.73	2 yr	0
208		10 yr	2.354	219		10 yr	0.882
209		100 yr	3.653	220		100 yr	2.986
DA-26	0.36	2 yr	0.475	DA-35	1.7	2 yr	0
209		10 yr	0.792	220		10 yr	0.033
210		100 yr	1.229	221		100 yr	1.4127
DA-27	2.5	2 yr	3.298	DA-36	3.13	2 yr	0
210		10 yr	5.5	221		10 yr	0.123
211		100 yr	8.535	222		100 yr	2.119
Confluence	12.01	2 yr	14.979	Channel	39.17	2 yr	27.844
		10 yr	24.987			10 yr	57.611
		100 yr	38.853			100 yr	100.339

DA-37	4.38	2 yr	3.673	DA-39	7.33	2 yr	8.483
223		10 yr	7.383	226		10 yr	15.772
224		100 yr	12.167	225		100 yr	25.324
DA-38	5.08	2 yr	5.17	Combined	72.26	2 yr	56.556
223		10 yr	9.893			10 yr	115.162
225		100 yr	16.043			100 yr	193.177

Table 1.1c San Bernardino County Rational Hydrology – Summary

	Acres	2 yr	10 yr	100 yr
Pre-Development	72.32	51.213	113.326	193.08
Post Development	72.26	65.147	124.124	205.908
Mitigated Flow		13.934	10.798	12.828

Drainage areas that will be directed to each of the detention basins will be used to run the required Unit Hydrograph. For Detention Basin BMP-1, information from node 224 will be used, Detention basin BMP-2 node 225 and Detention Basin BMP-3 node 226 will be used.

Table 1.2 San Bernardino County Unit Hydrograph and Basin Routing

Post-Development Unit Hydrograph					Post-Development Basin Routine				
NODE	Area (ac)		TC (hr)	Q (cfs)	NODE	Area (ac)		TC (hr)	Q (cfs)
224	4.38	2 yr	0.252	4.137	224	4.38	2 yr	0.252	0.93
BMP-1		10 yr		9.101			10 yr		0.93
		100 yr		15.955			100 yr		2.562
225	5.08	2 yr	0.204	5.377	225	5.08	2 yr	0.204	0.946
BMP-2		10 yr		11.558			10 yr		3.34
		100 yr		20.148			100 yr		4.5
226	7.33	2 yr	0.176	7.111	2263 dis	7.33	2 yr	0.176	5.749
BMP-3		10 yr		14.726			10 yr		9.309
		100 yr		26.213			100 yr		20

Table 1.3 Basin Volumes

Basin A

Elevation	Volume (ac.–ft)	Outfall (cfs)
1020	0	0
1020.5	0.052	0.93
1021	0.114	0.93
1021.5	0.186	0.93
1022	0.261	0.93
1022.5	0.342	0.93
1023	0.431	1.86
1023.5	0.527	2.79
1024	0.630	2.79

Basin II

Elevation	Volume (ac.–ft)	Outfall (cfs)
1015	0	0
1015.5	0.044	0.93
1016	0.093	0.93
1016.5	0.148	1.86
1017	0.210	2.79
1017.5	0.278	3.72
1018	0.352	4.5
1018.5	0.433	4.5
1019	0.522	4.5

Basin III

Elevation	Volume (ac.–ft)	Outfall (cfs)
999	0	0
999.5	0.021	3.72
1000	0.047	7.44
1000.5	0.078	7.44
1001	0.114	7.44
1001.5	0.156	20
1002	0.204	20

Table 1.4 Conclusion

Event	Pre	Post Mitigated	Decrease	% Change
2 yr	51.213	50.913	0.3	-1%
10 yr	113.326	104.655	8.671	-7.65%
100 yr	193.08	179.436	13.644	-7.07%

V. CONCLUSION

The project will increase the post Q amount. To mitigate the increase of flow coming from the project, three detention basins with the capacity to store up to a volume of 59,067 c.f. are being proposed. Routing of the flow through the two basins did show a reduction of 0.3 cfs for the 2 year event, 8.671 cfs for the 10 year event and 13.644 cfs for the 100 year event leaving the project site into the existing culvert under Chino Hills Road.

APPENDIX

Soil Map
Rain Maps

CIVILD Rational Method Calculations
- Pre-Development 2 yr
- Pre-Development 10 yr
- Pre-Development 100 yr
- Post Development 2 yr
- Post Development 10 yr
- Post Development 100 yr

UNIT Hydrograph

- Post Development 2 yr
- Post Development 10 yr
- Post Development 100 yr

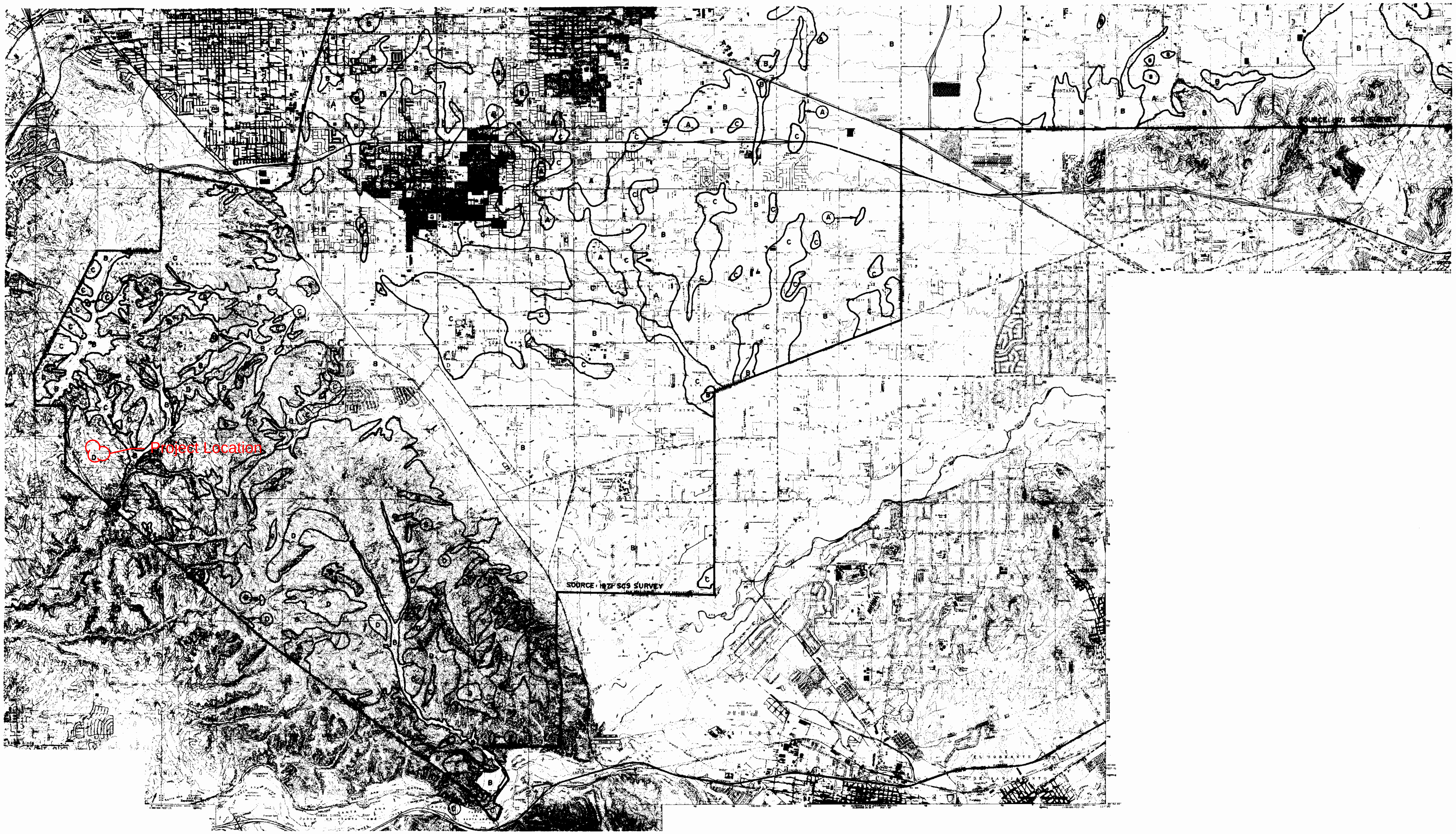
Basin Routing

DMA-1

- Post Development 2 yr
- Post Development 10 yr
- Post Development 100 yr

DMA-2

- Post Development 2 yr
- Post Development 10 yr
- Post Development 100 yr



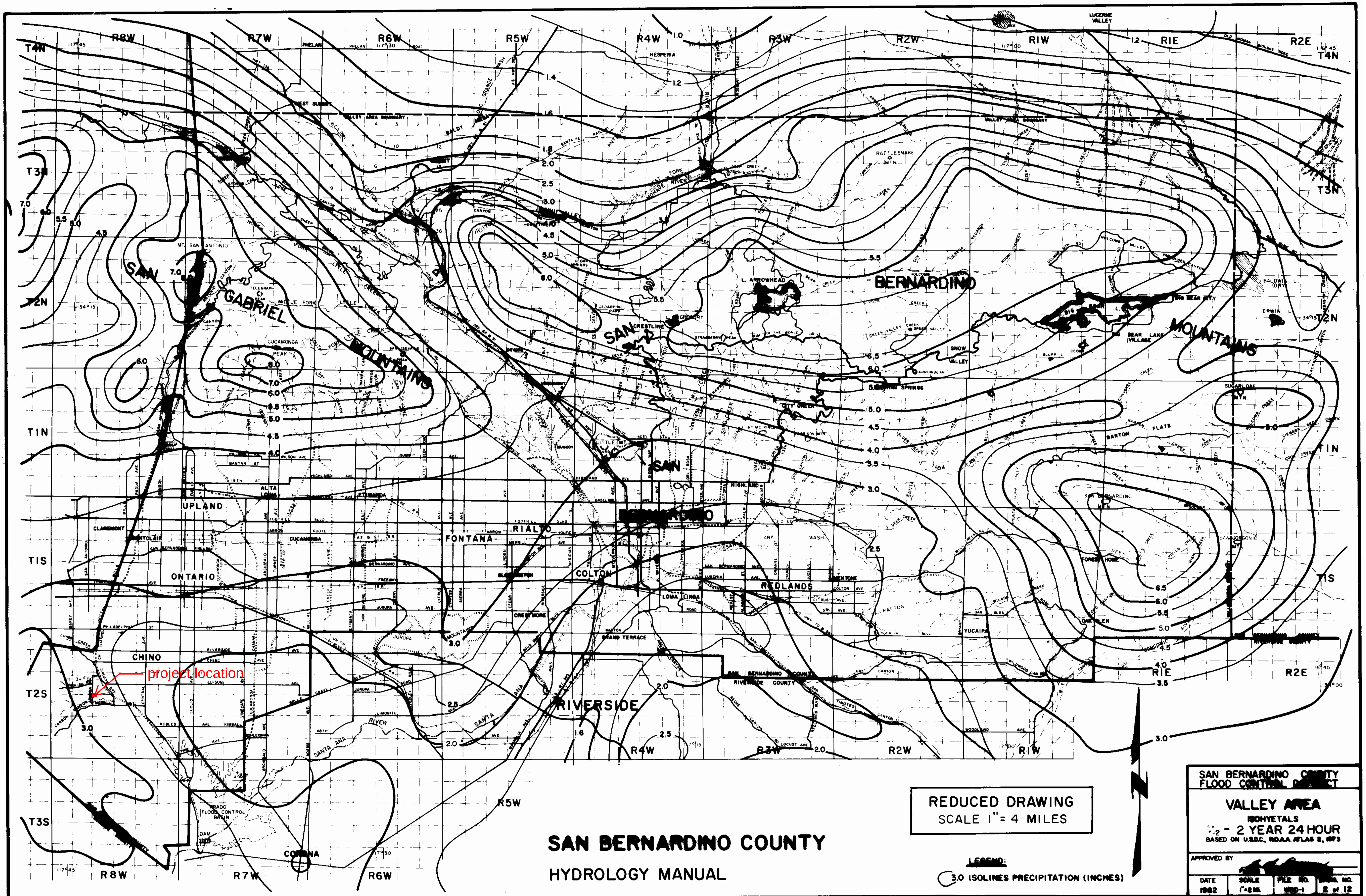
SCALE REDUCED BY 1/2

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

HYDROLOGIC SOILS GROUP MAP FOR SOUTHWEST-C AREA

FIGURE C-15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REDUCED DRAWING
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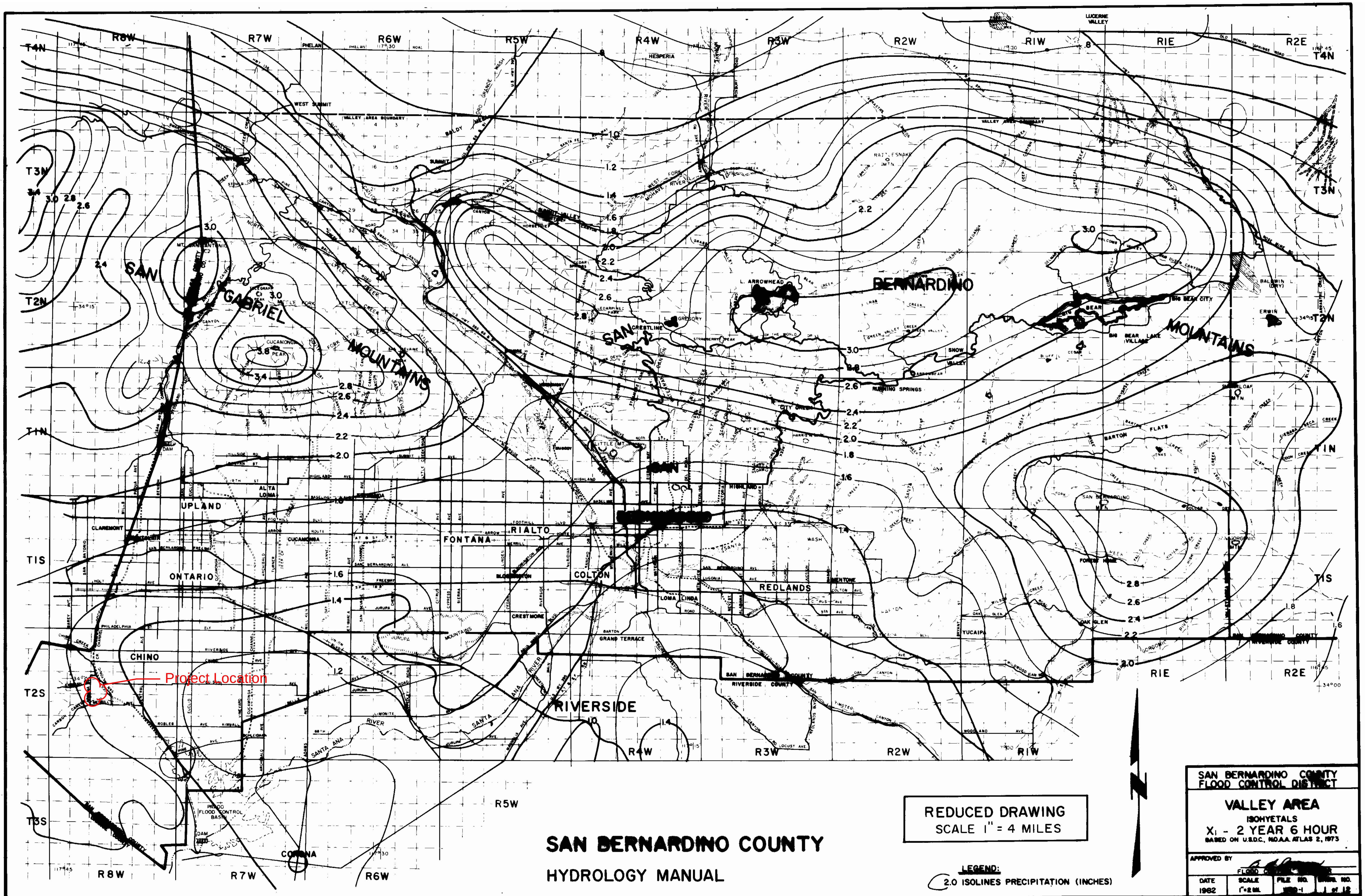
SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
2 YEAR 24 HOUR
BASED ON U.S.D.C., N.O.A.A. ATLAS 2, 1973
APPROVED BY
DATE 1982
project location
SAN GABRIEL MOUNTAINS
SAN BERNARDINO MOUNTAINS
UPLAND
ONTARIO
CHINO
FONTANA
RIALTO
COLTON
REDLANDS
LOMA LINDA
YUCAIPA
RIVERSIDE
CORONA
CLAREMONT
CUCAMONGA
HESPERIA
PHELAN
LUCERNE VALLEY
T4N
T3N
T2N
T1N
T1S
T2S
T3S
R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E

FIGURE B-2


SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
REDUCED DRAWING
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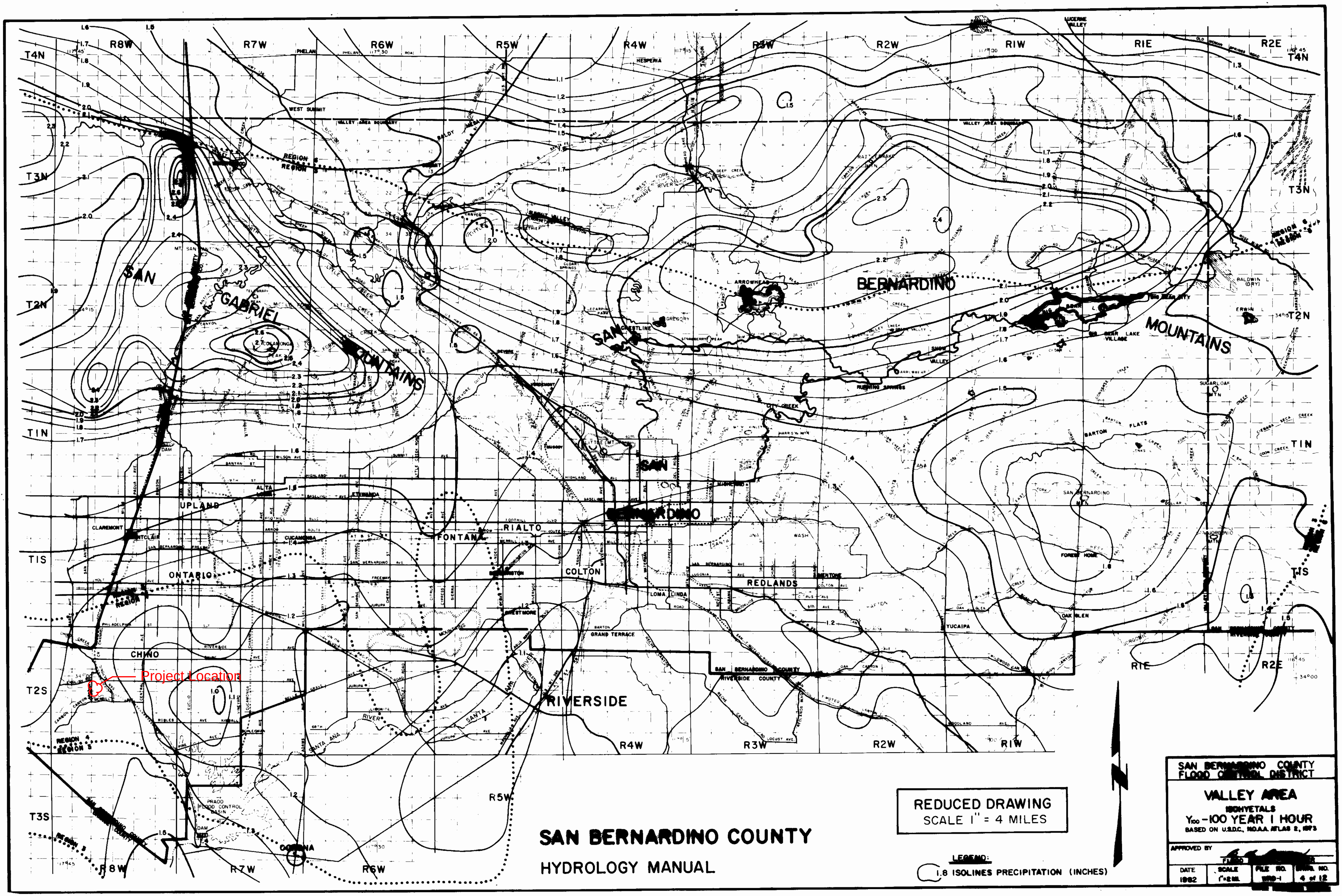
SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
X1 - 2 YEAR 6 HOUR
BASED ON U.S.D.C., NOAA ATLAS 2, 1973
APPROVED BY
DATE
1982
SCALE
1"=2 MI.
Project Location
SAN GABRIEL MOUNTAINS
SAN BERNARDINO MOUNTAINS
UPLAND
ONTARIO
CHINO
FONTANA
RIALTO
COLTON
REDLANDS
LOMA LINDA
RIVERSIDE
CORONA
HESPERIA
CLAREMONT
YUCAIPA
GRAND TERRACE
CRESTMORE
ALTA LOMA
CUCAMONGA
PRADO FLOOD CONTROL BASIN
R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
T4N
T3N
T2N
T1N
T1S
T2S
T3S

FIGURE B-1



SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
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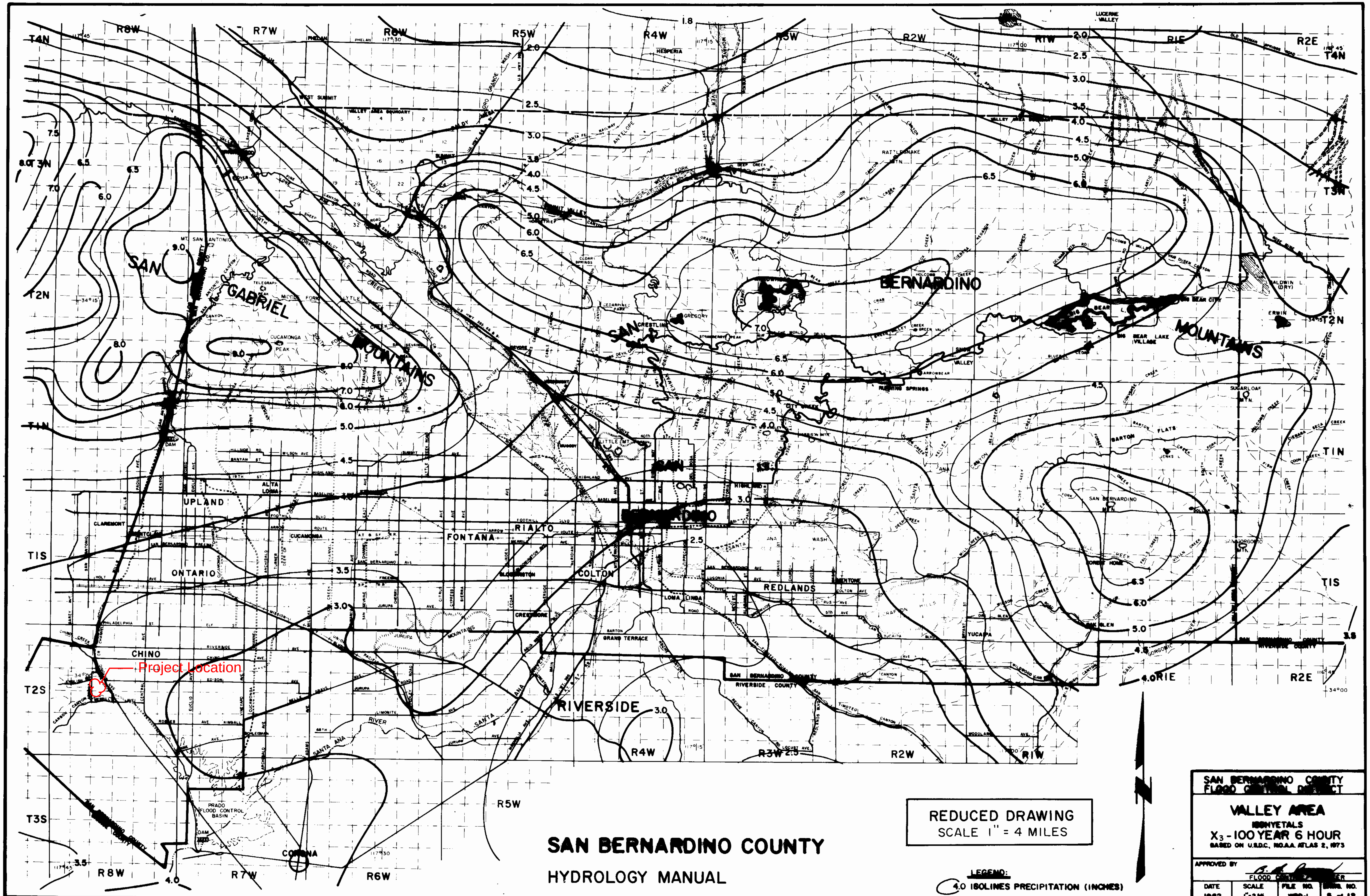
SAN BERNARDINO COUNTY FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
Y_{100} - 100 YEAR 1 HOUR
BASED ON U.S.D.C., NOAA ATLAS 2, 1973
APPROVED BY
DATE 1982
SCALE 1"=2 MI.
FILE NO. WRD-1
DWG. NO. 4 of 12
Project Location
SAN GABRIEL MOUNTAINS
SAN BERNARDINO MOUNTAINS
UPLAND
CLAREMONT
MONTCLAIR
ONTARIO
CHINO
CUCAMONGA
FONTANA
RIALTO
SAN BERNARDINO
COLTON
REDLANDS
LOMA LINDA
YUCAIPA
RIVERSIDE
CORONA
GRAND TERRACE
BLOOMINGTON
ALTA LOMA
ETIWANDA
MENTONE
CRESTLINE
L. ARROWHEAD
HESPERIA
PHELAN
FOREST HOME
OAK GLEN
PRADO FLOOD CONTROL BASIN
SAN BERNARDINO COUNTY
RIVERSIDE COUNTY
R8W
R7W
R6W
R5W
R4W
R3W
R2W
R1W
R1E
R2E
T4N
T3N
T2N
T1N
T1S
T2S
T3S

FIGURE B-4


SAN BERNARDINO COUNTY
HYDROLOGY MANUAL
REDUCED DRAWING
SCALE 1" = 4 MILES
LEGEND:
4.0 ISOLINES PRECIPITATION (INCHES)
SAN BERNARDINO COUNTY
FLOOD CONTROL DISTRICT
VALLEY AREA
ISOHYETALS
X3 - 100 YEAR 6 HOUR
BASED ON U.S.D.C., NOAA ATLAS 2, 1973
APPROVED BY
FLOOD CONTROL ENGINEER
DATE 1982
SCALE 1"=2 MI.
FILE NO. WRD-1
SHEET NO. 5 of 12
Project Location
SAN GABRIEL MOUNTAINS
SAN BERNARDINO MOUNTAINS
UPLAND
ONTARIO
CHINO
FONTANA
RIALTO
COLTON
REDLANDS
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CLAREMONT
CUCAMONGA
YUCAIPA
HESPERIA
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T4N
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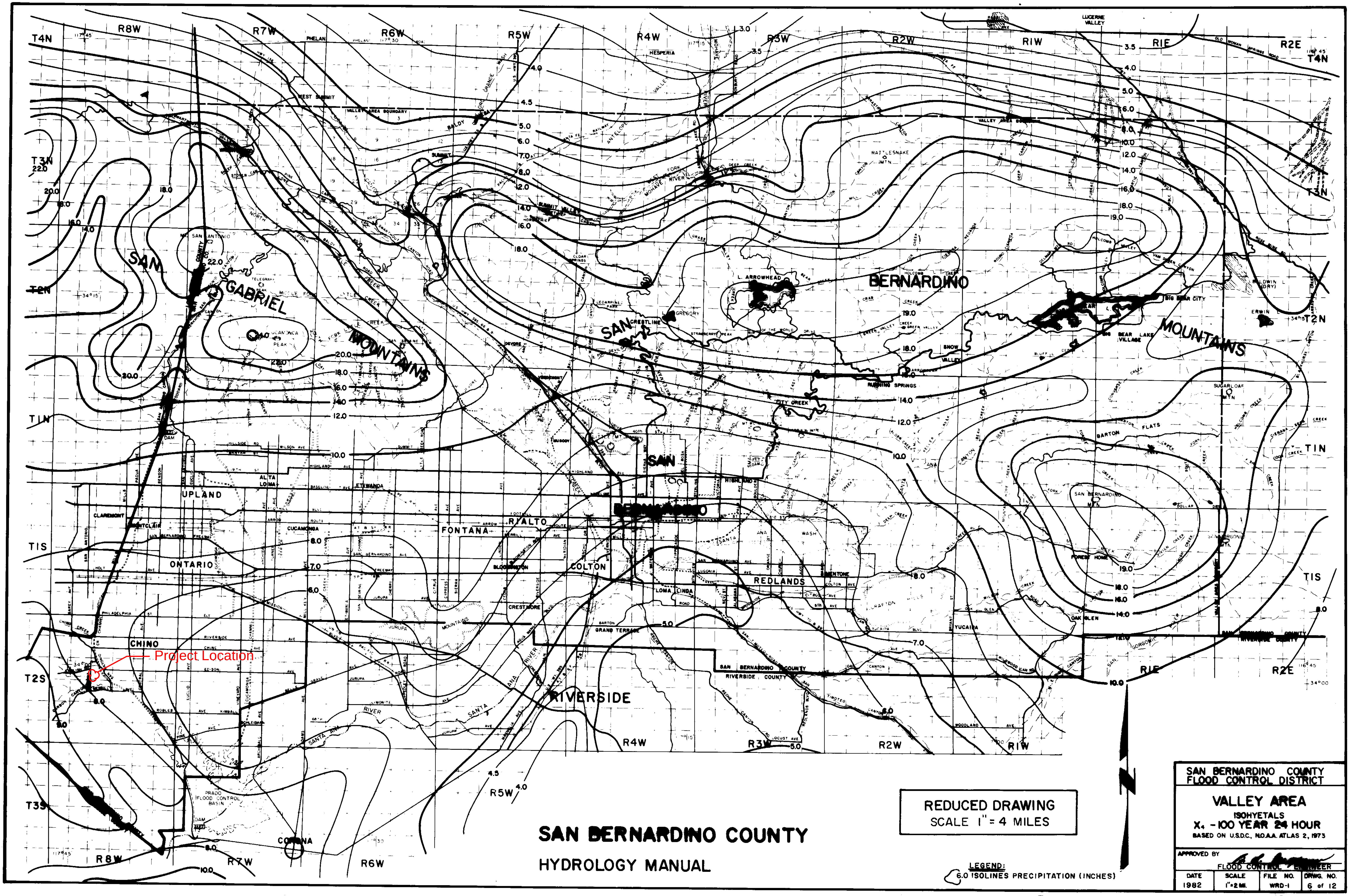
R2E



B-14

FIGURE B-6

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                 San Bernardino County Rational Hydrology Program

                     (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2019 Version 9.1
        Rational Hydrology Study        Date: 05/26/21
------------------------------------------------------------------------
Paradise Ranch Residential Subdivision
Pre Development 2 yr


------------------------------------------------------------------------


Program License Serial Number 6481

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is     2.0
   10 Year storm 1 hour rainfall  =      0.950(In.)
  100 Year storm 1 hour rainfall  =      1.380(In.)
Computed rainfall intensity:
Storm year =     2.00   1 hour rainfall =     0.649 (In.)
Slope used for rainfall intensity curve b =  0.6000
Soil antecedent moisture condition (AMC) = 1


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.000 to Point/Station      101.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 89.00
Adjusted SCS curve number for AMC 1 = 76.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.430(In/Hr)
Initial subarea data:
Initial area flow distance =   948.080(Ft.)
Top (of initial area) elevation =  1289.910(Ft.)
Bottom (of initial area) elevation =  1058.680(Ft.)
Difference in elevation =   231.230(Ft.)
Slope =    0.24389  s(%)=      24.39
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.801 min.
```

```
Rainfall intensity =      1.817(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.687
Subarea runoff =     12.482(CFS)
Total initial stream area =       10.000(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.430(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.384(Ft.), Average velocity =   7.773(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00             5.00
        2             10.00             0.00
        3             15.00             0.00
        4             25.00             5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     17.218(CFS)
  '     '        flow top width =      6.536(Ft.)
  '     '    velocity=    7.773(Ft/s)
  '     '        area =      2.215(Sq.Ft)
  '     '        Froude number =     2.353

Upstream point elevation =  1058.680(Ft.)
Downstream point elevation =  1025.000(Ft.)
Flow length =   311.600(Ft.)
Travel time  =    0.67 min.
Time of concentration =   11.47 min.
Depth of flow =   0.384(Ft.)
Average velocity =   7.773(Ft/s)
Total irregular channel flow =    17.218(CFS)
Irregular channel normal depth above invert elev. =   0.384(Ft.)
Average velocity of channel(s) =   7.773(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Adjusted SCS curve number for AMC 1 = 68.60
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.554(In/Hr)
Rainfall intensity =      1.753(In/Hr) for a     2.0 year storm
```

```
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.649
Subarea runoff =      9.401(CFS) for    9.250(Ac.)
Total runoff =     21.883(CFS)
Effective area this stream =       19.25(Ac.)
Total Study Area (Main Stream No. 1) =       19.25(Ac.)
Area averaged Fm value =    0.490(In/Hr)
Depth of flow =   0.441(Ft.), Average velocity =   8.428(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.628(Ft.), Average velocity =   6.309(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              5.00
        2             10.00              0.00
        3             15.00              0.00
        4             25.00              5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     24.784(CFS)
  '     '        flow top width =      7.512(Ft.)
  '     '    velocity=    6.309(Ft/s)
  '     '        area =      3.929(Sq.Ft)
  '     '        Froude number =     1.537

Upstream point elevation =  1025.000(Ft.)
Downstream point elevation =  1002.820(Ft.)
Flow length =   547.140(Ft.)
Travel time  =    1.45 min.
Time of concentration =   12.91 min.
Depth of flow =   0.628(Ft.)
Average velocity =   6.309(Ft/s)
Total irregular channel flow =    24.784(CFS)
Irregular channel normal depth above invert elev. =   0.628(Ft.)
Average velocity of channel(s) =   6.309(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Adjusted SCS curve number for AMC 1 = 68.60
```

```
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.554(In/Hr)
Rainfall intensity =      1.632(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.620
Subarea runoff =      5.744(CFS) for    8.070(Ac.)
Total runoff =     27.627(CFS)
Effective area this stream =       27.32(Ac.)
Total Study Area (Main Stream No. 1) =       27.32(Ac.)
Area averaged Fm value =    0.509(In/Hr)
Depth of flow =   0.668(Ft.), Average velocity =   6.530(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.719(Ft.), Average velocity =   6.758(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              5.00
        2             10.00              0.00
        3             15.00              0.00
        4             25.00              5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     31.293(CFS)
  '     '        flow top width =      7.877(Ft.)
  '     '    velocity=    6.758(Ft/s)
  '     '        area =      4.630(Sq.Ft)
  '     '        Froude number =     1.553

Upstream point elevation =  1002.820(Ft.)
Downstream point elevation =   980.320(Ft.)
Flow length =   562.590(Ft.)
Travel time  =    1.39 min.
Time of concentration =   14.30 min.
Depth of flow =   0.719(Ft.)
Average velocity =   6.758(Ft/s)
Total irregular channel flow =    31.293(CFS)
Irregular channel normal depth above invert elev. =   0.719(Ft.)
Average velocity of channel(s) =   6.758(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
```

```
SCS curve number for soil(AMC 2)  = 84.00
Adjusted SCS curve number for AMC 1 = 68.60
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.554(In/Hr)
Rainfall intensity =      1.535(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.594
Subarea runoff =      7.269(CFS) for   10.930(Ac.)
Total runoff =     34.896(CFS)
Effective area this stream =       38.25(Ac.)
Total Study Area (Main Stream No. 1) =       38.25(Ac.)
Area averaged Fm value =    0.522(In/Hr)
Depth of flow =   0.765(Ft.), Average velocity =   6.991(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.868(Ft.), Average velocity =   6.050(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00              5.00
        2            10.00              0.00
        3            15.00              0.00
        4            25.00              5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     35.366(CFS)
  '     '        flow top width =      8.472(Ft.)
  '     '    velocity=    6.050(Ft/s)
  '     '        area =      5.846(Sq.Ft)
  '     '        Froude number =     1.283

Upstream point elevation =   980.320(Ft.)
Downstream point elevation =   965.880(Ft.)
Flow length =   554.320(Ft.)
Travel time  =    1.53 min.
Time of concentration =   15.83 min.
Depth of flow =   0.868(Ft.)
Average velocity =   6.050(Ft/s)
Total irregular channel flow =    35.366(CFS)
Irregular channel normal depth above invert elev. =   0.868(Ft.)
Average velocity of channel(s) =   6.050(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
```

```
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Adjusted SCS curve number for AMC 1 = 68.60
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.554(In/Hr)
Rainfall intensity =      1.445(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.573
Subarea runoff =      0.878(CFS) for    4.990(Ac.)
Total runoff =     35.774(CFS)
Effective area this stream =       43.24(Ac.)
Total Study Area (Main Stream No. 1) =       43.24(Ac.)
Area averaged Fm value =    0.525(In/Hr)
Depth of flow =   0.873(Ft.), Average velocity =   6.071(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      106.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   1.053(Ft.), Average velocity =   5.052(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00             5.00
        2             10.00             0.00
        3             15.00             0.00
        4             25.00             5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     37.778(CFS)
  '     '        flow top width =      9.210(Ft.)
  '     '    velocity=    5.052(Ft/s)
  '     '        area =      7.478(Sq.Ft)
  '     '        Froude number =     0.988

Upstream point elevation =   965.880(Ft.)
Downstream point elevation =   961.230(Ft.)
Flow length =   315.750(Ft.)
Travel time  =    1.04 min.
Time of concentration =   16.87 min.
Depth of flow =   1.053(Ft.)
Average velocity =   5.052(Ft/s)
Total irregular channel flow =    37.778(CFS)
Irregular channel normal depth above invert elev. =   1.053(Ft.)
Average velocity of channel(s) =   5.052(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
```

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Adjusted SCS curve number for AMC 1 = 68.60
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.554(In/Hr)
Rainfall intensity =      1.390(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.557
Subarea runoff =      3.920(CFS) for    8.010(Ac.)
Total runoff =     39.695(CFS)
Effective area this stream =       51.25(Ac.)
Total Study Area (Main Stream No. 1) =       51.25(Ac.)
Area averaged Fm value =    0.530(In/Hr)
Depth of flow =   1.081(Ft.), Average velocity =   5.126(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   1.026(Ft.), Average velocity =   5.978(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00             5.00
        2             10.00             0.00
        3             15.00             0.00
        4             25.00             5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     43.258(CFS)
  '     '        flow top width =      9.104(Ft.)
  '     '    velocity=    5.978(Ft/s)
  '     '        area =      7.236(Sq.Ft)
  '     '        Froude number =     1.182

Upstream point elevation =   961.230(Ft.)
Downstream point elevation =   946.000(Ft.)
Flow length =   718.380(Ft.)
Travel time  =    2.00 min.
Time of concentration =   18.87 min.
Depth of flow =   1.026(Ft.)
Average velocity =   5.978(Ft/s)
Total irregular channel flow =    43.258(CFS)
Irregular channel normal depth above invert elev. =   1.026(Ft.)
Average velocity of channel(s) =   5.978(Ft/s)
```

```
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Adjusted SCS curve number for AMC 1 = 68.60
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.554(In/Hr)
Rainfall intensity =      1.300(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.529
Subarea runoff =      7.076(CFS) for   16.760(Ac.)
Total runoff =     46.771(CFS)
Effective area this stream =       68.01(Ac.)
Total Study Area (Main Stream No. 1) =       68.01(Ac.)
Area averaged Fm value =    0.536(In/Hr)
Depth of flow =   1.071(Ft.), Average velocity =   6.117(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      109.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Adjusted SCS curve number for AMC 1 = 68.60
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.554(In/Hr)
Initial subarea data:
Initial area flow distance =   730.430(Ft.)
Top (of initial area) elevation =  1189.000(Ft.)
Bottom (of initial area) elevation =   985.040(Ft.)
Difference in elevation =   203.960(Ft.)
Slope =    0.27923  s(%)=      27.92
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.736 min.
Rainfall intensity =      1.646(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.597
Subarea runoff =      3.754(CFS)
Total initial stream area =        3.820(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.554(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      111.000
```

**** INITIAL AREA EVALUATION ****

UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2) = 84.00
Adjusted SCS curve number for AMC 1 = 68.60
Pervious ratio(Ap) = 1.0000   Max loss rate(Fm)=   0.554(In/Hr)
Initial subarea data:
Initial area flow distance =   255.290(Ft.)
Top (of initial area) elevation = 1037.430(Ft.)
Bottom (of initial area) elevation =   967.030(Ft.)
Difference in elevation =   70.400(Ft.)
Slope =   0.27576 s(%)=   27.58
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   8.385 min.
Rainfall intensity =   2.115(In/Hr) for a   2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.664
Subarea runoff =   0.688(CFS)
Total initial stream area =   0.490(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =   0.554(In/Hr)
End of computations, Total Study Area =   72.32 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 84.7

```
            San Bernardino County Rational Hydrology Program

                (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2019 Version 9.1
        Rational Hydrology Study       Date: 05/26/21
------------------------------------------------------------------------
Paradise Ranch Residential Subdivision
Pre Development 10 yr


------------------------------------------------------------------------


Program License Serial Number 6481

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is    10.0
Computed rainfall intensity:
Storm year =    10.00   1 hour rainfall =     0.950 (In.)
Slope used for rainfall intensity curve b =  0.6000
Soil antecedent moisture condition (AMC) = 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.000 to Point/Station      101.000
**** INITIAL AREA EVALUATION ****

UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 89.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.211(In/Hr)
Initial subarea data:
Initial area flow distance =   948.080(Ft.)
Top (of initial area) elevation =  1289.910(Ft.)
Bottom (of initial area) elevation =  1058.680(Ft.)
Difference in elevation =   231.230(Ft.)
Slope =    0.24389  s(%)=      24.39
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.801 min.
Rainfall intensity =      2.658(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.829
Subarea runoff =     22.024(CFS)
```

```
Total initial stream area =       10.000(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.211(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.541(Ft.), Average velocity =   9.474(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00              5.00
        2            10.00              0.00
        3            15.00              0.00
        4            25.00              5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     31.196(CFS)
  '     '        flow top width =      7.165(Ft.)
  '     '    velocity=    9.474(Ft/s)
  '     '        area =      3.293(Sq.Ft)
  '     '        Froude number =     2.463

Upstream point elevation =  1058.680(Ft.)
Downstream point elevation =  1025.000(Ft.)
Flow length =   311.600(Ft.)
Travel time  =    0.55 min.
Time of concentration =   11.35 min.
Depth of flow =   0.541(Ft.)
Average velocity =   9.474(Ft/s)
Total irregular channel flow =    31.196(CFS)
Irregular channel normal depth above invert elev. =   0.541(Ft.)
Average velocity of channel(s) =   9.474(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.301(In/Hr)
Rainfall intensity =      2.580(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.811
Subarea runoff =     18.277(CFS) for    9.250(Ac.)
Total runoff =     40.301(CFS)
```

```
Effective area this stream =       19.25(Ac.)
Total Study Area (Main Stream No. 1) =       19.25(Ac.)
Area averaged Fm value =    0.254(In/Hr)
Depth of flow =   0.626(Ft.), Average velocity =  10.288(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.896(Ft.), Average velocity =   7.681(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              5.00
        2             10.00              0.00
        3             15.00              0.00
        4             25.00              5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     46.774(CFS)
  '     '        flow top width =      8.586(Ft.)
  '     '    velocity=    7.681(Ft/s)
  '     '        area =      6.089(Sq.Ft)
  '     '        Froude number =     1.607

Upstream point elevation =  1025.000(Ft.)
Downstream point elevation =  1002.820(Ft.)
Flow length =   547.140(Ft.)
Travel time  =    1.19 min.
Time of concentration =   12.54 min.
Depth of flow =   0.896(Ft.)
Average velocity =   7.681(Ft/s)
Total irregular channel flow =    46.775(CFS)
Irregular channel normal depth above invert elev. =   0.896(Ft.)
Average velocity of channel(s) =   7.681(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.301(In/Hr)
Rainfall intensity =      2.431(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.801
Subarea runoff =     12.880(CFS) for    8.070(Ac.)
```

```
Total runoff =     53.181(CFS)
Effective area this stream =       27.32(Ac.)
Total Study Area (Main Stream No. 1) =       27.32(Ac.)
Area averaged Fm value =    0.268(In/Hr)
Depth of flow =   0.962(Ft.), Average velocity =   7.983(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   1.046(Ft.), Average velocity =   8.298(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              5.00
        2             10.00              0.00
        3             15.00              0.00
        4             25.00              5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     61.584(CFS)
  '     '        flow top width =      9.185(Ft.)
  '     '    velocity=    8.298(Ft/s)
  '     '        area =      7.421(Sq.Ft)
  '     '        Froude number =     1.627

Upstream point elevation =  1002.820(Ft.)
Downstream point elevation =   980.320(Ft.)
Flow length =   562.590(Ft.)
Travel time  =    1.13 min.
Time of concentration =   13.67 min.
Depth of flow =   1.046(Ft.)
Average velocity =   8.298(Ft/s)
Total irregular channel flow =    61.584(CFS)
Irregular channel normal depth above invert elev. =   1.046(Ft.)
Average velocity of channel(s) =   8.298(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.301(In/Hr)
Rainfall intensity =      2.308(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.792
```

```
Subarea runoff =     16.731(CFS) for   10.930(Ac.)
Total runoff =     69.912(CFS)
Effective area this stream =       38.25(Ac.)
Total Study Area (Main Stream No. 1) =       38.25(Ac.)
Area averaged Fm value =    0.277(In/Hr)
Depth of flow =   1.121(Ft.), Average velocity =   8.613(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   1.279(Ft.), Average velocity =   7.463(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00             5.00
        2            10.00             0.00
        3            15.00             0.00
        4            25.00             5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     72.181(CFS)
  '     '        flow top width =     10.118(Ft.)
  '     '    velocity=    7.463(Ft/s)
  '     '        area =      9.671(Sq.Ft)
  '     '        Froude number =     1.345

Upstream point elevation =   980.320(Ft.)
Downstream point elevation =   965.880(Ft.)
Flow length =   554.320(Ft.)
Travel time  =    1.24 min.
Time of concentration =   14.90 min.
Depth of flow =   1.279(Ft.)
Average velocity =   7.463(Ft/s)
Total irregular channel flow =    72.181(CFS)
Irregular channel normal depth above invert elev. =   1.279(Ft.)
Average velocity of channel(s) =   7.463(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.301(In/Hr)
Rainfall intensity =      2.191(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
```

```
rational method)(Q=KCIA) is C = 0.785
Subarea runoff =      4.462(CFS) for    4.990(Ac.)
Total runoff =     74.374(CFS)
Effective area this stream =       43.24(Ac.)
Total Study Area (Main Stream No. 1) =       43.24(Ac.)
Area averaged Fm value =    0.280(In/Hr)
Depth of flow =   1.300(Ft.), Average velocity =   7.528(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      105.000 to Point/Station      106.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   1.565(Ft.), Average velocity =   6.252(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00             5.00
        2             10.00             0.00
        3             15.00             0.00
        4             25.00             5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     79.577(CFS)
  '     '        flow top width =     11.262(Ft.)
  '     '    velocity=    6.252(Ft/s)
  '     '        area =     12.729(Sq.Ft)
  '     '        Froude number =     1.036

Upstream point elevation =   965.880(Ft.)
Downstream point elevation =   961.230(Ft.)
Flow length =   315.750(Ft.)
Travel time  =    0.84 min.
Time of concentration =   15.75 min.
Depth of flow =   1.565(Ft.)
Average velocity =   6.252(Ft/s)
Total irregular channel flow =    79.577(CFS)
Irregular channel normal depth above invert elev. =   1.565(Ft.)
Average velocity of channel(s) =   6.252(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.301(In/Hr)
Rainfall intensity =      2.120(In/Hr) for a    10.0 year storm
```

```
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.780
Subarea runoff =     10.351(CFS) for    8.010(Ac.)
Total runoff =     84.725(CFS)
Effective area this stream =       51.25(Ac.)
Total Study Area (Main Stream No. 1) =       51.25(Ac.)
Area averaged Fm value =    0.283(In/Hr)
Depth of flow =   1.617(Ft.), Average velocity =   6.362(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   1.560(Ft.), Average velocity =   7.486(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              5.00
        2             10.00              0.00
        3             15.00              0.00
        4             25.00              5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     94.819(CFS)
  '     '        flow top width =     11.239(Ft.)
  '     '    velocity=    7.486(Ft/s)
  '     '        area =     12.665(Sq.Ft)
  '     '        Froude number =     1.243

Upstream point elevation =   961.230(Ft.)
Downstream point elevation =   946.000(Ft.)
Flow length =   718.380(Ft.)
Travel time  =    1.60 min.
Time of concentration =   17.35 min.
Depth of flow =   1.560(Ft.)
Average velocity =   7.486(Ft/s)
Total irregular channel flow =    94.819(CFS)
Irregular channel normal depth above invert elev. =   1.560(Ft.)
Average velocity of channel(s) =   7.486(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.301(In/Hr)
```

```
Rainfall intensity =      2.000(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.771
Subarea runoff =     20.126(CFS) for   16.760(Ac.)
Total runoff =    104.850(CFS)
Effective area this stream =       68.01(Ac.)
Total Study Area (Main Stream No. 1) =       68.01(Ac.)
Area averaged Fm value =    0.287(In/Hr)
Depth of flow =   1.643(Ft.), Average velocity =   7.698(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      108.000 to Point/Station      109.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.301(In/Hr)
Initial subarea data:
Initial area flow distance =   730.430(Ft.)
Top (of initial area) elevation =  1189.000(Ft.)
Bottom (of initial area) elevation =   985.040(Ft.)
Difference in elevation =   203.960(Ft.)
Slope =    0.27923  s(%)=      27.92
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.736 min.
Rainfall intensity =      2.408(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.788
Subarea runoff =      7.244(CFS)
Total initial stream area =        3.820(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.301(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      111.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.301(In/Hr)
Initial subarea data:
```

```
Initial area flow distance =   255.290(Ft.)
Top (of initial area) elevation =  1037.430(Ft.)
Bottom (of initial area) elevation =   967.030(Ft.)
Difference in elevation =    70.400(Ft.)
Slope =    0.27576  s(%)=      27.58
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.385 min.
Rainfall intensity =      3.094(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.813
Subarea runoff =      1.232(CFS)
Total initial stream area =        0.490(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.301(In/Hr)
End of computations, Total Study Area =           72.32 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number =  84.7
```

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                San Bernardino County Rational Hydrology Program

                    (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2019 Version 9.1
        Rational Hydrology Study        Date: 05/27/21
------------------------------------------------------------------------
Paradise Ranch Residential Subdivision
Pre Development 100 yr


------------------------------------------------------------------------


Program License Serial Number 6481

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
   10 Year storm 1 hour rainfall  =      0.950(In.)
  100 Year storm 1 hour rainfall  =      1.380(In.)
Computed rainfall intensity:
Storm year =   100.00   1 hour rainfall =     1.380 (In.)
Slope used for rainfall intensity curve b =  0.6000
Soil antecedent moisture condition (AMC) = 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      100.000 to Point/Station      101.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 89.00
Adjusted SCS curve number for AMC 3 = 97.80
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.044(In/Hr)
Initial subarea data:
Initial area flow distance =   948.080(Ft.)
Top (of initial area) elevation =  1289.910(Ft.)
Bottom (of initial area) elevation =  1058.680(Ft.)
Difference in elevation =   231.230(Ft.)
Slope =    0.24389  s(%)=      24.39
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.801 min.
```

```
Rainfall intensity =      3.861(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.890
Subarea runoff =     34.356(CFS)
Total initial stream area =       10.000(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.044(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.702(Ft.), Average velocity =  10.965(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00             5.00
        2             10.00             0.00
        3             15.00             0.00
        4             25.00             5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     49.312(CFS)
  '     '        flow top width =      7.809(Ft.)
  '     '    velocity=   10.965(Ft/s)
  '     '        area =      4.497(Sq.Ft)
  '     '        Froude number =     2.546

Upstream point elevation =  1058.680(Ft.)
Downstream point elevation =  1025.000(Ft.)
Flow length =   311.600(Ft.)
Travel time  =    0.47 min.
Time of concentration =   11.27 min.
Depth of flow =   0.702(Ft.)
Average velocity =  10.965(Ft/s)
Total irregular channel flow =    49.312(CFS)
Irregular channel normal depth above invert elev. =   0.702(Ft.)
Average velocity of channel(s) =  10.965(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Adjusted SCS curve number for AMC 3 = 96.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.071(In/Hr)
Rainfall intensity =      3.763(In/Hr) for a   100.0 year storm
```

```
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.886
Subarea runoff =     29.851(CFS) for    9.250(Ac.)
Total runoff =     64.207(CFS)
Effective area this stream =       19.25(Ac.)
Total Study Area (Main Stream No. 1) =       19.25(Ac.)
Area averaged Fm value =    0.057(In/Hr)
Depth of flow =   0.814(Ft.), Average velocity =  11.898(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      102.000 to Point/Station      103.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   1.162(Ft.), Average velocity =   8.842(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00             5.00
        2            10.00             0.00
        3            15.00             0.00
        4            25.00             5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     75.286(CFS)
  '     '        flow top width =      9.650(Ft.)
  '     '    velocity=    8.842(Ft/s)
  '     '        area =      8.514(Sq.Ft)
  '     '        Froude number =     1.659

Upstream point elevation =  1025.000(Ft.)
Downstream point elevation =  1002.820(Ft.)
Flow length =   547.140(Ft.)
Travel time  =    1.03 min.
Time of concentration =   12.31 min.
Depth of flow =   1.162(Ft.)
Average velocity =   8.842(Ft/s)
Total irregular channel flow =    75.286(CFS)
Irregular channel normal depth above invert elev. =   1.162(Ft.)
Average velocity of channel(s) =   8.842(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Adjusted SCS curve number for AMC 3 = 96.40
```

```
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.071(In/Hr)
Rainfall intensity =      3.570(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.885
Subarea runoff =     22.080(CFS) for    8.070(Ac.)
Total runoff =     86.287(CFS)
Effective area this stream =       27.32(Ac.)
Total Study Area (Main Stream No. 1) =       27.32(Ac.)
Area averaged Fm value =    0.061(In/Hr)
Depth of flow =   1.251(Ft.), Average velocity =   9.197(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      103.000 to Point/Station      104.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   1.363(Ft.), Average velocity =   9.568(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              5.00
        2             10.00              0.00
        3             15.00              0.00
        4             25.00              5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =    100.783(CFS)
  '     '        flow top width =     10.453(Ft.)
  '     '    velocity=    9.568(Ft/s)
  '     '        area =     10.534(Sq.Ft)
  '     '        Froude number =     1.680

Upstream point elevation =  1002.820(Ft.)
Downstream point elevation =   980.320(Ft.)
Flow length =   562.590(Ft.)
Travel time  =    0.98 min.
Time of concentration =   13.29 min.
Depth of flow =   1.363(Ft.)
Average velocity =   9.568(Ft/s)
Total irregular channel flow =   100.783(CFS)
Irregular channel normal depth above invert elev. =   1.363(Ft.)
Average velocity of channel(s) =   9.568(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
```

```
SCS curve number for soil(AMC 2)  = 84.00
Adjusted SCS curve number for AMC 3 = 96.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.071(In/Hr)
Rainfall intensity =      3.410(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.883
Subarea runoff =     28.900(CFS) for   10.930(Ac.)
Total runoff =    115.187(CFS)
Effective area this stream =       38.25(Ac.)
Total Study Area (Main Stream No. 1) =       38.25(Ac.)
Area averaged Fm value =    0.064(In/Hr)
Depth of flow =   1.463(Ft.), Average velocity =   9.935(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      104.000 to Point/Station      105.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   1.669(Ft.), Average velocity =   8.604(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              5.00
        2             10.00              0.00
        3             15.00              0.00
        4             25.00              5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =    119.710(CFS)
  '     '        flow top width =     11.675(Ft.)
  '     '    velocity=    8.604(Ft/s)
  '     '        area =     13.914(Sq.Ft)
  '     '        Froude number =     1.389

Upstream point elevation =   980.320(Ft.)
Downstream point elevation =   965.880(Ft.)
Flow length =   554.320(Ft.)
Travel time  =    1.07 min.
Time of concentration =   14.36 min.
Depth of flow =   1.669(Ft.)
Average velocity =   8.604(Ft/s)
Total irregular channel flow =   119.710(CFS)
Irregular channel normal depth above invert elev. =   1.669(Ft.)
Average velocity of channel(s) =   8.604(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
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Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Adjusted SCS curve number for AMC 3 = 96.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.071(In/Hr)
Rainfall intensity =      3.255(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.882
Subarea runoff =      8.949(CFS) for    4.990(Ac.)
Total runoff =    124.136(CFS)
Effective area this stream =       43.24(Ac.)
Total Study Area (Main Stream No. 1) =       43.24(Ac.)
Area averaged Fm value =    0.065(In/Hr)
Depth of flow =   1.700(Ft.), Average velocity =   8.690(Ft/s)


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Process from Point/Station      105.000 to Point/Station      106.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   2.040(Ft.), Average velocity =   7.203(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00             5.00
        2             10.00             0.00
        3             15.00             0.00
        4             25.00             5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =    133.444(CFS)
  '     '        flow top width =     13.161(Ft.)
  '     '    velocity=    7.203(Ft/s)
  '     '        area =     18.527(Sq.Ft)
  '     '        Froude number =     1.070

Upstream point elevation =   965.880(Ft.)
Downstream point elevation =   961.230(Ft.)
Flow length =   315.750(Ft.)
Travel time  =    0.73 min.
Time of concentration =   15.09 min.
Depth of flow =   2.040(Ft.)
Average velocity =   7.203(Ft/s)
Total irregular channel flow =   133.444(CFS)
Irregular channel normal depth above invert elev. =   2.040(Ft.)
Average velocity of channel(s) =   7.203(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
```

```
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Adjusted SCS curve number for AMC 3 = 96.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.071(In/Hr)
Rainfall intensity =      3.159(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.881
Subarea runoff =     18.546(CFS) for    8.010(Ac.)
Total runoff =    142.682(CFS)
Effective area this stream =       51.25(Ac.)
Total Study Area (Main Stream No. 1) =       51.25(Ac.)
Area averaged Fm value =    0.066(In/Hr)
Depth of flow =   2.110(Ft.), Average velocity =   7.334(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      106.000 to Point/Station      107.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   2.046(Ft.), Average velocity =   8.656(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00             5.00
        2             10.00             0.00
        3             15.00             0.00
        4             25.00             5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =    161.056(CFS)
  '     '        flow top width =     13.185(Ft.)
  '     '    velocity=    8.656(Ft/s)
  '     '        area =     18.607(Sq.Ft)
  '     '        Froude number =     1.284

Upstream point elevation =   961.230(Ft.)
Downstream point elevation =   946.000(Ft.)
Flow length =   718.380(Ft.)
Travel time  =    1.38 min.
Time of concentration =   16.47 min.
Depth of flow =   2.046(Ft.)
Average velocity =   8.656(Ft/s)
Total irregular channel flow =   161.056(CFS)
Irregular channel normal depth above invert elev. =   2.046(Ft.)
Average velocity of channel(s) =   8.656(Ft/s)
```

```
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Adjusted SCS curve number for AMC 3 = 96.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.071(In/Hr)
Rainfall intensity =      2.997(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.880
Subarea runoff =     36.668(CFS) for   16.760(Ac.)
Total runoff =    179.349(CFS)
Effective area this stream =       68.01(Ac.)
Total Study Area (Main Stream No. 1) =       68.01(Ac.)
Area averaged Fm value =    0.067(In/Hr)
Depth of flow =   2.160(Ft.), Average velocity =   8.910(Ft/s)


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Process from Point/Station      108.000 to Point/Station      109.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Adjusted SCS curve number for AMC 3 = 96.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.071(In/Hr)
Initial subarea data:
Initial area flow distance =   730.430(Ft.)
Top (of initial area) elevation =  1189.000(Ft.)
Bottom (of initial area) elevation =   985.040(Ft.)
Difference in elevation =   203.960(Ft.)
Slope =    0.27923  s(%)=      27.92
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.736 min.
Rainfall intensity =      3.497(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.882
Subarea runoff =     11.780(CFS)
Total initial stream area =        3.820(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.071(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      110.000 to Point/Station      111.000
```

**** INITIAL AREA EVALUATION ****

UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2) = 84.00
Adjusted SCS curve number for AMC 3 = 96.40
Pervious ratio(Ap) = 1.0000   Max loss rate(Fm)=   0.071(In/Hr)
Initial subarea data:
Initial area flow distance =   255.290(Ft.)
Top (of initial area) elevation = 1037.430(Ft.)
Bottom (of initial area) elevation =   967.030(Ft.)
Difference in elevation =   70.400(Ft.)
Slope =   0.27576 s(%)=   27.58
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   8.385 min.
Rainfall intensity =   4.494(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.886
Subarea runoff =   1.951(CFS)
Total initial stream area =   0.490(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =   0.071(In/Hr)
End of computations, Total Study Area =   72.32 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 1.000
Area averaged SCS curve number = 84.7

```
             San Bernardino County Rational Hydrology Program

                (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2019 Version 9.1
        Rational Hydrology Study        Date: 05/27/21
------------------------------------------------------------------------
Paradise Ranch
Post Development 2 yr




------------------------------------------------------------------------



Program License Serial Number 6481

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is     2.0
   10 Year storm 1 hour rainfall  =      0.950(In.)
  100 Year storm 1 hour rainfall  =      1.380(In.)
Computed rainfall intensity:
Storm year =     2.00   1 hour rainfall =     0.649 (In.)
Slope used for rainfall intensity curve b =  0.6000
Soil antecedent moisture condition (AMC) = 1


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 1 = 57.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.360(In/Hr)
Initial subarea data:
Initial area flow distance =   668.870(Ft.)
Top (of initial area) elevation =  1029.500(Ft.)
Bottom (of initial area) elevation =  1020.500(Ft.)
Difference in elevation =     9.000(Ft.)
Slope =    0.01346  s(%)=       1.35
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
```

```
Initial area time of concentration =   12.425 min.
Rainfall intensity =      1.671(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.706
Subarea runoff =      2.500(CFS)
Total initial stream area =        2.120(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.360(In/Hr)


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Process from Point/Station      202.000 to Point/Station      203.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 1 = 57.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.360(In/Hr)
Time of concentration =    12.43 min.
Rainfall intensity =      1.671(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.706
Subarea runoff =      0.483(CFS) for    0.410(Ac.)
Total runoff =      2.983(CFS)
Effective area this stream =        2.53(Ac.)
Total Study Area (Main Stream No. 1) =        2.53(Ac.)
Area averaged Fm value =    0.360(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 1 = 57.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.360(In/Hr)
Time of concentration =    12.43 min.
Rainfall intensity =      1.671(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.706
Subarea runoff =      0.519(CFS) for    0.440(Ac.)
Total runoff =      3.502(CFS)
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```
Effective area this stream =        2.97(Ac.)
Total Study Area (Main Stream No. 1) =        2.97(Ac.)
Area averaged Fm value =    0.360(In/Hr)


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Process from Point/Station      203.000 to Point/Station      204.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.970(Ac.)
Runoff from this stream =      3.502(CFS)
Time of concentration =   12.43 min.
Rainfall intensity =     1.671(In/Hr)
Area averaged loss rate (Fm) =    0.3603(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      3.50     2.970     12.43    0.360      1.671
Qmax(1) =
           1.000 *    1.000 *     3.502) + =       3.502

Total of 1 streams to confluence:
Flow rates before confluence point:
       3.502
Maximum flow rates at confluence using above data:
        3.502
Area of streams before confluence:
        2.970
Effective area values after confluence:
        2.970
Results of confluence:
Total flow rate =      3.502(CFS)
Time of concentration =    12.425 min.
Effective stream area after confluence =      2.970(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.360(In/Hr)
Study area total (this main stream) =       2.97(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      205.000 to Point/Station      206.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
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Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 1 = 57.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.360(In/Hr)
Initial subarea data:
Initial area flow distance =   733.590(Ft.)
Top (of initial area) elevation =  1021.000(Ft.)
Bottom (of initial area) elevation =  1001.500(Ft.)
Difference in elevation =    19.500(Ft.)
Slope =    0.02658  s(%)=       2.66
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.252 min.
Rainfall intensity =      1.773(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.717
Subarea runoff =      2.327(CFS)
Total initial stream area =        1.830(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.360(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      206.000 to Point/Station      207.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 1 = 57.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.360(In/Hr)
Time of concentration =    11.25 min.
Rainfall intensity =      1.773(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.717
Subarea runoff =      4.170(CFS) for    3.280(Ac.)
Total runoff =      6.497(CFS)
Effective area this stream =        5.11(Ac.)
Total Study Area (Main Stream No. 1) =        8.08(Ac.)
Area averaged Fm value =    0.360(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      206.000 to Point/Station      207.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
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Stream flow area =      5.110(Ac.)
Runoff from this stream =      6.497(CFS)
Time of concentration =   11.25 min.
Rainfall intensity =     1.773(In/Hr)
Area averaged loss rate (Fm) =    0.3603(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      3.50     2.970     12.43    0.360      1.671
2      6.50     5.110     11.25    0.360      1.773
Qmax(1) =
           1.000 *    1.000 *     3.502) +
           0.927 *    1.000 *     6.497) + =       9.528
Qmax(2) =
           1.078 *    0.906 *     3.502) +
           1.000 *    1.000 *     6.497) + =       9.916

Total of 2 streams to confluence:
Flow rates before confluence point:
       3.502       6.497
Maximum flow rates at confluence using above data:
        9.528        9.916
Area of streams before confluence:
        2.970        5.110
Effective area values after confluence:
        8.080        7.799
Results of confluence:
Total flow rate =      9.916(CFS)
Time of concentration =    11.252 min.
Effective stream area after confluence =      7.799(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.360(In/Hr)
Study area total (this main stream) =      8.08(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      208.000 to Point/Station      209.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 1 = 57.00
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```
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.360(In/Hr)
Initial subarea data:
Initial area flow distance =   687.260(Ft.)
Top (of initial area) elevation =  1026.500(Ft.)
Bottom (of initial area) elevation =  1006.000(Ft.)
Difference in elevation =    20.500(Ft.)
Slope =    0.02983  s(%)=       2.98
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.712 min.
Rainfall intensity =      1.826(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.722
Subarea runoff =      1.411(CFS)
Total initial stream area =        1.070(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.360(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      209.000 to Point/Station      210.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 1 = 57.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.360(In/Hr)
Time of concentration =    10.71 min.
Rainfall intensity =      1.826(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.722
Subarea runoff =      0.475(CFS) for    0.360(Ac.)
Total runoff =      1.886(CFS)
Effective area this stream =        1.43(Ac.)
Total Study Area (Main Stream No. 1) =       9.51(Ac.)
Area averaged Fm value =    0.360(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      211.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
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```
Adjusted SCS curve number for AMC 1 = 57.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.360(In/Hr)
Time of concentration =    10.71 min.
Rainfall intensity =      1.826(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.722
Subarea runoff =      3.298(CFS) for    2.500(Ac.)
Total runoff =      5.184(CFS)
Effective area this stream =        3.93(Ac.)
Total Study Area (Main Stream No. 1) =       12.01(Ac.)
Area averaged Fm value =    0.360(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      211.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =      3.930(Ac.)
Runoff from this stream =      5.184(CFS)
Time of concentration =   10.71 min.
Rainfall intensity =     1.826(In/Hr)
Area averaged loss rate (Fm) =    0.3603(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC      Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      3.50     2.970     12.43    0.360      1.671
2      6.50     5.110     11.25    0.360      1.773
3      5.18     3.930     10.71    0.360      1.826
Qmax(1) =
           1.000 *    1.000 *     3.502) +
           0.927 *    1.000 *     6.497) +
           0.894 *    1.000 *     5.184) + =      14.162
Qmax(2) =
           1.078 *    0.906 *     3.502) +
           1.000 *    1.000 *     6.497) +
           0.964 *    1.000 *     5.184) + =      14.913
Qmax(3) =
           1.119 *    0.862 *     3.502) +
           1.038 *    0.952 *     6.497) +
           1.000 *    1.000 *     5.184) + =      14.979

Total of 3 streams to confluence:
Flow rates before confluence point:
       3.502       6.497       5.184
Maximum flow rates at confluence using above data:
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```
       14.162       14.913       14.979
Area of streams before confluence:
        2.970        5.110        3.930
Effective area values after confluence:
       12.010       11.729       11.355
Results of confluence:
Total flow rate =     14.979(CFS)
Time of concentration =    10.712 min.
Effective stream area after confluence =     11.355(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.360(In/Hr)
Study area total (this main stream) =      12.01(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      212.000 to Point/Station      213.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 1 = 57.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.360(In/Hr)
Initial subarea data:
Initial area flow distance =   891.070(Ft.)
Top (of initial area) elevation =  1021.500(Ft.)
Bottom (of initial area) elevation =   997.500(Ft.)
Difference in elevation =    24.000(Ft.)
Slope =    0.02693  s(%)=       2.69
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.130 min.
Rainfall intensity =      1.695(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.709
Subarea runoff =      3.435(CFS)
Total initial stream area =        2.860(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.360(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      213.000 to Point/Station      214.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
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Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 1 = 57.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.360(In/Hr)
Time of concentration =    12.13 min.
Rainfall intensity =      1.695(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.709
Subarea runoff =      1.717(CFS) for    1.430(Ac.)
Total runoff =      5.152(CFS)
Effective area this stream =        4.29(Ac.)
Total Study Area (Main Stream No. 1) =       16.30(Ac.)
Area averaged Fm value =    0.360(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      213.000 to Point/Station      214.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 4
Stream flow area =      4.290(Ac.)
Runoff from this stream =      5.152(CFS)
Time of concentration =   12.13 min.
Rainfall intensity =     1.695(In/Hr)
Area averaged loss rate (Fm) =    0.3603(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC      Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      3.50     2.970     12.43    0.360      1.671
2      6.50     5.110     11.25    0.360      1.773
3      5.18     3.930     10.71    0.360      1.826
4      5.15     4.290     12.13    0.360      1.695
Qmax(1) =
           1.000 *    1.000 *     3.502) +
           0.927 *    1.000 *     6.497) +
           0.894 *    1.000 *     5.184) +
           0.982 *    1.000 *     5.152) + =      19.220
Qmax(2) =
           1.078 *    0.906 *     3.502) +
           1.000 *    1.000 *     6.497) +
           0.964 *    1.000 *     5.184) +
           1.059 *    0.928 *     5.152) + =      19.972
Qmax(3) =
           1.119 *    0.862 *     3.502) +
           1.038 *    0.952 *     6.497) +
           1.000 *    1.000 *     5.184) +
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           1.098 *    0.883 *     5.152) + =      19.977
Qmax(4) =
           1.019 *    0.976 *     3.502) +
           0.945 *    1.000 *     6.497) +
           0.910 *    1.000 *     5.184) +
           1.000 *    1.000 *     5.152) + =      19.492

Total of 4 streams to confluence:
Flow rates before confluence point:
       3.502       6.497       5.184       5.152
Maximum flow rates at confluence using above data:
       19.220       19.972       19.977       19.492
Area of streams before confluence:
        2.970        5.110        3.930        4.290
Effective area values after confluence:
       16.300       15.709       15.144       16.229
Results of confluence:
Total flow rate =     19.977(CFS)
Time of concentration =    10.712 min.
Effective stream area after confluence =     15.144(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.360(In/Hr)
Study area total (this main stream) =      16.30(Ac.)


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Process from Point/Station      215.000 to Point/Station      216.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 89.00
Adjusted SCS curve number for AMC 1 = 76.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.430(In/Hr)
Initial subarea data:
Initial area flow distance =   948.080(Ft.)
Top (of initial area) elevation =  1289.950(Ft.)
Bottom (of initial area) elevation =  1058.740(Ft.)
Difference in elevation =   231.210(Ft.)
Slope =    0.24387  s(%)=      24.39
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.801 min.
Rainfall intensity =      1.817(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.687
Subarea runoff =     12.482(CFS)
Total initial stream area =       10.000(Ac.)
Pervious area fraction = 1.000
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Initial area Fm value =    0.430(In/Hr)


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Process from Point/Station      216.000 to Point/Station      217.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.384(Ft.), Average velocity =   7.777(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00             5.00
        2             10.00             0.00
        3             15.00             0.00
        4             25.00             5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     17.218(CFS)
  '     '        flow top width =      6.535(Ft.)
  '     '    velocity=    7.777(Ft/s)
  '     '        area =      2.214(Sq.Ft)
  '     '        Froude number =     2.355

Upstream point elevation =  1058.740(Ft.)
Downstream point elevation =  1025.000(Ft.)
Flow length =   311.600(Ft.)
Travel time  =    0.67 min.
Time of concentration =   11.47 min.
Depth of flow =   0.384(Ft.)
Average velocity =   7.777(Ft/s)
Total irregular channel flow =    17.218(CFS)
Irregular channel normal depth above invert elev. =   0.384(Ft.)
Average velocity of channel(s) =   7.777(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Adjusted SCS curve number for AMC 1 = 68.60
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.554(In/Hr)
Rainfall intensity =      1.753(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.649
Subarea runoff =      9.401(CFS) for    9.250(Ac.)
Total runoff =     21.884(CFS)
Effective area this stream =       19.25(Ac.)
```

```
Total Study Area (Main Stream No. 1) =       35.55(Ac.)
Area averaged Fm value =    0.490(In/Hr)
Depth of flow =   0.441(Ft.), Average velocity =   8.433(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      217.000 to Point/Station      218.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.620(Ft.), Average velocity =   6.284(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00             5.00
        2             10.00             0.00
        3             15.00             0.00
        4             25.00             5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     24.322(CFS)
  '     '        flow top width =      7.481(Ft.)
  '     '    velocity=    6.284(Ft/s)
  '     '        area =      3.870(Sq.Ft)
  '     '        Froude number =     1.540

Upstream point elevation =  1025.000(Ft.)
Downstream point elevation =  1002.680(Ft.)
Flow length =   547.140(Ft.)
Travel time  =    1.45 min.
Time of concentration =   12.92 min.
Depth of flow =   0.620(Ft.)
Average velocity =   6.284(Ft/s)
Total irregular channel flow =    24.322(CFS)
Irregular channel normal depth above invert elev. =   0.620(Ft.)
Average velocity of channel(s) =   6.284(Ft/s)
 Adding area flow to channel
RESIDENTIAL(2.5 acre lot)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 1 = 57.00
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.649(In/Hr)
Rainfall intensity =      1.632(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.605
Subarea runoff =      4.808(CFS) for    7.800(Ac.)
```

```
Total runoff =     26.691(CFS)
Effective area this stream =       27.05(Ac.)
Total Study Area (Main Stream No. 1) =       43.35(Ac.)
Area averaged Fm value =    0.535(In/Hr)
Depth of flow =   0.654(Ft.), Average velocity =   6.473(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      218.000 to Point/Station      219.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.669(Ft.), Average velocity =   6.436(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              5.00
        2             10.00              0.00
        3             15.00              0.00
        4             25.00              5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     27.296(CFS)
  '     '        flow top width =      7.676(Ft.)
  '     '    velocity=    6.436(Ft/s)
  '     '        area =      4.241(Sq.Ft)
  '     '        Froude number =     1.526

Upstream point elevation =  1002.680(Ft.)
Downstream point elevation =   980.570(Ft.)
Flow length =   562.590(Ft.)
Travel time  =    1.46 min.
Time of concentration =   14.38 min.
Depth of flow =   0.669(Ft.)
Average velocity =   6.436(Ft/s)
Total irregular channel flow =    27.295(CFS)
Irregular channel normal depth above invert elev. =   0.669(Ft.)
Average velocity of channel(s) =   6.436(Ft/s)
 Adding area flow to channel
RESIDENTIAL(2.5 acre lot)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 1 = 57.00
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.649(In/Hr)
Rainfall intensity =      1.531(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
```

```
rational method)(Q=KCIA) is C = 0.576
Subarea runoff =      1.153(CFS) for    4.560(Ac.)
Total runoff =     27.844(CFS)
Effective area this stream =       31.61(Ac.)
Total Study Area (Main Stream No. 1) =       47.91(Ac.)
Area averaged Fm value =    0.552(In/Hr)
Depth of flow =   0.677(Ft.), Average velocity =   6.477(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      219.000 to Point/Station      220.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.750(Ft.), Average velocity =   5.719(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              5.00
        2             10.00              0.00
        3             15.00              0.00
        4             25.00              5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     27.881(CFS)
  '     '        flow top width =      8.000(Ft.)
  '     '    velocity=    5.719(Ft/s)
  '     '        area =      4.875(Sq.Ft)
  '     '        Froude number =     1.291

Upstream point elevation =   980.570(Ft.)
Downstream point elevation =   965.400(Ft.)
Flow length =   555.010(Ft.)
Travel time  =    1.62 min.
Time of concentration =   15.99 min.
Depth of flow =   0.750(Ft.)
Average velocity =   5.719(Ft/s)
Total irregular channel flow =    27.881(CFS)
Irregular channel normal depth above invert elev. =   0.750(Ft.)
Average velocity of channel(s) =   5.719(Ft/s)
 Adding area flow to channel
RESIDENTIAL(2.5 acre lot)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 1 = 57.00
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.649(In/Hr)
```

```
The area added to the existing stream causes a
a lower flow rate of Q =     27.079(CFS)
therefore the upstream flow rate of Q =     27.844(CFS) is being used
Rainfall intensity =      1.436(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.549
Subarea runoff =      0.000(CFS) for    2.730(Ac.)
Total runoff =     27.844(CFS)
Effective area this stream =       34.34(Ac.)
Total Study Area (Main Stream No. 1) =       50.64(Ac.)
Area averaged Fm value =    0.559(In/Hr)
Depth of flow =   0.749(Ft.), Average velocity =   5.716(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      220.000 to Point/Station      221.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.945(Ft.), Average velocity =   4.280(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00             5.00
        2             10.00             0.00
        3             15.00             0.00
        4             25.00             5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     27.887(CFS)
  '     '        flow top width =      8.782(Ft.)
  '     '    velocity=    4.280(Ft/s)
  '     '        area =      6.515(Sq.Ft)
  '     '        Froude number =     0.876

Upstream point elevation =   965.400(Ft.)
Downstream point elevation =   961.640(Ft.)
Flow length =   316.570(Ft.)
Travel time  =    1.23 min.
Time of concentration =   17.23 min.
Depth of flow =   0.945(Ft.)
Average velocity =   4.280(Ft/s)
Total irregular channel flow =    27.887(CFS)
Irregular channel normal depth above invert elev. =   0.945(Ft.)
Average velocity of channel(s) =   4.280(Ft/s)
 Adding area flow to channel
RESIDENTIAL(2.5 acre lot)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
```

```
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 1 = 57.00
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.649(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =     26.255(CFS)
therefore the upstream flow rate of Q =     27.844(CFS) is being used
Rainfall intensity =      1.373(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.531
Subarea runoff =      0.000(CFS) for    1.700(Ac.)
Total runoff =     27.844(CFS)
Effective area this stream =       36.04(Ac.)
Total Study Area (Main Stream No. 1) =       52.34(Ac.)
Area averaged Fm value =    0.564(In/Hr)
Depth of flow =   0.945(Ft.), Average velocity =   4.278(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      221.000 to Point/Station      222.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.802(Ft.), Average velocity =   5.262(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1             0.00              5.00
        2            10.00              0.00
        3            15.00              0.00
        4            25.00              5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     27.881(CFS)
  '     '        flow top width =      8.209(Ft.)
  '     '    velocity=    5.262(Ft/s)
  '     '        area =      5.298(Sq.Ft)
  '     '        Froude number =     1.154

Upstream point elevation =   961.640(Ft.)
Downstream point elevation =   946.260(Ft.)
Flow length =   715.700(Ft.)
Travel time  =    2.27 min.
Time of concentration =   19.49 min.
Depth of flow =   0.802(Ft.)
Average velocity =   5.262(Ft/s)
Total irregular channel flow =    27.881(CFS)
Irregular channel normal depth above invert elev. =   0.802(Ft.)
```

```
Average velocity of channel(s) =   5.262(Ft/s)
 Adding area flow to channel
RESIDENTIAL(2.5 acre lot)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 1 = 57.00
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.649(In/Hr)
The area added to the existing stream causes a
a lower flow rate of Q =     24.835(CFS)
therefore the upstream flow rate of Q =     27.844(CFS) is being used
Rainfall intensity =      1.275(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.497
Subarea runoff =      0.000(CFS) for    3.130(Ac.)
Total runoff =     27.844(CFS)
Effective area this stream =       39.17(Ac.)
Total Study Area (Main Stream No. 1) =       55.47(Ac.)
Area averaged Fm value =    0.570(In/Hr)
Depth of flow =   0.802(Ft.), Average velocity =   5.260(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      223.000 to Point/Station      224.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Adjusted SCS curve number for AMC 1 = 68.60
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.554(In/Hr)
Initial subarea data:
Initial area flow distance =   937.660(Ft.)
Top (of initial area) elevation =  1204.000(Ft.)
Bottom (of initial area) elevation =  1020.000(Ft.)
Difference in elevation =   184.000(Ft.)
Slope =    0.19623  s(%)=      19.62
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.103 min.
Rainfall intensity =      1.486(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.564
Subarea runoff =      3.673(CFS)
Total initial stream area =        4.380(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.554(In/Hr)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      223.000 to Point/Station      225.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Adjusted SCS curve number for AMC 1 = 68.60
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.554(In/Hr)
Initial subarea data:
Initial area flow distance =   667.430(Ft.)
Top (of initial area) elevation =  1204.000(Ft.)
Bottom (of initial area) elevation =  1015.000(Ft.)
Difference in elevation =   189.000(Ft.)
Slope =    0.28318  s(%)=      28.32
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.251 min.
Rainfall intensity =      1.685(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.604
Subarea runoff =      5.170(CFS)
Total initial stream area =        5.080(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.554(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      226.000 to Point/Station      227.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Adjusted SCS curve number for AMC 1 = 68.60
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.554(In/Hr)
Initial subarea data:
Initial area flow distance =   534.060(Ft.)
Top (of initial area) elevation =  1201.770(Ft.)
Bottom (of initial area) elevation =  1000.000(Ft.)
Difference in elevation =   201.770(Ft.)
Slope =    0.37780  s(%)=      37.78
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.578 min.
```

```
Rainfall intensity =      1.840(In/Hr) for a     2.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.629
Subarea runoff =      8.483(CFS)
Total initial stream area =        7.330(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.554(In/Hr)
End of computations, Total Study Area =           72.26 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.860
Area averaged SCS curve number =  80.2
```

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              San Bernardino County Rational Hydrology Program

                 (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2019 Version 9.1
        Rational Hydrology Study       Date: 05/27/21
------------------------------------------------------------------------
Paradise Ranch
Post Development 10 yr




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Program License Serial Number 6481

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is    10.0
Computed rainfall intensity:
Storm year =    10.00   1 hour rainfall =     0.950 (In.)
Slope used for rainfall intensity curve b =  0.6000
Soil antecedent moisture condition (AMC) = 2


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.226(In/Hr)
Initial subarea data:
Initial area flow distance =   668.870(Ft.)
Top (of initial area) elevation =  1029.500(Ft.)
Bottom (of initial area) elevation =  1020.500(Ft.)
Difference in elevation =     9.000(Ft.)
Slope =    0.01346  s(%)=       1.35
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.425 min.
Rainfall intensity =      2.444(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.817
```

```
Subarea runoff =      4.230(CFS)
Total initial stream area =        2.120(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.226(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      203.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.226(In/Hr)
Time of concentration =    12.43 min.
Rainfall intensity =      2.444(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.817
Subarea runoff =      0.818(CFS) for    0.410(Ac.)
Total runoff =      5.048(CFS)
Effective area this stream =        2.53(Ac.)
Total Study Area (Main Stream No. 1) =        2.53(Ac.)
Area averaged Fm value =    0.226(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.226(In/Hr)
Time of concentration =    12.43 min.
Rainfall intensity =      2.444(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.817
Subarea runoff =      0.878(CFS) for    0.440(Ac.)
Total runoff =      5.926(CFS)
Effective area this stream =        2.97(Ac.)
Total Study Area (Main Stream No. 1) =        2.97(Ac.)
Area averaged Fm value =    0.226(In/Hr)
```

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++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.970(Ac.)
Runoff from this stream =      5.926(CFS)
Time of concentration =   12.43 min.
Rainfall intensity =     2.444(In/Hr)
Area averaged loss rate (Fm) =    0.2265(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      5.93     2.970     12.43    0.226      2.444
Qmax(1) =
           1.000 *    1.000 *     5.926) + =       5.926

Total of 1 streams to confluence:
Flow rates before confluence point:
       5.926
Maximum flow rates at confluence using above data:
        5.926
Area of streams before confluence:
        2.970
Effective area values after confluence:
        2.970
Results of confluence:
Total flow rate =      5.926(CFS)
Time of concentration =    12.425 min.
Effective stream area after confluence =      2.970(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.226(In/Hr)
Study area total (this main stream) =       2.97(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      205.000 to Point/Station      206.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.226(In/Hr)
```

```
Initial subarea data:
Initial area flow distance =   733.590(Ft.)
Top (of initial area) elevation =  1021.000(Ft.)
Bottom (of initial area) elevation =  1001.500(Ft.)
Difference in elevation =    19.500(Ft.)
Slope =    0.02658  s(%)=       2.66
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.252 min.
Rainfall intensity =      2.593(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.821
Subarea runoff =      3.898(CFS)
Total initial stream area =        1.830(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.226(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      206.000 to Point/Station      207.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.226(In/Hr)
Time of concentration =    11.25 min.
Rainfall intensity =      2.593(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.821
Subarea runoff =      6.987(CFS) for    3.280(Ac.)
Total runoff =     10.886(CFS)
Effective area this stream =        5.11(Ac.)
Total Study Area (Main Stream No. 1) =        8.08(Ac.)
Area averaged Fm value =    0.226(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      206.000 to Point/Station      207.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      5.110(Ac.)
Runoff from this stream =     10.886(CFS)
Time of concentration =   11.25 min.
Rainfall intensity =     2.593(In/Hr)
Area averaged loss rate (Fm) =    0.2265(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:
```

```
Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      5.93     2.970     12.43    0.226      2.444
2     10.89     5.110     11.25    0.226      2.593
Qmax(1) =
           1.000 *    1.000 *     5.926) +
           0.937 *    1.000 *    10.886) + =      16.123
Qmax(2) =
           1.068 *    0.906 *     5.926) +
           1.000 *    1.000 *    10.886) + =      16.615

Total of 2 streams to confluence:
Flow rates before confluence point:
       5.926      10.886
Maximum flow rates at confluence using above data:
       16.123       16.615
Area of streams before confluence:
        2.970        5.110
Effective area values after confluence:
        8.080        7.799
Results of confluence:
Total flow rate =     16.615(CFS)
Time of concentration =    11.252 min.
Effective stream area after confluence =      7.799(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.226(In/Hr)
Study area total (this main stream) =      8.08(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      208.000 to Point/Station      209.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.226(In/Hr)
Initial subarea data:
Initial area flow distance =   687.260(Ft.)
Top (of initial area) elevation =  1026.500(Ft.)
Bottom (of initial area) elevation =  1006.000(Ft.)
Difference in elevation =    20.500(Ft.)
Slope =    0.02983  s(%)=       2.98
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
```

```
Initial area time of concentration =   10.712 min.
Rainfall intensity =      2.671(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.824
Subarea runoff =      2.354(CFS)
Total initial stream area =        1.070(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.226(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      209.000 to Point/Station      210.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.226(In/Hr)
Time of concentration =    10.71 min.
Rainfall intensity =      2.671(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.824
Subarea runoff =      0.792(CFS) for    0.360(Ac.)
Total runoff =      3.146(CFS)
Effective area this stream =        1.43(Ac.)
Total Study Area (Main Stream No. 1) =        9.51(Ac.)
Area averaged Fm value =    0.226(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      211.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.226(In/Hr)
Time of concentration =    10.71 min.
Rainfall intensity =      2.671(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.824
Subarea runoff =      5.500(CFS) for    2.500(Ac.)
Total runoff =      8.647(CFS)
Effective area this stream =        3.93(Ac.)
Total Study Area (Main Stream No. 1) =       12.01(Ac.)
```

```
Area averaged Fm value =    0.226(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      211.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =      3.930(Ac.)
Runoff from this stream =      8.647(CFS)
Time of concentration =   10.71 min.
Rainfall intensity =     2.671(In/Hr)
Area averaged loss rate (Fm) =    0.2265(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      5.93     2.970     12.43    0.226      2.444
2     10.89     5.110     11.25    0.226      2.593
3      8.65     3.930     10.71    0.226      2.671
Qmax(1) =
           1.000 *    1.000 *     5.926) +
           0.937 *    1.000 *    10.886) +
           0.907 *    1.000 *     8.647) + =      23.965
Qmax(2) =
           1.068 *    0.906 *     5.926) +
           1.000 *    1.000 *    10.886) +
           0.968 *    1.000 *     8.647) + =      24.987
Qmax(3) =
           1.103 *    0.862 *     5.926) +
           1.033 *    0.952 *    10.886) +
           1.000 *    1.000 *     8.647) + =      24.984

Total of 3 streams to confluence:
Flow rates before confluence point:
       5.926      10.886       8.647
Maximum flow rates at confluence using above data:
       23.965       24.987       24.984
Area of streams before confluence:
        2.970        5.110        3.930
Effective area values after confluence:
       12.010       11.729       11.355
Results of confluence:
Total flow rate =     24.987(CFS)
Time of concentration =    11.252 min.
Effective stream area after confluence =     11.729(Ac.)
Study area average Pervious fraction(Ap) =  0.500
```

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Study area average soil loss rate(Fm) =    0.226(In/Hr)
Study area total (this main stream) =      12.01(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      212.000 to Point/Station      213.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.226(In/Hr)
Initial subarea data:
Initial area flow distance =   891.070(Ft.)
Top (of initial area) elevation =  1021.500(Ft.)
Bottom (of initial area) elevation =   997.500(Ft.)
Difference in elevation =    24.000(Ft.)
Slope =    0.02693  s(%)=       2.69
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.130 min.
Rainfall intensity =      2.479(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.818
Subarea runoff =      5.798(CFS)
Total initial stream area =        2.860(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.226(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      213.000 to Point/Station      214.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.226(In/Hr)
Time of concentration =    12.13 min.
Rainfall intensity =      2.479(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.818
Subarea runoff =      2.899(CFS) for    1.430(Ac.)
Total runoff =      8.697(CFS)
Effective area this stream =        4.29(Ac.)
Total Study Area (Main Stream No. 1) =      16.30(Ac.)
```

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Area averaged Fm value =    0.226(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      213.000 to Point/Station      214.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 4
Stream flow area =      4.290(Ac.)
Runoff from this stream =      8.697(CFS)
Time of concentration =   12.13 min.
Rainfall intensity =     2.479(In/Hr)
Area averaged loss rate (Fm) =    0.2265(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      5.93     2.970     12.43    0.226      2.444
2     10.89     5.110     11.25    0.226      2.593
3      8.65     3.930     10.71    0.226      2.671
4      8.70     4.290     12.13    0.226      2.479
Qmax(1) =
           1.000 *    1.000 *     5.926) +
           0.937 *    1.000 *    10.886) +
           0.907 *    1.000 *     8.647) +
           0.984 *    1.000 *     8.697) + =      32.525
Qmax(2) =
           1.068 *    0.906 *     5.926) +
           1.000 *    1.000 *    10.886) +
           0.968 *    1.000 *     8.647) +
           1.051 *    0.928 *     8.697) + =      33.465
Qmax(3) =
           1.103 *    0.862 *     5.926) +
           1.033 *    0.952 *    10.886) +
           1.000 *    1.000 *     8.647) +
           1.085 *    0.883 *     8.697) + =      33.319
Qmax(4) =
           1.016 *    0.976 *     5.926) +
           0.952 *    1.000 *    10.886) +
           0.921 *    1.000 *     8.647) +
           1.000 *    1.000 *     8.697) + =      32.903

Total of 4 streams to confluence:
Flow rates before confluence point:
       5.926      10.886       8.647       8.697
Maximum flow rates at confluence using above data:
       32.525       33.465       33.319       32.903
```

```
Area of streams before confluence:
        2.970        5.110        3.930        4.290
Effective area values after confluence:
       16.300       15.709       15.144       16.229
Results of confluence:
Total flow rate =     33.465(CFS)
Time of concentration =    11.252 min.
Effective stream area after confluence =     15.709(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.226(In/Hr)
Study area total (this main stream) =      16.30(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      215.000 to Point/Station      216.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 89.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.211(In/Hr)
Initial subarea data:
Initial area flow distance =   948.080(Ft.)
Top (of initial area) elevation =  1289.950(Ft.)
Bottom (of initial area) elevation =  1058.740(Ft.)
Difference in elevation =   231.210(Ft.)
Slope =    0.24387  s(%)=      24.39
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.801 min.
Rainfall intensity =      2.658(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.829
Subarea runoff =     22.024(CFS)
Total initial stream area =       10.000(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.211(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      216.000 to Point/Station      217.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.541(Ft.), Average velocity =   9.480(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
```

```
        1            0.00            5.00
        2           10.00            0.00
        3           15.00            0.00
        4           25.00            5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     31.197(CFS)
  '     '        flow top width =      7.164(Ft.)
  '     '    velocity=    9.480(Ft/s)
  '     '        area =      3.291(Sq.Ft)
  '     '        Froude number =     2.465

Upstream point elevation =  1058.740(Ft.)
Downstream point elevation =  1025.000(Ft.)
Flow length =   311.600(Ft.)
Travel time  =    0.55 min.
Time of concentration =   11.35 min.
Depth of flow =   0.541(Ft.)
Average velocity =   9.480(Ft/s)
Total irregular channel flow =    31.196(CFS)
Irregular channel normal depth above invert elev. =   0.541(Ft.)
Average velocity of channel(s) =   9.480(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.301(In/Hr)
Rainfall intensity =      2.580(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.811
Subarea runoff =     18.278(CFS) for    9.250(Ac.)
Total runoff =     40.302(CFS)
Effective area this stream =       19.25(Ac.)
Total Study Area (Main Stream No. 1) =       35.55(Ac.)
Area averaged Fm value =    0.254(In/Hr)
Depth of flow =   0.626(Ft.), Average velocity =  10.294(Ft/s)


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Process from Point/Station      217.000 to Point/Station      218.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.888(Ft.), Average velocity =   7.667(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
```

```
Point number      'X' coordinate     'Y' coordinate
        1              0.00              5.00
        2             10.00              0.00
        3             15.00              0.00
        4             25.00              5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     46.143(CFS)
  '     '        flow top width =      8.553(Ft.)
  '     '    velocity=    7.667(Ft/s)
  '     '        area =      6.019(Sq.Ft)
  '     '        Froude number =     1.611

Upstream point elevation =  1025.000(Ft.)
Downstream point elevation =  1002.680(Ft.)
Flow length =   547.140(Ft.)
Travel time  =    1.19 min.
Time of concentration =   12.54 min.
Depth of flow =   0.888(Ft.)
Average velocity =   7.667(Ft/s)
Total irregular channel flow =    46.143(CFS)
Irregular channel normal depth above invert elev. =   0.888(Ft.)
Average velocity of channel(s) =   7.667(Ft/s)
 Adding area flow to channel
RESIDENTIAL(2.5 acre lot)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.408(In/Hr)
Rainfall intensity =      2.430(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.790
Subarea runoff =     11.604(CFS) for    7.800(Ac.)
Total runoff =     51.906(CFS)
Effective area this stream =       27.05(Ac.)
Total Study Area (Main Stream No. 1) =       43.35(Ac.)
Area averaged Fm value =    0.298(In/Hr)
Depth of flow =   0.948(Ft.), Average velocity =   7.943(Ft/s)


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Process from Point/Station      218.000 to Point/Station      219.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.981(Ft.), Average velocity =   7.944(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
```

```
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              5.00
        2             10.00              0.00
        3             15.00              0.00
        4             25.00              5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     54.273(CFS)
  '     '        flow top width =      8.925(Ft.)
  '     '    velocity=    7.944(Ft/s)
  '     '        area =      6.832(Sq.Ft)
  '     '        Froude number =     1.600

Upstream point elevation =  1002.680(Ft.)
Downstream point elevation =   980.570(Ft.)
Flow length =   562.590(Ft.)
Travel time  =    1.18 min.
Time of concentration =   13.72 min.
Depth of flow =   0.981(Ft.)
Average velocity =   7.944(Ft/s)
Total irregular channel flow =    54.273(CFS)
Irregular channel normal depth above invert elev. =   0.981(Ft.)
Average velocity of channel(s) =   7.944(Ft/s)
 Adding area flow to channel
RESIDENTIAL(2.5 acre lot)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.408(In/Hr)
Rainfall intensity =      2.303(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.777
Subarea runoff =      4.668(CFS) for    4.560(Ac.)
Total runoff =     56.574(CFS)
Effective area this stream =       31.61(Ac.)
Total Study Area (Main Stream No. 1) =       47.91(Ac.)
Area averaged Fm value =    0.314(In/Hr)
Depth of flow =   1.004(Ft.), Average velocity =   8.043(Ft/s)


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Process from Point/Station      219.000 to Point/Station      220.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   1.113(Ft.), Average velocity =   7.093(Ft/s)
        ******* Irregular Channel Data ***********
```

```
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00               5.00
        2             10.00               0.00
        3             15.00               0.00
        4             25.00               5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     57.048(CFS)
  '     '        flow top width =      9.452(Ft.)
  '     '    velocity=    7.093(Ft/s)
  '     '        area =      8.043(Sq.Ft)
  '     '        Froude number =     1.355

Upstream point elevation =   980.570(Ft.)
Downstream point elevation =   965.400(Ft.)
Flow length =   555.010(Ft.)
Travel time  =    1.30 min.
Time of concentration =   15.02 min.
Depth of flow =   1.113(Ft.)
Average velocity =   7.093(Ft/s)
Total irregular channel flow =    57.048(CFS)
Irregular channel normal depth above invert elev. =   1.113(Ft.)
Average velocity of channel(s) =   7.093(Ft/s)
 Adding area flow to channel
RESIDENTIAL(2.5 acre lot)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.408(In/Hr)
Rainfall intensity =      2.181(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.767
Subarea runoff =      0.882(CFS) for    2.730(Ac.)
Total runoff =     57.456(CFS)
Effective area this stream =       34.34(Ac.)
Total Study Area (Main Stream No. 1) =       50.64(Ac.)
Area averaged Fm value =    0.321(In/Hr)
Depth of flow =   1.117(Ft.), Average velocity =   7.108(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      220.000 to Point/Station      221.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   1.397(Ft.), Average velocity =   5.283(Ft/s)
```

```
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              5.00
        2             10.00              0.00
        3             15.00              0.00
        4             25.00              5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     57.517(CFS)
  '     '        flow top width =     10.588(Ft.)
  '     '    velocity=    5.283(Ft/s)
  '     '        area =     10.888(Sq.Ft)
  '     '        Froude number =     0.918

Upstream point elevation =   965.400(Ft.)
Downstream point elevation =   961.640(Ft.)
Flow length =   316.570(Ft.)
Travel time  =    1.00 min.
Time of concentration =   16.02 min.
Depth of flow =   1.397(Ft.)
Average velocity =   5.283(Ft/s)
Total irregular channel flow =    57.517(CFS)
Irregular channel normal depth above invert elev. =   1.397(Ft.)
Average velocity of channel(s) =   5.283(Ft/s)
 Adding area flow to channel
RESIDENTIAL(2.5 acre lot)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.408(In/Hr)
Rainfall intensity =      2.098(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.760
Subarea runoff =      0.033(CFS) for    1.700(Ac.)
Total runoff =     57.489(CFS)
Effective area this stream =       36.04(Ac.)
Total Study Area (Main Stream No. 1) =       52.34(Ac.)
Area averaged Fm value =    0.326(In/Hr)
Depth of flow =   1.397(Ft.), Average velocity =   5.282(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      221.000 to Point/Station      222.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
```

```
Depth of flow =   1.194(Ft.), Average velocity =   6.531(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              5.00
        2             10.00              0.00
        3             15.00              0.00
        4             25.00              5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     57.590(CFS)
  '     '        flow top width =      9.775(Ft.)
  '     '    velocity=    6.531(Ft/s)
  '     '        area =      8.818(Sq.Ft)
  '     '        Froude number =     1.212

Upstream point elevation =   961.640(Ft.)
Downstream point elevation =   946.260(Ft.)
Flow length =   715.700(Ft.)
Travel time  =    1.83 min.
Time of concentration =   17.85 min.
Depth of flow =   1.194(Ft.)
Average velocity =   6.531(Ft/s)
Total irregular channel flow =    57.590(CFS)
Irregular channel normal depth above invert elev. =   1.194(Ft.)
Average velocity of channel(s) =   6.531(Ft/s)
 Adding area flow to channel
RESIDENTIAL(2.5 acre lot)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.408(In/Hr)
Rainfall intensity =      1.966(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.748
Subarea runoff =      0.123(CFS) for    3.130(Ac.)
Total runoff =     57.611(CFS)
Effective area this stream =       39.17(Ac.)
Total Study Area (Main Stream No. 1) =       55.47(Ac.)
Area averaged Fm value =    0.332(In/Hr)
Depth of flow =   1.194(Ft.), Average velocity =   6.531(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      223.000 to Point/Station      224.000
**** INITIAL AREA EVALUATION ****
```

```
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.301(In/Hr)
Initial subarea data:
Initial area flow distance =   937.660(Ft.)
Top (of initial area) elevation =  1204.000(Ft.)
Bottom (of initial area) elevation =  1020.000(Ft.)
Difference in elevation =   184.000(Ft.)
Slope =    0.19623  s(%)=      19.62
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.103 min.
Rainfall intensity =      2.174(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.776
Subarea runoff =      7.383(CFS)
Total initial stream area =        4.380(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.301(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      223.000 to Point/Station      225.000
**** INITIAL AREA EVALUATION ****
________________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.301(In/Hr)
Initial subarea data:
Initial area flow distance =   667.430(Ft.)
Top (of initial area) elevation =  1204.000(Ft.)
Bottom (of initial area) elevation =  1015.000(Ft.)
Difference in elevation =   189.000(Ft.)
Slope =    0.28318  s(%)=      28.32
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.251 min.
Rainfall intensity =      2.464(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.790
Subarea runoff =      9.893(CFS)
Total initial stream area =        5.080(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.301(In/Hr)
```

```
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      226.000 to Point/Station      227.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.301(In/Hr)
Initial subarea data:
Initial area flow distance =   534.060(Ft.)
Top (of initial area) elevation =  1201.770(Ft.)
Bottom (of initial area) elevation =  1000.000(Ft.)
Difference in elevation =   201.770(Ft.)
Slope =    0.37780  s(%)=      37.78
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.578 min.
Rainfall intensity =      2.691(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.799
Subarea runoff =     15.772(CFS)
Total initial stream area =        7.330(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.301(In/Hr)
End of computations, Total Study Area =           72.26 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.860
Area averaged SCS curve number =  80.2
```

```
                San Bernardino County Rational Hydrology Program

                    (Hydrology Manual Date - August 1986)

 CIVILCADD/CIVILDESIGN  Engineering Software, (c) 1989-2019 Version 9.1
        Rational Hydrology Study        Date: 05/27/21
------------------------------------------------------------------------
Paradise Ranch
Post Development 100 yr



------------------------------------------------------------------------


Program License Serial Number 6481

------------------------------------------------------------------------
 *********   Hydrology Study Control Information **********

------------------------------------------------------------------------
Rational hydrology study storm event year is   100.0
   10 Year storm 1 hour rainfall  =      0.950(In.)
  100 Year storm 1 hour rainfall  =      1.380(In.)
Computed rainfall intensity:
Storm year =   100.00   1 hour rainfall =     1.380 (In.)
Slope used for rainfall intensity curve b =  0.6000
Soil antecedent moisture condition (AMC) = 3


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      201.000 to Point/Station      202.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 3 = 91.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.087(In/Hr)
Initial subarea data:
Initial area flow distance =   668.870(Ft.)
Top (of initial area) elevation =  1029.500(Ft.)
Bottom (of initial area) elevation =  1020.500(Ft.)
Difference in elevation =     9.000(Ft.)
Slope =    0.01346  s(%)=       1.35
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
```

```
Initial area time of concentration =   12.425 min.
Rainfall intensity =      3.550(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.878
Subarea runoff =      6.607(CFS)
Total initial stream area =        2.120(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.087(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      202.000 to Point/Station      203.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 3 = 91.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.087(In/Hr)
Time of concentration =    12.43 min.
Rainfall intensity =      3.550(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.878
Subarea runoff =      1.278(CFS) for    0.410(Ac.)
Total runoff =      7.885(CFS)
Effective area this stream =        2.53(Ac.)
Total Study Area (Main Stream No. 1) =        2.53(Ac.)
Area averaged Fm value =    0.087(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 3 = 91.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.087(In/Hr)
Time of concentration =    12.43 min.
Rainfall intensity =      3.550(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.878
Subarea runoff =      1.371(CFS) for    0.440(Ac.)
Total runoff =      9.256(CFS)
```

```
Effective area this stream =        2.97(Ac.)
Total Study Area (Main Stream No. 1) =        2.97(Ac.)
Area averaged Fm value =    0.087(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      203.000 to Point/Station      204.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.970(Ac.)
Runoff from this stream =      9.256(CFS)
Time of concentration =   12.43 min.
Rainfall intensity =     3.550(In/Hr)
Area averaged loss rate (Fm) =    0.0869(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC      Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)



1      9.26     2.970     12.43    0.087      3.550
Qmax(1) =
           1.000 *    1.000 *     9.256) + =       9.256

Total of 1 streams to confluence:
Flow rates before confluence point:
       9.256
Maximum flow rates at confluence using above data:
        9.256
Area of streams before confluence:
        2.970
Effective area values after confluence:
        2.970
Results of confluence:
Total flow rate =      9.256(CFS)
Time of concentration =    12.425 min.
Effective stream area after confluence =      2.970(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.087(In/Hr)
Study area total (this main stream) =       2.97(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      205.000 to Point/Station      206.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
```

```
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 3 = 91.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.087(In/Hr)
Initial subarea data:
Initial area flow distance =   733.590(Ft.)
Top (of initial area) elevation =  1021.000(Ft.)
Bottom (of initial area) elevation =  1001.500(Ft.)
Difference in elevation =    19.500(Ft.)
Slope =    0.02658  s(%)=       2.66
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   11.252 min.
Rainfall intensity =      3.767(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.879
Subarea runoff =      6.062(CFS)
Total initial stream area =        1.830(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.087(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      206.000 to Point/Station      207.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 3 = 91.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.087(In/Hr)
Time of concentration =    11.25 min.
Rainfall intensity =      3.767(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.879
Subarea runoff =     10.865(CFS) for    3.280(Ac.)
Total runoff =     16.927(CFS)
Effective area this stream =        5.11(Ac.)
Total Study Area (Main Stream No. 1) =        8.08(Ac.)
Area averaged Fm value =    0.087(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      206.000 to Point/Station      207.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
```

```
Stream flow area =      5.110(Ac.)
Runoff from this stream =     16.927(CFS)
Time of concentration =   11.25 min.
Rainfall intensity =     3.767(In/Hr)
Area averaged loss rate (Fm) =    0.0869(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      9.26     2.970     12.43    0.087      3.550
2     16.93     5.110     11.25    0.087      3.767
Qmax(1) =
           1.000 *    1.000 *     9.256) +
           0.941 *    1.000 *    16.927) + =      25.181
Qmax(2) =
           1.063 *    0.906 *     9.256) +
           1.000 *    1.000 *    16.927) + =      25.835

Total of 2 streams to confluence:
Flow rates before confluence point:
       9.256      16.927
Maximum flow rates at confluence using above data:
       25.181       25.835
Area of streams before confluence:
        2.970        5.110
Effective area values after confluence:
        8.080        7.799
Results of confluence:
Total flow rate =     25.835(CFS)
Time of concentration =    11.252 min.
Effective stream area after confluence =      7.799(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.087(In/Hr)
Study area total (this main stream) =      8.08(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      208.000 to Point/Station      209.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 3 = 91.00
```

```
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.087(In/Hr)
Initial subarea data:
Initial area flow distance =   687.260(Ft.)
Top (of initial area) elevation =  1026.500(Ft.)
Bottom (of initial area) elevation =  1006.000(Ft.)
Difference in elevation =    20.500(Ft.)
Slope =    0.02983  s(%)=       2.98
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.712 min.
Rainfall intensity =      3.880(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.880
Subarea runoff =      3.653(CFS)
Total initial stream area =        1.070(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.087(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      209.000 to Point/Station      210.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 3 = 91.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.087(In/Hr)
Time of concentration =    10.71 min.
Rainfall intensity =      3.880(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.880
Subarea runoff =      1.229(CFS) for    0.360(Ac.)
Total runoff =      4.882(CFS)
Effective area this stream =        1.43(Ac.)
Total Study Area (Main Stream No. 1) =        9.51(Ac.)
Area averaged Fm value =    0.087(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      211.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
```

```
Adjusted SCS curve number for AMC 3 = 91.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.087(In/Hr)
Time of concentration =    10.71 min.
Rainfall intensity =      3.880(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.880
Subarea runoff =      8.535(CFS) for    2.500(Ac.)
Total runoff =     13.417(CFS)
Effective area this stream =        3.93(Ac.)
Total Study Area (Main Stream No. 1) =       12.01(Ac.)
Area averaged Fm value =    0.087(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      210.000 to Point/Station      211.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 3
Stream flow area =      3.930(Ac.)
Runoff from this stream =     13.417(CFS)
Time of concentration =   10.71 min.
Rainfall intensity =     3.880(In/Hr)
Area averaged loss rate (Fm) =    0.0869(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC      Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)     (In/Hr)


1      9.26     2.970     12.43    0.087      3.550
2     16.93     5.110     11.25    0.087      3.767
3     13.42     3.930     10.71    0.087      3.880
Qmax(1) =
           1.000 *    1.000 *     9.256) +
           0.941 *    1.000 *    16.927) +
           0.913 *    1.000 *    13.417) + =      37.429
Qmax(2) =
           1.063 *    0.906 *     9.256) +
           1.000 *    1.000 *    16.927) +
           0.970 *    1.000 *    13.417) + =      38.853
Qmax(3) =
           1.095 *    0.862 *     9.256) +
           1.031 *    0.952 *    16.927) +
           1.000 *    1.000 *    13.417) + =      38.766

Total of 3 streams to confluence:
Flow rates before confluence point:
       9.256      16.927      13.417
Maximum flow rates at confluence using above data:
```

```
       37.429       38.853       38.766
Area of streams before confluence:
        2.970        5.110        3.930
Effective area values after confluence:
       12.010       11.729       11.355
Results of confluence:
Total flow rate =     38.853(CFS)
Time of concentration =    11.252 min.
Effective stream area after confluence =     11.729(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.087(In/Hr)
Study area total (this main stream) =      12.01(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      212.000 to Point/Station      213.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 3 = 91.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.087(In/Hr)
Initial subarea data:
Initial area flow distance =   891.070(Ft.)
Top (of initial area) elevation =  1021.500(Ft.)
Bottom (of initial area) elevation =   997.500(Ft.)
Difference in elevation =    24.000(Ft.)
Slope =    0.02693  s(%)=       2.69
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.130 min.
Rainfall intensity =      3.601(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.878
Subarea runoff =      9.046(CFS)
Total initial stream area =        2.860(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.087(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      213.000 to Point/Station      214.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
```

```
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 3 = 91.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.087(In/Hr)
Time of concentration =    12.13 min.
Rainfall intensity =      3.601(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.878
Subarea runoff =      4.523(CFS) for    1.430(Ac.)
Total runoff =     13.569(CFS)
Effective area this stream =        4.29(Ac.)
Total Study Area (Main Stream No. 1) =       16.30(Ac.)
Area averaged Fm value =    0.087(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      213.000 to Point/Station      214.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 4
Stream flow area =      4.290(Ac.)
Runoff from this stream =     13.569(CFS)
Time of concentration =   12.13 min.
Rainfall intensity =     3.601(In/Hr)
Area averaged loss rate (Fm) =    0.0869(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC      Fm       Rainfall Intensity
 No.    (CFS)   (Ac.)       (min) (In/Hr)      (In/Hr)


1      9.26     2.970     12.43    0.087      3.550
2     16.93     5.110     11.25    0.087      3.767
3     13.42     3.930     10.71    0.087      3.880
4     13.57     4.290     12.13    0.087      3.601
Qmax(1) =
           1.000 *    1.000 *     9.256) +
           0.941 *    1.000 *    16.927) +
           0.913 *    1.000 *    13.417) +
           0.985 *    1.000 *    13.569) + =      50.799
Qmax(2) =
           1.063 *    0.906 *     9.256) +
           1.000 *    1.000 *    16.927) +
           0.970 *    1.000 *    13.417) +
           1.047 *    0.928 *    13.569) + =      52.035
Qmax(3) =
           1.095 *    0.862 *     9.256) +
           1.031 *    0.952 *    16.927) +
           1.000 *    1.000 *    13.417) +
```

```
           1.079 *    0.883 *    13.569) + =      51.700
Qmax(4) =
           1.015 *    0.976 *     9.256) +
           0.955 *    1.000 *    16.927) +
           0.926 *    1.000 *    13.417) +
           1.000 *    1.000 *    13.569) + =      51.333

Total of 4 streams to confluence:
Flow rates before confluence point:
       9.256      16.927      13.417      13.569
Maximum flow rates at confluence using above data:
       50.799       52.035       51.700       51.333
Area of streams before confluence:
        2.970        5.110        3.930        4.290
Effective area values after confluence:
       16.300       15.709       15.144       16.229
Results of confluence:
Total flow rate =     52.035(CFS)
Time of concentration =    11.252 min.
Effective stream area after confluence =     15.709(Ac.)
Study area average Pervious fraction(Ap) =  0.500
Study area average soil loss rate(Fm) =    0.087(In/Hr)
Study area total (this main stream) =      16.30(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      215.000 to Point/Station      216.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 89.00
Adjusted SCS curve number for AMC 3 = 97.80
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.044(In/Hr)
Initial subarea data:
Initial area flow distance =   948.080(Ft.)
Top (of initial area) elevation =  1289.950(Ft.)
Bottom (of initial area) elevation =  1058.740(Ft.)
Difference in elevation =   231.210(Ft.)
Slope =    0.24387  s(%)=      24.39
TC = k(0.525)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.801 min.
Rainfall intensity =      3.861(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.890
Subarea runoff =     34.356(CFS)
Total initial stream area =       10.000(Ac.)
Pervious area fraction = 1.000
```

```
Initial area Fm value =    0.044(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      216.000 to Point/Station      217.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   0.702(Ft.), Average velocity =  10.971(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              5.00
        2             10.00              0.00
        3             15.00              0.00
        4             25.00              5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     49.312(CFS)
  '     '        flow top width =      7.808(Ft.)
  '     '    velocity=   10.971(Ft/s)
  '     '        area =      4.495(Sq.Ft)
  '     '        Froude number =     2.548

Upstream point elevation =  1058.740(Ft.)
Downstream point elevation =  1025.000(Ft.)
Flow length =   311.600(Ft.)
Travel time  =    0.47 min.
Time of concentration =   11.27 min.
Depth of flow =   0.702(Ft.)
Average velocity =  10.971(Ft/s)
Total irregular channel flow =    49.312(CFS)
Irregular channel normal depth above invert elev. =   0.702(Ft.)
Average velocity of channel(s) =  10.971(Ft/s)
 Adding area flow to channel
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Adjusted SCS curve number for AMC 3 = 96.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.071(In/Hr)
Rainfall intensity =      3.763(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.886
Subarea runoff =     29.852(CFS) for    9.250(Ac.)
Total runoff =     64.207(CFS)
Effective area this stream =       19.25(Ac.)
```

```
Total Study Area (Main Stream No. 1) =       35.55(Ac.)
Area averaged Fm value =    0.057(In/Hr)
Depth of flow =   0.814(Ft.), Average velocity =  11.906(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      217.000 to Point/Station      218.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   1.154(Ft.), Average velocity =   8.837(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              5.00
        2             10.00              0.00
        3             15.00              0.00
        4             25.00              5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     74.565(CFS)
  '     '        flow top width =      9.618(Ft.)
  '     '    velocity=    8.837(Ft/s)
  '     '        area =      8.437(Sq.Ft)
  '     '        Froude number =     1.663

Upstream point elevation =  1025.000(Ft.)
Downstream point elevation =  1002.680(Ft.)
Flow length =   547.140(Ft.)
Travel time  =    1.03 min.
Time of concentration =   12.31 min.
Depth of flow =   1.154(Ft.)
Average velocity =   8.837(Ft/s)
Total irregular channel flow =    74.565(CFS)
Irregular channel normal depth above invert elev. =   1.154(Ft.)
Average velocity of channel(s) =   8.837(Ft/s)
 Adding area flow to channel
RESIDENTIAL(2.5 acre lot)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 3 = 91.00
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.156(In/Hr)
Rainfall intensity =      3.570(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.878
Subarea runoff =     20.628(CFS) for    7.800(Ac.)
```

```
Total runoff =     84.835(CFS)
Effective area this stream =       27.05(Ac.)
Total Study Area (Main Stream No. 1) =       43.35(Ac.)
Area averaged Fm value =    0.086(In/Hr)
Depth of flow =   1.237(Ft.), Average velocity =   9.173(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      218.000 to Point/Station      219.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   1.286(Ft.), Average velocity =   9.192(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00             5.00
        2             10.00             0.00
        3             15.00             0.00
        4             25.00             5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     89.512(CFS)
  '     '        flow top width =     10.144(Ft.)
  '     '    velocity=    9.192(Ft/s)
  '     '        area =      9.738(Sq.Ft)
  '     '        Froude number =     1.653

Upstream point elevation =  1002.680(Ft.)
Downstream point elevation =   980.570(Ft.)
Flow length =   562.590(Ft.)
Travel time  =    1.02 min.
Time of concentration =   13.33 min.
Depth of flow =   1.286(Ft.)
Average velocity =   9.192(Ft/s)
Total irregular channel flow =    89.512(CFS)
Irregular channel normal depth above invert elev. =   1.286(Ft.)
Average velocity of channel(s) =   9.192(Ft/s)
 Adding area flow to channel
RESIDENTIAL(2.5 acre lot)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 3 = 91.00
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.156(In/Hr)
Rainfall intensity =      3.404(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
```

```
rational method)(Q=KCIA) is C = 0.875
Subarea runoff =      9.272(CFS) for    4.560(Ac.)
Total runoff =     94.107(CFS)
Effective area this stream =       31.61(Ac.)
Total Study Area (Main Stream No. 1) =       47.91(Ac.)
Area averaged Fm value =    0.096(In/Hr)
Depth of flow =   1.321(Ft.), Average velocity =   9.325(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      219.000 to Point/Station      220.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   1.466(Ft.), Average velocity =   8.224(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              5.00
        2             10.00              0.00
        3             15.00              0.00
        4             25.00              5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     95.641(CFS)
  '     '        flow top width =     10.865(Ft.)
  '     '    velocity=    8.224(Ft/s)
  '     '        area =     11.630(Sq.Ft)
  '     '        Froude number =     1.401

Upstream point elevation =   980.570(Ft.)
Downstream point elevation =   965.400(Ft.)
Flow length =   555.010(Ft.)
Travel time  =    1.12 min.
Time of concentration =   14.45 min.
Depth of flow =   1.466(Ft.)
Average velocity =   8.224(Ft/s)
Total irregular channel flow =    95.641(CFS)
Irregular channel normal depth above invert elev. =   1.466(Ft.)
Average velocity of channel(s) =   8.224(Ft/s)
 Adding area flow to channel
RESIDENTIAL(2.5 acre lot)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 3 = 91.00
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.156(In/Hr)
```

```
Rainfall intensity =      3.242(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.872
Subarea runoff =      2.986(CFS) for    2.730(Ac.)
Total runoff =     97.093(CFS)
Effective area this stream =       34.34(Ac.)
Total Study Area (Main Stream No. 1) =       50.64(Ac.)
Area averaged Fm value =    0.101(In/Hr)
Depth of flow =   1.478(Ft.), Average velocity =   8.259(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      220.000 to Point/Station      221.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   1.839(Ft.), Average velocity =   6.120(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00              5.00
        2             10.00              0.00
        3             15.00              0.00
        4             25.00              5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     97.686(CFS)
  '     '        flow top width =     12.357(Ft.)
  '     '    velocity=    6.120(Ft/s)
  '     '        area =     15.963(Sq.Ft)
  '     '        Froude number =     0.949

Upstream point elevation =   965.400(Ft.)
Downstream point elevation =   961.640(Ft.)
Flow length =   316.570(Ft.)
Travel time  =    0.86 min.
Time of concentration =   15.31 min.
Depth of flow =   1.839(Ft.)
Average velocity =   6.120(Ft/s)
Total irregular channel flow =    97.686(CFS)
Irregular channel normal depth above invert elev. =   1.839(Ft.)
Average velocity of channel(s) =   6.120(Ft/s)
 Adding area flow to channel
RESIDENTIAL(2.5 acre lot)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
```

```
Adjusted SCS curve number for AMC 3 = 91.00
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.156(In/Hr)
Rainfall intensity =      3.131(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.870
Subarea runoff =      1.127(CFS) for    1.700(Ac.)
Total runoff =     98.221(CFS)
Effective area this stream =       36.04(Ac.)
Total Study Area (Main Stream No. 1) =       52.34(Ac.)
Area averaged Fm value =    0.103(In/Hr)
Depth of flow =   1.844(Ft.), Average velocity =   6.129(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      221.000 to Point/Station      222.000
**** IRREGULAR CHANNEL FLOW TRAVEL TIME ****
______________________________________________________________________
Estimated mean flow rate at midpoint of channel =      0.000(CFS)
Depth of flow =   1.592(Ft.), Average velocity =   7.621(Ft/s)
        ******* Irregular Channel Data ***********
-----------------------------------------------------------------
Information entered for subchannel number 1 :
Point number      'X' coordinate     'Y' coordinate
        1              0.00             5.00
        2             10.00             0.00
        3             15.00             0.00
        4             25.00             5.00
Manning's 'N' friction factor =   0.030
-----------------------------------------------------------------
Sub-Channel flow  =     99.306(CFS)
  '     '        flow top width =     11.369(Ft.)
  '     '    velocity=    7.621(Ft/s)
  '     '        area =     13.031(Sq.Ft)
  '     '        Froude number =     1.254

Upstream point elevation =   961.640(Ft.)
Downstream point elevation =   946.260(Ft.)
Flow length =   715.700(Ft.)
Travel time  =    1.57 min.
Time of concentration =   16.88 min.
Depth of flow =   1.592(Ft.)
Average velocity =   7.621(Ft/s)
Total irregular channel flow =    99.306(CFS)
Irregular channel normal depth above invert elev. =   1.592(Ft.)
Average velocity of channel(s) =   7.621(Ft/s)
 Adding area flow to channel
RESIDENTIAL(2.5 acre lot)
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
```

```
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 75.00
Adjusted SCS curve number for AMC 3 = 91.00
Pervious ratio(Ap) = 0.9000     Max loss rate(Fm)=     0.156(In/Hr)
Rainfall intensity =      2.954(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.867
Subarea runoff =      2.119(CFS) for    3.130(Ac.)
Total runoff =    100.339(CFS)
Effective area this stream =       39.17(Ac.)
Total Study Area (Main Stream No. 1) =       55.47(Ac.)
Area averaged Fm value =    0.107(In/Hr)
Depth of flow =   1.601(Ft.), Average velocity =   7.642(Ft/s)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      223.000 to Point/Station      224.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Adjusted SCS curve number for AMC 3 = 96.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.071(In/Hr)
Initial subarea data:
Initial area flow distance =   937.660(Ft.)
Top (of initial area) elevation =  1204.000(Ft.)
Bottom (of initial area) elevation =  1020.000(Ft.)
Difference in elevation =   184.000(Ft.)
Slope =    0.19623  s(%)=      19.62
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.103 min.
Rainfall intensity =      3.157(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.880
Subarea runoff =     12.167(CFS)
Total initial stream area =       4.380(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.071(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      223.000 to Point/Station      225.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
```

```
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Adjusted SCS curve number for AMC 3 = 96.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.071(In/Hr)
Initial subarea data:
Initial area flow distance =   667.430(Ft.)
Top (of initial area) elevation =  1204.000(Ft.)
Bottom (of initial area) elevation =  1015.000(Ft.)
Difference in elevation =   189.000(Ft.)
Slope =    0.28318  s(%)=      28.32
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   12.251 min.
Rainfall intensity =      3.580(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.882
Subarea runoff =     16.043(CFS)
Total initial stream area =        5.080(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.071(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      226.000 to Point/Station      227.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
UNDEVELOPED (average cover) subarea
Decimal fraction soil group A = 0.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 1.000
SCS curve number for soil(AMC 2)  = 84.00
Adjusted SCS curve number for AMC 3 = 96.40
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.071(In/Hr)
Initial subarea data:
Initial area flow distance =   534.060(Ft.)
Top (of initial area) elevation =  1201.770(Ft.)
Bottom (of initial area) elevation =  1000.000(Ft.)
Difference in elevation =   201.770(Ft.)
Slope =    0.37780  s(%)=      37.78
TC = k(0.706)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.578 min.
Rainfall intensity =      3.910(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.884
Subarea runoff =     25.324(CFS)
Total initial stream area =        7.330(Ac.)
Pervious area fraction = 1.000
Initial area Fm value =    0.071(In/Hr)
End of computations, Total Study Area =           72.26 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
```

Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.860
Area averaged SCS curve number = 80.2

U n i t   H y d r o g r a p h   A n a l y s i s

Study date 02/26/21

++

San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6481

Paradise Ranch
2 yr Unit Hydrograph
DA38

Storm Event Year = 2

Antecedent Moisture Condition = 1

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
4.38	1	0.94
Rainfall data for year 2		
4.38	6	3.25
Rainfall data for year 2		
4.38	24	3.52
Rainfall data for year 100		

4.38	1	1.50

Rainfall data for year 100

4.38	6	1.34

Rainfall data for year 100

4.38	24	9.00

++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 1)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
84.0	68.6	4.38	1.000	0.554	1.000	0.554

Area-averaged adjusted loss rate Fm (In/Hr) = 0.554

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC1)	S	Pervious Yield Fr
4.38	1.000	84.0	68.6	4.58	0.268

Area-averaged catchment yield fraction, Y = 0.268
Area-averaged low loss fraction, Yb = 0.732
User entry of time of concentration = 0.252 (hours)

++

Watershed area = 4.38(Ac.)
Catchment Lag time = 0.202 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 41.3360
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.554(In/Hr)
Average low loss rate fraction (Yb) = 0.732 (decimal)
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall = 0.260(In)
Computed peak 30-minute rainfall = 0.446(In)
Specified peak 1-hour rainfall = 0.549(In)
Computed peak 3-hour rainfall = 1.633(In)
Specified peak 6-hour rainfall = 3.250(In)
Specified peak 24-hour rainfall = 3.520(In)

Rainfall depth area reduction factors:
Using a total area of 4.38(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.260(In)
30-minute factor = 1.000 Adjusted rainfall = 0.445(In)

```
1-hour factor = 1.000       Adjusted rainfall =  0.548(In)
3-hour factor = 1.000       Adjusted rainfall =  1.633(In)
6-hour factor = 1.000       Adjusted rainfall =  3.250(In)
24-hour factor = 1.000      Adjusted rainfall =  3.520(In)
----------------------------------------------------------------------

                       U n i t  H y d r o g r a p h
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values             ((CFS))
----------------------------------------------------------------------
                (K =        52.97 (CFS))

  1                3.278                   1.737
  2               15.863                   6.666
  3               49.042                  17.576
  4               70.026                  11.115
  5               79.746                   5.149
  6               86.184                   3.410
  7               90.753                   2.420
  8               94.013                   1.727
  9               96.218                   1.168
 10               97.660                   0.764
 11               98.308                   0.343
 12               98.754                   0.236
 13               99.099                   0.183
 14               99.368                   0.142
 15               99.676                   0.163
 16               99.860                   0.098
 17              100.000                   0.074
----------------------------------------------------------------------
Peak Unit   Adjusted mass rainfall  Unit rainfall
Number              (In)                 (In)
  1              0.2603               0.2603
  2              0.3204               0.0602
  3              0.3619               0.0414
  4              0.3945               0.0326
  5              0.4218               0.0273
  6              0.4455               0.0237
  7              0.4666               0.0211
  8              0.4856               0.0191
  9              0.5031               0.0175
 10              0.5193               0.0162
 11              0.5343               0.0151
 12              0.5485               0.0141
 13              0.5938               0.0454
 14              0.6392               0.0454
 15              0.6845               0.0453
 16              0.7298               0.0453
 17              0.7751               0.0453
```

18	0.8204	0.0453
19	0.8656	0.0453
20	0.9109	0.0452
21	0.9561	0.0452
22	1.0013	0.0452
23	1.0465	0.0452
24	1.0917	0.0452
25	1.1369	0.0452
26	1.1820	0.0452
27	1.2271	0.0451
28	1.2723	0.0451
29	1.3174	0.0451
30	1.3625	0.0451
31	1.4076	0.0451
32	1.4527	0.0451
33	1.4978	0.0451
34	1.5428	0.0451
35	1.5879	0.0451
36	1.6329	0.0451
37	1.6780	0.0450
38	1.7230	0.0450
39	1.7680	0.0450
40	1.8130	0.0450
41	1.8580	0.0450
42	1.9030	0.0450
43	1.9480	0.0450
44	1.9930	0.0450
45	2.0380	0.0450
46	2.0829	0.0450
47	2.1279	0.0450
48	2.1728	0.0450
49	2.2178	0.0449
50	2.2627	0.0449
51	2.3077	0.0449
52	2.3526	0.0449
53	2.3975	0.0449
54	2.4424	0.0449
55	2.4873	0.0449
56	2.5322	0.0449
57	2.5771	0.0449
58	2.6220	0.0449
59	2.6669	0.0449
60	2.7118	0.0449
61	2.7567	0.0449
62	2.8015	0.0449
63	2.8464	0.0449
64	2.8913	0.0449
65	2.9361	0.0449
66	2.9810	0.0448
67	3.0258	0.0448

68	3.0706	0.0448
69	3.1155	0.0448
70	3.1603	0.0448
71	3.2051	0.0448
72	3.2500	0.0448
73	3.2525	0.0026
74	3.2551	0.0025
75	3.2576	0.0025
76	3.2601	0.0025
77	3.2625	0.0025
78	3.2650	0.0024
79	3.2674	0.0024
80	3.2697	0.0024
81	3.2721	0.0023
82	3.2744	0.0023
83	3.2767	0.0023
84	3.2789	0.0023
85	3.2812	0.0022
86	3.2834	0.0022
87	3.2856	0.0022
88	3.2877	0.0022
89	3.2899	0.0021
90	3.2920	0.0021
91	3.2941	0.0021
92	3.2961	0.0021
93	3.2982	0.0021
94	3.3002	0.0020
95	3.3022	0.0020
96	3.3042	0.0020
97	3.3062	0.0020
98	3.3082	0.0020
99	3.3101	0.0019
100	3.3120	0.0019
101	3.3139	0.0019
102	3.3158	0.0019
103	3.3176	0.0019
104	3.3195	0.0018
105	3.3213	0.0018
106	3.3231	0.0018
107	3.3249	0.0018
108	3.3267	0.0018
109	3.3285	0.0018
110	3.3302	0.0018
111	3.3320	0.0017
112	3.3337	0.0017
113	3.3354	0.0017
114	3.3371	0.0017
115	3.3388	0.0017
116	3.3404	0.0017
117	3.3421	0.0017

118	3.3437	0.0016
119	3.3453	0.0016
120	3.3470	0.0016
121	3.3486	0.0016
122	3.3501	0.0016
123	3.3517	0.0016
124	3.3533	0.0016
125	3.3548	0.0016
126	3.3564	0.0015
127	3.3579	0.0015
128	3.3594	0.0015
129	3.3609	0.0015
130	3.3624	0.0015
131	3.3639	0.0015
132	3.3654	0.0015
133	3.3668	0.0015
134	3.3683	0.0015
135	3.3697	0.0014
136	3.3712	0.0014
137	3.3726	0.0014
138	3.3740	0.0014
139	3.3754	0.0014
140	3.3768	0.0014
141	3.3782	0.0014
142	3.3796	0.0014
143	3.3809	0.0014
144	3.3823	0.0014
145	3.3836	0.0013
146	3.3850	0.0013
147	3.3863	0.0013
148	3.3876	0.0013
149	3.3889	0.0013
150	3.3902	0.0013
151	3.3915	0.0013
152	3.3928	0.0013
153	3.3941	0.0013
154	3.3954	0.0013
155	3.3966	0.0013
156	3.3979	0.0013
157	3.3991	0.0013
158	3.4004	0.0012
159	3.4016	0.0012
160	3.4029	0.0012
161	3.4041	0.0012
162	3.4053	0.0012
163	3.4065	0.0012
164	3.4077	0.0012
165	3.4089	0.0012
166	3.4101	0.0012
167	3.4113	0.0012

168	3.4124	0.0012
169	3.4136	0.0012
170	3.4148	0.0012
171	3.4159	0.0012
172	3.4171	0.0011
173	3.4182	0.0011
174	3.4193	0.0011
175	3.4205	0.0011
176	3.4216	0.0011
177	3.4227	0.0011
178	3.4238	0.0011
179	3.4249	0.0011
180	3.4260	0.0011
181	3.4271	0.0011
182	3.4282	0.0011
183	3.4293	0.0011
184	3.4303	0.0011
185	3.4314	0.0011
186	3.4325	0.0011
187	3.4335	0.0011
188	3.4346	0.0011
189	3.4356	0.0010
190	3.4367	0.0010
191	3.4377	0.0010
192	3.4388	0.0010
193	3.4398	0.0010
194	3.4408	0.0010
195	3.4418	0.0010
196	3.4428	0.0010
197	3.4439	0.0010
198	3.4449	0.0010
199	3.4459	0.0010
200	3.4469	0.0010
201	3.4478	0.0010
202	3.4488	0.0010
203	3.4498	0.0010
204	3.4508	0.0010
205	3.4518	0.0010
206	3.4527	0.0010
207	3.4537	0.0010
208	3.4546	0.0010
209	3.4556	0.0010
210	3.4565	0.0009
211	3.4575	0.0009
212	3.4584	0.0009
213	3.4594	0.0009
214	3.4603	0.0009
215	3.4612	0.0009
216	3.4622	0.0009
217	3.4631	0.0009

218	3.4640	0.0009
219	3.4649	0.0009
220	3.4658	0.0009
221	3.4667	0.0009
222	3.4676	0.0009
223	3.4685	0.0009
224	3.4694	0.0009
225	3.4703	0.0009
226	3.4712	0.0009
227	3.4721	0.0009
228	3.4730	0.0009
229	3.4738	0.0009
230	3.4747	0.0009
231	3.4756	0.0009
232	3.4764	0.0009
233	3.4773	0.0009
234	3.4782	0.0009
235	3.4790	0.0009
236	3.4799	0.0009
237	3.4807	0.0008
238	3.4815	0.0008
239	3.4824	0.0008
240	3.4832	0.0008
241	3.4841	0.0008
242	3.4849	0.0008
243	3.4857	0.0008
244	3.4865	0.0008
245	3.4874	0.0008
246	3.4882	0.0008
247	3.4890	0.0008
248	3.4898	0.0008
249	3.4906	0.0008
250	3.4914	0.0008
251	3.4922	0.0008
252	3.4930	0.0008
253	3.4938	0.0008
254	3.4946	0.0008
255	3.4954	0.0008
256	3.4962	0.0008
257	3.4970	0.0008
258	3.4978	0.0008
259	3.4985	0.0008
260	3.4993	0.0008
261	3.5001	0.0008
262	3.5009	0.0008
263	3.5016	0.0008
264	3.5024	0.0008
265	3.5032	0.0008
266	3.5039	0.0008
267	3.5047	0.0008

268	3.5054	0.0008
269	3.5062	0.0008
270	3.5069	0.0007
271	3.5077	0.0007
272	3.5084	0.0007
273	3.5092	0.0007
274	3.5099	0.0007
275	3.5106	0.0007
276	3.5114	0.0007
277	3.5121	0.0007
278	3.5128	0.0007
279	3.5136	0.0007
280	3.5143	0.0007
281	3.5150	0.0007
282	3.5157	0.0007
283	3.5164	0.0007
284	3.5171	0.0007
285	3.5179	0.0007
286	3.5186	0.0007
287	3.5193	0.0007
288	3.5200	0.0007

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0007	0.0005	0.0002
2	0.0007	0.0005	0.0002
3	0.0007	0.0005	0.0002
4	0.0007	0.0005	0.0002
5	0.0007	0.0005	0.0002
6	0.0007	0.0005	0.0002
7	0.0007	0.0005	0.0002
8	0.0007	0.0005	0.0002
9	0.0007	0.0005	0.0002
10	0.0007	0.0005	0.0002
11	0.0007	0.0005	0.0002
12	0.0007	0.0005	0.0002
13	0.0007	0.0005	0.0002
14	0.0008	0.0006	0.0002
15	0.0008	0.0006	0.0002
16	0.0008	0.0006	0.0002
17	0.0008	0.0006	0.0002
18	0.0008	0.0006	0.0002
19	0.0008	0.0006	0.0002
20	0.0008	0.0006	0.0002
21	0.0008	0.0006	0.0002
22	0.0008	0.0006	0.0002
23	0.0008	0.0006	0.0002
24	0.0008	0.0006	0.0002

25	0.0008	0.0006	0.0002
26	0.0008	0.0006	0.0002
27	0.0008	0.0006	0.0002
28	0.0008	0.0006	0.0002
29	0.0008	0.0006	0.0002
30	0.0008	0.0006	0.0002
31	0.0008	0.0006	0.0002
32	0.0008	0.0006	0.0002
33	0.0008	0.0006	0.0002
34	0.0008	0.0006	0.0002
35	0.0008	0.0006	0.0002
36	0.0009	0.0006	0.0002
37	0.0009	0.0006	0.0002
38	0.0009	0.0006	0.0002
39	0.0009	0.0006	0.0002
40	0.0009	0.0006	0.0002
41	0.0009	0.0006	0.0002
42	0.0009	0.0006	0.0002
43	0.0009	0.0007	0.0002
44	0.0009	0.0007	0.0002
45	0.0009	0.0007	0.0002
46	0.0009	0.0007	0.0002
47	0.0009	0.0007	0.0002
48	0.0009	0.0007	0.0002
49	0.0009	0.0007	0.0002
50	0.0009	0.0007	0.0002
51	0.0009	0.0007	0.0003
52	0.0009	0.0007	0.0003
53	0.0009	0.0007	0.0003
54	0.0010	0.0007	0.0003
55	0.0010	0.0007	0.0003
56	0.0010	0.0007	0.0003
57	0.0010	0.0007	0.0003
58	0.0010	0.0007	0.0003
59	0.0010	0.0007	0.0003
60	0.0010	0.0007	0.0003
61	0.0010	0.0007	0.0003
62	0.0010	0.0007	0.0003
63	0.0010	0.0007	0.0003
64	0.0010	0.0007	0.0003
65	0.0010	0.0008	0.0003
66	0.0010	0.0008	0.0003
67	0.0010	0.0008	0.0003
68	0.0011	0.0008	0.0003
69	0.0011	0.0008	0.0003
70	0.0011	0.0008	0.0003
71	0.0011	0.0008	0.0003
72	0.0011	0.0008	0.0003
73	0.0011	0.0008	0.0003
74	0.0011	0.0008	0.0003

75	0.0011	0.0008	0.0003
76	0.0011	0.0008	0.0003
77	0.0011	0.0008	0.0003
78	0.0011	0.0008	0.0003
79	0.0012	0.0008	0.0003
80	0.0012	0.0008	0.0003
81	0.0012	0.0009	0.0003
82	0.0012	0.0009	0.0003
83	0.0012	0.0009	0.0003
84	0.0012	0.0009	0.0003
85	0.0012	0.0009	0.0003
86	0.0012	0.0009	0.0003
87	0.0012	0.0009	0.0003
88	0.0012	0.0009	0.0003
89	0.0013	0.0009	0.0003
90	0.0013	0.0009	0.0003
91	0.0013	0.0009	0.0003
92	0.0013	0.0009	0.0003
93	0.0013	0.0010	0.0004
94	0.0013	0.0010	0.0004
95	0.0013	0.0010	0.0004
96	0.0013	0.0010	0.0004
97	0.0014	0.0010	0.0004
98	0.0014	0.0010	0.0004
99	0.0014	0.0010	0.0004
100	0.0014	0.0010	0.0004
101	0.0014	0.0010	0.0004
102	0.0014	0.0010	0.0004
103	0.0014	0.0011	0.0004
104	0.0015	0.0011	0.0004
105	0.0015	0.0011	0.0004
106	0.0015	0.0011	0.0004
107	0.0015	0.0011	0.0004
108	0.0015	0.0011	0.0004
109	0.0015	0.0011	0.0004
110	0.0016	0.0011	0.0004
111	0.0016	0.0012	0.0004
112	0.0016	0.0012	0.0004
113	0.0016	0.0012	0.0004
114	0.0016	0.0012	0.0004
115	0.0017	0.0012	0.0004
116	0.0017	0.0012	0.0004
117	0.0017	0.0012	0.0005
118	0.0017	0.0012	0.0005
119	0.0017	0.0013	0.0005
120	0.0018	0.0013	0.0005
121	0.0018	0.0013	0.0005
122	0.0018	0.0013	0.0005
123	0.0018	0.0013	0.0005
124	0.0018	0.0014	0.0005

125	0.0019	0.0014	0.0005
126	0.0019	0.0014	0.0005
127	0.0019	0.0014	0.0005
128	0.0020	0.0014	0.0005
129	0.0020	0.0015	0.0005
130	0.0020	0.0015	0.0005
131	0.0021	0.0015	0.0006
132	0.0021	0.0015	0.0006
133	0.0021	0.0015	0.0006
134	0.0021	0.0016	0.0006
135	0.0022	0.0016	0.0006
136	0.0022	0.0016	0.0006
137	0.0023	0.0017	0.0006
138	0.0023	0.0017	0.0006
139	0.0023	0.0017	0.0006
140	0.0024	0.0017	0.0006
141	0.0024	0.0018	0.0007
142	0.0025	0.0018	0.0007
143	0.0025	0.0018	0.0007
144	0.0025	0.0019	0.0007
145	0.0448	0.0328	0.0120
146	0.0448	0.0328	0.0120
147	0.0448	0.0328	0.0120
148	0.0448	0.0328	0.0120
149	0.0448	0.0328	0.0120
150	0.0449	0.0328	0.0120
151	0.0449	0.0328	0.0120
152	0.0449	0.0328	0.0120
153	0.0449	0.0328	0.0120
154	0.0449	0.0328	0.0120
155	0.0449	0.0328	0.0120
156	0.0449	0.0329	0.0120
157	0.0449	0.0329	0.0121
158	0.0449	0.0329	0.0121
159	0.0449	0.0329	0.0121
160	0.0449	0.0329	0.0121
161	0.0450	0.0329	0.0121
162	0.0450	0.0329	0.0121
163	0.0450	0.0329	0.0121
164	0.0450	0.0329	0.0121
165	0.0450	0.0329	0.0121
166	0.0450	0.0329	0.0121
167	0.0450	0.0329	0.0121
168	0.0450	0.0329	0.0121
169	0.0451	0.0330	0.0121
170	0.0451	0.0330	0.0121
171	0.0451	0.0330	0.0121
172	0.0451	0.0330	0.0121
173	0.0451	0.0330	0.0121
174	0.0451	0.0330	0.0121

175	0.0451	0.0330	0.0121
176	0.0452	0.0330	0.0121
177	0.0452	0.0331	0.0121
178	0.0452	0.0331	0.0121
179	0.0452	0.0331	0.0121
180	0.0452	0.0331	0.0121
181	0.0453	0.0331	0.0121
182	0.0453	0.0331	0.0122
183	0.0453	0.0332	0.0122
184	0.0454	0.0332	0.0122
185	0.0141	0.0103	0.0038
186	0.0151	0.0110	0.0040
187	0.0175	0.0128	0.0047
188	0.0191	0.0140	0.0051
189	0.0237	0.0173	0.0064
190	0.0273	0.0200	0.0073
191	0.0414	0.0303	0.0111
192	0.0602	0.0440	0.0161
193	0.2603	0.0462	0.2141
194	0.0326	0.0239	0.0088
195	0.0211	0.0154	0.0057
196	0.0162	0.0118	0.0043
197	0.0454	0.0332	0.0122
198	0.0453	0.0332	0.0122
199	0.0453	0.0331	0.0121
200	0.0452	0.0331	0.0121
201	0.0452	0.0330	0.0121
202	0.0451	0.0330	0.0121
203	0.0451	0.0330	0.0121
204	0.0451	0.0330	0.0121
205	0.0450	0.0330	0.0121
206	0.0450	0.0329	0.0121
207	0.0450	0.0329	0.0121
208	0.0450	0.0329	0.0121
209	0.0449	0.0329	0.0121
210	0.0449	0.0329	0.0121
211	0.0449	0.0329	0.0121
212	0.0449	0.0328	0.0120
213	0.0449	0.0328	0.0120
214	0.0449	0.0328	0.0120
215	0.0448	0.0328	0.0120
216	0.0448	0.0328	0.0120
217	0.0026	0.0019	0.0007
218	0.0025	0.0018	0.0007
219	0.0024	0.0018	0.0006
220	0.0023	0.0017	0.0006
221	0.0022	0.0016	0.0006
222	0.0022	0.0016	0.0006
223	0.0021	0.0015	0.0006
224	0.0020	0.0015	0.0005

225	0.0020	0.0014	0.0005
226	0.0019	0.0014	0.0005
227	0.0019	0.0014	0.0005
228	0.0018	0.0013	0.0005
229	0.0018	0.0013	0.0005
230	0.0017	0.0013	0.0005
231	0.0017	0.0012	0.0005
232	0.0016	0.0012	0.0004
233	0.0016	0.0012	0.0004
234	0.0016	0.0011	0.0004
235	0.0015	0.0011	0.0004
236	0.0015	0.0011	0.0004
237	0.0015	0.0011	0.0004
238	0.0014	0.0010	0.0004
239	0.0014	0.0010	0.0004
240	0.0014	0.0010	0.0004
241	0.0013	0.0010	0.0004
242	0.0013	0.0010	0.0004
243	0.0013	0.0009	0.0003
244	0.0013	0.0009	0.0003
245	0.0013	0.0009	0.0003
246	0.0012	0.0009	0.0003
247	0.0012	0.0009	0.0003
248	0.0012	0.0009	0.0003
249	0.0012	0.0009	0.0003
250	0.0011	0.0008	0.0003
251	0.0011	0.0008	0.0003
252	0.0011	0.0008	0.0003
253	0.0011	0.0008	0.0003
254	0.0011	0.0008	0.0003
255	0.0011	0.0008	0.0003
256	0.0010	0.0008	0.0003
257	0.0010	0.0008	0.0003
258	0.0010	0.0007	0.0003
259	0.0010	0.0007	0.0003
260	0.0010	0.0007	0.0003
261	0.0010	0.0007	0.0003
262	0.0010	0.0007	0.0003
263	0.0009	0.0007	0.0003
264	0.0009	0.0007	0.0003
265	0.0009	0.0007	0.0002
266	0.0009	0.0007	0.0002
267	0.0009	0.0007	0.0002
268	0.0009	0.0006	0.0002
269	0.0009	0.0006	0.0002
270	0.0009	0.0006	0.0002
271	0.0009	0.0006	0.0002
272	0.0008	0.0006	0.0002
273	0.0008	0.0006	0.0002
274	0.0008	0.0006	0.0002

```
      275              0.0008           0.0006              0.0002
      276              0.0008           0.0006              0.0002
      277              0.0008           0.0006              0.0002
      278              0.0008           0.0006              0.0002
      279              0.0008           0.0006              0.0002
      280              0.0008           0.0006              0.0002
      281              0.0008           0.0006              0.0002
      282              0.0008           0.0006              0.0002
      283              0.0007           0.0005              0.0002
      284              0.0007           0.0005              0.0002
      285              0.0007           0.0005              0.0002
      286              0.0007           0.0005              0.0002
      287              0.0007           0.0005              0.0002
      288              0.0007           0.0005              0.0002
      --------------------------------------------------------------------
      --------------------------------------------------------------------
      Total soil rain loss =      2.43(In)
      Total effective rainfall =      1.09(In)
      Peak flow rate in flood hydrograph =      4.14(CFS)
      ---------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                         24 - H O U R   S T O R M
                    R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                 Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
  0+ 5       0.0000      0.00  Q         |         |         |         |
  0+10       0.0000      0.00  Q         |         |         |         |
  0+15       0.0000      0.00  Q         |         |         |         |
  0+20       0.0001      0.01  Q         |         |         |         |
  0+25       0.0002      0.01  Q         |         |         |         |
  0+30       0.0002      0.01  Q         |         |         |         |
  0+35       0.0003      0.01  Q         |         |         |         |
  0+40       0.0003      0.01  Q         |         |         |         |
  0+45       0.0004      0.01  Q         |         |         |         |
  0+50       0.0005      0.01  Q         |         |         |         |
  0+55       0.0005      0.01  Q         |         |         |         |
  1+ 0       0.0006      0.01  Q         |         |         |         |
  1+ 5       0.0007      0.01  Q         |         |         |         |
  1+10       0.0008      0.01  Q         |         |         |         |
  1+15       0.0008      0.01  Q         |         |         |         |
  1+20       0.0009      0.01  Q         |         |         |         |
  1+25       0.0010      0.01  Q         |         |         |         |
  1+30       0.0011      0.01  Q         |         |         |         |
  1+35       0.0011      0.01  Q         |         |         |         |
  1+40       0.0012      0.01  Q         |         |         |         |
  1+45       0.0013      0.01  Q         |         |         |         |
```

1+50	0.0014	0.01	Q		|	|	|	|
1+55	0.0014	0.01	Q		|	|	|	|
2+ 0	0.0015	0.01	Q		|	|	|	|
2+ 5	0.0016	0.01	Q		|	|	|	|
2+10	0.0017	0.01	Q		|	|	|	|
2+15	0.0017	0.01	Q		|	|	|	|
2+20	0.0018	0.01	Q		|	|	|	|
2+25	0.0019	0.01	Q		|	|	|	|
2+30	0.0020	0.01	Q		|	|	|	|
2+35	0.0021	0.01	Q		|	|	|	|
2+40	0.0021	0.01	Q		|	|	|	|
2+45	0.0022	0.01	Q		|	|	|	|
2+50	0.0023	0.01	Q		|	|	|	|
2+55	0.0024	0.01	Q		|	|	|	|
3+ 0	0.0025	0.01	Q		|	|	|	|
3+ 5	0.0025	0.01	Q		|	|	|	|
3+10	0.0026	0.01	Q		|	|	|	|
3+15	0.0027	0.01	Q		|	|	|	|
3+20	0.0028	0.01	Q		|	|	|	|
3+25	0.0029	0.01	Q		|	|	|	|
3+30	0.0030	0.01	Q		|	|	|	|
3+35	0.0030	0.01	Q		|	|	|	|
3+40	0.0031	0.01	Q		|	|	|	|
3+45	0.0032	0.01	Q		|	|	|	|
3+50	0.0033	0.01	Q		|	|	|	|
3+55	0.0034	0.01	Q		|	|	|	|
4+ 0	0.0035	0.01	Q		|	|	|	|
4+ 5	0.0036	0.01	Q		|	|	|	|
4+10	0.0037	0.01	Q		|	|	|	|
4+15	0.0037	0.01	Q		|	|	|	|
4+20	0.0038	0.01	Q		|	|	|	|
4+25	0.0039	0.01	Q		|	|	|	|
4+30	0.0040	0.01	Q		|	|	|	|
4+35	0.0041	0.01	Q		|	|	|	|
4+40	0.0042	0.01	Q		|	|	|	|
4+45	0.0043	0.01	Q		|	|	|	|
4+50	0.0044	0.01	Q		|	|	|	|
4+55	0.0045	0.01	Q		|	|	|	|
5+ 0	0.0046	0.01	Q		|	|	|	|
5+ 5	0.0047	0.01	Q		|	|	|	|
5+10	0.0048	0.01	Q		|	|	|	|
5+15	0.0049	0.01	Q		|	|	|	|
5+20	0.0050	0.01	Q		|	|	|	|
5+25	0.0051	0.01	Q		|	|	|	|
5+30	0.0052	0.01	Q		|	|	|	|
5+35	0.0053	0.01	Q		|	|	|	|
5+40	0.0054	0.01	Q		|	|	|	|
5+45	0.0055	0.01	Q		|	|	|	|
5+50	0.0056	0.01	Q		|	|	|	|
5+55	0.0057	0.01	Q		|	|	|	|

```
  6+ 0        0.0058       0.02  Q          |          |          |          |
  6+ 5        0.0059       0.02  Q          |          |          |          |
  6+10        0.0060       0.02  Q          |          |          |          |
  6+15        0.0061       0.02  Q          |          |          |          |
  6+20        0.0062       0.02  Q          |          |          |          |
  6+25        0.0063       0.02  Q          |          |          |          |
  6+30        0.0064       0.02  Q          |          |          |          |
  6+35        0.0065       0.02  Q          |          |          |          |
  6+40        0.0066       0.02  Q          |          |          |          |
  6+45        0.0068       0.02  Q          |          |          |          |
  6+50        0.0069       0.02  Q          |          |          |          |
  6+55        0.0070       0.02  Q          |          |          |          |
  7+ 0        0.0071       0.02  Q          |          |          |          |
  7+ 5        0.0072       0.02  Q          |          |          |          |
  7+10        0.0073       0.02  Q          |          |          |          |
  7+15        0.0074       0.02  Q          |          |          |          |
  7+20        0.0076       0.02  Q          |          |          |          |
  7+25        0.0077       0.02  Q          |          |          |          |
  7+30        0.0078       0.02  Q          |          |          |          |
  7+35        0.0079       0.02  Q          |          |          |          |
  7+40        0.0080       0.02  Q          |          |          |          |
  7+45        0.0082       0.02  Q          |          |          |          |
  7+50        0.0083       0.02  Q          |          |          |          |
  7+55        0.0084       0.02  Q          |          |          |          |
  8+ 0        0.0086       0.02  Q          |          |          |          |
  8+ 5        0.0087       0.02  Q          |          |          |          |
  8+10        0.0088       0.02  Q          |          |          |          |
  8+15        0.0089       0.02  Q          |          |          |          |
  8+20        0.0091       0.02  Q          |          |          |          |
  8+25        0.0092       0.02  Q          |          |          |          |
  8+30        0.0093       0.02  Q          |          |          |          |
  8+35        0.0095       0.02  Q          |          |          |          |
  8+40        0.0096       0.02  Q          |          |          |          |
  8+45        0.0098       0.02  Q          |          |          |          |
  8+50        0.0099       0.02  Q          |          |          |          |
  8+55        0.0100       0.02  QV         |          |          |          |
  9+ 0        0.0102       0.02  QV         |          |          |          |
  9+ 5        0.0103       0.02  QV         |          |          |          |
  9+10        0.0105       0.02  QV         |          |          |          |
  9+15        0.0106       0.02  QV         |          |          |          |
  9+20        0.0108       0.02  QV         |          |          |          |
  9+25        0.0109       0.02  QV         |          |          |          |
  9+30        0.0111       0.02  QV         |          |          |          |
  9+35        0.0112       0.02  QV         |          |          |          |
  9+40        0.0114       0.02  QV         |          |          |          |
  9+45        0.0115       0.02  QV         |          |          |          |
  9+50        0.0117       0.02  QV         |          |          |          |
  9+55        0.0119       0.02  QV         |          |          |          |
 10+ 0        0.0120       0.02  QV         |          |          |          |
 10+ 5        0.0122       0.02  QV         |          |          |          |
```

```
10+10       0.0124      0.02  QV        |         |         |         |
10+15       0.0125      0.02  QV        |         |         |         |
10+20       0.0127      0.03  QV        |         |         |         |
10+25       0.0129      0.03  QV        |         |         |         |
10+30       0.0131      0.03  QV        |         |         |         |
10+35       0.0133      0.03  QV        |         |         |         |
10+40       0.0134      0.03  QV        |         |         |         |
10+45       0.0136      0.03  QV        |         |         |         |
10+50       0.0138      0.03  QV        |         |         |         |
10+55       0.0140      0.03  QV        |         |         |         |
11+ 0       0.0142      0.03  QV        |         |         |         |
11+ 5       0.0144      0.03  QV        |         |         |         |
11+10       0.0146      0.03  QV        |         |         |         |
11+15       0.0148      0.03  QV        |         |         |         |
11+20       0.0150      0.03  QV        |         |         |         |
11+25       0.0152      0.03  QV        |         |         |         |
11+30       0.0154      0.03  QV        |         |         |         |
11+35       0.0156      0.03  QV        |         |         |         |
11+40       0.0159      0.03  QV        |         |         |         |
11+45       0.0161      0.03  QV        |         |         |         |
11+50       0.0163      0.03  QV        |         |         |         |
11+55       0.0165      0.03  QV        |         |         |         |
12+ 0       0.0168      0.03  QV        |         |         |         |
12+ 5       0.0172      0.05  QV        |         |         |         |
12+10       0.0181      0.13  QV        |         |         |         |
12+15       0.0203      0.33  |QV       |         |         |         |
12+20       0.0235      0.46  |QV       |         |         |         |
12+25       0.0270      0.52  | Q       |         |         |         |
12+30       0.0308      0.55  | QV      |         |         |         |
12+35       0.0349      0.58  | QV      |         |         |         |
12+40       0.0390      0.60  | QV      |         |         |         |
12+45       0.0432      0.61  | Q V     |         |         |         |
12+50       0.0475      0.62  | Q V     |         |         |         |
12+55       0.0518      0.63  | Q  V    |         |         |         |
13+ 0       0.0562      0.63  | Q  V    |         |         |         |
13+ 5       0.0605      0.63  | Q   V   |         |         |         |
13+10       0.0649      0.63  | Q   V   |         |         |         |
13+15       0.0693      0.64  | Q   V   |         |         |         |
13+20       0.0737      0.64  | Q    V  |         |         |         |
13+25       0.0781      0.64  | Q    V  |         |         |         |
13+30       0.0825      0.64  | Q     V |         |         |         |
13+35       0.0869      0.64  | Q     V |         |         |         |
13+40       0.0913      0.64  | Q      V|         |         |         |
13+45       0.0957      0.64  | Q      V|         |         |         |
13+50       0.1001      0.64  | Q       V         |         |         |
13+55       0.1045      0.64  | Q       V         |         |         |
14+ 0       0.1089      0.64  | Q       V         |         |         |
14+ 5       0.1133      0.64  | Q       |V        |         |         |
14+10       0.1177      0.64  | Q       |V        |         |         |
14+15       0.1221      0.64  | Q       | V       |         |         |
```

```
14+20       0.1265      0.64  | Q       | V       |         |         |
14+25       0.1309      0.64  | Q       |  V      |         |         |
14+30       0.1353      0.64  | Q       |  V      |         |         |
14+35       0.1398      0.64  | Q       |   V     |         |         |
14+40       0.1442      0.64  | Q       |   V     |         |         |
14+45       0.1486      0.64  | Q       |   V     |         |         |
14+50       0.1530      0.64  | Q       |    V    |         |         |
14+55       0.1574      0.64  | Q       |    V    |         |         |
15+ 0       0.1619      0.64  | Q       |     V   |         |         |
15+ 5       0.1663      0.64  | Q       |     V   |         |         |
15+10       0.1707      0.64  | Q       |      V  |         |         |
15+15       0.1751      0.64  | Q       |      V  |         |         |
15+20       0.1796      0.64  | Q       |       V |         |         |
15+25       0.1839      0.63  | Q       |       V |         |         |
15+30       0.1879      0.57  | Q       |       V |         |         |
15+35       0.1908      0.43  |Q        |        V|         |         |
15+40       0.1932      0.35  |Q        |        V|         |         |
15+45       0.1954      0.32  |Q        |        V|         |         |
15+50       0.1976      0.32  |Q        |        V|         |         |
15+55       0.2000      0.34  |Q        |         V         |         |
16+ 0       0.2027      0.40  |Q        |         V         |         |
16+ 5       0.2086      0.85  |  Q      |         |V        |         |
16+10       0.2221      1.95  |      Q  |         | V       |         |
16+15       0.2506      4.14  |         |     Q   |    V    |         |
16+20       0.2695      2.75  |         Q         |      V  |         |
16+25       0.2796      1.46  |    Q    |         |       V |         |
16+30       0.2871      1.10  |   Q     |         |       V |         |
16+35       0.2940      1.00  |  Q      |         |        V|         |
16+40       0.3003      0.92  |  Q      |         |         V         |
16+45       0.3060      0.83  |  Q      |         |         V         |
16+50       0.3112      0.76  |  Q      |         |         |V        |
16+55       0.3160      0.69  | Q       |         |         |V        |
17+ 0       0.3206      0.67  | Q       |         |         | V       |
17+ 5       0.3252      0.67  | Q       |         |         | V       |
17+10       0.3298      0.67  | Q       |         |         |  V      |
17+15       0.3344      0.67  | Q       |         |         |  V      |
17+20       0.3389      0.66  | Q       |         |         |   V     |
17+25       0.3434      0.65  | Q       |         |         |   V     |
17+30       0.3478      0.64  | Q       |         |         |    V    |
17+35       0.3522      0.64  | Q       |         |         |    V    |
17+40       0.3566      0.64  | Q       |         |         |    V    |
17+45       0.3610      0.64  | Q       |         |         |     V   |
17+50       0.3654      0.64  | Q       |         |         |     V   |
17+55       0.3698      0.64  | Q       |         |         |      V  |
18+ 0       0.3742      0.64  | Q       |         |         |      V  |
18+ 5       0.3784      0.62  | Q       |         |         |       V |
18+10       0.3822      0.54  | Q       |         |         |       V |
18+15       0.3845      0.34  |Q        |         |         |       V |
18+20       0.3860      0.22  Q         |         |         |       V |
18+25       0.3871      0.16  Q         |         |         |       V |
```

```
18+30        0.3879      0.12  Q          |          |          |        V|
18+35        0.3885      0.09  Q          |          |          |        V|
18+40        0.3890      0.07  Q          |          |          |        V|
18+45        0.3894      0.05  Q          |          |          |        V|
18+50        0.3897      0.04  Q          |          |          |        V|
18+55        0.3899      0.04  Q          |          |          |        V|
19+ 0        0.3902      0.04  Q          |          |          |        V|
19+ 5        0.3904      0.03  Q          |          |          |        V|
19+10        0.3906      0.03  Q          |          |          |        V|
19+15        0.3908      0.03  Q          |          |          |        V|
19+20        0.3910      0.03  Q          |          |          |        V|
19+25        0.3912      0.02  Q          |          |          |        V|
19+30        0.3913      0.02  Q          |          |          |        V|
19+35        0.3915      0.02  Q          |          |          |        V|
19+40        0.3916      0.02  Q          |          |          |        V|
19+45        0.3918      0.02  Q          |          |          |        V|
19+50        0.3919      0.02  Q          |          |          |        V|
19+55        0.3921      0.02  Q          |          |          |        V|
20+ 0        0.3922      0.02  Q          |          |          |        V|
20+ 5        0.3924      0.02  Q          |          |          |        V|
20+10        0.3925      0.02  Q          |          |          |        V|
20+15        0.3927      0.02  Q          |          |          |        V|
20+20        0.3928      0.02  Q          |          |          |        V|
20+25        0.3929      0.02  Q          |          |          |        V|
20+30        0.3930      0.02  Q          |          |          |        V|
20+35        0.3932      0.02  Q          |          |          |        V|
20+40        0.3933      0.02  Q          |          |          |        V|
20+45        0.3934      0.02  Q          |          |          |        V|
20+50        0.3935      0.02  Q          |          |          |        V|
20+55        0.3937      0.02  Q          |          |          |        V|
21+ 0        0.3938      0.02  Q          |          |          |        V|
21+ 5        0.3939      0.02  Q          |          |          |        V|
21+10        0.3940      0.02  Q          |          |          |        V|
21+15        0.3941      0.02  Q          |          |          |        V|
21+20        0.3942      0.02  Q          |          |          |        V|
21+25        0.3943      0.02  Q          |          |          |        V|
21+30        0.3944      0.02  Q          |          |          |        V|
21+35        0.3945      0.01  Q          |          |          |        V|
21+40        0.3946      0.01  Q          |          |          |        V|
21+45        0.3947      0.01  Q          |          |          |        V|
21+50        0.3948      0.01  Q          |          |          |        V|
21+55        0.3949      0.01  Q          |          |          |        V|
22+ 0        0.3950      0.01  Q          |          |          |        V|
22+ 5        0.3951      0.01  Q          |          |          |        V|
22+10        0.3952      0.01  Q          |          |          |        V|
22+15        0.3953      0.01  Q          |          |          |        V|
22+20        0.3954      0.01  Q          |          |          |        V|
22+25        0.3955      0.01  Q          |          |          |        V|
22+30        0.3956      0.01  Q          |          |          |        V|
22+35        0.3956      0.01  Q          |          |          |        V|
```

```
  22+40        0.3957       0.01  Q          |         |         |       V|
  22+45        0.3958       0.01  Q          |         |         |       V|
  22+50        0.3959       0.01  Q          |         |         |       V|
  22+55        0.3960       0.01  Q          |         |         |       V|
  23+ 0        0.3961       0.01  Q          |         |         |       V|
  23+ 5        0.3961       0.01  Q          |         |         |       V|
  23+10        0.3962       0.01  Q          |         |         |       V|
  23+15        0.3963       0.01  Q          |         |         |       V|
  23+20        0.3964       0.01  Q          |         |         |       V|
  23+25        0.3965       0.01  Q          |         |         |       V|
  23+30        0.3965       0.01  Q          |         |         |       V|
  23+35        0.3966       0.01  Q          |         |         |       V|
  23+40        0.3967       0.01  Q          |         |         |       V|
  23+45        0.3968       0.01  Q          |         |         |       V|
  23+50        0.3968       0.01  Q          |         |         |       V|
  23+55        0.3969       0.01  Q          |         |         |       V|
  24+ 0        0.3970       0.01  Q          |         |         |       V|
  24+ 5        0.3970       0.01  Q          |         |         |       V|
  24+10        0.3971       0.01  Q          |         |         |       V|
  24+15        0.3971       0.01  Q          |         |         |       V|
  24+20        0.3972       0.00  Q          |         |         |       V|
  24+25        0.3972       0.00  Q          |         |         |       V|
  24+30        0.3972       0.00  Q          |         |         |       V|
  24+35        0.3972       0.00  Q          |         |         |       V|
  24+40        0.3972       0.00  Q          |         |         |       V|
  24+45        0.3972       0.00  Q          |         |         |       V|
  24+50        0.3972       0.00  Q          |         |         |       V|
  24+55        0.3972       0.00  Q          |         |         |       V|
  25+ 0        0.3972       0.00  Q          |         |         |       V|
  25+ 5        0.3972       0.00  Q          |         |         |       V|
  25+10        0.3972       0.00  Q          |         |         |       V|
  25+15        0.3972       0.00  Q          |         |         |       V|
  25+20        0.3972       0.00  Q          |         |         |        V
-----------------------------------------------------------------------
```

```
        U n i t   H y d r o g r a p h   A n a l y s i s

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                Study date  02/26/21

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------------------------------------------------------------------------

San Bernardino County Synthetic Unit Hydrology Method
                Manual date - August 1986


Program License Serial Number 6481

----------------------------------------------------------------------
Paradise Ranch
2 yr Hydrograph
DA39

---------------------------------------------------------------------

        Storm Event Year = 2

        Antecedent Moisture Condition = 1

 English (in-lb) Input Units Used

 English Rainfall Data (Inches) Input Values Used

 English Units used in output format




Area averaged rainfall intensity isohyetal data:
        Sub-Area        Duration        Isohyetal
        (Ac.)            (hours)         (In)
Rainfall data for year 10
             5.08           1           0.94
---------------------------------------------------------------------
Rainfall data for year 2
             5.08           6           3.25
---------------------------------------------------------------------
Rainfall data for year 2
             5.08          24           3.52
---------------------------------------------------------------------
Rainfall data for year 100
```

```
             5.08           1           1.50
---------------------------------------------------------------------
Rainfall data for year 100
             5.08           6           1.34
---------------------------------------------------------------------
Rainfall data for year 100
             5.08          24           9.00
---------------------------------------------------------------------
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

******** Area-averaged max loss rate, Fm ********


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 1)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 84.0      68.6          5.08      1.000     0.554    1.000    0.554

Area-averaged adjusted loss rate Fm (In/Hr) =  0.554

********* Area-Averaged low loss rate fraction, Yb **********

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC1)           Yield Fr
     5.08   1.000         84.0      68.6       4.58     0.268

Area-averaged catchment yield fraction, Y =  0.268
Area-averaged low loss fraction, Yb =  0.732
User entry of time of concentration  =   0.204 (hours)
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       5.08(Ac.)
Catchment Lag time =   0.163 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 51.0621
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.554(In/Hr)
Average low loss rate fraction (Yb) = 0.732 (decimal)
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall =  0.260(In)
Computed peak 30-minute rainfall =  0.446(In)
Specified peak 1-hour rainfall =  0.549(In)
Computed peak 3-hour rainfall =  1.633(In)
Specified peak 6-hour rainfall =  3.250(In)
Specified peak 24-hour rainfall =  3.520(In)


Rainfall depth area reduction factors:
Using a total area of       5.08(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.260(In)
30-minute factor = 1.000    Adjusted rainfall =  0.445(In)
```

```
1-hour factor = 1.000       Adjusted rainfall =  0.548(In)
3-hour factor = 1.000       Adjusted rainfall =  1.633(In)
6-hour factor = 1.000       Adjusted rainfall =  3.250(In)
24-hour factor = 1.000      Adjusted rainfall =  3.520(In)
---------------------------------------------------------------------
```

U n i t   H y d r o g r a p h

```
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 61.44 (CFS))	
1	4.409	2.709
2	25.936	13.225
3	63.898	23.322
4	78.235	8.808
5	86.466	5.057
6	91.800	3.277
7	95.273	2.133
8	97.375	1.292
9	98.307	0.572
10	98.846	0.332
11	99.220	0.229
12	99.591	0.228
13	99.849	0.159
14	100.000	0.093

```
---------------------------------------------------------------------
```

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.2602	0.2602
2	0.3204	0.0602
3	0.3618	0.0414
4	0.3945	0.0326
5	0.4218	0.0273
6	0.4455	0.0237
7	0.4666	0.0211
8	0.4856	0.0191
9	0.5031	0.0175
10	0.5193	0.0162
11	0.5343	0.0151
12	0.5484	0.0141
13	0.5938	0.0454
14	0.6392	0.0454
15	0.6845	0.0453
16	0.7298	0.0453
17	0.7751	0.0453
18	0.8204	0.0453
19	0.8656	0.0453
20	0.9109	0.0452

21	0.9561	0.0452
22	1.0013	0.0452
23	1.0465	0.0452
24	1.0917	0.0452
25	1.1368	0.0452
26	1.1820	0.0452
27	1.2271	0.0451
28	1.2723	0.0451
29	1.3174	0.0451
30	1.3625	0.0451
31	1.4076	0.0451
32	1.4527	0.0451
33	1.4978	0.0451
34	1.5428	0.0451
35	1.5879	0.0451
36	1.6329	0.0451
37	1.6780	0.0450
38	1.7230	0.0450
39	1.7680	0.0450
40	1.8130	0.0450
41	1.8580	0.0450
42	1.9030	0.0450
43	1.9480	0.0450
44	1.9930	0.0450
45	2.0380	0.0450
46	2.0829	0.0450
47	2.1279	0.0450
48	2.1728	0.0450
49	2.2178	0.0449
50	2.2627	0.0449
51	2.3077	0.0449
52	2.3526	0.0449
53	2.3975	0.0449
54	2.4424	0.0449
55	2.4873	0.0449
56	2.5322	0.0449
57	2.5771	0.0449
58	2.6220	0.0449
59	2.6669	0.0449
60	2.7118	0.0449
61	2.7567	0.0449
62	2.8015	0.0449
63	2.8464	0.0449
64	2.8912	0.0449
65	2.9361	0.0449
66	2.9809	0.0448
67	3.0258	0.0448
68	3.0706	0.0448
69	3.1155	0.0448
70	3.1603	0.0448

71	3.2051	0.0448
72	3.2499	0.0448
73	3.2525	0.0026
74	3.2551	0.0025
75	3.2576	0.0025
76	3.2601	0.0025
77	3.2625	0.0025
78	3.2650	0.0024
79	3.2674	0.0024
80	3.2697	0.0024
81	3.2721	0.0023
82	3.2744	0.0023
83	3.2767	0.0023
84	3.2789	0.0023
85	3.2812	0.0022
86	3.2834	0.0022
87	3.2856	0.0022
88	3.2877	0.0022
89	3.2899	0.0021
90	3.2920	0.0021
91	3.2941	0.0021
92	3.2961	0.0021
93	3.2982	0.0021
94	3.3002	0.0020
95	3.3022	0.0020
96	3.3042	0.0020
97	3.3062	0.0020
98	3.3082	0.0020
99	3.3101	0.0019
100	3.3120	0.0019
101	3.3139	0.0019
102	3.3158	0.0019
103	3.3176	0.0019
104	3.3195	0.0018
105	3.3213	0.0018
106	3.3231	0.0018
107	3.3249	0.0018
108	3.3267	0.0018
109	3.3285	0.0018
110	3.3302	0.0018
111	3.3320	0.0017
112	3.3337	0.0017
113	3.3354	0.0017
114	3.3371	0.0017
115	3.3388	0.0017
116	3.3404	0.0017
117	3.3421	0.0017
118	3.3437	0.0016
119	3.3453	0.0016
120	3.3470	0.0016

121	3.3486	0.0016
122	3.3501	0.0016
123	3.3517	0.0016
124	3.3533	0.0016
125	3.3548	0.0016
126	3.3564	0.0015
127	3.3579	0.0015
128	3.3594	0.0015
129	3.3609	0.0015
130	3.3624	0.0015
131	3.3639	0.0015
132	3.3654	0.0015
133	3.3668	0.0015
134	3.3683	0.0015
135	3.3697	0.0014
136	3.3712	0.0014
137	3.3726	0.0014
138	3.3740	0.0014
139	3.3754	0.0014
140	3.3768	0.0014
141	3.3782	0.0014
142	3.3795	0.0014
143	3.3809	0.0014
144	3.3823	0.0014
145	3.3836	0.0013
146	3.3850	0.0013
147	3.3863	0.0013
148	3.3876	0.0013
149	3.3889	0.0013
150	3.3902	0.0013
151	3.3915	0.0013
152	3.3928	0.0013
153	3.3941	0.0013
154	3.3954	0.0013
155	3.3966	0.0013
156	3.3979	0.0013
157	3.3991	0.0013
158	3.4004	0.0012
159	3.4016	0.0012
160	3.4028	0.0012
161	3.4041	0.0012
162	3.4053	0.0012
163	3.4065	0.0012
164	3.4077	0.0012
165	3.4089	0.0012
166	3.4101	0.0012
167	3.4112	0.0012
168	3.4124	0.0012
169	3.4136	0.0012
170	3.4147	0.0012

171	3.4159	0.0012
172	3.4170	0.0011
173	3.4182	0.0011
174	3.4193	0.0011
175	3.4205	0.0011
176	3.4216	0.0011
177	3.4227	0.0011
178	3.4238	0.0011
179	3.4249	0.0011
180	3.4260	0.0011
181	3.4271	0.0011
182	3.4282	0.0011
183	3.4293	0.0011
184	3.4303	0.0011
185	3.4314	0.0011
186	3.4325	0.0011
187	3.4335	0.0011
188	3.4346	0.0011
189	3.4356	0.0010
190	3.4367	0.0010
191	3.4377	0.0010
192	3.4388	0.0010
193	3.4398	0.0010
194	3.4408	0.0010
195	3.4418	0.0010
196	3.4428	0.0010
197	3.4439	0.0010
198	3.4449	0.0010
199	3.4459	0.0010
200	3.4468	0.0010
201	3.4478	0.0010
202	3.4488	0.0010
203	3.4498	0.0010
204	3.4508	0.0010
205	3.4518	0.0010
206	3.4527	0.0010
207	3.4537	0.0010
208	3.4546	0.0010
209	3.4556	0.0010
210	3.4565	0.0009
211	3.4575	0.0009
212	3.4584	0.0009
213	3.4594	0.0009
214	3.4603	0.0009
215	3.4612	0.0009
216	3.4622	0.0009
217	3.4631	0.0009
218	3.4640	0.0009
219	3.4649	0.0009
220	3.4658	0.0009

221	3.4667	0.0009
222	3.4676	0.0009
223	3.4685	0.0009
224	3.4694	0.0009
225	3.4703	0.0009
226	3.4712	0.0009
227	3.4721	0.0009
228	3.4729	0.0009
229	3.4738	0.0009
230	3.4747	0.0009
231	3.4756	0.0009
232	3.4764	0.0009
233	3.4773	0.0009
234	3.4781	0.0009
235	3.4790	0.0009
236	3.4799	0.0009
237	3.4807	0.0008
238	3.4815	0.0008
239	3.4824	0.0008
240	3.4832	0.0008
241	3.4841	0.0008
242	3.4849	0.0008
243	3.4857	0.0008
244	3.4865	0.0008
245	3.4874	0.0008
246	3.4882	0.0008
247	3.4890	0.0008
248	3.4898	0.0008
249	3.4906	0.0008
250	3.4914	0.0008
251	3.4922	0.0008
252	3.4930	0.0008
253	3.4938	0.0008
254	3.4946	0.0008
255	3.4954	0.0008
256	3.4962	0.0008
257	3.4970	0.0008
258	3.4978	0.0008
259	3.4985	0.0008
260	3.4993	0.0008
261	3.5001	0.0008
262	3.5009	0.0008
263	3.5016	0.0008
264	3.5024	0.0008
265	3.5032	0.0008
266	3.5039	0.0008
267	3.5047	0.0008
268	3.5054	0.0008
269	3.5062	0.0008
270	3.5069	0.0007

271	3.5077	0.0007
272	3.5084	0.0007
273	3.5092	0.0007
274	3.5099	0.0007
275	3.5106	0.0007
276	3.5114	0.0007
277	3.5121	0.0007
278	3.5128	0.0007
279	3.5135	0.0007
280	3.5143	0.0007
281	3.5150	0.0007
282	3.5157	0.0007
283	3.5164	0.0007
284	3.5171	0.0007
285	3.5179	0.0007
286	3.5186	0.0007
287	3.5193	0.0007
288	3.5200	0.0007

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0007	0.0005	0.0002
2	0.0007	0.0005	0.0002
3	0.0007	0.0005	0.0002
4	0.0007	0.0005	0.0002
5	0.0007	0.0005	0.0002
6	0.0007	0.0005	0.0002
7	0.0007	0.0005	0.0002
8	0.0007	0.0005	0.0002
9	0.0007	0.0005	0.0002
10	0.0007	0.0005	0.0002
11	0.0007	0.0005	0.0002
12	0.0007	0.0005	0.0002
13	0.0007	0.0005	0.0002
14	0.0008	0.0006	0.0002
15	0.0008	0.0006	0.0002
16	0.0008	0.0006	0.0002
17	0.0008	0.0006	0.0002
18	0.0008	0.0006	0.0002
19	0.0008	0.0006	0.0002
20	0.0008	0.0006	0.0002
21	0.0008	0.0006	0.0002
22	0.0008	0.0006	0.0002
23	0.0008	0.0006	0.0002
24	0.0008	0.0006	0.0002
25	0.0008	0.0006	0.0002
26	0.0008	0.0006	0.0002
27	0.0008	0.0006	0.0002

28	0.0008	0.0006	0.0002
29	0.0008	0.0006	0.0002
30	0.0008	0.0006	0.0002
31	0.0008	0.0006	0.0002
32	0.0008	0.0006	0.0002
33	0.0008	0.0006	0.0002
34	0.0008	0.0006	0.0002
35	0.0008	0.0006	0.0002
36	0.0009	0.0006	0.0002
37	0.0009	0.0006	0.0002
38	0.0009	0.0006	0.0002
39	0.0009	0.0006	0.0002
40	0.0009	0.0006	0.0002
41	0.0009	0.0006	0.0002
42	0.0009	0.0006	0.0002
43	0.0009	0.0007	0.0002
44	0.0009	0.0007	0.0002
45	0.0009	0.0007	0.0002
46	0.0009	0.0007	0.0002
47	0.0009	0.0007	0.0002
48	0.0009	0.0007	0.0002
49	0.0009	0.0007	0.0002
50	0.0009	0.0007	0.0002
51	0.0009	0.0007	0.0003
52	0.0009	0.0007	0.0003
53	0.0009	0.0007	0.0003
54	0.0010	0.0007	0.0003
55	0.0010	0.0007	0.0003
56	0.0010	0.0007	0.0003
57	0.0010	0.0007	0.0003
58	0.0010	0.0007	0.0003
59	0.0010	0.0007	0.0003
60	0.0010	0.0007	0.0003
61	0.0010	0.0007	0.0003
62	0.0010	0.0007	0.0003
63	0.0010	0.0007	0.0003
64	0.0010	0.0007	0.0003
65	0.0010	0.0008	0.0003
66	0.0010	0.0008	0.0003
67	0.0010	0.0008	0.0003
68	0.0011	0.0008	0.0003
69	0.0011	0.0008	0.0003
70	0.0011	0.0008	0.0003
71	0.0011	0.0008	0.0003
72	0.0011	0.0008	0.0003
73	0.0011	0.0008	0.0003
74	0.0011	0.0008	0.0003
75	0.0011	0.0008	0.0003
76	0.0011	0.0008	0.0003
77	0.0011	0.0008	0.0003

78	0.0011	0.0008	0.0003
79	0.0012	0.0008	0.0003
80	0.0012	0.0008	0.0003
81	0.0012	0.0009	0.0003
82	0.0012	0.0009	0.0003
83	0.0012	0.0009	0.0003
84	0.0012	0.0009	0.0003
85	0.0012	0.0009	0.0003
86	0.0012	0.0009	0.0003
87	0.0012	0.0009	0.0003
88	0.0012	0.0009	0.0003
89	0.0013	0.0009	0.0003
90	0.0013	0.0009	0.0003
91	0.0013	0.0009	0.0003
92	0.0013	0.0009	0.0003
93	0.0013	0.0010	0.0004
94	0.0013	0.0010	0.0004
95	0.0013	0.0010	0.0004
96	0.0013	0.0010	0.0004
97	0.0014	0.0010	0.0004
98	0.0014	0.0010	0.0004
99	0.0014	0.0010	0.0004
100	0.0014	0.0010	0.0004
101	0.0014	0.0010	0.0004
102	0.0014	0.0010	0.0004
103	0.0014	0.0011	0.0004
104	0.0015	0.0011	0.0004
105	0.0015	0.0011	0.0004
106	0.0015	0.0011	0.0004
107	0.0015	0.0011	0.0004
108	0.0015	0.0011	0.0004
109	0.0015	0.0011	0.0004
110	0.0016	0.0011	0.0004
111	0.0016	0.0012	0.0004
112	0.0016	0.0012	0.0004
113	0.0016	0.0012	0.0004
114	0.0016	0.0012	0.0004
115	0.0017	0.0012	0.0004
116	0.0017	0.0012	0.0004
117	0.0017	0.0012	0.0005
118	0.0017	0.0012	0.0005
119	0.0017	0.0013	0.0005
120	0.0018	0.0013	0.0005
121	0.0018	0.0013	0.0005
122	0.0018	0.0013	0.0005
123	0.0018	0.0013	0.0005
124	0.0018	0.0014	0.0005
125	0.0019	0.0014	0.0005
126	0.0019	0.0014	0.0005
127	0.0019	0.0014	0.0005

128	0.0020	0.0014	0.0005
129	0.0020	0.0015	0.0005
130	0.0020	0.0015	0.0005
131	0.0021	0.0015	0.0006
132	0.0021	0.0015	0.0006
133	0.0021	0.0015	0.0006
134	0.0021	0.0016	0.0006
135	0.0022	0.0016	0.0006
136	0.0022	0.0016	0.0006
137	0.0023	0.0017	0.0006
138	0.0023	0.0017	0.0006
139	0.0023	0.0017	0.0006
140	0.0024	0.0017	0.0006
141	0.0024	0.0018	0.0007
142	0.0025	0.0018	0.0007
143	0.0025	0.0018	0.0007
144	0.0025	0.0019	0.0007
145	0.0448	0.0328	0.0120
146	0.0448	0.0328	0.0120
147	0.0448	0.0328	0.0120
148	0.0448	0.0328	0.0120
149	0.0448	0.0328	0.0120
150	0.0449	0.0328	0.0120
151	0.0449	0.0328	0.0120
152	0.0449	0.0328	0.0120
153	0.0449	0.0328	0.0120
154	0.0449	0.0328	0.0120
155	0.0449	0.0328	0.0120
156	0.0449	0.0329	0.0120
157	0.0449	0.0329	0.0121
158	0.0449	0.0329	0.0121
159	0.0449	0.0329	0.0121
160	0.0449	0.0329	0.0121
161	0.0450	0.0329	0.0121
162	0.0450	0.0329	0.0121
163	0.0450	0.0329	0.0121
164	0.0450	0.0329	0.0121
165	0.0450	0.0329	0.0121
166	0.0450	0.0329	0.0121
167	0.0450	0.0329	0.0121
168	0.0450	0.0329	0.0121
169	0.0451	0.0330	0.0121
170	0.0451	0.0330	0.0121
171	0.0451	0.0330	0.0121
172	0.0451	0.0330	0.0121
173	0.0451	0.0330	0.0121
174	0.0451	0.0330	0.0121
175	0.0451	0.0330	0.0121
176	0.0452	0.0330	0.0121
177	0.0452	0.0331	0.0121

178	0.0452	0.0331	0.0121
179	0.0452	0.0331	0.0121
180	0.0452	0.0331	0.0121
181	0.0453	0.0331	0.0121
182	0.0453	0.0331	0.0122
183	0.0453	0.0332	0.0122
184	0.0454	0.0332	0.0122
185	0.0141	0.0103	0.0038
186	0.0151	0.0110	0.0040
187	0.0175	0.0128	0.0047
188	0.0191	0.0140	0.0051
189	0.0237	0.0173	0.0064
190	0.0273	0.0200	0.0073
191	0.0414	0.0303	0.0111
192	0.0602	0.0440	0.0161
193	0.2602	0.0462	0.2141
194	0.0326	0.0239	0.0088
195	0.0211	0.0154	0.0057
196	0.0162	0.0118	0.0043
197	0.0454	0.0332	0.0122
198	0.0453	0.0332	0.0122
199	0.0453	0.0331	0.0121
200	0.0452	0.0331	0.0121
201	0.0452	0.0330	0.0121
202	0.0451	0.0330	0.0121
203	0.0451	0.0330	0.0121
204	0.0451	0.0330	0.0121
205	0.0450	0.0330	0.0121
206	0.0450	0.0329	0.0121
207	0.0450	0.0329	0.0121
208	0.0450	0.0329	0.0121
209	0.0449	0.0329	0.0121
210	0.0449	0.0329	0.0121
211	0.0449	0.0329	0.0121
212	0.0449	0.0328	0.0120
213	0.0449	0.0328	0.0120
214	0.0449	0.0328	0.0120
215	0.0448	0.0328	0.0120
216	0.0448	0.0328	0.0120
217	0.0026	0.0019	0.0007
218	0.0025	0.0018	0.0007
219	0.0024	0.0018	0.0006
220	0.0023	0.0017	0.0006
221	0.0022	0.0016	0.0006
222	0.0022	0.0016	0.0006
223	0.0021	0.0015	0.0006
224	0.0020	0.0015	0.0005
225	0.0020	0.0014	0.0005
226	0.0019	0.0014	0.0005
227	0.0019	0.0014	0.0005

228	0.0018	0.0013	0.0005
229	0.0018	0.0013	0.0005
230	0.0017	0.0013	0.0005
231	0.0017	0.0012	0.0005
232	0.0016	0.0012	0.0004
233	0.0016	0.0012	0.0004
234	0.0016	0.0011	0.0004
235	0.0015	0.0011	0.0004
236	0.0015	0.0011	0.0004
237	0.0015	0.0011	0.0004
238	0.0014	0.0010	0.0004
239	0.0014	0.0010	0.0004
240	0.0014	0.0010	0.0004
241	0.0013	0.0010	0.0004
242	0.0013	0.0010	0.0004
243	0.0013	0.0009	0.0003
244	0.0013	0.0009	0.0003
245	0.0013	0.0009	0.0003
246	0.0012	0.0009	0.0003
247	0.0012	0.0009	0.0003
248	0.0012	0.0009	0.0003
249	0.0012	0.0009	0.0003
250	0.0011	0.0008	0.0003
251	0.0011	0.0008	0.0003
252	0.0011	0.0008	0.0003
253	0.0011	0.0008	0.0003
254	0.0011	0.0008	0.0003
255	0.0011	0.0008	0.0003
256	0.0010	0.0008	0.0003
257	0.0010	0.0008	0.0003
258	0.0010	0.0007	0.0003
259	0.0010	0.0007	0.0003
260	0.0010	0.0007	0.0003
261	0.0010	0.0007	0.0003
262	0.0010	0.0007	0.0003
263	0.0009	0.0007	0.0003
264	0.0009	0.0007	0.0003
265	0.0009	0.0007	0.0002
266	0.0009	0.0007	0.0002
267	0.0009	0.0007	0.0002
268	0.0009	0.0006	0.0002
269	0.0009	0.0006	0.0002
270	0.0009	0.0006	0.0002
271	0.0009	0.0006	0.0002
272	0.0008	0.0006	0.0002
273	0.0008	0.0006	0.0002
274	0.0008	0.0006	0.0002
275	0.0008	0.0006	0.0002
276	0.0008	0.0006	0.0002
277	0.0008	0.0006	0.0002

```
278              0.0008           0.0006              0.0002
279              0.0008           0.0006              0.0002
280              0.0008           0.0006              0.0002
281              0.0008           0.0006              0.0002
282              0.0008           0.0006              0.0002
283              0.0007           0.0005              0.0002
284              0.0007           0.0005              0.0002
285              0.0007           0.0005              0.0002
286              0.0007           0.0005              0.0002
287              0.0007           0.0005              0.0002
288              0.0007           0.0005              0.0002
--------------------------------------------------------------------
--------------------------------------------------------------------
Total soil rain loss =      2.43(In)
Total effective rainfall =      1.09(In)
Peak flow rate in flood hydrograph =      5.38(CFS)
---------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                   24 - H O U R    S T O R M
              R u n o f f     H y d r o g r a p h
--------------------------------------------------------------------
            Hydrograph in   5   Minute intervals ((CFS))

--------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
  0+ 5       0.0000      0.00  Q         |         |         |         |
  0+10       0.0000      0.00  Q         |         |         |         |
  0+15       0.0001      0.01  Q         |         |         |         |
  0+20       0.0001      0.01  Q         |         |         |         |
  0+25       0.0002      0.01  Q         |         |         |         |
  0+30       0.0003      0.01  Q         |         |         |         |
  0+35       0.0004      0.01  Q         |         |         |         |
  0+40       0.0004      0.01  Q         |         |         |         |
  0+45       0.0005      0.01  Q         |         |         |         |
  0+50       0.0006      0.01  Q         |         |         |         |
  0+55       0.0007      0.01  Q         |         |         |         |
  1+ 0       0.0008      0.01  Q         |         |         |         |
  1+ 5       0.0009      0.01  Q         |         |         |         |
  1+10       0.0009      0.01  Q         |         |         |         |
  1+15       0.0010      0.01  Q         |         |         |         |
  1+20       0.0011      0.01  Q         |         |         |         |
  1+25       0.0012      0.01  Q         |         |         |         |
  1+30       0.0013      0.01  Q         |         |         |         |
  1+35       0.0014      0.01  Q         |         |         |         |
  1+40       0.0015      0.01  Q         |         |         |         |
  1+45       0.0015      0.01  Q         |         |         |         |
  1+50       0.0016      0.01  Q         |         |         |         |
  1+55       0.0017      0.01  Q         |         |         |         |
  2+ 0       0.0018      0.01  Q         |         |         |         |
```

2+ 5	0.0019	0.01	Q
2+10	0.0020	0.01	Q
2+15	0.0021	0.01	Q
2+20	0.0022	0.01	Q
2+25	0.0023	0.01	Q
2+30	0.0023	0.01	Q
2+35	0.0024	0.01	Q
2+40	0.0025	0.01	Q
2+45	0.0026	0.01	Q
2+50	0.0027	0.01	Q
2+55	0.0028	0.01	Q
3+ 0	0.0029	0.01	Q
3+ 5	0.0030	0.01	Q
3+10	0.0031	0.01	Q
3+15	0.0032	0.01	Q
3+20	0.0033	0.01	Q
3+25	0.0034	0.01	Q
3+30	0.0035	0.01	Q
3+35	0.0036	0.01	Q
3+40	0.0037	0.01	Q
3+45	0.0038	0.01	Q
3+50	0.0039	0.01	Q
3+55	0.0040	0.01	Q
4+ 0	0.0041	0.01	Q
4+ 5	0.0042	0.01	Q
4+10	0.0043	0.02	Q
4+15	0.0044	0.02	Q
4+20	0.0045	0.02	Q
4+25	0.0046	0.02	Q
4+30	0.0047	0.02	Q
4+35	0.0048	0.02	Q
4+40	0.0049	0.02	Q
4+45	0.0051	0.02	Q
4+50	0.0052	0.02	Q
4+55	0.0053	0.02	Q
5+ 0	0.0054	0.02	Q
5+ 5	0.0055	0.02	Q
5+10	0.0056	0.02	Q
5+15	0.0057	0.02	Q
5+20	0.0058	0.02	Q
5+25	0.0060	0.02	Q
5+30	0.0061	0.02	Q
5+35	0.0062	0.02	Q
5+40	0.0063	0.02	Q
5+45	0.0064	0.02	Q
5+50	0.0065	0.02	Q
5+55	0.0067	0.02	Q
6+ 0	0.0068	0.02	Q
6+ 5	0.0069	0.02	Q
6+10	0.0070	0.02	Q

6+15	0.0071	0.02	Q				
6+20	0.0073	0.02	Q				
6+25	0.0074	0.02	Q				
6+30	0.0075	0.02	Q				
6+35	0.0077	0.02	Q				
6+40	0.0078	0.02	Q				
6+45	0.0079	0.02	Q				
6+50	0.0080	0.02	Q				
6+55	0.0082	0.02	Q				
7+ 0	0.0083	0.02	Q				
7+ 5	0.0084	0.02	Q				
7+10	0.0086	0.02	Q				
7+15	0.0087	0.02	Q				
7+20	0.0089	0.02	Q				
7+25	0.0090	0.02	Q				
7+30	0.0091	0.02	Q				
7+35	0.0093	0.02	Q				
7+40	0.0094	0.02	Q				
7+45	0.0096	0.02	Q				
7+50	0.0097	0.02	Q				
7+55	0.0099	0.02	Q				
8+ 0	0.0100	0.02	Q				
8+ 5	0.0102	0.02	Q				
8+10	0.0103	0.02	Q				
8+15	0.0105	0.02	Q				
8+20	0.0106	0.02	Q				
8+25	0.0108	0.02	Q				
8+30	0.0109	0.02	Q				
8+35	0.0111	0.02	Q				
8+40	0.0112	0.02	Q				
8+45	0.0114	0.02	Q				
8+50	0.0116	0.02	QV				
8+55	0.0117	0.02	QV				
9+ 0	0.0119	0.02	QV				
9+ 5	0.0121	0.02	QV				
9+10	0.0123	0.02	QV				
9+15	0.0124	0.03	QV				
9+20	0.0126	0.03	QV				
9+25	0.0128	0.03	QV				
9+30	0.0130	0.03	QV				
9+35	0.0131	0.03	QV				
9+40	0.0133	0.03	QV				
9+45	0.0135	0.03	QV				
9+50	0.0137	0.03	QV				
9+55	0.0139	0.03	QV				
10+ 0	0.0141	0.03	QV				
10+ 5	0.0143	0.03	QV				
10+10	0.0145	0.03	QV				
10+15	0.0147	0.03	QV				
10+20	0.0149	0.03	QV				

```
10+25       0.0151      0.03  QV        |         |         |         |
10+30       0.0153      0.03  QV        |         |         |         |
10+35       0.0155      0.03  QV        |         |         |         |
10+40       0.0157      0.03  QV        |         |         |         |
10+45       0.0159      0.03  QV        |         |         |         |
10+50       0.0162      0.03  QV        |         |         |         |
10+55       0.0164      0.03  QV        |         |         |         |
11+ 0       0.0166      0.03  QV        |         |         |         |
11+ 5       0.0168      0.03  QV        |         |         |         |
11+10       0.0171      0.03  QV        |         |         |         |
11+15       0.0173      0.03  QV        |         |         |         |
11+20       0.0175      0.04  QV        |         |         |         |
11+25       0.0178      0.04  QV        |         |         |         |
11+30       0.0180      0.04  QV        |         |         |         |
11+35       0.0183      0.04  QV        |         |         |         |
11+40       0.0186      0.04  QV        |         |         |         |
11+45       0.0188      0.04  QV        |         |         |         |
11+50       0.0191      0.04  QV        |         |         |         |
11+55       0.0194      0.04  QV        |         |         |         |
12+ 0       0.0196      0.04  QV        |         |         |         |
12+ 5       0.0201      0.07  QV        |         |         |         |
12+10       0.0217      0.22  QV        |         |         |         |
12+15       0.0250      0.49  |QV       |         |         |         |
12+20       0.0291      0.59  | Q       |         |         |         |
12+25       0.0335      0.64  | Q       |         |         |         |
12+30       0.0382      0.68  | QV      |         |         |         |
12+35       0.0431      0.71  | QV      |         |         |         |
12+40       0.0480      0.72  | Q V     |         |         |         |
12+45       0.0530      0.73  | Q V     |         |         |         |
12+50       0.0581      0.73  | Q  V    |         |         |         |
12+55       0.0631      0.73  | Q  V    |         |         |         |
13+ 0       0.0682      0.74  | Q  V    |         |         |         |
13+ 5       0.0733      0.74  | Q   V   |         |         |         |
13+10       0.0784      0.74  | Q   V   |         |         |         |
13+15       0.0835      0.74  | Q    V  |         |         |         |
13+20       0.0886      0.74  | Q    V  |         |         |         |
13+25       0.0937      0.74  | Q     V |         |         |         |
13+30       0.0988      0.74  | Q     V |         |         |         |
13+35       0.1039      0.74  | Q      V|         |         |         |
13+40       0.1090      0.74  | Q      V|         |         |         |
13+45       0.1141      0.74  | Q      V|         |         |         |
13+50       0.1192      0.74  | Q       V         |         |         |
13+55       0.1243      0.74  | Q       V         |         |         |
14+ 0       0.1294      0.74  | Q       |V        |         |         |
14+ 5       0.1345      0.74  | Q       |V        |         |         |
14+10       0.1396      0.74  | Q       | V       |         |         |
14+15       0.1448      0.74  | Q       | V       |         |         |
14+20       0.1499      0.74  | Q       |  V      |         |         |
14+25       0.1550      0.74  | Q       |  V      |         |         |
14+30       0.1601      0.74  | Q       |  V      |         |         |
```

```
14+35       0.1652      0.74  | Q       |   V     |         |         |
14+40       0.1704      0.74  | Q       |   V     |         |         |
14+45       0.1755      0.74  | Q       |    V    |         |         |
14+50       0.1806      0.74  | Q       |    V    |         |         |
14+55       0.1857      0.74  | Q       |     V   |         |         |
15+ 0       0.1909      0.74  | Q       |     V   |         |         |
15+ 5       0.1960      0.75  | Q       |      V  |         |         |
15+10       0.2011      0.75  | Q       |      V  |         |         |
15+15       0.2063      0.75  | Q       |      V  |         |         |
15+20       0.2114      0.75  | Q       |       V |         |         |
15+25       0.2164      0.72  | Q       |       V |         |         |
15+30       0.2206      0.61  | Q       |        V|         |         |
15+35       0.2236      0.42  |Q        |        V|         |         |
15+40       0.2261      0.37  |Q        |        V|         |         |
15+45       0.2285      0.35  |Q        |        V|         |         |
15+50       0.2310      0.36  |Q        |         V         |         |
15+55       0.2337      0.40  |Q        |         V         |         |
16+ 0       0.2371      0.49  |Q        |         V         |         |
16+ 5       0.2453      1.20  |   Q     |         |V        |         |
16+10       0.2689      3.42  |         |  Q      |  V      |         |
16+15       0.3059      5.38  |         |         |Q    V   |         |
16+20       0.3219      2.33  |        Q|         |      V  |         |
16+25       0.3321      1.48  |    Q    |         |       V |         |
16+30       0.3400      1.15  |   Q     |         |        V|         |
16+35       0.3473      1.06  |   Q     |         |         V         |
16+40       0.3538      0.94  |  Q      |         |         V         |
16+45       0.3594      0.82  |  Q      |         |         |V        |
16+50       0.3648      0.78  |  Q      |         |         |V        |
16+55       0.3702      0.78  |  Q      |         |         | V       |
17+ 0       0.3756      0.78  |  Q      |         |         | V       |
17+ 5       0.3809      0.77  |  Q      |         |         |  V      |
17+10       0.3861      0.76  |  Q      |         |         |  V      |
17+15       0.3912      0.74  | Q       |         |         |  V      |
17+20       0.3963      0.74  | Q       |         |         |   V     |
17+25       0.4014      0.74  | Q       |         |         |   V     |
17+30       0.4065      0.74  | Q       |         |         |    V    |
17+35       0.4116      0.74  | Q       |         |         |    V    |
17+40       0.4167      0.74  | Q       |         |         |     V   |
17+45       0.4218      0.74  | Q       |         |         |     V   |
17+50       0.4269      0.74  | Q       |         |         |      V  |
17+55       0.4320      0.74  | Q       |         |         |      V  |
18+ 0       0.4371      0.74  | Q       |         |         |      V  |
18+ 5       0.4420      0.71  | Q       |         |         |       V |
18+10       0.4458      0.56  | Q       |         |         |       V |
18+15       0.4479      0.29  |Q        |         |         |       V |
18+20       0.4492      0.19  Q         |         |         |        V|
18+25       0.4501      0.13  Q         |         |         |        V|
18+30       0.4508      0.10  Q         |         |         |        V|
18+35       0.4513      0.07  Q         |         |         |        V|
18+40       0.4516      0.05  Q         |         |         |        V|
```

```
18+45        0.4520      0.05  Q           |          |          |        V|
18+50        0.4523      0.04  Q           |          |          |        V|
18+55        0.4525      0.04  Q           |          |          |        V|
19+ 0        0.4528      0.04  Q           |          |          |        V|
19+ 5        0.4530      0.03  Q           |          |          |        V|
19+10        0.4532      0.03  Q           |          |          |        V|
19+15        0.4534      0.03  Q           |          |          |        V|
19+20        0.4536      0.03  Q           |          |          |        V|
19+25        0.4538      0.03  Q           |          |          |        V|
19+30        0.4540      0.03  Q           |          |          |        V|
19+35        0.4542      0.03  Q           |          |          |        V|
19+40        0.4543      0.03  Q           |          |          |        V|
19+45        0.4545      0.03  Q           |          |          |        V|
19+50        0.4547      0.03  Q           |          |          |        V|
19+55        0.4549      0.02  Q           |          |          |        V|
20+ 0        0.4550      0.02  Q           |          |          |        V|
20+ 5        0.4552      0.02  Q           |          |          |        V|
20+10        0.4553      0.02  Q           |          |          |        V|
20+15        0.4555      0.02  Q           |          |          |        V|
20+20        0.4557      0.02  Q           |          |          |        V|
20+25        0.4558      0.02  Q           |          |          |        V|
20+30        0.4560      0.02  Q           |          |          |        V|
20+35        0.4561      0.02  Q           |          |          |        V|
20+40        0.4562      0.02  Q           |          |          |        V|
20+45        0.4564      0.02  Q           |          |          |        V|
20+50        0.4565      0.02  Q           |          |          |        V|
20+55        0.4566      0.02  Q           |          |          |        V|
21+ 0        0.4568      0.02  Q           |          |          |        V|
21+ 5        0.4569      0.02  Q           |          |          |        V|
21+10        0.4570      0.02  Q           |          |          |        V|
21+15        0.4572      0.02  Q           |          |          |        V|
21+20        0.4573      0.02  Q           |          |          |        V|
21+25        0.4574      0.02  Q           |          |          |        V|
21+30        0.4575      0.02  Q           |          |          |        V|
21+35        0.4576      0.02  Q           |          |          |        V|
21+40        0.4578      0.02  Q           |          |          |        V|
21+45        0.4579      0.02  Q           |          |          |        V|
21+50        0.4580      0.02  Q           |          |          |        V|
21+55        0.4581      0.02  Q           |          |          |        V|
22+ 0        0.4582      0.02  Q           |          |          |        V|
22+ 5        0.4583      0.02  Q           |          |          |        V|
22+10        0.4584      0.02  Q           |          |          |        V|
22+15        0.4585      0.02  Q           |          |          |        V|
22+20        0.4586      0.02  Q           |          |          |        V|
22+25        0.4587      0.01  Q           |          |          |        V|
22+30        0.4588      0.01  Q           |          |          |        V|
22+35        0.4589      0.01  Q           |          |          |        V|
22+40        0.4590      0.01  Q           |          |          |        V|
22+45        0.4591      0.01  Q           |          |          |        V|
22+50        0.4592      0.01  Q           |          |          |        V|
```

```
   22+55         0.4593       0.01   Q          |          |          |        V|
   23+ 0         0.4594       0.01   Q          |          |          |        V|
   23+ 5         0.4595       0.01   Q          |          |          |        V|
   23+10         0.4596       0.01   Q          |          |          |        V|
   23+15         0.4597       0.01   Q          |          |          |        V|
   23+20         0.4598       0.01   Q          |          |          |        V|
   23+25         0.4599       0.01   Q          |          |          |        V|
   23+30         0.4600       0.01   Q          |          |          |        V|
   23+35         0.4600       0.01   Q          |          |          |        V|
   23+40         0.4601       0.01   Q          |          |          |        V|
   23+45         0.4602       0.01   Q          |          |          |        V|
   23+50         0.4603       0.01   Q          |          |          |        V|
   23+55         0.4604       0.01   Q          |          |          |        V|
   24+ 0         0.4605       0.01   Q          |          |          |        V|
   24+ 5         0.4606       0.01   Q          |          |          |        V|
   24+10         0.4606       0.01   Q          |          |          |        V|
   24+15         0.4606       0.00   Q          |          |          |        V|
   24+20         0.4607       0.00   Q          |          |          |        V|
   24+25         0.4607       0.00   Q          |          |          |        V|
   24+30         0.4607       0.00   Q          |          |          |        V|
   24+35         0.4607       0.00   Q          |          |          |        V|
   24+40         0.4607       0.00   Q          |          |          |        V|
   24+45         0.4607       0.00   Q          |          |          |        V|
   24+50         0.4607       0.00   Q          |          |          |        V|
   24+55         0.4607       0.00   Q          |          |          |        V|
   25+ 0         0.4607       0.00   Q          |          |          |        V|
   25+ 5         0.4607       0.00   Q          |          |          |         V
-----------------------------------------------------------------------
```

U n i t   H y d r o g r a p h   A n a l y s i s

Study date 02/28/21

++

San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6481

Paradise Ranch
2 yr Hydrograph
DA40

Storm Event Year = 2

Antecedent Moisture Condition = 1

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
7.33	1	0.94
Rainfall data for year 2		
7.33	6	3.25
Rainfall data for year 2		
7.33	24	3.52
Rainfall data for year 100		

7.33 1 1.50

Rainfall data for year 100

7.33 6 1.34

Rainfall data for year 100

7.33 24 9.00

+++

******** Area-averaged max loss rate, Fm ********

SCS curve No.(AMCII)	SCS curve NO.(AMC 1)	Area (Ac.)	Area Fraction	Fp(Fig C6) (In/Hr)	Ap (dec.)	Fm (In/Hr)
84.0	68.6	7.33	1.000	0.554	1.000	0.554

Area-averaged adjusted loss rate Fm (In/Hr) = 0.554

********* Area-Averaged low loss rate fraction, Yb **********

Area (Ac.)	Area Fract	SCS CN (AMC2)	SCS CN (AMC1)	S	Pervious Yield Fr
7.33	1.000	84.0	68.6	4.58	0.268

Area-averaged catchment yield fraction, Y = 0.268
Area-averaged low loss fraction, Yb = 0.732
User entry of time of concentration = 0.176 (hours)
+++
Watershed area = 7.33(Ac.)
Catchment Lag time = 0.141 hours
Unit interval = 5.000 minutes
Unit interval percentage of lag time = 59.1856
Hydrograph baseflow = 0.00(CFS)
Average maximum watershed loss rate(Fm) = 0.554(In/Hr)
Average low loss rate fraction (Yb) = 0.732 (decimal)
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall = 0.260(In)
Computed peak 30-minute rainfall = 0.446(In)
Specified peak 1-hour rainfall = 0.549(In)
Computed peak 3-hour rainfall = 1.633(In)
Specified peak 6-hour rainfall = 3.250(In)
Specified peak 24-hour rainfall = 3.520(In)

Rainfall depth area reduction factors:
Using a total area of 7.33(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000 Adjusted rainfall = 0.260(In)
30-minute factor = 1.000 Adjusted rainfall = 0.445(In)

```
1-hour factor = 1.000       Adjusted rainfall =  0.548(In)
3-hour factor = 1.000       Adjusted rainfall =  1.633(In)
6-hour factor = 1.000       Adjusted rainfall =  3.250(In)
24-hour factor = 1.000      Adjusted rainfall =  3.520(In)
----------------------------------------------------------------------

                        U n i t  H y d r o g r a p h
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values             ((CFS))
----------------------------------------------------------------------
                (K =        88.65 (CFS))

  1                5.478                     4.856
  2               36.233                    27.263
  3               70.694                    30.549
  4               83.231                    11.114
  5               90.473                     6.420
  6               94.907                     3.930
  7               97.404                     2.214
  8               98.417                     0.898
  9               98.995                     0.512
 10               99.403                     0.362
 11               99.784                     0.337
 12              100.000                     0.192
----------------------------------------------------------------------
Peak Unit   Adjusted mass rainfall  Unit rainfall
Number              (In)                (In)
  1              0.2602               0.2602
  2              0.3204               0.0601
  3              0.3618               0.0414
  4              0.3944               0.0326
  5              0.4217               0.0273
  6              0.4454               0.0237
  7              0.4665               0.0211
  8              0.4856               0.0191
  9              0.5030               0.0175
 10              0.5192               0.0162
 11              0.5343               0.0151
 12              0.5484               0.0141
 13              0.5938               0.0454
 14              0.6391               0.0454
 15              0.6844               0.0453
 16              0.7298               0.0453
 17              0.7750               0.0453
 18              0.8203               0.0453
 19              0.8656               0.0453
 20              0.9108               0.0452
 21              0.9560               0.0452
 22              1.0012               0.0452
```

23	1.0464	0.0452
24	1.0916	0.0452
25	1.1368	0.0452
26	1.1819	0.0452
27	1.2271	0.0451
28	1.2722	0.0451
29	1.3173	0.0451
30	1.3625	0.0451
31	1.4076	0.0451
32	1.4526	0.0451
33	1.4977	0.0451
34	1.5428	0.0451
35	1.5879	0.0451
36	1.6329	0.0451
37	1.6780	0.0450
38	1.7230	0.0450
39	1.7680	0.0450
40	1.8130	0.0450
41	1.8580	0.0450
42	1.9030	0.0450
43	1.9480	0.0450
44	1.9930	0.0450
45	2.0379	0.0450
46	2.0829	0.0450
47	2.1279	0.0450
48	2.1728	0.0450
49	2.2178	0.0449
50	2.2627	0.0449
51	2.3076	0.0449
52	2.3526	0.0449
53	2.3975	0.0449
54	2.4424	0.0449
55	2.4873	0.0449
56	2.5322	0.0449
57	2.5771	0.0449
58	2.6220	0.0449
59	2.6669	0.0449
60	2.7118	0.0449
61	2.7566	0.0449
62	2.8015	0.0449
63	2.8464	0.0449
64	2.8912	0.0449
65	2.9361	0.0449
66	2.9809	0.0448
67	3.0258	0.0448
68	3.0706	0.0448
69	3.1154	0.0448
70	3.1603	0.0448
71	3.2051	0.0448
72	3.2499	0.0448

73	3.2525	0.0026
74	3.2551	0.0025
75	3.2576	0.0025
76	3.2601	0.0025
77	3.2625	0.0025
78	3.2649	0.0024
79	3.2673	0.0024
80	3.2697	0.0024
81	3.2720	0.0023
82	3.2744	0.0023
83	3.2766	0.0023
84	3.2789	0.0023
85	3.2811	0.0022
86	3.2833	0.0022
87	3.2855	0.0022
88	3.2877	0.0022
89	3.2898	0.0021
90	3.2920	0.0021
91	3.2940	0.0021
92	3.2961	0.0021
93	3.2982	0.0021
94	3.3002	0.0020
95	3.3022	0.0020
96	3.3042	0.0020
97	3.3062	0.0020
98	3.3081	0.0020
99	3.3101	0.0019
100	3.3120	0.0019
101	3.3139	0.0019
102	3.3158	0.0019
103	3.3176	0.0019
104	3.3195	0.0018
105	3.3213	0.0018
106	3.3231	0.0018
107	3.3249	0.0018
108	3.3267	0.0018
109	3.3285	0.0018
110	3.3302	0.0018
111	3.3319	0.0017
112	3.3337	0.0017
113	3.3354	0.0017
114	3.3371	0.0017
115	3.3387	0.0017
116	3.3404	0.0017
117	3.3421	0.0017
118	3.3437	0.0016
119	3.3453	0.0016
120	3.3469	0.0016
121	3.3485	0.0016
122	3.3501	0.0016

123	3.3517	0.0016
124	3.3533	0.0016
125	3.3548	0.0016
126	3.3563	0.0015
127	3.3579	0.0015
128	3.3594	0.0015
129	3.3609	0.0015
130	3.3624	0.0015
131	3.3639	0.0015
132	3.3654	0.0015
133	3.3668	0.0015
134	3.3683	0.0015
135	3.3697	0.0014
136	3.3711	0.0014
137	3.3726	0.0014
138	3.3740	0.0014
139	3.3754	0.0014
140	3.3768	0.0014
141	3.3782	0.0014
142	3.3795	0.0014
143	3.3809	0.0014
144	3.3823	0.0014
145	3.3836	0.0013
146	3.3849	0.0013
147	3.3863	0.0013
148	3.3876	0.0013
149	3.3889	0.0013
150	3.3902	0.0013
151	3.3915	0.0013
152	3.3928	0.0013
153	3.3941	0.0013
154	3.3954	0.0013
155	3.3966	0.0013
156	3.3979	0.0013
157	3.3991	0.0013
158	3.4004	0.0012
159	3.4016	0.0012
160	3.4028	0.0012
161	3.4041	0.0012
162	3.4053	0.0012
163	3.4065	0.0012
164	3.4077	0.0012
165	3.4089	0.0012
166	3.4101	0.0012
167	3.4112	0.0012
168	3.4124	0.0012
169	3.4136	0.0012
170	3.4147	0.0012
171	3.4159	0.0012
172	3.4170	0.0011

173	3.4182	0.0011
174	3.4193	0.0011
175	3.4204	0.0011
176	3.4216	0.0011
177	3.4227	0.0011
178	3.4238	0.0011
179	3.4249	0.0011
180	3.4260	0.0011
181	3.4271	0.0011
182	3.4282	0.0011
183	3.4293	0.0011
184	3.4303	0.0011
185	3.4314	0.0011
186	3.4325	0.0011
187	3.4335	0.0011
188	3.4346	0.0011
189	3.4356	0.0010
190	3.4367	0.0010
191	3.4377	0.0010
192	3.4387	0.0010
193	3.4398	0.0010
194	3.4408	0.0010
195	3.4418	0.0010
196	3.4428	0.0010
197	3.4438	0.0010
198	3.4448	0.0010
199	3.4458	0.0010
200	3.4468	0.0010
201	3.4478	0.0010
202	3.4488	0.0010
203	3.4498	0.0010
204	3.4508	0.0010
205	3.4517	0.0010
206	3.4527	0.0010
207	3.4537	0.0010
208	3.4546	0.0010
209	3.4556	0.0010
210	3.4565	0.0009
211	3.4575	0.0009
212	3.4584	0.0009
213	3.4594	0.0009
214	3.4603	0.0009
215	3.4612	0.0009
216	3.4621	0.0009
217	3.4631	0.0009
218	3.4640	0.0009
219	3.4649	0.0009
220	3.4658	0.0009
221	3.4667	0.0009
222	3.4676	0.0009

223	3.4685	0.0009
224	3.4694	0.0009
225	3.4703	0.0009
226	3.4712	0.0009
227	3.4721	0.0009
228	3.4729	0.0009
229	3.4738	0.0009
230	3.4747	0.0009
231	3.4756	0.0009
232	3.4764	0.0009
233	3.4773	0.0009
234	3.4781	0.0009
235	3.4790	0.0009
236	3.4798	0.0009
237	3.4807	0.0008
238	3.4815	0.0008
239	3.4824	0.0008
240	3.4832	0.0008
241	3.4840	0.0008
242	3.4849	0.0008
243	3.4857	0.0008
244	3.4865	0.0008
245	3.4873	0.0008
246	3.4882	0.0008
247	3.4890	0.0008
248	3.4898	0.0008
249	3.4906	0.0008
250	3.4914	0.0008
251	3.4922	0.0008
252	3.4930	0.0008
253	3.4938	0.0008
254	3.4946	0.0008
255	3.4954	0.0008
256	3.4962	0.0008
257	3.4970	0.0008
258	3.4977	0.0008
259	3.4985	0.0008
260	3.4993	0.0008
261	3.5001	0.0008
262	3.5008	0.0008
263	3.5016	0.0008
264	3.5024	0.0008
265	3.5031	0.0008
266	3.5039	0.0008
267	3.5047	0.0008
268	3.5054	0.0008
269	3.5062	0.0008
270	3.5069	0.0007
271	3.5077	0.0007
272	3.5084	0.0007

273	3.5091	0.0007
274	3.5099	0.0007
275	3.5106	0.0007
276	3.5114	0.0007
277	3.5121	0.0007
278	3.5128	0.0007
279	3.5135	0.0007
280	3.5143	0.0007
281	3.5150	0.0007
282	3.5157	0.0007
283	3.5164	0.0007
284	3.5171	0.0007
285	3.5178	0.0007
286	3.5186	0.0007
287	3.5193	0.0007
288	3.5200	0.0007

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0007	0.0005	0.0002
2	0.0007	0.0005	0.0002
3	0.0007	0.0005	0.0002
4	0.0007	0.0005	0.0002
5	0.0007	0.0005	0.0002
6	0.0007	0.0005	0.0002
7	0.0007	0.0005	0.0002
8	0.0007	0.0005	0.0002
9	0.0007	0.0005	0.0002
10	0.0007	0.0005	0.0002
11	0.0007	0.0005	0.0002
12	0.0007	0.0005	0.0002
13	0.0007	0.0005	0.0002
14	0.0008	0.0006	0.0002
15	0.0008	0.0006	0.0002
16	0.0008	0.0006	0.0002
17	0.0008	0.0006	0.0002
18	0.0008	0.0006	0.0002
19	0.0008	0.0006	0.0002
20	0.0008	0.0006	0.0002
21	0.0008	0.0006	0.0002
22	0.0008	0.0006	0.0002
23	0.0008	0.0006	0.0002
24	0.0008	0.0006	0.0002
25	0.0008	0.0006	0.0002
26	0.0008	0.0006	0.0002
27	0.0008	0.0006	0.0002
28	0.0008	0.0006	0.0002
29	0.0008	0.0006	0.0002

30	0.0008	0.0006	0.0002
31	0.0008	0.0006	0.0002
32	0.0008	0.0006	0.0002
33	0.0008	0.0006	0.0002
34	0.0008	0.0006	0.0002
35	0.0008	0.0006	0.0002
36	0.0009	0.0006	0.0002
37	0.0009	0.0006	0.0002
38	0.0009	0.0006	0.0002
39	0.0009	0.0006	0.0002
40	0.0009	0.0006	0.0002
41	0.0009	0.0006	0.0002
42	0.0009	0.0006	0.0002
43	0.0009	0.0007	0.0002
44	0.0009	0.0007	0.0002
45	0.0009	0.0007	0.0002
46	0.0009	0.0007	0.0002
47	0.0009	0.0007	0.0002
48	0.0009	0.0007	0.0002
49	0.0009	0.0007	0.0002
50	0.0009	0.0007	0.0002
51	0.0009	0.0007	0.0003
52	0.0009	0.0007	0.0003
53	0.0009	0.0007	0.0003
54	0.0010	0.0007	0.0003
55	0.0010	0.0007	0.0003
56	0.0010	0.0007	0.0003
57	0.0010	0.0007	0.0003
58	0.0010	0.0007	0.0003
59	0.0010	0.0007	0.0003
60	0.0010	0.0007	0.0003
61	0.0010	0.0007	0.0003
62	0.0010	0.0007	0.0003
63	0.0010	0.0007	0.0003
64	0.0010	0.0007	0.0003
65	0.0010	0.0008	0.0003
66	0.0010	0.0008	0.0003
67	0.0010	0.0008	0.0003
68	0.0011	0.0008	0.0003
69	0.0011	0.0008	0.0003
70	0.0011	0.0008	0.0003
71	0.0011	0.0008	0.0003
72	0.0011	0.0008	0.0003
73	0.0011	0.0008	0.0003
74	0.0011	0.0008	0.0003
75	0.0011	0.0008	0.0003
76	0.0011	0.0008	0.0003
77	0.0011	0.0008	0.0003
78	0.0011	0.0008	0.0003
79	0.0012	0.0008	0.0003

80	0.0012	0.0008	0.0003
81	0.0012	0.0009	0.0003
82	0.0012	0.0009	0.0003
83	0.0012	0.0009	0.0003
84	0.0012	0.0009	0.0003
85	0.0012	0.0009	0.0003
86	0.0012	0.0009	0.0003
87	0.0012	0.0009	0.0003
88	0.0012	0.0009	0.0003
89	0.0013	0.0009	0.0003
90	0.0013	0.0009	0.0003
91	0.0013	0.0009	0.0003
92	0.0013	0.0009	0.0003
93	0.0013	0.0010	0.0004
94	0.0013	0.0010	0.0004
95	0.0013	0.0010	0.0004
96	0.0013	0.0010	0.0004
97	0.0014	0.0010	0.0004
98	0.0014	0.0010	0.0004
99	0.0014	0.0010	0.0004
100	0.0014	0.0010	0.0004
101	0.0014	0.0010	0.0004
102	0.0014	0.0010	0.0004
103	0.0014	0.0011	0.0004
104	0.0015	0.0011	0.0004
105	0.0015	0.0011	0.0004
106	0.0015	0.0011	0.0004
107	0.0015	0.0011	0.0004
108	0.0015	0.0011	0.0004
109	0.0015	0.0011	0.0004
110	0.0016	0.0011	0.0004
111	0.0016	0.0012	0.0004
112	0.0016	0.0012	0.0004
113	0.0016	0.0012	0.0004
114	0.0016	0.0012	0.0004
115	0.0017	0.0012	0.0004
116	0.0017	0.0012	0.0004
117	0.0017	0.0012	0.0005
118	0.0017	0.0012	0.0005
119	0.0017	0.0013	0.0005
120	0.0018	0.0013	0.0005
121	0.0018	0.0013	0.0005
122	0.0018	0.0013	0.0005
123	0.0018	0.0013	0.0005
124	0.0018	0.0014	0.0005
125	0.0019	0.0014	0.0005
126	0.0019	0.0014	0.0005
127	0.0019	0.0014	0.0005
128	0.0020	0.0014	0.0005
129	0.0020	0.0015	0.0005

130	0.0020	0.0015	0.0005
131	0.0021	0.0015	0.0006
132	0.0021	0.0015	0.0006
133	0.0021	0.0015	0.0006
134	0.0021	0.0016	0.0006
135	0.0022	0.0016	0.0006
136	0.0022	0.0016	0.0006
137	0.0023	0.0017	0.0006
138	0.0023	0.0017	0.0006
139	0.0023	0.0017	0.0006
140	0.0024	0.0017	0.0006
141	0.0024	0.0018	0.0007
142	0.0025	0.0018	0.0007
143	0.0025	0.0018	0.0007
144	0.0025	0.0019	0.0007
145	0.0448	0.0328	0.0120
146	0.0448	0.0328	0.0120
147	0.0448	0.0328	0.0120
148	0.0448	0.0328	0.0120
149	0.0448	0.0328	0.0120
150	0.0449	0.0328	0.0120
151	0.0449	0.0328	0.0120
152	0.0449	0.0328	0.0120
153	0.0449	0.0328	0.0120
154	0.0449	0.0328	0.0120
155	0.0449	0.0328	0.0120
156	0.0449	0.0329	0.0120
157	0.0449	0.0329	0.0121
158	0.0449	0.0329	0.0121
159	0.0449	0.0329	0.0121
160	0.0449	0.0329	0.0121
161	0.0450	0.0329	0.0121
162	0.0450	0.0329	0.0121
163	0.0450	0.0329	0.0121
164	0.0450	0.0329	0.0121
165	0.0450	0.0329	0.0121
166	0.0450	0.0329	0.0121
167	0.0450	0.0329	0.0121
168	0.0450	0.0329	0.0121
169	0.0451	0.0330	0.0121
170	0.0451	0.0330	0.0121
171	0.0451	0.0330	0.0121
172	0.0451	0.0330	0.0121
173	0.0451	0.0330	0.0121
174	0.0451	0.0330	0.0121
175	0.0451	0.0330	0.0121
176	0.0452	0.0330	0.0121
177	0.0452	0.0331	0.0121
178	0.0452	0.0331	0.0121
179	0.0452	0.0331	0.0121

180	0.0452	0.0331	0.0121
181	0.0453	0.0331	0.0121
182	0.0453	0.0331	0.0122
183	0.0453	0.0332	0.0122
184	0.0454	0.0332	0.0122
185	0.0141	0.0103	0.0038
186	0.0151	0.0110	0.0040
187	0.0175	0.0128	0.0047
188	0.0191	0.0140	0.0051
189	0.0237	0.0173	0.0064
190	0.0273	0.0200	0.0073
191	0.0414	0.0303	0.0111
192	0.0601	0.0440	0.0161
193	0.2602	0.0462	0.2140
194	0.0326	0.0239	0.0088
195	0.0211	0.0154	0.0057
196	0.0162	0.0118	0.0043
197	0.0454	0.0332	0.0122
198	0.0453	0.0332	0.0122
199	0.0453	0.0331	0.0121
200	0.0452	0.0331	0.0121
201	0.0452	0.0330	0.0121
202	0.0451	0.0330	0.0121
203	0.0451	0.0330	0.0121
204	0.0451	0.0330	0.0121
205	0.0450	0.0330	0.0121
206	0.0450	0.0329	0.0121
207	0.0450	0.0329	0.0121
208	0.0450	0.0329	0.0121
209	0.0449	0.0329	0.0121
210	0.0449	0.0329	0.0121
211	0.0449	0.0329	0.0121
212	0.0449	0.0328	0.0120
213	0.0449	0.0328	0.0120
214	0.0449	0.0328	0.0120
215	0.0448	0.0328	0.0120
216	0.0448	0.0328	0.0120
217	0.0026	0.0019	0.0007
218	0.0025	0.0018	0.0007
219	0.0024	0.0018	0.0006
220	0.0023	0.0017	0.0006
221	0.0022	0.0016	0.0006
222	0.0022	0.0016	0.0006
223	0.0021	0.0015	0.0006
224	0.0020	0.0015	0.0005
225	0.0020	0.0014	0.0005
226	0.0019	0.0014	0.0005
227	0.0019	0.0014	0.0005
228	0.0018	0.0013	0.0005
229	0.0018	0.0013	0.0005

230	0.0017	0.0013	0.0005
231	0.0017	0.0012	0.0005
232	0.0016	0.0012	0.0004
233	0.0016	0.0012	0.0004
234	0.0016	0.0011	0.0004
235	0.0015	0.0011	0.0004
236	0.0015	0.0011	0.0004
237	0.0015	0.0011	0.0004
238	0.0014	0.0010	0.0004
239	0.0014	0.0010	0.0004
240	0.0014	0.0010	0.0004
241	0.0013	0.0010	0.0004
242	0.0013	0.0010	0.0004
243	0.0013	0.0009	0.0003
244	0.0013	0.0009	0.0003
245	0.0013	0.0009	0.0003
246	0.0012	0.0009	0.0003
247	0.0012	0.0009	0.0003
248	0.0012	0.0009	0.0003
249	0.0012	0.0009	0.0003
250	0.0011	0.0008	0.0003
251	0.0011	0.0008	0.0003
252	0.0011	0.0008	0.0003
253	0.0011	0.0008	0.0003
254	0.0011	0.0008	0.0003
255	0.0011	0.0008	0.0003
256	0.0010	0.0008	0.0003
257	0.0010	0.0008	0.0003
258	0.0010	0.0007	0.0003
259	0.0010	0.0007	0.0003
260	0.0010	0.0007	0.0003
261	0.0010	0.0007	0.0003
262	0.0010	0.0007	0.0003
263	0.0009	0.0007	0.0003
264	0.0009	0.0007	0.0003
265	0.0009	0.0007	0.0002
266	0.0009	0.0007	0.0002
267	0.0009	0.0007	0.0002
268	0.0009	0.0006	0.0002
269	0.0009	0.0006	0.0002
270	0.0009	0.0006	0.0002
271	0.0009	0.0006	0.0002
272	0.0008	0.0006	0.0002
273	0.0008	0.0006	0.0002
274	0.0008	0.0006	0.0002
275	0.0008	0.0006	0.0002
276	0.0008	0.0006	0.0002
277	0.0008	0.0006	0.0002
278	0.0008	0.0006	0.0002
279	0.0008	0.0006	0.0002

```
280              0.0008          0.0006            0.0002
281              0.0008          0.0006            0.0002
282              0.0008          0.0006            0.0002
283              0.0007          0.0005            0.0002
284              0.0007          0.0005            0.0002
285              0.0007          0.0005            0.0002
286              0.0007          0.0005            0.0002
287              0.0007          0.0005            0.0002
288              0.0007          0.0005            0.0002
--------------------------------------------------------------------
--------------------------------------------------------------------
Total soil rain loss =      2.43(In)
Total effective rainfall =      1.09(In)
Peak flow rate in flood hydrograph =      7.11(CFS)
---------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    24 - H O U R   S T O R M
               R u n o f f     H y d r o g r a p h
--------------------------------------------------------------------
            Hydrograph in   5   Minute intervals ((CFS))

--------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
  0+ 5      0.0000      0.00  Q         |         |         |         |
  0+10      0.0000      0.01  Q         |         |         |         |
  0+15      0.0001      0.01  Q         |         |         |         |
  0+20      0.0002      0.01  Q         |         |         |         |
  0+25      0.0003      0.02  Q         |         |         |         |
  0+30      0.0004      0.02  Q         |         |         |         |
  0+35      0.0006      0.02  Q         |         |         |         |
  0+40      0.0007      0.02  Q         |         |         |         |
  0+45      0.0008      0.02  Q         |         |         |         |
  0+50      0.0009      0.02  Q         |         |         |         |
  0+55      0.0010      0.02  Q         |         |         |         |
  1+ 0      0.0012      0.02  Q         |         |         |         |
  1+ 5      0.0013      0.02  Q         |         |         |         |
  1+10      0.0014      0.02  Q         |         |         |         |
  1+15      0.0015      0.02  Q         |         |         |         |
  1+20      0.0016      0.02  Q         |         |         |         |
  1+25      0.0018      0.02  Q         |         |         |         |
  1+30      0.0019      0.02  Q         |         |         |         |
  1+35      0.0020      0.02  Q         |         |         |         |
  1+40      0.0021      0.02  Q         |         |         |         |
  1+45      0.0023      0.02  Q         |         |         |         |
  1+50      0.0024      0.02  Q         |         |         |         |
  1+55      0.0025      0.02  Q         |         |         |         |
  2+ 0      0.0026      0.02  Q         |         |         |         |
  2+ 5      0.0028      0.02  Q         |         |         |         |
  2+10      0.0029      0.02  Q         |         |         |         |
```

2+15	0.0030	0.02	Q
2+20	0.0032	0.02	Q
2+25	0.0033	0.02	Q
2+30	0.0034	0.02	Q
2+35	0.0036	0.02	Q
2+40	0.0037	0.02	Q
2+45	0.0038	0.02	Q
2+50	0.0040	0.02	Q
2+55	0.0041	0.02	Q
3+ 0	0.0042	0.02	Q
3+ 5	0.0044	0.02	Q
3+10	0.0045	0.02	Q
3+15	0.0047	0.02	Q
3+20	0.0048	0.02	Q
3+25	0.0049	0.02	Q
3+30	0.0051	0.02	Q
3+35	0.0052	0.02	Q
3+40	0.0054	0.02	Q
3+45	0.0055	0.02	Q
3+50	0.0057	0.02	Q
3+55	0.0058	0.02	Q
4+ 0	0.0060	0.02	Q
4+ 5	0.0061	0.02	Q
4+10	0.0063	0.02	Q
4+15	0.0064	0.02	Q
4+20	0.0066	0.02	Q
4+25	0.0067	0.02	Q
4+30	0.0069	0.02	Q
4+35	0.0070	0.02	Q
4+40	0.0072	0.02	Q
4+45	0.0073	0.02	Q
4+50	0.0075	0.02	Q
4+55	0.0077	0.02	Q
5+ 0	0.0078	0.02	Q
5+ 5	0.0080	0.02	Q
5+10	0.0081	0.02	Q
5+15	0.0083	0.02	Q
5+20	0.0085	0.02	Q
5+25	0.0086	0.02	Q
5+30	0.0088	0.02	Q
5+35	0.0090	0.02	Q
5+40	0.0092	0.02	Q
5+45	0.0093	0.02	Q
5+50	0.0095	0.03	Q
5+55	0.0097	0.03	Q
6+ 0	0.0098	0.03	Q
6+ 5	0.0100	0.03	Q
6+10	0.0102	0.03	Q
6+15	0.0104	0.03	Q
6+20	0.0106	0.03	Q

6+25	0.0107	0.03	Q
6+30	0.0109	0.03	Q
6+35	0.0111	0.03	Q
6+40	0.0113	0.03	Q
6+45	0.0115	0.03	Q
6+50	0.0117	0.03	Q
6+55	0.0119	0.03	Q
7+ 0	0.0121	0.03	Q
7+ 5	0.0123	0.03	Q
7+10	0.0125	0.03	Q
7+15	0.0127	0.03	Q
7+20	0.0129	0.03	Q
7+25	0.0131	0.03	Q
7+30	0.0133	0.03	Q
7+35	0.0135	0.03	Q
7+40	0.0137	0.03	Q
7+45	0.0139	0.03	Q
7+50	0.0141	0.03	Q
7+55	0.0143	0.03	Q
8+ 0	0.0145	0.03	Q
8+ 5	0.0147	0.03	Q
8+10	0.0150	0.03	Q
8+15	0.0152	0.03	Q
8+20	0.0154	0.03	Q
8+25	0.0156	0.03	Q
8+30	0.0159	0.03	Q
8+35	0.0161	0.03	Q
8+40	0.0163	0.03	Q
8+45	0.0166	0.03	Q
8+50	0.0168	0.03	QV
8+55	0.0170	0.03	QV
9+ 0	0.0173	0.04	QV
9+ 5	0.0175	0.04	QV
9+10	0.0178	0.04	QV
9+15	0.0180	0.04	QV
9+20	0.0183	0.04	QV
9+25	0.0185	0.04	QV
9+30	0.0188	0.04	QV
9+35	0.0191	0.04	QV
9+40	0.0193	0.04	QV
9+45	0.0196	0.04	QV
9+50	0.0199	0.04	QV
9+55	0.0201	0.04	QV
10+ 0	0.0204	0.04	QV
10+ 5	0.0207	0.04	QV
10+10	0.0210	0.04	QV
10+15	0.0213	0.04	QV
10+20	0.0216	0.04	QV
10+25	0.0219	0.04	QV
10+30	0.0222	0.04	QV

```
10+35       0.0225      0.04  QV        |         |         |         |
10+40       0.0228      0.05  QV        |         |         |         |
10+45       0.0231      0.05  QV        |         |         |         |
10+50       0.0234      0.05  QV        |         |         |         |
10+55       0.0237      0.05  QV        |         |         |         |
11+ 0       0.0241      0.05  QV        |         |         |         |
11+ 5       0.0244      0.05  QV        |         |         |         |
11+10       0.0247      0.05  QV        |         |         |         |
11+15       0.0251      0.05  QV        |         |         |         |
11+20       0.0254      0.05  QV        |         |         |         |
11+25       0.0258      0.05  QV        |         |         |         |
11+30       0.0262      0.05  QV        |         |         |         |
11+35       0.0265      0.05  QV        |         |         |         |
11+40       0.0269      0.05  QV        |         |         |         |
11+45       0.0273      0.06  QV        |         |         |         |
11+50       0.0277      0.06  QV        |         |         |         |
11+55       0.0281      0.06  QV        |         |         |         |
12+ 0       0.0285      0.06  QV        |         |         |         |
12+ 5       0.0293      0.11  QV        |         |         |         |
12+10       0.0322      0.42  |Q        |         |         |         |
12+15       0.0375      0.77  | VQ      |         |         |         |
12+20       0.0437      0.90  | VQ      |         |         |         |
12+25       0.0504      0.97  |  Q      |         |         |         |
12+30       0.0574      1.02  |  VQ     |         |         |         |
12+35       0.0645      1.04  |  VQ     |         |         |         |
12+40       0.0718      1.05  |   Q     |         |         |         |
12+45       0.0790      1.06  |   Q     |         |         |         |
12+50       0.0863      1.06  |   QV    |         |         |         |
12+55       0.0937      1.07  |   QV    |         |         |         |
13+ 0       0.1010      1.07  |   Q V   |         |         |         |
13+ 5       0.1084      1.07  |   Q V   |         |         |         |
13+10       0.1157      1.07  |   Q V   |         |         |         |
13+15       0.1231      1.07  |   Q  V  |         |         |         |
13+20       0.1305      1.07  |   Q  V  |         |         |         |
13+25       0.1378      1.07  |   Q   V |         |         |         |
13+30       0.1452      1.07  |   Q   V |         |         |         |
13+35       0.1525      1.07  |   Q    V|         |         |         |
13+40       0.1599      1.07  |   Q    V|         |         |         |
13+45       0.1673      1.07  |   Q     V         |         |         |
13+50       0.1747      1.07  |   Q     V         |         |         |
13+55       0.1820      1.07  |   Q     V         |         |         |
14+ 0       0.1894      1.07  |   Q     |V        |         |         |
14+ 5       0.1968      1.07  |   Q     |V        |         |         |
14+10       0.2041      1.07  |   Q     | V       |         |         |
14+15       0.2115      1.07  |   Q     | V       |         |         |
14+20       0.2189      1.07  |   Q     |  V      |         |         |
14+25       0.2263      1.07  |   Q     |  V      |         |         |
14+30       0.2337      1.07  |   Q     |   V     |         |         |
14+35       0.2411      1.07  |   Q     |   V     |         |         |
14+40       0.2485      1.07  |   Q     |   V     |         |         |
```

```
14+45       0.2559      1.07  |   Q     |    V    |         |         |
14+50       0.2633      1.07  |   Q     |    V    |         |         |
14+55       0.2707      1.07  |   Q     |     V   |         |         |
15+ 0       0.2781      1.08  |   Q     |     V   |         |         |
15+ 5       0.2855      1.08  |   Q     |      V  |         |         |
15+10       0.2929      1.08  |   Q     |      V  |         |         |
15+15       0.3003      1.08  |   Q     |       V |         |         |
15+20       0.3077      1.08  |   Q     |       V |         |         |
15+25       0.3149      1.04  |   Q     |       V |         |         |
15+30       0.3204      0.81  |  Q      |        V|         |         |
15+35       0.3243      0.56  | Q       |        V|         |         |
15+40       0.3278      0.50  |Q        |        V|         |         |
15+45       0.3311      0.49  |Q        |        V|         |         |
15+50       0.3346      0.51  | Q       |         V         |         |
15+55       0.3387      0.59  | Q       |         V         |         |
16+ 0       0.3439      0.76  |  Q      |         V         |         |
16+ 5       0.3576      1.99  |      Q  |         |V        |         |
16+10       0.4030      6.59  |         |         |   V Q   |         |
16+15       0.4520      7.11  |         |         |      VQ |         |
16+20       0.4726      3.00  |         |Q        |       V |         |
16+25       0.4859      1.92  |      Q  |         |        V|         |
16+30       0.4964      1.54  |     Q   |         |        V|         |
16+35       0.5060      1.38  |    Q    |         |         V         |
16+40       0.5140      1.17  |   Q     |         |         V         |
16+45       0.5218      1.13  |   Q     |         |         |V        |
16+50       0.5296      1.12  |   Q     |         |         |V        |
16+55       0.5374      1.13  |   Q     |         |         | V       |
17+ 0       0.5450      1.11  |   Q     |         |         | V       |
17+ 5       0.5523      1.07  |   Q     |         |         |  V      |
17+10       0.5597      1.07  |   Q     |         |         |  V      |
17+15       0.5671      1.07  |   Q     |         |         |   V     |
17+20       0.5745      1.07  |   Q     |         |         |   V     |
17+25       0.5818      1.07  |   Q     |         |         |    V    |
17+30       0.5892      1.07  |   Q     |         |         |    V    |
17+35       0.5966      1.07  |   Q     |         |         |    V    |
17+40       0.6039      1.07  |   Q     |         |         |     V   |
17+45       0.6113      1.07  |   Q     |         |         |     V   |
17+50       0.6186      1.07  |   Q     |         |         |      V  |
17+55       0.6260      1.07  |   Q     |         |         |      V  |
18+ 0       0.6333      1.07  |   Q     |         |         |       V |
18+ 5       0.6403      1.01  |   Q     |         |         |       V |
18+10       0.6451      0.70  | Q       |         |         |       V |
18+15       0.6476      0.36  |Q        |         |         |       V |
18+20       0.6492      0.23  Q         |         |         |        V|
18+25       0.6502      0.15  Q         |         |         |        V|
18+30       0.6509      0.11  Q         |         |         |        V|
18+35       0.6515      0.08  Q         |         |         |        V|
18+40       0.6520      0.07  Q         |         |         |        V|
18+45       0.6524      0.06  Q         |         |         |        V|
18+50       0.6528      0.05  Q         |         |         |        V|
```

```
18+55        0.6531       0.05  Q          |          |          |         V|
19+ 0        0.6534       0.05  Q          |          |          |         V|
19+ 5        0.6537       0.04  Q          |          |          |         V|
19+10        0.6540       0.04  Q          |          |          |         V|
19+15        0.6543       0.04  Q          |          |          |         V|
19+20        0.6546       0.04  Q          |          |          |         V|
19+25        0.6549       0.04  Q          |          |          |         V|
19+30        0.6551       0.04  Q          |          |          |         V|
19+35        0.6554       0.04  Q          |          |          |         V|
19+40        0.6557       0.04  Q          |          |          |         V|
19+45        0.6559       0.04  Q          |          |          |         V|
19+50        0.6562       0.04  Q          |          |          |         V|
19+55        0.6564       0.04  Q          |          |          |         V|
20+ 0        0.6566       0.03  Q          |          |          |         V|
20+ 5        0.6569       0.03  Q          |          |          |         V|
20+10        0.6571       0.03  Q          |          |          |         V|
20+15        0.6573       0.03  Q          |          |          |         V|
20+20        0.6575       0.03  Q          |          |          |         V|
20+25        0.6578       0.03  Q          |          |          |         V|
20+30        0.6580       0.03  Q          |          |          |         V|
20+35        0.6582       0.03  Q          |          |          |         V|
20+40        0.6584       0.03  Q          |          |          |         V|
20+45        0.6586       0.03  Q          |          |          |         V|
20+50        0.6588       0.03  Q          |          |          |         V|
20+55        0.6590       0.03  Q          |          |          |         V|
21+ 0        0.6591       0.03  Q          |          |          |         V|
21+ 5        0.6593       0.03  Q          |          |          |         V|
21+10        0.6595       0.03  Q          |          |          |         V|
21+15        0.6597       0.03  Q          |          |          |         V|
21+20        0.6599       0.03  Q          |          |          |         V|
21+25        0.6600       0.03  Q          |          |          |         V|
21+30        0.6602       0.02  Q          |          |          |         V|
21+35        0.6604       0.02  Q          |          |          |         V|
21+40        0.6606       0.02  Q          |          |          |         V|
21+45        0.6607       0.02  Q          |          |          |         V|
21+50        0.6609       0.02  Q          |          |          |         V|
21+55        0.6610       0.02  Q          |          |          |         V|
22+ 0        0.6612       0.02  Q          |          |          |         V|
22+ 5        0.6614       0.02  Q          |          |          |         V|
22+10        0.6615       0.02  Q          |          |          |         V|
22+15        0.6617       0.02  Q          |          |          |         V|
22+20        0.6618       0.02  Q          |          |          |         V|
22+25        0.6620       0.02  Q          |          |          |         V|
22+30        0.6621       0.02  Q          |          |          |         V|
22+35        0.6622       0.02  Q          |          |          |         V|
22+40        0.6624       0.02  Q          |          |          |         V|
22+45        0.6625       0.02  Q          |          |          |         V|
22+50        0.6627       0.02  Q          |          |          |         V|
22+55        0.6628       0.02  Q          |          |          |         V|
23+ 0        0.6629       0.02  Q          |          |          |         V|
```

```
    23+ 5         0.6631       0.02  Q          |         |         |       V|
    23+10         0.6632       0.02  Q          |         |         |       V|
    23+15         0.6633       0.02  Q          |         |         |       V|
    23+20         0.6635       0.02  Q          |         |         |       V|
    23+25         0.6636       0.02  Q          |         |         |       V|
    23+30         0.6637       0.02  Q          |         |         |       V|
    23+35         0.6638       0.02  Q          |         |         |       V|
    23+40         0.6640       0.02  Q          |         |         |       V|
    23+45         0.6641       0.02  Q          |         |         |       V|
    23+50         0.6642       0.02  Q          |         |         |       V|
    23+55         0.6643       0.02  Q          |         |         |       V|
    24+ 0         0.6645       0.02  Q          |         |         |       V|
    24+ 5         0.6646       0.02  Q          |         |         |       V|
    24+10         0.6646       0.01  Q          |         |         |       V|
    24+15         0.6647       0.01  Q          |         |         |       V|
    24+20         0.6647       0.00  Q          |         |         |       V|
    24+25         0.6647       0.00  Q          |         |         |       V|
    24+30         0.6647       0.00  Q          |         |         |       V|
    24+35         0.6647       0.00  Q          |         |         |       V|
    24+40         0.6647       0.00  Q          |         |         |       V|
    24+45         0.6647       0.00  Q          |         |         |       V|
    24+50         0.6647       0.00  Q          |         |         |       V|
    24+55         0.6647       0.00  Q          |         |         |        V
-----------------------------------------------------------------------
```

U n i t   H y d r o g r a p h   A n a l y s i s

Study date 02/28/21

++

San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6481

Paradise Ranch
10 yr Hydrograph
DA40

Storm Event Year = 10

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
7.33	1	0.94
Rainfall data for year 2		
7.33	6	3.25
Rainfall data for year 2		
7.33	24	3.52
Rainfall data for year 100		

```
             7.33           1          1.50
--------------------------------------------------------------------
Rainfall data for year 100
             7.33           6          1.34
--------------------------------------------------------------------
Rainfall data for year 100
             7.33          24          9.00
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

******** Area-averaged max loss rate, Fm ********


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 2)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 84.0      84.0          7.33      1.000     0.301    1.000    0.301

Area-averaged adjusted loss rate Fm (In/Hr) =  0.301

********* Area-Averaged low loss rate fraction, Yb **********

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
     7.33   1.000         84.0      84.0       1.90     0.690

Area-averaged catchment yield fraction, Y =  0.690
Area-averaged low loss fraction, Yb =  0.310
User entry of time of concentration  =   0.176 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       7.33(Ac.)
Catchment Lag time =   0.141 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 59.1856
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.554(In/Hr)
Average low loss rate fraction (Yb) = 0.310 (decimal)
Note: user entry of the Fm value
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall =  0.446(In)
Computed peak 30-minute rainfall =  0.764(In)
Specified peak 1-hour rainfall =  0.940(In)
Computed peak 3-hour rainfall =  1.697(In)
Specified peak 6-hour rainfall =  2.464(In)
Specified peak 24-hour rainfall =  5.775(In)


Rainfall depth area reduction factors:
Using a total area of       7.33(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.446(In)
```

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30-minute factor = 1.000    Adjusted rainfall =  0.763(In)
1-hour factor = 1.000       Adjusted rainfall =  0.940(In)
3-hour factor = 1.000       Adjusted rainfall =  1.697(In)
6-hour factor = 1.000       Adjusted rainfall =  2.464(In)
24-hour factor = 1.000      Adjusted rainfall =  5.774(In)
---------------------------------------------------------------------

                        U n i t   H y d r o g r a p h
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval           'S' Graph          Unit Hydrograph
Number             Mean values             ((CFS))
---------------------------------------------------------------------
                 (K =        88.65 (CFS))

   1                5.478                    4.856
   2               36.233                   27.263
   3               70.694                   30.549
   4               83.231                   11.114
   5               90.473                    6.420
   6               94.907                    3.930
   7               97.404                    2.214
   8               98.417                    0.898
   9               98.995                    0.512
  10               99.403                    0.362
  11               99.784                    0.337
  12              100.000                    0.192
---------------------------------------------------------------------
Peak Unit   Adjusted mass rainfall  Unit rainfall
Number              (In)                 (In)
   1              0.4459              0.4459
   2              0.5490              0.1031
   3              0.6200              0.0710
   4              0.6758              0.0559
   5              0.7226              0.0468
   6              0.7633              0.0406
   7              0.7994              0.0361
   8              0.8321              0.0327
   9              0.8620              0.0299
  10              0.8897              0.0277
  11              0.9155              0.0258
  12              0.9397              0.0242
  13              0.9810              0.0414
  14              1.0210              0.0399
  15              1.0596              0.0386
  16              1.0970              0.0374
  17              1.1334              0.0364
  18              1.1688              0.0354
  19              1.2033              0.0345
  20              1.2370              0.0337
  21              1.2699              0.0329
```

22	1.3021	0.0322
23	1.3336	0.0315
24	1.3645	0.0309
25	1.3948	0.0303
26	1.4246	0.0298
27	1.4538	0.0292
28	1.4825	0.0287
29	1.5108	0.0283
30	1.5386	0.0278
31	1.5660	0.0274
32	1.5930	0.0270
33	1.6196	0.0266
34	1.6458	0.0262
35	1.6717	0.0259
36	1.6972	0.0255
37	1.7224	0.0252
38	1.7473	0.0249
39	1.7719	0.0246
40	1.7962	0.0243
41	1.8202	0.0240
42	1.8440	0.0237
43	1.8675	0.0235
44	1.8907	0.0232
45	1.9137	0.0230
46	1.9364	0.0228
47	1.9590	0.0225
48	1.9813	0.0223
49	2.0034	0.0221
50	2.0253	0.0219
51	2.0470	0.0217
52	2.0685	0.0215
53	2.0898	0.0213
54	2.1109	0.0211
55	2.1318	0.0209
56	2.1526	0.0208
57	2.1732	0.0206
58	2.1936	0.0204
59	2.2139	0.0203
60	2.2340	0.0201
61	2.2539	0.0200
62	2.2737	0.0198
63	2.2934	0.0197
64	2.3129	0.0195
65	2.3322	0.0194
66	2.3515	0.0192
67	2.3706	0.0191
68	2.3895	0.0190
69	2.4084	0.0188
70	2.4271	0.0187
71	2.4457	0.0186

72	2.4642	0.0185
73	2.4851	0.0210
74	2.5060	0.0209
75	2.5267	0.0207
76	2.5474	0.0206
77	2.5679	0.0205
78	2.5883	0.0204
79	2.6087	0.0203
80	2.6289	0.0202
81	2.6491	0.0201
82	2.6691	0.0200
83	2.6890	0.0199
84	2.7089	0.0199
85	2.7287	0.0198
86	2.7483	0.0197
87	2.7679	0.0196
88	2.7874	0.0195
89	2.8068	0.0194
90	2.8262	0.0193
91	2.8454	0.0192
92	2.8646	0.0192
93	2.8837	0.0191
94	2.9027	0.0190
95	2.9216	0.0189
96	2.9405	0.0189
97	2.9593	0.0188
98	2.9780	0.0187
99	2.9966	0.0186
100	3.0151	0.0186
101	3.0336	0.0185
102	3.0520	0.0184
103	3.0704	0.0183
104	3.0887	0.0183
105	3.1069	0.0182
106	3.1250	0.0181
107	3.1431	0.0181
108	3.1611	0.0180
109	3.1791	0.0179
110	3.1969	0.0179
111	3.2148	0.0178
112	3.2325	0.0178
113	3.2502	0.0177
114	3.2679	0.0176
115	3.2854	0.0176
116	3.3030	0.0175
117	3.3204	0.0175
118	3.3378	0.0174
119	3.3552	0.0173
120	3.3725	0.0173
121	3.3897	0.0172

122	3.4069	0.0172
123	3.4240	0.0171
124	3.4411	0.0171
125	3.4581	0.0170
126	3.4751	0.0170
127	3.4920	0.0169
128	3.5089	0.0169
129	3.5257	0.0168
130	3.5424	0.0168
131	3.5592	0.0167
132	3.5758	0.0167
133	3.5924	0.0166
134	3.6090	0.0166
135	3.6255	0.0165
136	3.6420	0.0165
137	3.6584	0.0164
138	3.6748	0.0164
139	3.6912	0.0163
140	3.7074	0.0163
141	3.7237	0.0162
142	3.7399	0.0162
143	3.7560	0.0162
144	3.7722	0.0161
145	3.7882	0.0161
146	3.8043	0.0160
147	3.8202	0.0160
148	3.8362	0.0159
149	3.8521	0.0159
150	3.8679	0.0159
151	3.8838	0.0158
152	3.8995	0.0158
153	3.9153	0.0157
154	3.9310	0.0157
155	3.9466	0.0157
156	3.9623	0.0156
157	3.9779	0.0156
158	3.9934	0.0155
159	4.0089	0.0155
160	4.0244	0.0155
161	4.0398	0.0154
162	4.0552	0.0154
163	4.0706	0.0154
164	4.0859	0.0153
165	4.1012	0.0153
166	4.1164	0.0153
167	4.1316	0.0152
168	4.1468	0.0152
169	4.1620	0.0151
170	4.1771	0.0151
171	4.1922	0.0151

172	4.2072	0.0150
173	4.2222	0.0150
174	4.2372	0.0150
175	4.2521	0.0149
176	4.2670	0.0149
177	4.2819	0.0149
178	4.2968	0.0148
179	4.3116	0.0148
180	4.3263	0.0148
181	4.3411	0.0147
182	4.3558	0.0147
183	4.3705	0.0147
184	4.3852	0.0147
185	4.3998	0.0146
186	4.4144	0.0146
187	4.4289	0.0146
188	4.4435	0.0145
189	4.4580	0.0145
190	4.4725	0.0145
191	4.4869	0.0144
192	4.5013	0.0144
193	4.5157	0.0144
194	4.5301	0.0144
195	4.5444	0.0143
196	4.5587	0.0143
197	4.5730	0.0143
198	4.5872	0.0142
199	4.6014	0.0142
200	4.6156	0.0142
201	4.6298	0.0142
202	4.6439	0.0141
203	4.6580	0.0141
204	4.6721	0.0141
205	4.6862	0.0141
206	4.7002	0.0140
207	4.7142	0.0140
208	4.7282	0.0140
209	4.7421	0.0140
210	4.7561	0.0139
211	4.7700	0.0139
212	4.7838	0.0139
213	4.7977	0.0138
214	4.8115	0.0138
215	4.8253	0.0138
216	4.8391	0.0138
217	4.8528	0.0137
218	4.8665	0.0137
219	4.8802	0.0137
220	4.8939	0.0137
221	4.9076	0.0137

222	4.9212	0.0136
223	4.9348	0.0136
224	4.9484	0.0136
225	4.9620	0.0136
226	4.9755	0.0135
227	4.9890	0.0135
228	5.0025	0.0135
229	5.0160	0.0135
230	5.0294	0.0134
231	5.0428	0.0134
232	5.0562	0.0134
233	5.0696	0.0134
234	5.0830	0.0134
235	5.0963	0.0133
236	5.1096	0.0133
237	5.1229	0.0133
238	5.1362	0.0133
239	5.1494	0.0132
240	5.1626	0.0132
241	5.1758	0.0132
242	5.1890	0.0132
243	5.2022	0.0132
244	5.2153	0.0131
245	5.2284	0.0131
246	5.2415	0.0131
247	5.2546	0.0131
248	5.2677	0.0131
249	5.2807	0.0130
250	5.2937	0.0130
251	5.3067	0.0130
252	5.3197	0.0130
253	5.3327	0.0130
254	5.3456	0.0129
255	5.3585	0.0129
256	5.3714	0.0129
257	5.3843	0.0129
258	5.3972	0.0129
259	5.4100	0.0128
260	5.4228	0.0128
261	5.4356	0.0128
262	5.4484	0.0128
263	5.4612	0.0128
264	5.4739	0.0127
265	5.4866	0.0127
266	5.4994	0.0127
267	5.5120	0.0127
268	5.5247	0.0127
269	5.5374	0.0127
270	5.5500	0.0126
271	5.5626	0.0126

272	5.5752	0.0126
273	5.5878	0.0126
274	5.6004	0.0126
275	5.6129	0.0125
276	5.6255	0.0125
277	5.6380	0.0125
278	5.6505	0.0125
279	5.6629	0.0125
280	5.6754	0.0125
281	5.6878	0.0124
282	5.7003	0.0124
283	5.7127	0.0124
284	5.7251	0.0124
285	5.7374	0.0124
286	5.7498	0.0124
287	5.7621	0.0123
288	5.7745	0.0123

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0123	0.0038	0.0085
2	0.0123	0.0038	0.0085
3	0.0124	0.0038	0.0085
4	0.0124	0.0038	0.0086
5	0.0124	0.0038	0.0086
6	0.0124	0.0039	0.0086
7	0.0125	0.0039	0.0086
8	0.0125	0.0039	0.0086
9	0.0125	0.0039	0.0086
10	0.0125	0.0039	0.0087
11	0.0126	0.0039	0.0087
12	0.0126	0.0039	0.0087
13	0.0126	0.0039	0.0087
14	0.0127	0.0039	0.0087
15	0.0127	0.0039	0.0088
16	0.0127	0.0039	0.0088
17	0.0127	0.0039	0.0088
18	0.0128	0.0040	0.0088
19	0.0128	0.0040	0.0088
20	0.0128	0.0040	0.0089
21	0.0129	0.0040	0.0089
22	0.0129	0.0040	0.0089
23	0.0129	0.0040	0.0089
24	0.0129	0.0040	0.0089
25	0.0130	0.0040	0.0090
26	0.0130	0.0040	0.0090
27	0.0130	0.0040	0.0090
28	0.0131	0.0040	0.0090

29	0.0131	0.0041	0.0090
30	0.0131	0.0041	0.0091
31	0.0132	0.0041	0.0091
32	0.0132	0.0041	0.0091
33	0.0132	0.0041	0.0091
34	0.0132	0.0041	0.0091
35	0.0133	0.0041	0.0092
36	0.0133	0.0041	0.0092
37	0.0134	0.0041	0.0092
38	0.0134	0.0041	0.0092
39	0.0134	0.0042	0.0093
40	0.0134	0.0042	0.0093
41	0.0135	0.0042	0.0093
42	0.0135	0.0042	0.0093
43	0.0136	0.0042	0.0094
44	0.0136	0.0042	0.0094
45	0.0136	0.0042	0.0094
46	0.0137	0.0042	0.0094
47	0.0137	0.0042	0.0095
48	0.0137	0.0043	0.0095
49	0.0138	0.0043	0.0095
50	0.0138	0.0043	0.0095
51	0.0138	0.0043	0.0096
52	0.0139	0.0043	0.0096
53	0.0139	0.0043	0.0096
54	0.0140	0.0043	0.0096
55	0.0140	0.0043	0.0097
56	0.0140	0.0043	0.0097
57	0.0141	0.0044	0.0097
58	0.0141	0.0044	0.0097
59	0.0142	0.0044	0.0098
60	0.0142	0.0044	0.0098
61	0.0142	0.0044	0.0098
62	0.0143	0.0044	0.0099
63	0.0143	0.0044	0.0099
64	0.0144	0.0044	0.0099
65	0.0144	0.0045	0.0100
66	0.0144	0.0045	0.0100
67	0.0145	0.0045	0.0100
68	0.0145	0.0045	0.0100
69	0.0146	0.0045	0.0101
70	0.0146	0.0045	0.0101
71	0.0147	0.0045	0.0101
72	0.0147	0.0046	0.0102
73	0.0148	0.0046	0.0102
74	0.0148	0.0046	0.0102
75	0.0149	0.0046	0.0103
76	0.0149	0.0046	0.0103
77	0.0150	0.0046	0.0103
78	0.0150	0.0046	0.0104

79	0.0151	0.0047	0.0104
80	0.0151	0.0047	0.0104
81	0.0152	0.0047	0.0105
82	0.0152	0.0047	0.0105
83	0.0153	0.0047	0.0106
84	0.0153	0.0047	0.0106
85	0.0154	0.0048	0.0106
86	0.0154	0.0048	0.0107
87	0.0155	0.0048	0.0107
88	0.0155	0.0048	0.0107
89	0.0156	0.0048	0.0108
90	0.0157	0.0049	0.0108
91	0.0157	0.0049	0.0109
92	0.0158	0.0049	0.0109
93	0.0159	0.0049	0.0109
94	0.0159	0.0049	0.0110
95	0.0160	0.0050	0.0110
96	0.0160	0.0050	0.0111
97	0.0161	0.0050	0.0111
98	0.0162	0.0050	0.0112
99	0.0162	0.0050	0.0112
100	0.0163	0.0050	0.0112
101	0.0164	0.0051	0.0113
102	0.0164	0.0051	0.0113
103	0.0165	0.0051	0.0114
104	0.0166	0.0051	0.0114
105	0.0167	0.0052	0.0115
106	0.0167	0.0052	0.0115
107	0.0168	0.0052	0.0116
108	0.0169	0.0052	0.0116
109	0.0170	0.0053	0.0117
110	0.0170	0.0053	0.0117
111	0.0171	0.0053	0.0118
112	0.0172	0.0053	0.0119
113	0.0173	0.0054	0.0119
114	0.0173	0.0054	0.0120
115	0.0175	0.0054	0.0121
116	0.0175	0.0054	0.0121
117	0.0176	0.0055	0.0122
118	0.0177	0.0055	0.0122
119	0.0178	0.0055	0.0123
120	0.0179	0.0055	0.0123
121	0.0180	0.0056	0.0124
122	0.0181	0.0056	0.0125
123	0.0182	0.0056	0.0126
124	0.0183	0.0057	0.0126
125	0.0184	0.0057	0.0127
126	0.0185	0.0057	0.0128
127	0.0186	0.0058	0.0129
128	0.0187	0.0058	0.0129

129	0.0189	0.0058	0.0130
130	0.0189	0.0059	0.0131
131	0.0191	0.0059	0.0132
132	0.0192	0.0059	0.0132
133	0.0193	0.0060	0.0133
134	0.0194	0.0060	0.0134
135	0.0196	0.0061	0.0135
136	0.0197	0.0061	0.0136
137	0.0199	0.0062	0.0137
138	0.0199	0.0062	0.0138
139	0.0201	0.0062	0.0139
140	0.0202	0.0063	0.0140
141	0.0204	0.0063	0.0141
142	0.0205	0.0064	0.0142
143	0.0207	0.0064	0.0143
144	0.0209	0.0065	0.0144
145	0.0185	0.0057	0.0127
146	0.0186	0.0058	0.0128
147	0.0188	0.0058	0.0130
148	0.0190	0.0059	0.0131
149	0.0192	0.0060	0.0133
150	0.0194	0.0060	0.0134
151	0.0197	0.0061	0.0136
152	0.0198	0.0061	0.0137
153	0.0201	0.0062	0.0139
154	0.0203	0.0063	0.0140
155	0.0206	0.0064	0.0142
156	0.0208	0.0064	0.0143
157	0.0211	0.0065	0.0146
158	0.0213	0.0066	0.0147
159	0.0217	0.0067	0.0150
160	0.0219	0.0068	0.0151
161	0.0223	0.0069	0.0154
162	0.0225	0.0070	0.0156
163	0.0230	0.0071	0.0159
164	0.0232	0.0072	0.0160
165	0.0237	0.0074	0.0164
166	0.0240	0.0074	0.0166
167	0.0246	0.0076	0.0170
168	0.0249	0.0077	0.0172
169	0.0255	0.0079	0.0176
170	0.0259	0.0080	0.0179
171	0.0266	0.0082	0.0184
172	0.0270	0.0084	0.0186
173	0.0278	0.0086	0.0192
174	0.0283	0.0088	0.0195
175	0.0292	0.0091	0.0202
176	0.0298	0.0092	0.0205
177	0.0309	0.0096	0.0213
178	0.0315	0.0098	0.0218

179	0.0329	0.0102	0.0227
180	0.0337	0.0104	0.0232
181	0.0354	0.0110	0.0244
182	0.0364	0.0113	0.0251
183	0.0386	0.0120	0.0267
184	0.0399	0.0124	0.0276
185	0.0242	0.0075	0.0167
186	0.0258	0.0080	0.0178
187	0.0299	0.0093	0.0207
188	0.0327	0.0101	0.0226
189	0.0406	0.0126	0.0280
190	0.0468	0.0145	0.0323
191	0.0710	0.0220	0.0490
192	0.1031	0.0319	0.0711
193	0.4459	0.0462	0.3997
194	0.0559	0.0173	0.0386
195	0.0361	0.0112	0.0249
196	0.0277	0.0086	0.0191
197	0.0414	0.0128	0.0285
198	0.0374	0.0116	0.0258
199	0.0345	0.0107	0.0238
200	0.0322	0.0100	0.0222
201	0.0303	0.0094	0.0209
202	0.0287	0.0089	0.0198
203	0.0274	0.0085	0.0189
204	0.0262	0.0081	0.0181
205	0.0252	0.0078	0.0174
206	0.0243	0.0075	0.0168
207	0.0235	0.0073	0.0162
208	0.0228	0.0070	0.0157
209	0.0221	0.0068	0.0153
210	0.0215	0.0067	0.0148
211	0.0209	0.0065	0.0145
212	0.0204	0.0063	0.0141
213	0.0200	0.0062	0.0138
214	0.0195	0.0060	0.0135
215	0.0191	0.0059	0.0132
216	0.0187	0.0058	0.0129
217	0.0210	0.0065	0.0145
218	0.0206	0.0064	0.0142
219	0.0203	0.0063	0.0140
220	0.0200	0.0062	0.0138
221	0.0198	0.0061	0.0136
222	0.0195	0.0060	0.0135
223	0.0192	0.0060	0.0133
224	0.0190	0.0059	0.0131
225	0.0188	0.0058	0.0130
226	0.0186	0.0057	0.0128
227	0.0183	0.0057	0.0127
228	0.0181	0.0056	0.0125

229	0.0179	0.0056	0.0124
230	0.0178	0.0055	0.0123
231	0.0176	0.0054	0.0121
232	0.0174	0.0054	0.0120
233	0.0172	0.0053	0.0119
234	0.0171	0.0053	0.0118
235	0.0169	0.0052	0.0117
236	0.0168	0.0052	0.0116
237	0.0166	0.0051	0.0115
238	0.0165	0.0051	0.0114
239	0.0163	0.0051	0.0113
240	0.0162	0.0050	0.0112
241	0.0161	0.0050	0.0111
242	0.0159	0.0049	0.0110
243	0.0158	0.0049	0.0109
244	0.0157	0.0049	0.0108
245	0.0156	0.0048	0.0108
246	0.0155	0.0048	0.0107
247	0.0154	0.0048	0.0106
248	0.0153	0.0047	0.0105
249	0.0151	0.0047	0.0105
250	0.0150	0.0047	0.0104
251	0.0149	0.0046	0.0103
252	0.0148	0.0046	0.0102
253	0.0147	0.0046	0.0102
254	0.0147	0.0045	0.0101
255	0.0146	0.0045	0.0101
256	0.0145	0.0045	0.0100
257	0.0144	0.0045	0.0099
258	0.0143	0.0044	0.0099
259	0.0142	0.0044	0.0098
260	0.0141	0.0044	0.0098
261	0.0141	0.0044	0.0097
262	0.0140	0.0043	0.0096
263	0.0139	0.0043	0.0096
264	0.0138	0.0043	0.0095
265	0.0137	0.0043	0.0095
266	0.0137	0.0042	0.0094
267	0.0136	0.0042	0.0094
268	0.0135	0.0042	0.0093
269	0.0135	0.0042	0.0093
270	0.0134	0.0042	0.0092
271	0.0133	0.0041	0.0092
272	0.0133	0.0041	0.0092
273	0.0132	0.0041	0.0091
274	0.0131	0.0041	0.0091
275	0.0131	0.0041	0.0090
276	0.0130	0.0040	0.0090
277	0.0130	0.0040	0.0089
278	0.0129	0.0040	0.0089

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     279              0.0128           0.0040              0.0089
     280              0.0128           0.0040              0.0088
     281              0.0127           0.0039              0.0088
     282              0.0127           0.0039              0.0087
     283              0.0126           0.0039              0.0087
     284              0.0126           0.0039              0.0087
     285              0.0125           0.0039              0.0086
     286              0.0125           0.0039              0.0086
     287              0.0124           0.0038              0.0086
     288              0.0124           0.0038              0.0085
     --------------------------------------------------------------------
     --------------------------------------------------------------------
     Total soil rain loss =      1.70(In)
     Total effective rainfall =      4.08(In)
     Peak flow rate in flood hydrograph =     14.73(CFS)
     ---------------------------------------------------------------------
     ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                         24 - H O U R   S T O R M
                    R u n o f f    H y d r o g r a p h
     --------------------------------------------------------------------
                 Hydrograph in   5   Minute intervals ((CFS))

     --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5      0.0003      0.04  Q        |         |         |         |
  0+10      0.0022      0.27  Q        |         |         |         |
  0+15      0.0058      0.53  VQ       |         |         |         |
  0+20      0.0102      0.63  VQ       |         |         |         |
  0+25      0.0149      0.69  VQ       |         |         |         |
  0+30      0.0199      0.72  VQ       |         |         |         |
  0+35      0.0249      0.74  VQ       |         |         |         |
  0+40      0.0301      0.75  VQ       |         |         |         |
  0+45      0.0353      0.76  VQ       |         |         |         |
  0+50      0.0405      0.76  VQ       |         |         |         |
  0+55      0.0458      0.76  VQ       |         |         |         |
  1+ 0      0.0511      0.77  VQ       |         |         |         |
  1+ 5      0.0564      0.77  VQ       |         |         |         |
  1+10      0.0617      0.77  VQ       |         |         |         |
  1+15      0.0670      0.77  |Q       |         |         |         |
  1+20      0.0724      0.77  |Q       |         |         |         |
  1+25      0.0777      0.78  |Q       |         |         |         |
  1+30      0.0831      0.78  |Q       |         |         |         |
  1+35      0.0884      0.78  |Q       |         |         |         |
  1+40      0.0938      0.78  |Q       |         |         |         |
  1+45      0.0992      0.78  |Q       |         |         |         |
  1+50      0.1046      0.78  |Q       |         |         |         |
  1+55      0.1100      0.79  |Q       |         |         |         |
  2+ 0      0.1154      0.79  |Q       |         |         |         |
  2+ 5      0.1209      0.79  |Q       |         |         |         |
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2+10        0.1263      0.79   |QV        |         |         |         |
2+15        0.1318      0.79   |QV        |         |         |         |
2+20        0.1373      0.80   |QV        |         |         |         |
2+25        0.1428      0.80   |QV        |         |         |         |
2+30        0.1483      0.80   |QV        |         |         |         |
2+35        0.1538      0.80   |QV        |         |         |         |
2+40        0.1593      0.80   |QV        |         |         |         |
2+45        0.1648      0.80   |QV        |         |         |         |
2+50        0.1704      0.81   |QV        |         |         |         |
2+55        0.1760      0.81   |QV        |         |         |         |
3+ 0        0.1815      0.81   |QV        |         |         |         |
3+ 5        0.1871      0.81   |Q V       |         |         |         |
3+10        0.1927      0.81   |Q V       |         |         |         |
3+15        0.1984      0.82   |Q V       |         |         |         |
3+20        0.2040      0.82   |Q V       |         |         |         |
3+25        0.2097      0.82   |Q V       |         |         |         |
3+30        0.2153      0.82   |Q V       |         |         |         |
3+35        0.2210      0.82   |Q V       |         |         |         |
3+40        0.2267      0.83   |Q V       |         |         |         |
3+45        0.2324      0.83   |Q V       |         |         |         |
3+50        0.2381      0.83   |Q V       |         |         |         |
3+55        0.2439      0.83   |Q V       |         |         |         |
4+ 0        0.2496      0.84   |Q  V      |         |         |         |
4+ 5        0.2554      0.84   |Q  V      |         |         |         |
4+10        0.2612      0.84   |Q  V      |         |         |         |
4+15        0.2670      0.84   |Q  V      |         |         |         |
4+20        0.2728      0.84   |Q  V      |         |         |         |
4+25        0.2786      0.85   |Q  V      |         |         |         |
4+30        0.2845      0.85   |Q  V      |         |         |         |
4+35        0.2903      0.85   |Q  V      |         |         |         |
4+40        0.2962      0.85   |Q  V      |         |         |         |
4+45        0.3021      0.86   |Q  V      |         |         |         |
4+50        0.3080      0.86   |Q  V      |         |         |         |
4+55        0.3139      0.86   |Q   V     |         |         |         |
5+ 0        0.3199      0.86   |Q   V     |         |         |         |
5+ 5        0.3258      0.87   |Q   V     |         |         |         |
5+10        0.3318      0.87   |Q   V     |         |         |         |
5+15        0.3378      0.87   |Q   V     |         |         |         |
5+20        0.3438      0.87   |Q   V     |         |         |         |
5+25        0.3499      0.88   |Q   V     |         |         |         |
5+30        0.3559      0.88   |Q   V     |         |         |         |
5+35        0.3620      0.88   |Q   V     |         |         |         |
5+40        0.3681      0.88   |Q   V     |         |         |         |
5+45        0.3742      0.89   |Q    V    |         |         |         |
5+50        0.3803      0.89   |Q    V    |         |         |         |
5+55        0.3864      0.89   |Q    V    |         |         |         |
6+ 0        0.3926      0.89   |Q    V    |         |         |         |
6+ 5        0.3988      0.90   |Q    V    |         |         |         |
6+10        0.4050      0.90   |Q    V    |         |         |         |
6+15        0.4112      0.90   |Q    V    |         |         |         |
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 6+20       0.4174      0.91   |Q    V   |         |         |         |
 6+25       0.4237      0.91   |Q    V   |         |         |         |
 6+30       0.4300      0.91   |Q    V   |         |         |         |
 6+35       0.4363      0.92   |Q     V  |         |         |         |
 6+40       0.4426      0.92   |Q     V  |         |         |         |
 6+45       0.4489      0.92   |Q     V  |         |         |         |
 6+50       0.4553      0.92   |Q     V  |         |         |         |
 6+55       0.4617      0.93   |Q     V  |         |         |         |
 7+ 0       0.4681      0.93   |Q     V  |         |         |         |
 7+ 5       0.4745      0.93   |Q     V  |         |         |         |
 7+10       0.4810      0.94   |Q     V  |         |         |         |
 7+15       0.4875      0.94   |Q     V  |         |         |         |
 7+20       0.4940      0.94   |Q     V  |         |         |         |
 7+25       0.5005      0.95   |Q      V |         |         |         |
 7+30       0.5071      0.95   |Q      V |         |         |         |
 7+35       0.5136      0.95   |Q      V |         |         |         |
 7+40       0.5202      0.96   |Q      V |         |         |         |
 7+45       0.5269      0.96   |Q      V |         |         |         |
 7+50       0.5335      0.97   |Q      V |         |         |         |
 7+55       0.5402      0.97   |Q      V |         |         |         |
 8+ 0       0.5469      0.97   |Q      V |         |         |         |
 8+ 5       0.5536      0.98   |Q      V |         |         |         |
 8+10       0.5604      0.98   |Q       V|         |         |         |
 8+15       0.5671      0.98   |Q       V|         |         |         |
 8+20       0.5739      0.99   |Q       V|         |         |         |
 8+25       0.5808      0.99   |Q       V|         |         |         |
 8+30       0.5876      1.00   |Q       V|         |         |         |
 8+35       0.5945      1.00   | Q      V|         |         |         |
 8+40       0.6015      1.00   | Q      V|         |         |         |
 8+45       0.6084      1.01   | Q      V|         |         |         |
 8+50       0.6154      1.01   | Q      V|         |         |         |
 8+55       0.6224      1.02   | Q      V|         |         |         |
 9+ 0       0.6294      1.02   | Q       V         |         |         |
 9+ 5       0.6365      1.03   | Q       V         |         |         |
 9+10       0.6436      1.03   | Q       V         |         |         |
 9+15       0.6508      1.04   | Q       V         |         |         |
 9+20       0.6579      1.04   | Q       V         |         |         |
 9+25       0.6651      1.05   | Q       V         |         |         |
 9+30       0.6724      1.05   | Q       V         |         |         |
 9+35       0.6796      1.06   | Q       V         |         |         |
 9+40       0.6869      1.06   | Q       |V        |         |         |
 9+45       0.6943      1.07   | Q       |V        |         |         |
 9+50       0.7017      1.07   | Q       |V        |         |         |
 9+55       0.7091      1.08   | Q       |V        |         |         |
10+ 0       0.7165      1.08   | Q       |V        |         |         |
10+ 5       0.7240      1.09   | Q       |V        |         |         |
10+10       0.7316      1.09   | Q       |V        |         |         |
10+15       0.7392      1.10   | Q       |V        |         |         |
10+20       0.7468      1.11   | Q       |V        |         |         |
10+25       0.7544      1.11   | Q       | V       |         |         |
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10+30       0.7621      1.12  | Q       | V       |         |         |
10+35       0.7699      1.12  | Q       | V       |         |         |
10+40       0.7777      1.13  | Q       | V       |         |         |
10+45       0.7855      1.14  | Q       | V       |         |         |
10+50       0.7934      1.14  | Q       | V       |         |         |
10+55       0.8013      1.15  | Q       | V       |         |         |
11+ 0       0.8093      1.16  | Q       |  V      |         |         |
11+ 5       0.8173      1.17  | Q       |  V      |         |         |
11+10       0.8254      1.17  | Q       |  V      |         |         |
11+15       0.8335      1.18  | Q       |  V      |         |         |
11+20       0.8417      1.19  | Q       |  V      |         |         |
11+25       0.8499      1.20  | Q       |  V      |         |         |
11+30       0.8582      1.20  | Q       |  V      |         |         |
11+35       0.8665      1.21  | Q       |  V      |         |         |
11+40       0.8749      1.22  | Q       |   V     |         |         |
11+45       0.8834      1.23  | Q       |   V     |         |         |
11+50       0.8919      1.24  | Q       |   V     |         |         |
11+55       0.9005      1.25  | Q       |   V     |         |         |
12+ 0       0.9092      1.26  | Q       |   V     |         |         |
12+ 5       0.9178      1.26  | Q       |   V     |         |         |
12+10       0.9262      1.22  | Q       |   V     |         |         |
12+15       0.9343      1.17  | Q       |    V    |         |         |
12+20       0.9423      1.16  | Q       |    V    |         |         |
12+25       0.9503      1.16  | Q       |    V    |         |         |
12+30       0.9584      1.17  | Q       |    V    |         |         |
12+35       0.9665      1.18  | Q       |    V    |         |         |
12+40       0.9747      1.19  | Q       |    V    |         |         |
12+45       0.9829      1.20  | Q       |    V    |         |         |
12+50       0.9913      1.21  | Q       |    V    |         |         |
12+55       0.9997      1.23  | Q       |     V   |         |         |
13+ 0       1.0082      1.24  | Q       |     V   |         |         |
13+ 5       1.0169      1.25  | Q       |     V   |         |         |
13+10       1.0256      1.27  | Q       |     V   |         |         |
13+15       1.0345      1.29  | Q       |     V   |         |         |
13+20       1.0435      1.30  | Q       |     V   |         |         |
13+25       1.0526      1.32  | Q       |     V   |         |         |
13+30       1.0618      1.34  | Q       |      V  |         |         |
13+35       1.0711      1.36  | Q       |      V  |         |         |
13+40       1.0806      1.38  | Q       |      V  |         |         |
13+45       1.0903      1.40  | Q       |      V  |         |         |
13+50       1.1000      1.42  | Q       |      V  |         |         |
13+55       1.1100      1.44  | Q       |      V  |         |         |
14+ 0       1.1201      1.47  | Q       |      V  |         |         |
14+ 5       1.1304      1.50  | Q       |       V |         |         |
14+10       1.1409      1.52  |  Q      |       V |         |         |
14+15       1.1516      1.55  |  Q      |       V |         |         |
14+20       1.1625      1.58  |  Q      |       V |         |         |
14+25       1.1736      1.62  |  Q      |       V |         |         |
14+30       1.1850      1.65  |  Q      |        V|         |         |
14+35       1.1966      1.69  |  Q      |        V|         |         |
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14+40       1.2085      1.73  |  Q      |        V|         |         |
14+45       1.2208      1.77  |  Q      |        V|         |         |
14+50       1.2333      1.82  |  Q      |        V|         |         |
14+55       1.2462      1.87  |  Q      |         V         |         |
15+ 0       1.2595      1.93  |  Q      |         V         |         |
15+ 5       1.2732      1.99  |  Q      |         V         |         |
15+10       1.2875      2.06  |   Q     |         V         |         |
15+15       1.3022      2.14  |   Q     |         V         |         |
15+20       1.3176      2.23  |   Q     |         |V        |         |
15+25       1.3333      2.27  |   Q     |         |V        |         |
15+30       1.3473      2.04  |   Q     |         |V        |         |
15+35       1.3596      1.78  |  Q      |         |V        |         |
15+40       1.3719      1.79  |  Q      |         | V       |         |
15+45       1.3851      1.91  |  Q      |         | V       |         |
15+50       1.3998      2.14  |   Q     |         | V       |         |
15+55       1.4172      2.53  |    Q    |         | V       |         |
16+ 0       1.4399      3.30  |     Q   |         |  V      |         |
16+ 5       1.4819      6.10  |         | Q       |  V      |         |
16+10       1.5798     14.22  |         |         |    V  Q |         |
16+15       1.6812     14.73  |         |         |      V Q|         |
16+20       1.7306      7.17  |         |   Q     |      V  |         |
16+25       1.7641      4.87  |        Q|         |       V |         |
16+30       1.7904      3.82  |      Q  |         |       V |         |
16+35       1.8126      3.22  |     Q   |         |        V|         |
16+40       1.8305      2.60  |    Q    |         |        V|         |
16+45       1.8465      2.32  |   Q     |         |        V|         |
16+50       1.8613      2.15  |   Q     |         |        V|         |
16+55       1.8753      2.03  |   Q     |         |         V         |
17+ 0       1.8882      1.87  |  Q      |         |         V         |
17+ 5       1.8999      1.71  |  Q      |         |         V         |
17+10       1.9112      1.63  |  Q      |         |         V         |
17+15       1.9220      1.57  |  Q      |         |         V         |
17+20       1.9324      1.51  |  Q      |         |         |V        |
17+25       1.9425      1.46  | Q       |         |         |V        |
17+30       1.9522      1.41  | Q       |         |         |V        |
17+35       1.9616      1.37  | Q       |         |         |V        |
17+40       1.9708      1.33  | Q       |         |         |V        |
17+45       1.9797      1.29  | Q       |         |         |V        |
17+50       1.9884      1.26  | Q       |         |         |V        |
17+55       1.9968      1.23  | Q       |         |         | V       |
18+ 0       2.0051      1.20  | Q       |         |         | V       |
18+ 5       2.0133      1.19  | Q       |         |         | V       |
18+10       2.0216      1.21  | Q       |         |         | V       |
18+15       2.0302      1.24  | Q       |         |         | V       |
18+20       2.0388      1.24  | Q       |         |         | V       |
18+25       2.0473      1.24  | Q       |         |         | V       |
18+30       2.0557      1.22  | Q       |         |         |  V      |
18+35       2.0640      1.21  | Q       |         |         |  V      |
18+40       2.0723      1.20  | Q       |         |         |  V      |
18+45       2.0804      1.18  | Q       |         |         |  V      |
```

18+50	2.0884	1.17	Q			V
18+55	2.0964	1.15	Q			V
19+ 0	2.1042	1.14	Q			V
19+ 5	2.1120	1.13	Q			V
19+10	2.1197	1.11	Q			V
19+15	2.1273	1.10	Q			V
19+20	2.1348	1.09	Q			V
19+25	2.1422	1.08	Q			V
19+30	2.1495	1.07	Q			V
19+35	2.1568	1.06	Q			V
19+40	2.1640	1.05	Q			V
19+45	2.1712	1.04	Q			V
19+50	2.1783	1.03	Q			V
19+55	2.1853	1.02	Q			V
20+ 0	2.1923	1.01	Q			V
20+ 5	2.1992	1.00	Q			V
20+10	2.2060	0.99	Q			V
20+15	2.2128	0.99	Q			V
20+20	2.2195	0.98	Q			V
20+25	2.2262	0.97	Q			V
20+30	2.2328	0.96	Q			V
20+35	2.2394	0.96	Q			V
20+40	2.2460	0.95	Q			V
20+45	2.2524	0.94	Q			V
20+50	2.2589	0.94	Q			V
20+55	2.2653	0.93	Q			V
21+ 0	2.2716	0.92	Q			V
21+ 5	2.2779	0.92	Q			V
21+10	2.2842	0.91	Q			V
21+15	2.2904	0.90	Q			V
21+20	2.2966	0.90	Q			V
21+25	2.3028	0.89	Q			V
21+30	2.3089	0.89	Q			V
21+35	2.3149	0.88	Q			V
21+40	2.3210	0.88	Q			V
21+45	2.3270	0.87	Q			V
21+50	2.3330	0.87	Q			V
21+55	2.3389	0.86	Q			V
22+ 0	2.3448	0.86	Q			V
22+ 5	2.3507	0.85	Q			V
22+10	2.3565	0.85	Q			V
22+15	2.3623	0.84	Q			V
22+20	2.3681	0.84	Q			V
22+25	2.3738	0.83	Q			V
22+30	2.3795	0.83	Q			V
22+35	2.3852	0.83	Q			V
22+40	2.3909	0.82	Q			V
22+45	2.3965	0.82	Q			V
22+50	2.4021	0.81	Q			V
22+55	2.4077	0.81	Q			V

```
   23+ 0        2.4132       0.81  |Q         |         |         |       V |
   23+ 5        2.4187       0.80  |Q         |         |         |       V |
   23+10        2.4242       0.80  |Q         |         |         |       V |
   23+15        2.4297       0.79  |Q         |         |         |        V|
   23+20        2.4351       0.79  |Q         |         |         |        V|
   23+25        2.4405       0.79  |Q         |         |         |        V|
   23+30        2.4459       0.78  |Q         |         |         |        V|
   23+35        2.4513       0.78  |Q         |         |         |        V|
   23+40        2.4566       0.78  |Q         |         |         |        V|
   23+45        2.4620       0.77  |Q         |         |         |        V|
   23+50        2.4673       0.77  |Q         |         |         |        V|
   23+55        2.4726       0.77  |Q         |         |         |        V|
   24+ 0        2.4778       0.76  |Q         |         |         |        V|
   24+ 5        2.4828       0.72  |Q         |         |         |        V|
   24+10        2.4861       0.48  Q          |         |         |        V|
   24+15        2.4876       0.22  Q          |         |         |        V|
   24+20        2.4885       0.13  Q          |         |         |        V|
   24+25        2.4890       0.07  Q          |         |         |        V|
   24+30        2.4893       0.04  Q          |         |         |        V|
   24+35        2.4894       0.02  Q          |         |         |        V|
   24+40        2.4895       0.01  Q          |         |         |        V|
   24+45        2.4895       0.01  Q          |         |         |        V|
   24+50        2.4896       0.00  Q          |         |         |        V|
   24+55        2.4896       0.00  Q          |         |         |        V|
-----------------------------------------------------------------------
```

```
        U n i t   H y d r o g r a p h   A n a l y s i s

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                Study date  02/26/21

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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San Bernardino County Synthetic Unit Hydrology Method
                Manual date - August 1986


Program License Serial Number 6481

---------------------------------------------------------------------
Paradise Ranch
10 yr Unit Hydrograph
DA38

--------------------------------------------------------------------

        Storm Event Year = 10

        Antecedent Moisture Condition = 2

 English (in-lb) Input Units Used

 English Rainfall Data (Inches) Input Values Used

 English Units used in output format




Area averaged rainfall intensity isohyetal data:
        Sub-Area       Duration       Isohyetal
        (Ac.)           (hours)        (In)
Rainfall data for year 10
             4.38           1           0.94
--------------------------------------------------------------------
Rainfall data for year 2
             4.38           6           3.25
--------------------------------------------------------------------
Rainfall data for year 2
             4.38          24           3.52
--------------------------------------------------------------------
Rainfall data for year 100
```

```
             4.38            1           1.50
--------------------------------------------------------------------
Rainfall data for year 100
             4.38            6           1.34
--------------------------------------------------------------------
Rainfall data for year 100
             4.38           24           9.00
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

******** Area-averaged max loss rate, Fm ********


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 2)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 84.0      84.0          4.38      1.000     0.301    1.000    0.301

Area-averaged adjusted loss rate Fm (In/Hr) =  0.301

********* Area-Averaged low loss rate fraction, Yb **********

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
     4.38   1.000         84.0      84.0       1.90     0.690

Area-averaged catchment yield fraction, Y =  0.690
Area-averaged low loss fraction, Yb =  0.310
User entry of time of concentration  =   0.252 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       4.38(Ac.)
Catchment Lag time =   0.202 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 41.3360
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.301(In/Hr)
Average low loss rate fraction (Yb) = 0.310 (decimal)
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall =  0.446(In)
Computed peak 30-minute rainfall =  0.764(In)
Specified peak 1-hour rainfall =  0.940(In)
Computed peak 3-hour rainfall =  1.697(In)
Specified peak 6-hour rainfall =  2.464(In)
Specified peak 24-hour rainfall =  5.775(In)


Rainfall depth area reduction factors:
Using a total area of       4.38(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.446(In)
30-minute factor = 1.000    Adjusted rainfall =  0.763(In)
```

1-hour factor = 1.000 Adjusted rainfall = 0.940(In)
3-hour factor = 1.000 Adjusted rainfall = 1.697(In)
6-hour factor = 1.000 Adjusted rainfall = 2.464(In)
24-hour factor = 1.000 Adjusted rainfall = 5.774(In)

U n i t H y d r o g r a p h

Interval Number	'S' Graph Mean values	Unit Hydrograph ((CFS))
	(K = 52.97 (CFS))	
1	3.278	1.737
2	15.863	6.666
3	49.042	17.576
4	70.026	11.115
5	79.746	5.149
6	86.184	3.410
7	90.753	2.420
8	94.013	1.727
9	96.218	1.168
10	97.660	0.764
11	98.308	0.343
12	98.754	0.236
13	99.099	0.183
14	99.368	0.142
15	99.676	0.163
16	99.860	0.098
17	100.000	0.074

Peak Unit Number	Adjusted mass rainfall (In)	Unit rainfall (In)
1	0.4459	0.4459
2	0.5490	0.1031
3	0.6200	0.0710
4	0.6759	0.0559
5	0.7227	0.0468
6	0.7634	0.0406
7	0.7995	0.0361
8	0.8322	0.0327
9	0.8621	0.0299
10	0.8898	0.0277
11	0.9156	0.0258
12	0.9398	0.0242
13	0.9812	0.0414
14	1.0211	0.0399
15	1.0597	0.0386
16	1.0971	0.0374
17	1.1335	0.0364

18	1.1689	0.0354
19	1.2034	0.0345
20	1.2371	0.0337
21	1.2700	0.0329
22	1.3022	0.0322
23	1.3337	0.0315
24	1.3646	0.0309
25	1.3949	0.0303
26	1.4247	0.0297
27	1.4539	0.0292
28	1.4826	0.0287
29	1.5109	0.0283
30	1.5387	0.0278
31	1.5661	0.0274
32	1.5930	0.0270
33	1.6196	0.0266
34	1.6459	0.0262
35	1.6717	0.0259
36	1.6973	0.0255
37	1.7225	0.0252
38	1.7473	0.0249
39	1.7719	0.0246
40	1.7962	0.0243
41	1.8202	0.0240
42	1.8440	0.0237
43	1.8675	0.0235
44	1.8907	0.0232
45	1.9137	0.0230
46	1.9365	0.0228
47	1.9590	0.0225
48	1.9813	0.0223
49	2.0034	0.0221
50	2.0253	0.0219
51	2.0470	0.0217
52	2.0685	0.0215
53	2.0898	0.0213
54	2.1109	0.0211
55	2.1318	0.0209
56	2.1526	0.0208
57	2.1732	0.0206
58	2.1936	0.0204
59	2.2139	0.0203
60	2.2340	0.0201
61	2.2539	0.0200
62	2.2737	0.0198
63	2.2934	0.0197
64	2.3129	0.0195
65	2.3323	0.0194
66	2.3515	0.0192
67	2.3706	0.0191

68	2.3896	0.0190
69	2.4084	0.0188
70	2.4271	0.0187
71	2.4457	0.0186
72	2.4642	0.0185
73	2.4851	0.0210
74	2.5060	0.0209
75	2.5268	0.0207
76	2.5474	0.0206
77	2.5679	0.0205
78	2.5884	0.0204
79	2.6087	0.0203
80	2.6289	0.0202
81	2.6491	0.0201
82	2.6691	0.0200
83	2.6891	0.0199
84	2.7089	0.0199
85	2.7287	0.0198
86	2.7484	0.0197
87	2.7680	0.0196
88	2.7875	0.0195
89	2.8069	0.0194
90	2.8262	0.0193
91	2.8454	0.0192
92	2.8646	0.0192
93	2.8837	0.0191
94	2.9027	0.0190
95	2.9216	0.0189
96	2.9405	0.0189
97	2.9593	0.0188
98	2.9780	0.0187
99	2.9966	0.0186
100	3.0152	0.0186
101	3.0337	0.0185
102	3.0521	0.0184
103	3.0704	0.0183
104	3.0887	0.0183
105	3.1069	0.0182
106	3.1250	0.0181
107	3.1431	0.0181
108	3.1611	0.0180
109	3.1791	0.0179
110	3.1970	0.0179
111	3.2148	0.0178
112	3.2326	0.0178
113	3.2503	0.0177
114	3.2679	0.0176
115	3.2855	0.0176
116	3.3030	0.0175
117	3.3205	0.0175

118	3.3379	0.0174
119	3.3552	0.0173
120	3.3725	0.0173
121	3.3897	0.0172
122	3.4069	0.0172
123	3.4240	0.0171
124	3.4411	0.0171
125	3.4581	0.0170
126	3.4751	0.0170
127	3.4920	0.0169
128	3.5089	0.0169
129	3.5257	0.0168
130	3.5425	0.0168
131	3.5592	0.0167
132	3.5759	0.0167
133	3.5925	0.0166
134	3.6090	0.0166
135	3.6256	0.0165
136	3.6420	0.0165
137	3.6585	0.0164
138	3.6748	0.0164
139	3.6912	0.0163
140	3.7075	0.0163
141	3.7237	0.0162
142	3.7399	0.0162
143	3.7561	0.0162
144	3.7722	0.0161
145	3.7883	0.0161
146	3.8043	0.0160
147	3.8203	0.0160
148	3.8362	0.0159
149	3.8521	0.0159
150	3.8680	0.0159
151	3.8838	0.0158
152	3.8996	0.0158
153	3.9153	0.0157
154	3.9310	0.0157
155	3.9467	0.0157
156	3.9623	0.0156
157	3.9779	0.0156
158	3.9934	0.0155
159	4.0089	0.0155
160	4.0244	0.0155
161	4.0398	0.0154
162	4.0552	0.0154
163	4.0706	0.0154
164	4.0859	0.0153
165	4.1012	0.0153
166	4.1164	0.0153
167	4.1317	0.0152

168	4.1468	0.0152
169	4.1620	0.0151
170	4.1771	0.0151
171	4.1922	0.0151
172	4.2072	0.0150
173	4.2222	0.0150
174	4.2372	0.0150
175	4.2521	0.0149
176	4.2671	0.0149
177	4.2819	0.0149
178	4.2968	0.0148
179	4.3116	0.0148
180	4.3264	0.0148
181	4.3411	0.0147
182	4.3558	0.0147
183	4.3705	0.0147
184	4.3852	0.0147
185	4.3998	0.0146
186	4.4144	0.0146
187	4.4290	0.0146
188	4.4435	0.0145
189	4.4580	0.0145
190	4.4725	0.0145
191	4.4869	0.0144
192	4.5013	0.0144
193	4.5157	0.0144
194	4.5301	0.0144
195	4.5444	0.0143
196	4.5587	0.0143
197	4.5730	0.0143
198	4.5872	0.0142
199	4.6015	0.0142
200	4.6156	0.0142
201	4.6298	0.0142
202	4.6439	0.0141
203	4.6581	0.0141
204	4.6721	0.0141
205	4.6862	0.0141
206	4.7002	0.0140
207	4.7142	0.0140
208	4.7282	0.0140
209	4.7421	0.0140
210	4.7561	0.0139
211	4.7700	0.0139
212	4.7838	0.0139
213	4.7977	0.0138
214	4.8115	0.0138
215	4.8253	0.0138
216	4.8391	0.0138
217	4.8528	0.0137

218	4.8666	0.0137
219	4.8803	0.0137
220	4.8939	0.0137
221	4.9076	0.0137
222	4.9212	0.0136
223	4.9348	0.0136
224	4.9484	0.0136
225	4.9620	0.0136
226	4.9755	0.0135
227	4.9890	0.0135
228	5.0025	0.0135
229	5.0160	0.0135
230	5.0294	0.0134
231	5.0428	0.0134
232	5.0562	0.0134
233	5.0696	0.0134
234	5.0830	0.0134
235	5.0963	0.0133
236	5.1096	0.0133
237	5.1229	0.0133
238	5.1362	0.0133
239	5.1494	0.0132
240	5.1627	0.0132
241	5.1759	0.0132
242	5.1890	0.0132
243	5.2022	0.0132
244	5.2153	0.0131
245	5.2285	0.0131
246	5.2416	0.0131
247	5.2546	0.0131
248	5.2677	0.0131
249	5.2807	0.0130
250	5.2937	0.0130
251	5.3067	0.0130
252	5.3197	0.0130
253	5.3327	0.0130
254	5.3456	0.0129
255	5.3585	0.0129
256	5.3714	0.0129
257	5.3843	0.0129
258	5.3972	0.0129
259	5.4100	0.0128
260	5.4228	0.0128
261	5.4356	0.0128
262	5.4484	0.0128
263	5.4612	0.0128
264	5.4739	0.0127
265	5.4867	0.0127
266	5.4994	0.0127
267	5.5121	0.0127

268	5.5247	0.0127
269	5.5374	0.0127
270	5.5500	0.0126
271	5.5626	0.0126
272	5.5752	0.0126
273	5.5878	0.0126
274	5.6004	0.0126
275	5.6129	0.0125
276	5.6255	0.0125
277	5.6380	0.0125
278	5.6505	0.0125
279	5.6630	0.0125
280	5.6754	0.0125
281	5.6879	0.0124
282	5.7003	0.0124
283	5.7127	0.0124
284	5.7251	0.0124
285	5.7375	0.0124
286	5.7498	0.0124
287	5.7622	0.0123
288	5.7745	0.0123

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0123	0.0038	0.0085
2	0.0123	0.0038	0.0085
3	0.0124	0.0038	0.0085
4	0.0124	0.0038	0.0086
5	0.0124	0.0038	0.0086
6	0.0124	0.0039	0.0086
7	0.0125	0.0039	0.0086
8	0.0125	0.0039	0.0086
9	0.0125	0.0039	0.0086
10	0.0125	0.0039	0.0087
11	0.0126	0.0039	0.0087
12	0.0126	0.0039	0.0087
13	0.0126	0.0039	0.0087
14	0.0127	0.0039	0.0087
15	0.0127	0.0039	0.0088
16	0.0127	0.0039	0.0088
17	0.0127	0.0039	0.0088
18	0.0128	0.0040	0.0088
19	0.0128	0.0040	0.0088
20	0.0128	0.0040	0.0089
21	0.0129	0.0040	0.0089
22	0.0129	0.0040	0.0089
23	0.0129	0.0040	0.0089
24	0.0129	0.0040	0.0089

25	0.0130	0.0040	0.0090
26	0.0130	0.0040	0.0090
27	0.0130	0.0040	0.0090
28	0.0131	0.0040	0.0090
29	0.0131	0.0041	0.0090
30	0.0131	0.0041	0.0091
31	0.0132	0.0041	0.0091
32	0.0132	0.0041	0.0091
33	0.0132	0.0041	0.0091
34	0.0132	0.0041	0.0091
35	0.0133	0.0041	0.0092
36	0.0133	0.0041	0.0092
37	0.0134	0.0041	0.0092
38	0.0134	0.0041	0.0092
39	0.0134	0.0042	0.0093
40	0.0134	0.0042	0.0093
41	0.0135	0.0042	0.0093
42	0.0135	0.0042	0.0093
43	0.0136	0.0042	0.0094
44	0.0136	0.0042	0.0094
45	0.0136	0.0042	0.0094
46	0.0137	0.0042	0.0094
47	0.0137	0.0042	0.0095
48	0.0137	0.0043	0.0095
49	0.0138	0.0043	0.0095
50	0.0138	0.0043	0.0095
51	0.0138	0.0043	0.0096
52	0.0139	0.0043	0.0096
53	0.0139	0.0043	0.0096
54	0.0140	0.0043	0.0096
55	0.0140	0.0043	0.0097
56	0.0140	0.0043	0.0097
57	0.0141	0.0044	0.0097
58	0.0141	0.0044	0.0097
59	0.0142	0.0044	0.0098
60	0.0142	0.0044	0.0098
61	0.0142	0.0044	0.0098
62	0.0143	0.0044	0.0099
63	0.0143	0.0044	0.0099
64	0.0144	0.0044	0.0099
65	0.0144	0.0045	0.0100
66	0.0144	0.0045	0.0100
67	0.0145	0.0045	0.0100
68	0.0145	0.0045	0.0100
69	0.0146	0.0045	0.0101
70	0.0146	0.0045	0.0101
71	0.0147	0.0045	0.0101
72	0.0147	0.0046	0.0102
73	0.0148	0.0046	0.0102
74	0.0148	0.0046	0.0102

75	0.0149	0.0046	0.0103
76	0.0149	0.0046	0.0103
77	0.0150	0.0046	0.0103
78	0.0150	0.0046	0.0104
79	0.0151	0.0047	0.0104
80	0.0151	0.0047	0.0104
81	0.0152	0.0047	0.0105
82	0.0152	0.0047	0.0105
83	0.0153	0.0047	0.0106
84	0.0153	0.0047	0.0106
85	0.0154	0.0048	0.0106
86	0.0154	0.0048	0.0107
87	0.0155	0.0048	0.0107
88	0.0155	0.0048	0.0107
89	0.0156	0.0048	0.0108
90	0.0157	0.0049	0.0108
91	0.0157	0.0049	0.0109
92	0.0158	0.0049	0.0109
93	0.0159	0.0049	0.0109
94	0.0159	0.0049	0.0110
95	0.0160	0.0050	0.0110
96	0.0160	0.0050	0.0111
97	0.0161	0.0050	0.0111
98	0.0162	0.0050	0.0112
99	0.0162	0.0050	0.0112
100	0.0163	0.0050	0.0112
101	0.0164	0.0051	0.0113
102	0.0164	0.0051	0.0113
103	0.0165	0.0051	0.0114
104	0.0166	0.0051	0.0114
105	0.0167	0.0052	0.0115
106	0.0167	0.0052	0.0115
107	0.0168	0.0052	0.0116
108	0.0169	0.0052	0.0116
109	0.0170	0.0053	0.0117
110	0.0170	0.0053	0.0117
111	0.0171	0.0053	0.0118
112	0.0172	0.0053	0.0119
113	0.0173	0.0054	0.0119
114	0.0173	0.0054	0.0120
115	0.0175	0.0054	0.0121
116	0.0175	0.0054	0.0121
117	0.0176	0.0055	0.0122
118	0.0177	0.0055	0.0122
119	0.0178	0.0055	0.0123
120	0.0179	0.0055	0.0123
121	0.0180	0.0056	0.0124
122	0.0181	0.0056	0.0125
123	0.0182	0.0056	0.0126
124	0.0183	0.0057	0.0126

125	0.0184	0.0057	0.0127
126	0.0185	0.0057	0.0128
127	0.0186	0.0058	0.0129
128	0.0187	0.0058	0.0129
129	0.0189	0.0058	0.0130
130	0.0189	0.0059	0.0131
131	0.0191	0.0059	0.0132
132	0.0192	0.0059	0.0132
133	0.0193	0.0060	0.0133
134	0.0194	0.0060	0.0134
135	0.0196	0.0061	0.0135
136	0.0197	0.0061	0.0136
137	0.0199	0.0062	0.0137
138	0.0199	0.0062	0.0138
139	0.0201	0.0062	0.0139
140	0.0202	0.0063	0.0140
141	0.0204	0.0063	0.0141
142	0.0205	0.0064	0.0142
143	0.0207	0.0064	0.0143
144	0.0209	0.0065	0.0144
145	0.0185	0.0057	0.0127
146	0.0186	0.0058	0.0128
147	0.0188	0.0058	0.0130
148	0.0190	0.0059	0.0131
149	0.0192	0.0060	0.0133
150	0.0194	0.0060	0.0134
151	0.0197	0.0061	0.0136
152	0.0198	0.0061	0.0137
153	0.0201	0.0062	0.0139
154	0.0203	0.0063	0.0140
155	0.0206	0.0064	0.0142
156	0.0208	0.0064	0.0143
157	0.0211	0.0065	0.0146
158	0.0213	0.0066	0.0147
159	0.0217	0.0067	0.0150
160	0.0219	0.0068	0.0151
161	0.0223	0.0069	0.0154
162	0.0225	0.0070	0.0156
163	0.0230	0.0071	0.0159
164	0.0232	0.0072	0.0160
165	0.0237	0.0074	0.0164
166	0.0240	0.0074	0.0166
167	0.0246	0.0076	0.0170
168	0.0249	0.0077	0.0172
169	0.0255	0.0079	0.0176
170	0.0259	0.0080	0.0179
171	0.0266	0.0082	0.0184
172	0.0270	0.0084	0.0186
173	0.0278	0.0086	0.0192
174	0.0283	0.0088	0.0195

175	0.0292	0.0091	0.0202
176	0.0297	0.0092	0.0205
177	0.0309	0.0096	0.0213
178	0.0315	0.0098	0.0218
179	0.0329	0.0102	0.0227
180	0.0337	0.0104	0.0232
181	0.0354	0.0110	0.0244
182	0.0364	0.0113	0.0251
183	0.0386	0.0120	0.0267
184	0.0399	0.0124	0.0276
185	0.0242	0.0075	0.0167
186	0.0258	0.0080	0.0178
187	0.0299	0.0093	0.0207
188	0.0327	0.0101	0.0226
189	0.0406	0.0126	0.0280
190	0.0468	0.0145	0.0323
191	0.0710	0.0220	0.0490
192	0.1031	0.0250	0.0780
193	0.4459	0.0250	0.4209
194	0.0559	0.0173	0.0386
195	0.0361	0.0112	0.0249
196	0.0277	0.0086	0.0191
197	0.0414	0.0128	0.0285
198	0.0374	0.0116	0.0258
199	0.0345	0.0107	0.0238
200	0.0322	0.0100	0.0222
201	0.0303	0.0094	0.0209
202	0.0287	0.0089	0.0198
203	0.0274	0.0085	0.0189
204	0.0262	0.0081	0.0181
205	0.0252	0.0078	0.0174
206	0.0243	0.0075	0.0168
207	0.0235	0.0073	0.0162
208	0.0228	0.0070	0.0157
209	0.0221	0.0068	0.0153
210	0.0215	0.0067	0.0148
211	0.0209	0.0065	0.0145
212	0.0204	0.0063	0.0141
213	0.0200	0.0062	0.0138
214	0.0195	0.0060	0.0135
215	0.0191	0.0059	0.0132
216	0.0187	0.0058	0.0129
217	0.0210	0.0065	0.0145
218	0.0206	0.0064	0.0142
219	0.0203	0.0063	0.0140
220	0.0200	0.0062	0.0138
221	0.0198	0.0061	0.0136
222	0.0195	0.0060	0.0135
223	0.0192	0.0060	0.0133
224	0.0190	0.0059	0.0131

225	0.0188	0.0058	0.0130
226	0.0186	0.0057	0.0128
227	0.0183	0.0057	0.0127
228	0.0181	0.0056	0.0125
229	0.0179	0.0056	0.0124
230	0.0178	0.0055	0.0123
231	0.0176	0.0054	0.0121
232	0.0174	0.0054	0.0120
233	0.0172	0.0053	0.0119
234	0.0171	0.0053	0.0118
235	0.0169	0.0052	0.0117
236	0.0168	0.0052	0.0116
237	0.0166	0.0051	0.0115
238	0.0165	0.0051	0.0114
239	0.0163	0.0051	0.0113
240	0.0162	0.0050	0.0112
241	0.0161	0.0050	0.0111
242	0.0159	0.0049	0.0110
243	0.0158	0.0049	0.0109
244	0.0157	0.0049	0.0108
245	0.0156	0.0048	0.0108
246	0.0155	0.0048	0.0107
247	0.0154	0.0048	0.0106
248	0.0153	0.0047	0.0105
249	0.0151	0.0047	0.0105
250	0.0150	0.0047	0.0104
251	0.0149	0.0046	0.0103
252	0.0148	0.0046	0.0102
253	0.0147	0.0046	0.0102
254	0.0147	0.0045	0.0101
255	0.0146	0.0045	0.0101
256	0.0145	0.0045	0.0100
257	0.0144	0.0045	0.0099
258	0.0143	0.0044	0.0099
259	0.0142	0.0044	0.0098
260	0.0141	0.0044	0.0098
261	0.0141	0.0044	0.0097
262	0.0140	0.0043	0.0096
263	0.0139	0.0043	0.0096
264	0.0138	0.0043	0.0095
265	0.0137	0.0043	0.0095
266	0.0137	0.0042	0.0094
267	0.0136	0.0042	0.0094
268	0.0135	0.0042	0.0093
269	0.0135	0.0042	0.0093
270	0.0134	0.0042	0.0092
271	0.0133	0.0041	0.0092
272	0.0133	0.0041	0.0092
273	0.0132	0.0041	0.0091
274	0.0131	0.0041	0.0091

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      275              0.0131           0.0041             0.0090
      276              0.0130           0.0040             0.0090
      277              0.0130           0.0040             0.0089
      278              0.0129           0.0040             0.0089
      279              0.0128           0.0040             0.0089
      280              0.0128           0.0040             0.0088
      281              0.0127           0.0039             0.0088
      282              0.0127           0.0039             0.0087
      283              0.0126           0.0039             0.0087
      284              0.0126           0.0039             0.0087
      285              0.0125           0.0039             0.0086
      286              0.0125           0.0039             0.0086
      287              0.0124           0.0038             0.0086
      288              0.0124           0.0038             0.0085
      --------------------------------------------------------------------
      --------------------------------------------------------------------
      Total soil rain loss =      1.67(In)
      Total effective rainfall =      4.11(In)
      Peak flow rate in flood hydrograph =      9.10(CFS)
      ---------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
-----------------------------------------------------------------------
  0+ 5       0.0001      0.01  Q         |         |         |         |
  0+10       0.0006      0.07  Q         |         |         |         |
  0+15       0.0021      0.22  Q         |         |         |         |
  0+20       0.0043      0.32  VQ        |         |         |         |
  0+25       0.0068      0.36  VQ        |         |         |         |
  0+30       0.0095      0.39  VQ        |         |         |         |
  0+35       0.0123      0.41  VQ        |         |         |         |
  0+40       0.0152      0.43  VQ        |         |         |         |
  0+45       0.0183      0.44  VQ        |         |         |         |
  0+50       0.0213      0.45  VQ        |         |         |         |
  0+55       0.0244      0.45  VQ        |         |         |         |
  1+ 0       0.0275      0.45  VQ        |         |         |         |
  1+ 5       0.0307      0.45  VQ        |         |         |         |
  1+10       0.0338      0.46  VQ        |         |         |         |
  1+15       0.0370      0.46  VQ        |         |         |         |
  1+20       0.0401      0.46  |Q        |         |         |         |
  1+25       0.0433      0.46  |Q        |         |         |         |
  1+30       0.0465      0.46  |Q        |         |         |         |
  1+35       0.0497      0.46  |Q        |         |         |         |
  1+40       0.0529      0.47  |Q        |         |         |         |
  1+45       0.0562      0.47  |Q        |         |         |         |
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1+50       0.0594      0.47  |Q        |         |         |         |
1+55       0.0626      0.47  |Q        |         |         |         |
2+ 0       0.0658      0.47  |Q        |         |         |         |
2+ 5       0.0691      0.47  |Q        |         |         |         |
2+10       0.0723      0.47  |Q        |         |         |         |
2+15       0.0756      0.47  |QV       |         |         |         |
2+20       0.0789      0.47  |QV       |         |         |         |
2+25       0.0821      0.48  |QV       |         |         |         |
2+30       0.0854      0.48  |QV       |         |         |         |
2+35       0.0887      0.48  |QV       |         |         |         |
2+40       0.0920      0.48  |QV       |         |         |         |
2+45       0.0953      0.48  |QV       |         |         |         |
2+50       0.0986      0.48  |QV       |         |         |         |
2+55       0.1019      0.48  |QV       |         |         |         |
3+ 0       0.1053      0.48  |QV       |         |         |         |
3+ 5       0.1086      0.48  |QV       |         |         |         |
3+10       0.1119      0.49  |QV       |         |         |         |
3+15       0.1153      0.49  |Q V      |         |         |         |
3+20       0.1186      0.49  |Q V      |         |         |         |
3+25       0.1220      0.49  |Q V      |         |         |         |
3+30       0.1254      0.49  |Q V      |         |         |         |
3+35       0.1288      0.49  |Q V      |         |         |         |
3+40       0.1322      0.49  |Q V      |         |         |         |
3+45       0.1356      0.49  |Q V      |         |         |         |
3+50       0.1390      0.50  |Q V      |         |         |         |
3+55       0.1424      0.50  |Q V      |         |         |         |
4+ 0       0.1458      0.50  |Q V      |         |         |         |
4+ 5       0.1493      0.50  |Q V      |         |         |         |
4+10       0.1527      0.50  | Q V     |         |         |         |
4+15       0.1562      0.50  | Q V     |         |         |         |
4+20       0.1596      0.50  | Q V     |         |         |         |
4+25       0.1631      0.50  | Q V     |         |         |         |
4+30       0.1666      0.51  | Q V     |         |         |         |
4+35       0.1701      0.51  | Q V     |         |         |         |
4+40       0.1736      0.51  | Q V     |         |         |         |
4+45       0.1771      0.51  | Q V     |         |         |         |
4+50       0.1806      0.51  | Q V     |         |         |         |
4+55       0.1842      0.51  | Q V     |         |         |         |
5+ 0       0.1877      0.51  | Q  V    |         |         |         |
5+ 5       0.1913      0.52  | Q  V    |         |         |         |
5+10       0.1948      0.52  | Q  V    |         |         |         |
5+15       0.1984      0.52  | Q  V    |         |         |         |
5+20       0.2020      0.52  | Q  V    |         |         |         |
5+25       0.2056      0.52  | Q  V    |         |         |         |
5+30       0.2092      0.52  | Q  V    |         |         |         |
5+35       0.2128      0.52  | Q  V    |         |         |         |
5+40       0.2164      0.53  | Q  V    |         |         |         |
5+45       0.2200      0.53  | Q  V    |         |         |         |
5+50       0.2237      0.53  | Q  V    |         |         |         |
5+55       0.2274      0.53  | Q   V   |         |         |         |
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 6+ 0       0.2310      0.53  | Q   V   |         |         |         |
 6+ 5       0.2347      0.53  | Q   V   |         |         |         |
 6+10       0.2384      0.54  | Q   V   |         |         |         |
 6+15       0.2421      0.54  | Q   V   |         |         |         |
 6+20       0.2458      0.54  | Q   V   |         |         |         |
 6+25       0.2496      0.54  | Q   V   |         |         |         |
 6+30       0.2533      0.54  | Q   V   |         |         |         |
 6+35       0.2571      0.55  | Q   V   |         |         |         |
 6+40       0.2608      0.55  | Q   V   |         |         |         |
 6+45       0.2646      0.55  | Q    V  |         |         |         |
 6+50       0.2684      0.55  | Q    V  |         |         |         |
 6+55       0.2722      0.55  | Q    V  |         |         |         |
 7+ 0       0.2760      0.55  | Q    V  |         |         |         |
 7+ 5       0.2798      0.56  | Q    V  |         |         |         |
 7+10       0.2837      0.56  | Q    V  |         |         |         |
 7+15       0.2875      0.56  | Q    V  |         |         |         |
 7+20       0.2914      0.56  | Q    V  |         |         |         |
 7+25       0.2953      0.56  | Q    V  |         |         |         |
 7+30       0.2992      0.57  | Q    V  |         |         |         |
 7+35       0.3031      0.57  | Q     V |         |         |         |
 7+40       0.3070      0.57  | Q     V |         |         |         |
 7+45       0.3110      0.57  | Q     V |         |         |         |
 7+50       0.3149      0.57  | Q     V |         |         |         |
 7+55       0.3189      0.58  | Q     V |         |         |         |
 8+ 0       0.3229      0.58  | Q     V |         |         |         |
 8+ 5       0.3269      0.58  | Q     V |         |         |         |
 8+10       0.3309      0.58  | Q     V |         |         |         |
 8+15       0.3350      0.59  | Q     V |         |         |         |
 8+20       0.3390      0.59  | Q      V|         |         |         |
 8+25       0.3431      0.59  | Q      V|         |         |         |
 8+30       0.3472      0.59  | Q      V|         |         |         |
 8+35       0.3513      0.60  | Q      V|         |         |         |
 8+40       0.3554      0.60  | Q      V|         |         |         |
 8+45       0.3595      0.60  | Q      V|         |         |         |
 8+50       0.3637      0.60  | Q      V|         |         |         |
 8+55       0.3679      0.61  | Q      V|         |         |         |
 9+ 0       0.3720      0.61  | Q      V|         |         |         |
 9+ 5       0.3763      0.61  | Q       V         |         |         |
 9+10       0.3805      0.61  | Q       V         |         |         |
 9+15       0.3847      0.62  | Q       V         |         |         |
 9+20       0.3890      0.62  | Q       V         |         |         |
 9+25       0.3933      0.62  | Q       V         |         |         |
 9+30       0.3976      0.63  | Q       V         |         |         |
 9+35       0.4019      0.63  | Q       V         |         |         |
 9+40       0.4063      0.63  | Q       V         |         |         |
 9+45       0.4106      0.63  | Q       V         |         |         |
 9+50       0.4150      0.64  | Q       |V        |         |         |
 9+55       0.4194      0.64  | Q       |V        |         |         |
10+ 0       0.4239      0.64  | Q       |V        |         |         |
10+ 5       0.4283      0.65  | Q       |V        |         |         |
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10+10       0.4328      0.65  | Q       |V        |         |         |
10+15       0.4373      0.65  | Q       |V        |         |         |
10+20       0.4418      0.66  | Q       |V        |         |         |
10+25       0.4464      0.66  | Q       |V        |         |         |
10+30       0.4510      0.66  | Q       | V       |         |         |
10+35       0.4556      0.67  | Q       | V       |         |         |
10+40       0.4602      0.67  | Q       | V       |         |         |
10+45       0.4649      0.68  | Q       | V       |         |         |
10+50       0.4695      0.68  | Q       | V       |         |         |
10+55       0.4742      0.68  | Q       | V       |         |         |
11+ 0       0.4790      0.69  | Q       | V       |         |         |
11+ 5       0.4837      0.69  | Q       | V       |         |         |
11+10       0.4885      0.70  | Q       |  V      |         |         |
11+15       0.4934      0.70  | Q       |  V      |         |         |
11+20       0.4982      0.71  | Q       |  V      |         |         |
11+25       0.5031      0.71  | Q       |  V      |         |         |
11+30       0.5080      0.71  | Q       |  V      |         |         |
11+35       0.5130      0.72  | Q       |  V      |         |         |
11+40       0.5180      0.72  | Q       |  V      |         |         |
11+45       0.5230      0.73  | Q       |  V      |         |         |
11+50       0.5281      0.73  | Q       |   V     |         |         |
11+55       0.5332      0.74  | Q       |   V     |         |         |
12+ 0       0.5383      0.75  | Q       |   V     |         |         |
12+ 5       0.5434      0.75  | Q       |   V     |         |         |
12+10       0.5486      0.74  | Q       |   V     |         |         |
12+15       0.5535      0.72  | Q       |   V     |         |         |
12+20       0.5583      0.70  | Q       |   V     |         |         |
12+25       0.5631      0.70  | Q       |    V    |         |         |
12+30       0.5680      0.70  | Q       |    V    |         |         |
12+35       0.5728      0.70  | Q       |    V    |         |         |
12+40       0.5777      0.71  | Q       |    V    |         |         |
12+45       0.5826      0.71  | Q       |    V    |         |         |
12+50       0.5875      0.72  | Q       |    V    |         |         |
12+55       0.5925      0.73  | Q       |    V    |         |         |
13+ 0       0.5976      0.73  | Q       |    V    |         |         |
13+ 5       0.6027      0.74  | Q       |     V   |         |         |
13+10       0.6079      0.75  |  Q      |     V   |         |         |
13+15       0.6131      0.76  |  Q      |     V   |         |         |
13+20       0.6184      0.77  |  Q      |     V   |         |         |
13+25       0.6238      0.78  |  Q      |     V   |         |         |
13+30       0.6292      0.79  |  Q      |     V   |         |         |
13+35       0.6347      0.80  |  Q      |     V   |         |         |
13+40       0.6403      0.81  |  Q      |      V  |         |         |
13+45       0.6460      0.82  |  Q      |      V  |         |         |
13+50       0.6518      0.84  |  Q      |      V  |         |         |
13+55       0.6576      0.85  |  Q      |      V  |         |         |
14+ 0       0.6636      0.86  |  Q      |      V  |         |         |
14+ 5       0.6696      0.88  |  Q      |      V  |         |         |
14+10       0.6758      0.89  |  Q      |       V |         |         |
14+15       0.6821      0.91  |  Q      |       V |         |         |
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14+20       0.6885      0.93  |  Q      |       V |         |         |
14+25       0.6950      0.95  |  Q      |       V |         |         |
14+30       0.7017      0.97  |  Q      |       V |         |         |
14+35       0.7085      0.99  |  Q      |       V |         |         |
14+40       0.7154      1.01  |   Q     |        V|         |         |
14+45       0.7226      1.04  |   Q     |        V|         |         |
14+50       0.7299      1.06  |   Q     |        V|         |         |
14+55       0.7374      1.09  |   Q     |        V|         |         |
15+ 0       0.7451      1.12  |   Q     |        V|         |         |
15+ 5       0.7531      1.16  |   Q     |         V         |         |
15+10       0.7614      1.20  |   Q     |         V         |         |
15+15       0.7699      1.24  |   Q     |         V         |         |
15+20       0.7788      1.29  |    Q    |         V         |         |
15+25       0.7879      1.32  |    Q    |         |V        |         |
15+30       0.7968      1.30  |    Q    |         |V        |         |
15+35       0.8047      1.14  |   Q     |         |V        |         |
15+40       0.8122      1.08  |   Q     |         |V        |         |
15+45       0.8199      1.12  |   Q     |         |V        |         |
15+50       0.8282      1.21  |   Q     |         | V       |         |
15+55       0.8377      1.38  |    Q    |         | V       |         |
16+ 0       0.8493      1.68  |     Q   |         | V       |         |
16+ 5       0.8688      2.84  |         |Q        |  V      |         |
16+10       0.9047      5.21  |         |         Q   V     |         |
16+15       0.9674      9.10  |         |         |    V    |     Q   |
16+20       1.0109      6.32  |         |         |    QV   |         |
16+25       1.0366      3.73  |         |   Q     |      V  |         |
16+30       1.0562      2.84  |         |Q        |       V |         |
16+35       1.0730      2.45  |        Q|         |       V |         |
16+40       1.0877      2.13  |       Q |         |        V|         |
16+45       1.1003      1.82  |      Q  |         |        V|         |
16+50       1.1111      1.57  |     Q   |         |        V|         |
16+55       1.1203      1.34  |    Q    |         |        V|         |
17+ 0       1.1288      1.23  |   Q     |         |         V         |
17+ 5       1.1367      1.16  |   Q     |         |         V         |
17+10       1.1442      1.09  |   Q     |         |         V         |
17+15       1.1515      1.05  |   Q     |         |         V         |
17+20       1.1583      0.99  |  Q      |         |         V         |
17+25       1.1647      0.94  |  Q      |         |         |V        |
17+30       1.1708      0.88  |  Q      |         |         |V        |
17+35       1.1766      0.85  |  Q      |         |         |V        |
17+40       1.1822      0.82  |  Q      |         |         |V        |
17+45       1.1877      0.80  |  Q      |         |         |V        |
17+50       1.1931      0.78  |  Q      |         |         |V        |
17+55       1.1983      0.76  |  Q      |         |         | V       |
18+ 0       1.2034      0.74  | Q       |         |         | V       |
18+ 5       1.2084      0.72  | Q       |         |         | V       |
18+10       1.2133      0.72  | Q       |         |         | V       |
18+15       1.2184      0.74  | Q       |         |         | V       |
18+20       1.2235      0.74  | Q       |         |         | V       |
18+25       1.2286      0.74  | Q       |         |         | V       |
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18+30       1.2337      0.74  | Q       |         |         | V       |
18+35       1.2387      0.73  | Q       |         |         |  V      |
18+40       1.2437      0.72  | Q       |         |         |  V      |
18+45       1.2486      0.71  | Q       |         |         |  V      |
18+50       1.2534      0.70  | Q       |         |         |  V      |
18+55       1.2582      0.70  | Q       |         |         |  V      |
19+ 0       1.2630      0.69  | Q       |         |         |  V      |
19+ 5       1.2677      0.68  | Q       |         |         |  V      |
19+10       1.2723      0.67  | Q       |         |         |  V      |
19+15       1.2769      0.67  | Q       |         |         |   V     |
19+20       1.2814      0.66  | Q       |         |         |   V     |
19+25       1.2859      0.65  | Q       |         |         |   V     |
19+30       1.2903      0.64  | Q       |         |         |   V     |
19+35       1.2947      0.64  | Q       |         |         |   V     |
19+40       1.2991      0.63  | Q       |         |         |   V     |
19+45       1.3034      0.63  | Q       |         |         |   V     |
19+50       1.3077      0.62  | Q       |         |         |   V     |
19+55       1.3119      0.61  | Q       |         |         |    V    |
20+ 0       1.3161      0.61  | Q       |         |         |    V    |
20+ 5       1.3203      0.60  | Q       |         |         |    V    |
20+10       1.3244      0.60  | Q       |         |         |    V    |
20+15       1.3285      0.59  | Q       |         |         |    V    |
20+20       1.3325      0.59  | Q       |         |         |    V    |
20+25       1.3366      0.58  | Q       |         |         |    V    |
20+30       1.3406      0.58  | Q       |         |         |    V    |
20+35       1.3445      0.58  | Q       |         |         |    V    |
20+40       1.3484      0.57  | Q       |         |         |     V   |
20+45       1.3524      0.57  | Q       |         |         |     V   |
20+50       1.3562      0.56  | Q       |         |         |     V   |
20+55       1.3601      0.56  | Q       |         |         |     V   |
21+ 0       1.3639      0.55  | Q       |         |         |     V   |
21+ 5       1.3677      0.55  | Q       |         |         |     V   |
21+10       1.3715      0.55  | Q       |         |         |     V   |
21+15       1.3752      0.54  | Q       |         |         |     V   |
21+20       1.3789      0.54  | Q       |         |         |     V   |
21+25       1.3826      0.54  | Q       |         |         |     V   |
21+30       1.3863      0.53  | Q       |         |         |      V  |
21+35       1.3900      0.53  | Q       |         |         |      V  |
21+40       1.3936      0.53  | Q       |         |         |      V  |
21+45       1.3972      0.52  | Q       |         |         |      V  |
21+50       1.4008      0.52  | Q       |         |         |      V  |
21+55       1.4043      0.52  | Q       |         |         |      V  |
22+ 0       1.4079      0.51  | Q       |         |         |      V  |
22+ 5       1.4114      0.51  | Q       |         |         |      V  |
22+10       1.4149      0.51  | Q       |         |         |      V  |
22+15       1.4184      0.51  | Q       |         |         |      V  |
22+20       1.4219      0.50  | Q       |         |         |      V  |
22+25       1.4253      0.50  | Q       |         |         |       V |
22+30       1.4288      0.50  |Q        |         |         |       V |
22+35       1.4322      0.50  |Q        |         |         |       V |
```

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  22+40        1.4356      0.49  |Q         |         |         |       V |
  22+45        1.4389      0.49  |Q         |         |         |       V |
  22+50        1.4423      0.49  |Q         |         |         |       V |
  22+55        1.4456      0.49  |Q         |         |         |       V |
  23+ 0        1.4490      0.48  |Q         |         |         |       V |
  23+ 5        1.4523      0.48  |Q         |         |         |       V |
  23+10        1.4556      0.48  |Q         |         |         |       V |
  23+15        1.4589      0.48  |Q         |         |         |       V |
  23+20        1.4621      0.47  |Q         |         |         |        V|
  23+25        1.4654      0.47  |Q         |         |         |        V|
  23+30        1.4686      0.47  |Q         |         |         |        V|
  23+35        1.4718      0.47  |Q         |         |         |        V|
  23+40        1.4751      0.47  |Q         |         |         |        V|
  23+45        1.4783      0.46  |Q         |         |         |        V|
  23+50        1.4814      0.46  |Q         |         |         |        V|
  23+55        1.4846      0.46  |Q         |         |         |        V|
  24+ 0        1.4878      0.46  |Q         |         |         |        V|
  24+ 5        1.4908      0.44  |Q         |         |         |        V|
  24+10        1.4934      0.38  |Q         |         |         |        V|
  24+15        1.4950      0.23  Q          |         |         |        V|
  24+20        1.4960      0.14  Q          |         |         |        V|
  24+25        1.4966      0.09  Q          |         |         |        V|
  24+30        1.4970      0.06  Q          |         |         |        V|
  24+35        1.4973      0.04  Q          |         |         |        V|
  24+40        1.4975      0.03  Q          |         |         |        V|
  24+45        1.4976      0.02  Q          |         |         |        V|
  24+50        1.4977      0.01  Q          |         |         |        V|
  24+55        1.4978      0.01  Q          |         |         |        V|
  25+ 0        1.4978      0.01  Q          |         |         |        V|
  25+ 5        1.4978      0.00  Q          |         |         |        V|
  25+10        1.4978      0.00  Q          |         |         |        V|
  25+15        1.4979      0.00  Q          |         |         |        V|
  25+20        1.4979      0.00  Q          |         |         |         V
-----------------------------------------------------------------------
```

U n i t   H y d r o g r a p h   A n a l y s i s

Study date 02/26/21

+++

San Bernardino County Synthetic Unit Hydrology Method
Manual date - August 1986

Program License Serial Number 6481

Paradise Ranch
10 yr Hydrograph
DA39

Storm Event Year = 10

Antecedent Moisture Condition = 2

English (in-lb) Input Units Used

English Rainfall Data (Inches) Input Values Used

English Units used in output format

Area averaged rainfall intensity isohyetal data:

Sub-Area (Ac.)	Duration (hours)	Isohyetal (In)
Rainfall data for year 10		
5.08	1	0.94
Rainfall data for year 2		
5.08	6	3.25
Rainfall data for year 2		
5.08	24	3.52
Rainfall data for year 100		

```
            5.08           1           1.50
--------------------------------------------------------------------
Rainfall data for year 100
            5.08           6           1.34
--------------------------------------------------------------------
Rainfall data for year 100
            5.08          24           9.00
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

******** Area-averaged max loss rate, Fm ********


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 2)    (Ac.)    Fraction    (In/Hr)  (dec.)   (In/Hr)
 84.0      84.0          5.08      1.000     0.301    1.000    0.301

Area-averaged adjusted loss rate Fm (In/Hr) =  0.301

********* Area-Averaged low loss rate fraction, Yb **********

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC2)           Yield Fr
     5.08   1.000         84.0      84.0       1.90     0.690

Area-averaged catchment yield fraction, Y =  0.690
Area-averaged low loss fraction, Yb =  0.310
User entry of time of concentration  =   0.204 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       5.08(Ac.)
Catchment Lag time =   0.163 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 51.0621
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.301(In/Hr)
Average low loss rate fraction (Yb) = 0.310 (decimal)
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall =  0.446(In)
Computed peak 30-minute rainfall =  0.764(In)
Specified peak 1-hour rainfall =  0.940(In)
Computed peak 3-hour rainfall =  1.697(In)
Specified peak 6-hour rainfall =  2.464(In)
Specified peak 24-hour rainfall =  5.775(In)


Rainfall depth area reduction factors:
Using a total area of       5.08(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.446(In)
30-minute factor = 1.000    Adjusted rainfall =  0.763(In)
```

```
1-hour factor = 1.000       Adjusted rainfall =  0.940(In)
3-hour factor = 1.000       Adjusted rainfall =  1.697(In)
6-hour factor = 1.000       Adjusted rainfall =  2.464(In)
24-hour factor = 1.000      Adjusted rainfall =  5.774(In)
---------------------------------------------------------------------

                        U n i t  H y d r o g r a p h
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph          Unit Hydrograph
Number            Mean values            ((CFS))
---------------------------------------------------------------------
                (K =        61.44 (CFS))

  1                4.409                     2.709
  2               25.936                    13.225
  3               63.898                    23.322
  4               78.235                     8.808
  5               86.466                     5.057
  6               91.800                     3.277
  7               95.273                     2.133
  8               97.375                     1.292
  9               98.307                     0.572
 10               98.846                     0.332
 11               99.220                     0.229
 12               99.591                     0.228
 13               99.849                     0.159
 14              100.000                     0.093
---------------------------------------------------------------------
Peak Unit   Adjusted mass rainfall  Unit rainfall
Number              (In)                (In)
  1              0.4459              0.4459
  2              0.5490              0.1031
  3              0.6200              0.0710
  4              0.6759              0.0559
  5              0.7227              0.0468
  6              0.7633              0.0406
  7              0.7995              0.0361
  8              0.8321              0.0327
  9              0.8621              0.0299
 10              0.8898              0.0277
 11              0.9156              0.0258
 12              0.9398              0.0242
 13              0.9811              0.0414
 14              1.0210              0.0399
 15              1.0597              0.0386
 16              1.0971              0.0374
 17              1.1335              0.0364
 18              1.1689              0.0354
 19              1.2034              0.0345
 20              1.2371              0.0337
```

21	1.2700	0.0329
22	1.3022	0.0322
23	1.3337	0.0315
24	1.3646	0.0309
25	1.3949	0.0303
26	1.4246	0.0297
27	1.4539	0.0292
28	1.4826	0.0287
29	1.5108	0.0283
30	1.5387	0.0278
31	1.5660	0.0274
32	1.5930	0.0270
33	1.6196	0.0266
34	1.6459	0.0262
35	1.6717	0.0259
36	1.6973	0.0255
37	1.7225	0.0252
38	1.7473	0.0249
39	1.7719	0.0246
40	1.7962	0.0243
41	1.8202	0.0240
42	1.8440	0.0237
43	1.8675	0.0235
44	1.8907	0.0232
45	1.9137	0.0230
46	1.9365	0.0228
47	1.9590	0.0225
48	1.9813	0.0223
49	2.0034	0.0221
50	2.0253	0.0219
51	2.0470	0.0217
52	2.0685	0.0215
53	2.0898	0.0213
54	2.1109	0.0211
55	2.1318	0.0209
56	2.1526	0.0208
57	2.1732	0.0206
58	2.1936	0.0204
59	2.2139	0.0203
60	2.2340	0.0201
61	2.2539	0.0200
62	2.2737	0.0198
63	2.2934	0.0197
64	2.3129	0.0195
65	2.3323	0.0194
66	2.3515	0.0192
67	2.3706	0.0191
68	2.3896	0.0190
69	2.4084	0.0188
70	2.4271	0.0187

71	2.4457	0.0186
72	2.4642	0.0185
73	2.4851	0.0210
74	2.5060	0.0209
75	2.5267	0.0207
76	2.5474	0.0206
77	2.5679	0.0205
78	2.5884	0.0204
79	2.6087	0.0203
80	2.6289	0.0202
81	2.6491	0.0201
82	2.6691	0.0200
83	2.6891	0.0199
84	2.7089	0.0199
85	2.7287	0.0198
86	2.7484	0.0197
87	2.7679	0.0196
88	2.7874	0.0195
89	2.8069	0.0194
90	2.8262	0.0193
91	2.8454	0.0192
92	2.8646	0.0192
93	2.8837	0.0191
94	2.9027	0.0190
95	2.9216	0.0189
96	2.9405	0.0189
97	2.9593	0.0188
98	2.9780	0.0187
99	2.9966	0.0186
100	3.0152	0.0186
101	3.0336	0.0185
102	3.0521	0.0184
103	3.0704	0.0183
104	3.0887	0.0183
105	3.1069	0.0182
106	3.1250	0.0181
107	3.1431	0.0181
108	3.1611	0.0180
109	3.1791	0.0179
110	3.1970	0.0179
111	3.2148	0.0178
112	3.2325	0.0178
113	3.2502	0.0177
114	3.2679	0.0176
115	3.2855	0.0176
116	3.3030	0.0175
117	3.3204	0.0175
118	3.3379	0.0174
119	3.3552	0.0173
120	3.3725	0.0173

121	3.3897	0.0172
122	3.4069	0.0172
123	3.4240	0.0171
124	3.4411	0.0171
125	3.4581	0.0170
126	3.4751	0.0170
127	3.4920	0.0169
128	3.5089	0.0169
129	3.5257	0.0168
130	3.5425	0.0168
131	3.5592	0.0167
132	3.5758	0.0167
133	3.5925	0.0166
134	3.6090	0.0166
135	3.6256	0.0165
136	3.6420	0.0165
137	3.6585	0.0164
138	3.6748	0.0164
139	3.6912	0.0163
140	3.7075	0.0163
141	3.7237	0.0162
142	3.7399	0.0162
143	3.7561	0.0162
144	3.7722	0.0161
145	3.7882	0.0161
146	3.8043	0.0160
147	3.8203	0.0160
148	3.8362	0.0159
149	3.8521	0.0159
150	3.8680	0.0159
151	3.8838	0.0158
152	3.8996	0.0158
153	3.9153	0.0157
154	3.9310	0.0157
155	3.9467	0.0157
156	3.9623	0.0156
157	3.9779	0.0156
158	3.9934	0.0155
159	4.0089	0.0155
160	4.0244	0.0155
161	4.0398	0.0154
162	4.0552	0.0154
163	4.0706	0.0154
164	4.0859	0.0153
165	4.1012	0.0153
166	4.1164	0.0153
167	4.1317	0.0152
168	4.1468	0.0152
169	4.1620	0.0151
170	4.1771	0.0151

171	4.1922	0.0151
172	4.2072	0.0150
173	4.2222	0.0150
174	4.2372	0.0150
175	4.2521	0.0149
176	4.2670	0.0149
177	4.2819	0.0149
178	4.2968	0.0148
179	4.3116	0.0148
180	4.3264	0.0148
181	4.3411	0.0147
182	4.3558	0.0147
183	4.3705	0.0147
184	4.3852	0.0147
185	4.3998	0.0146
186	4.4144	0.0146
187	4.4290	0.0146
188	4.4435	0.0145
189	4.4580	0.0145
190	4.4725	0.0145
191	4.4869	0.0144
192	4.5013	0.0144
193	4.5157	0.0144
194	4.5301	0.0144
195	4.5444	0.0143
196	4.5587	0.0143
197	4.5730	0.0143
198	4.5872	0.0142
199	4.6014	0.0142
200	4.6156	0.0142
201	4.6298	0.0142
202	4.6439	0.0141
203	4.6580	0.0141
204	4.6721	0.0141
205	4.6862	0.0141
206	4.7002	0.0140
207	4.7142	0.0140
208	4.7282	0.0140
209	4.7421	0.0140
210	4.7561	0.0139
211	4.7700	0.0139
212	4.7838	0.0139
213	4.7977	0.0138
214	4.8115	0.0138
215	4.8253	0.0138
216	4.8391	0.0138
217	4.8528	0.0137
218	4.8666	0.0137
219	4.8803	0.0137
220	4.8939	0.0137

221	4.9076	0.0137
222	4.9212	0.0136
223	4.9348	0.0136
224	4.9484	0.0136
225	4.9620	0.0136
226	4.9755	0.0135
227	4.9890	0.0135
228	5.0025	0.0135
229	5.0160	0.0135
230	5.0294	0.0134
231	5.0428	0.0134
232	5.0562	0.0134
233	5.0696	0.0134
234	5.0830	0.0134
235	5.0963	0.0133
236	5.1096	0.0133
237	5.1229	0.0133
238	5.1362	0.0133
239	5.1494	0.0132
240	5.1626	0.0132
241	5.1758	0.0132
242	5.1890	0.0132
243	5.2022	0.0132
244	5.2153	0.0131
245	5.2285	0.0131
246	5.2416	0.0131
247	5.2546	0.0131
248	5.2677	0.0131
249	5.2807	0.0130
250	5.2937	0.0130
251	5.3067	0.0130
252	5.3197	0.0130
253	5.3327	0.0130
254	5.3456	0.0129
255	5.3585	0.0129
256	5.3714	0.0129
257	5.3843	0.0129
258	5.3972	0.0129
259	5.4100	0.0128
260	5.4228	0.0128
261	5.4356	0.0128
262	5.4484	0.0128
263	5.4612	0.0128
264	5.4739	0.0127
265	5.4867	0.0127
266	5.4994	0.0127
267	5.5121	0.0127
268	5.5247	0.0127
269	5.5374	0.0127
270	5.5500	0.0126

271	5.5626	0.0126
272	5.5752	0.0126
273	5.5878	0.0126
274	5.6004	0.0126
275	5.6129	0.0125
276	5.6255	0.0125
277	5.6380	0.0125
278	5.6505	0.0125
279	5.6630	0.0125
280	5.6754	0.0125
281	5.6879	0.0124
282	5.7003	0.0124
283	5.7127	0.0124
284	5.7251	0.0124
285	5.7375	0.0124
286	5.7498	0.0124
287	5.7622	0.0123
288	5.7745	0.0123

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0123	0.0038	0.0085
2	0.0123	0.0038	0.0085
3	0.0124	0.0038	0.0085
4	0.0124	0.0038	0.0086
5	0.0124	0.0038	0.0086
6	0.0124	0.0039	0.0086
7	0.0125	0.0039	0.0086
8	0.0125	0.0039	0.0086
9	0.0125	0.0039	0.0086
10	0.0125	0.0039	0.0087
11	0.0126	0.0039	0.0087
12	0.0126	0.0039	0.0087
13	0.0126	0.0039	0.0087
14	0.0127	0.0039	0.0087
15	0.0127	0.0039	0.0088
16	0.0127	0.0039	0.0088
17	0.0127	0.0039	0.0088
18	0.0128	0.0040	0.0088
19	0.0128	0.0040	0.0088
20	0.0128	0.0040	0.0089
21	0.0129	0.0040	0.0089
22	0.0129	0.0040	0.0089
23	0.0129	0.0040	0.0089
24	0.0129	0.0040	0.0089
25	0.0130	0.0040	0.0090
26	0.0130	0.0040	0.0090
27	0.0130	0.0040	0.0090

28	0.0131	0.0040	0.0090
29	0.0131	0.0041	0.0090
30	0.0131	0.0041	0.0091
31	0.0132	0.0041	0.0091
32	0.0132	0.0041	0.0091
33	0.0132	0.0041	0.0091
34	0.0132	0.0041	0.0091
35	0.0133	0.0041	0.0092
36	0.0133	0.0041	0.0092
37	0.0134	0.0041	0.0092
38	0.0134	0.0041	0.0092
39	0.0134	0.0042	0.0093
40	0.0134	0.0042	0.0093
41	0.0135	0.0042	0.0093
42	0.0135	0.0042	0.0093
43	0.0136	0.0042	0.0094
44	0.0136	0.0042	0.0094
45	0.0136	0.0042	0.0094
46	0.0137	0.0042	0.0094
47	0.0137	0.0042	0.0095
48	0.0137	0.0043	0.0095
49	0.0138	0.0043	0.0095
50	0.0138	0.0043	0.0095
51	0.0138	0.0043	0.0096
52	0.0139	0.0043	0.0096
53	0.0139	0.0043	0.0096
54	0.0140	0.0043	0.0096
55	0.0140	0.0043	0.0097
56	0.0140	0.0043	0.0097
57	0.0141	0.0044	0.0097
58	0.0141	0.0044	0.0097
59	0.0142	0.0044	0.0098
60	0.0142	0.0044	0.0098
61	0.0142	0.0044	0.0098
62	0.0143	0.0044	0.0099
63	0.0143	0.0044	0.0099
64	0.0144	0.0044	0.0099
65	0.0144	0.0045	0.0100
66	0.0144	0.0045	0.0100
67	0.0145	0.0045	0.0100
68	0.0145	0.0045	0.0100
69	0.0146	0.0045	0.0101
70	0.0146	0.0045	0.0101
71	0.0147	0.0045	0.0101
72	0.0147	0.0046	0.0102
73	0.0148	0.0046	0.0102
74	0.0148	0.0046	0.0102
75	0.0149	0.0046	0.0103
76	0.0149	0.0046	0.0103
77	0.0150	0.0046	0.0103

78	0.0150	0.0046	0.0104
79	0.0151	0.0047	0.0104
80	0.0151	0.0047	0.0104
81	0.0152	0.0047	0.0105
82	0.0152	0.0047	0.0105
83	0.0153	0.0047	0.0106
84	0.0153	0.0047	0.0106
85	0.0154	0.0048	0.0106
86	0.0154	0.0048	0.0107
87	0.0155	0.0048	0.0107
88	0.0155	0.0048	0.0107
89	0.0156	0.0048	0.0108
90	0.0157	0.0049	0.0108
91	0.0157	0.0049	0.0109
92	0.0158	0.0049	0.0109
93	0.0159	0.0049	0.0109
94	0.0159	0.0049	0.0110
95	0.0160	0.0050	0.0110
96	0.0160	0.0050	0.0111
97	0.0161	0.0050	0.0111
98	0.0162	0.0050	0.0112
99	0.0162	0.0050	0.0112
100	0.0163	0.0050	0.0112
101	0.0164	0.0051	0.0113
102	0.0164	0.0051	0.0113
103	0.0165	0.0051	0.0114
104	0.0166	0.0051	0.0114
105	0.0167	0.0052	0.0115
106	0.0167	0.0052	0.0115
107	0.0168	0.0052	0.0116
108	0.0169	0.0052	0.0116
109	0.0170	0.0053	0.0117
110	0.0170	0.0053	0.0117
111	0.0171	0.0053	0.0118
112	0.0172	0.0053	0.0119
113	0.0173	0.0054	0.0119
114	0.0173	0.0054	0.0120
115	0.0175	0.0054	0.0121
116	0.0175	0.0054	0.0121
117	0.0176	0.0055	0.0122
118	0.0177	0.0055	0.0122
119	0.0178	0.0055	0.0123
120	0.0179	0.0055	0.0123
121	0.0180	0.0056	0.0124
122	0.0181	0.0056	0.0125
123	0.0182	0.0056	0.0126
124	0.0183	0.0057	0.0126
125	0.0184	0.0057	0.0127
126	0.0185	0.0057	0.0128
127	0.0186	0.0058	0.0129

128	0.0187	0.0058	0.0129
129	0.0189	0.0058	0.0130
130	0.0189	0.0059	0.0131
131	0.0191	0.0059	0.0132
132	0.0192	0.0059	0.0132
133	0.0193	0.0060	0.0133
134	0.0194	0.0060	0.0134
135	0.0196	0.0061	0.0135
136	0.0197	0.0061	0.0136
137	0.0199	0.0062	0.0137
138	0.0199	0.0062	0.0138
139	0.0201	0.0062	0.0139
140	0.0202	0.0063	0.0140
141	0.0204	0.0063	0.0141
142	0.0205	0.0064	0.0142
143	0.0207	0.0064	0.0143
144	0.0209	0.0065	0.0144
145	0.0185	0.0057	0.0127
146	0.0186	0.0058	0.0128
147	0.0188	0.0058	0.0130
148	0.0190	0.0059	0.0131
149	0.0192	0.0060	0.0133
150	0.0194	0.0060	0.0134
151	0.0197	0.0061	0.0136
152	0.0198	0.0061	0.0137
153	0.0201	0.0062	0.0139
154	0.0203	0.0063	0.0140
155	0.0206	0.0064	0.0142
156	0.0208	0.0064	0.0143
157	0.0211	0.0065	0.0146
158	0.0213	0.0066	0.0147
159	0.0217	0.0067	0.0150
160	0.0219	0.0068	0.0151
161	0.0223	0.0069	0.0154
162	0.0225	0.0070	0.0156
163	0.0230	0.0071	0.0159
164	0.0232	0.0072	0.0160
165	0.0237	0.0074	0.0164
166	0.0240	0.0074	0.0166
167	0.0246	0.0076	0.0170
168	0.0249	0.0077	0.0172
169	0.0255	0.0079	0.0176
170	0.0259	0.0080	0.0179
171	0.0266	0.0082	0.0184
172	0.0270	0.0084	0.0186
173	0.0278	0.0086	0.0192
174	0.0283	0.0088	0.0195
175	0.0292	0.0091	0.0202
176	0.0297	0.0092	0.0205
177	0.0309	0.0096	0.0213

178	0.0315	0.0098	0.0218
179	0.0329	0.0102	0.0227
180	0.0337	0.0104	0.0232
181	0.0354	0.0110	0.0244
182	0.0364	0.0113	0.0251
183	0.0386	0.0120	0.0267
184	0.0399	0.0124	0.0276
185	0.0242	0.0075	0.0167
186	0.0258	0.0080	0.0178
187	0.0299	0.0093	0.0207
188	0.0327	0.0101	0.0226
189	0.0406	0.0126	0.0280
190	0.0468	0.0145	0.0323
191	0.0710	0.0220	0.0490
192	0.1031	0.0250	0.0780
193	0.4459	0.0250	0.4209
194	0.0559	0.0173	0.0386
195	0.0361	0.0112	0.0249
196	0.0277	0.0086	0.0191
197	0.0414	0.0128	0.0285
198	0.0374	0.0116	0.0258
199	0.0345	0.0107	0.0238
200	0.0322	0.0100	0.0222
201	0.0303	0.0094	0.0209
202	0.0287	0.0089	0.0198
203	0.0274	0.0085	0.0189
204	0.0262	0.0081	0.0181
205	0.0252	0.0078	0.0174
206	0.0243	0.0075	0.0168
207	0.0235	0.0073	0.0162
208	0.0228	0.0070	0.0157
209	0.0221	0.0068	0.0153
210	0.0215	0.0067	0.0148
211	0.0209	0.0065	0.0145
212	0.0204	0.0063	0.0141
213	0.0200	0.0062	0.0138
214	0.0195	0.0060	0.0135
215	0.0191	0.0059	0.0132
216	0.0187	0.0058	0.0129
217	0.0210	0.0065	0.0145
218	0.0206	0.0064	0.0142
219	0.0203	0.0063	0.0140
220	0.0200	0.0062	0.0138
221	0.0198	0.0061	0.0136
222	0.0195	0.0060	0.0135
223	0.0192	0.0060	0.0133
224	0.0190	0.0059	0.0131
225	0.0188	0.0058	0.0130
226	0.0186	0.0057	0.0128
227	0.0183	0.0057	0.0127

228	0.0181	0.0056	0.0125
229	0.0179	0.0056	0.0124
230	0.0178	0.0055	0.0123
231	0.0176	0.0054	0.0121
232	0.0174	0.0054	0.0120
233	0.0172	0.0053	0.0119
234	0.0171	0.0053	0.0118
235	0.0169	0.0052	0.0117
236	0.0168	0.0052	0.0116
237	0.0166	0.0051	0.0115
238	0.0165	0.0051	0.0114
239	0.0163	0.0051	0.0113
240	0.0162	0.0050	0.0112
241	0.0161	0.0050	0.0111
242	0.0159	0.0049	0.0110
243	0.0158	0.0049	0.0109
244	0.0157	0.0049	0.0108
245	0.0156	0.0048	0.0108
246	0.0155	0.0048	0.0107
247	0.0154	0.0048	0.0106
248	0.0153	0.0047	0.0105
249	0.0151	0.0047	0.0105
250	0.0150	0.0047	0.0104
251	0.0149	0.0046	0.0103
252	0.0148	0.0046	0.0102
253	0.0147	0.0046	0.0102
254	0.0147	0.0045	0.0101
255	0.0146	0.0045	0.0101
256	0.0145	0.0045	0.0100
257	0.0144	0.0045	0.0099
258	0.0143	0.0044	0.0099
259	0.0142	0.0044	0.0098
260	0.0141	0.0044	0.0098
261	0.0141	0.0044	0.0097
262	0.0140	0.0043	0.0096
263	0.0139	0.0043	0.0096
264	0.0138	0.0043	0.0095
265	0.0137	0.0043	0.0095
266	0.0137	0.0042	0.0094
267	0.0136	0.0042	0.0094
268	0.0135	0.0042	0.0093
269	0.0135	0.0042	0.0093
270	0.0134	0.0042	0.0092
271	0.0133	0.0041	0.0092
272	0.0133	0.0041	0.0092
273	0.0132	0.0041	0.0091
274	0.0131	0.0041	0.0091
275	0.0131	0.0041	0.0090
276	0.0130	0.0040	0.0090
277	0.0130	0.0040	0.0089

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      278              0.0129          0.0040              0.0089
      279              0.0128          0.0040              0.0089
      280              0.0128          0.0040              0.0088
      281              0.0127          0.0039              0.0088
      282              0.0127          0.0039              0.0087
      283              0.0126          0.0039              0.0087
      284              0.0126          0.0039              0.0087
      285              0.0125          0.0039              0.0086
      286              0.0125          0.0039              0.0086
      287              0.0124          0.0038              0.0086
      288              0.0124          0.0038              0.0085
      --------------------------------------------------------------------
      --------------------------------------------------------------------
      Total soil rain loss =      1.67(In)
      Total effective rainfall =      4.11(In)
      Peak flow rate in flood hydrograph =     11.56(CFS)
      ---------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R   S T O R M
                     R u n o f f     H y d r o g r a p h
      --------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5       0.0002      0.02  Q         |         |         |         |
  0+10       0.0011      0.14  Q         |         |         |         |
  0+15       0.0034      0.33  Q         |         |         |         |
  0+20       0.0062      0.41  Q         |         |         |         |
  0+25       0.0093      0.45  Q         |         |         |         |
  0+30       0.0127      0.48  Q         |         |         |         |
  0+35       0.0161      0.50  VQ        |         |         |         |
  0+40       0.0197      0.51  VQ        |         |         |         |
  0+45       0.0232      0.52  VQ        |         |         |         |
  0+50       0.0268      0.52  VQ        |         |         |         |
  0+55       0.0305      0.53  VQ        |         |         |         |
  1+ 0       0.0341      0.53  VQ        |         |         |         |
  1+ 5       0.0378      0.53  VQ        |         |         |         |
  1+10       0.0414      0.53  VQ        |         |         |         |
  1+15       0.0451      0.54  |Q        |         |         |         |
  1+20       0.0488      0.54  |Q        |         |         |         |
  1+25       0.0525      0.54  |Q        |         |         |         |
  1+30       0.0562      0.54  |Q        |         |         |         |
  1+35       0.0600      0.54  |Q        |         |         |         |
  1+40       0.0637      0.54  |Q        |         |         |         |
  1+45       0.0674      0.54  |Q        |         |         |         |
  1+50       0.0711      0.54  |Q        |         |         |         |
  1+55       0.0749      0.54  |Q        |         |         |         |
  2+ 0       0.0787      0.55  |Q        |         |         |         |
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2+ 5       0.0824      0.55  |Q         |          |          |          |
2+10       0.0862      0.55  |Q         |          |          |          |
2+15       0.0900      0.55  |QV        |          |          |          |
2+20       0.0938      0.55  |QV        |          |          |          |
2+25       0.0976      0.55  |QV        |          |          |          |
2+30       0.1014      0.55  |QV        |          |          |          |
2+35       0.1052      0.55  |QV        |          |          |          |
2+40       0.1090      0.56  |QV        |          |          |          |
2+45       0.1129      0.56  |QV        |          |          |          |
2+50       0.1167      0.56  |QV        |          |          |          |
2+55       0.1206      0.56  |QV        |          |          |          |
3+ 0       0.1244      0.56  |QV        |          |          |          |
3+ 5       0.1283      0.56  |QV        |          |          |          |
3+10       0.1322      0.56  |Q V       |          |          |          |
3+15       0.1361      0.57  |Q V       |          |          |          |
3+20       0.1400      0.57  |Q V       |          |          |          |
3+25       0.1439      0.57  |Q V       |          |          |          |
3+30       0.1478      0.57  |Q V       |          |          |          |
3+35       0.1518      0.57  |Q V       |          |          |          |
3+40       0.1557      0.57  |Q V       |          |          |          |
3+45       0.1597      0.57  |Q V       |          |          |          |
3+50       0.1636      0.58  |Q V       |          |          |          |
3+55       0.1676      0.58  |Q V       |          |          |          |
4+ 0       0.1716      0.58  |Q V       |          |          |          |
4+ 5       0.1756      0.58  |Q  V      |          |          |          |
4+10       0.1796      0.58  |Q  V      |          |          |          |
4+15       0.1836      0.58  |Q  V      |          |          |          |
4+20       0.1876      0.58  |Q  V      |          |          |          |
4+25       0.1916      0.59  |Q  V      |          |          |          |
4+30       0.1957      0.59  |Q  V      |          |          |          |
4+35       0.1997      0.59  |Q  V      |          |          |          |
4+40       0.2038      0.59  |Q  V      |          |          |          |
4+45       0.2079      0.59  |Q  V      |          |          |          |
4+50       0.2120      0.59  |Q  V      |          |          |          |
4+55       0.2161      0.60  |Q  V      |          |          |          |
5+ 0       0.2202      0.60  |Q   V     |          |          |          |
5+ 5       0.2243      0.60  |Q   V     |          |          |          |
5+10       0.2285      0.60  |Q   V     |          |          |          |
5+15       0.2326      0.60  |Q   V     |          |          |          |
5+20       0.2368      0.60  |Q   V     |          |          |          |
5+25       0.2410      0.61  |Q   V     |          |          |          |
5+30       0.2452      0.61  |Q   V     |          |          |          |
5+35       0.2494      0.61  |Q   V     |          |          |          |
5+40       0.2536      0.61  |Q   V     |          |          |          |
5+45       0.2578      0.61  |Q   V     |          |          |          |
5+50       0.2620      0.62  |Q    V    |          |          |          |
5+55       0.2663      0.62  |Q    V    |          |          |          |
6+ 0       0.2706      0.62  |Q    V    |          |          |          |
6+ 5       0.2748      0.62  |Q    V    |          |          |          |
6+10       0.2791      0.62  |Q    V    |          |          |          |
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 6+15       0.2834      0.63  |Q    V   |         |         |         |
 6+20       0.2878      0.63  |Q    V   |         |         |         |
 6+25       0.2921      0.63  |Q    V   |         |         |         |
 6+30       0.2964      0.63  |Q    V   |         |         |         |
 6+35       0.3008      0.63  |Q    V   |         |         |         |
 6+40       0.3052      0.64  |Q     V  |         |         |         |
 6+45       0.3096      0.64  |Q     V  |         |         |         |
 6+50       0.3140      0.64  |Q     V  |         |         |         |
 6+55       0.3184      0.64  |Q     V  |         |         |         |
 7+ 0       0.3228      0.64  |Q     V  |         |         |         |
 7+ 5       0.3273      0.65  |Q     V  |         |         |         |
 7+10       0.3318      0.65  |Q     V  |         |         |         |
 7+15       0.3362      0.65  |Q     V  |         |         |         |
 7+20       0.3407      0.65  |Q     V  |         |         |         |
 7+25       0.3453      0.66  |Q     V  |         |         |         |
 7+30       0.3498      0.66  |Q      V |         |         |         |
 7+35       0.3543      0.66  |Q      V |         |         |         |
 7+40       0.3589      0.66  |Q      V |         |         |         |
 7+45       0.3635      0.67  |Q      V |         |         |         |
 7+50       0.3681      0.67  |Q      V |         |         |         |
 7+55       0.3727      0.67  |Q      V |         |         |         |
 8+ 0       0.3773      0.67  |Q      V |         |         |         |
 8+ 5       0.3820      0.68  |Q      V |         |         |         |
 8+10       0.3867      0.68  |Q      V |         |         |         |
 8+15       0.3914      0.68  |Q       V|         |         |         |
 8+20       0.3961      0.68  |Q       V|         |         |         |
 8+25       0.4008      0.69  |Q       V|         |         |         |
 8+30       0.4056      0.69  |Q       V|         |         |         |
 8+35       0.4103      0.69  |Q       V|         |         |         |
 8+40       0.4151      0.70  |Q       V|         |         |         |
 8+45       0.4199      0.70  |Q       V|         |         |         |
 8+50       0.4248      0.70  |Q       V|         |         |         |
 8+55       0.4296      0.70  |Q       V|         |         |         |
 9+ 0       0.4345      0.71  |Q        V         |         |         |
 9+ 5       0.4394      0.71  |Q        V         |         |         |
 9+10       0.4443      0.71  |Q        V         |         |         |
 9+15       0.4492      0.72  |Q        V         |         |         |
 9+20       0.4542      0.72  |Q        V         |         |         |
 9+25       0.4592      0.72  |Q        V         |         |         |
 9+30       0.4642      0.73  |Q        V         |         |         |
 9+35       0.4692      0.73  |Q        V         |         |         |
 9+40       0.4743      0.73  |Q        V         |         |         |
 9+45       0.4794      0.74  |Q        |V        |         |         |
 9+50       0.4845      0.74  |Q        |V        |         |         |
 9+55       0.4896      0.75  |Q        |V        |         |         |
10+ 0       0.4948      0.75  |Q        |V        |         |         |
10+ 5       0.4999      0.75  |Q        |V        |         |         |
10+10       0.5052      0.76  |Q        |V        |         |         |
10+15       0.5104      0.76  |Q        |V        |         |         |
10+20       0.5157      0.76  |Q        |V        |         |         |
```

```
10+25       0.5210      0.77  |Q        |V        |         |         |
10+30       0.5263      0.77  |Q        | V       |         |         |
10+35       0.5316      0.78  |Q        | V       |         |         |
10+40       0.5370      0.78  |Q        | V       |         |         |
10+45       0.5424      0.79  |Q        | V       |         |         |
10+50       0.5479      0.79  |Q        | V       |         |         |
10+55       0.5534      0.80  |Q        | V       |         |         |
11+ 0       0.5589      0.80  |Q        | V       |         |         |
11+ 5       0.5644      0.81  |Q        | V       |         |         |
11+10       0.5700      0.81  |Q        |  V      |         |         |
11+15       0.5756      0.82  |Q        |  V      |         |         |
11+20       0.5813      0.82  |Q        |  V      |         |         |
11+25       0.5870      0.83  |Q        |  V      |         |         |
11+30       0.5927      0.83  |Q        |  V      |         |         |
11+35       0.5985      0.84  |Q        |  V      |         |         |
11+40       0.6043      0.84  |Q        |  V      |         |         |
11+45       0.6102      0.85  |Q        |   V     |         |         |
11+50       0.6160      0.86  |Q        |   V     |         |         |
11+55       0.6220      0.86  |Q        |   V     |         |         |
12+ 0       0.6280      0.87  |Q        |   V     |         |         |
12+ 5       0.6340      0.87  |Q        |   V     |         |         |
12+10       0.6398      0.85  |Q        |   V     |         |         |
12+15       0.6455      0.82  |Q        |   V     |         |         |
12+20       0.6510      0.81  |Q        |   V     |         |         |
12+25       0.6566      0.81  |Q        |    V    |         |         |
12+30       0.6622      0.81  |Q        |    V    |         |         |
12+35       0.6678      0.81  |Q        |    V    |         |         |
12+40       0.6735      0.82  |Q        |    V    |         |         |
12+45       0.6792      0.83  |Q        |    V    |         |         |
12+50       0.6849      0.84  |Q        |    V    |         |         |
12+55       0.6908      0.85  |Q        |    V    |         |         |
13+ 0       0.6967      0.86  |Q        |     V   |         |         |
13+ 5       0.7026      0.87  |Q        |     V   |         |         |
13+10       0.7087      0.88  |Q        |     V   |         |         |
13+15       0.7148      0.89  |Q        |     V   |         |         |
13+20       0.7210      0.90  |Q        |     V   |         |         |
13+25       0.7272      0.91  |Q        |     V   |         |         |
13+30       0.7336      0.92  |Q        |     V   |         |         |
13+35       0.7400      0.94  |Q        |      V  |         |         |
13+40       0.7466      0.95  |Q        |      V  |         |         |
13+45       0.7532      0.97  |Q        |      V  |         |         |
13+50       0.7600      0.98  |Q        |      V  |         |         |
13+55       0.7668      1.00  |Q        |      V  |         |         |
14+ 0       0.7738      1.01  | Q       |      V  |         |         |
14+ 5       0.7809      1.03  | Q       |      V  |         |         |
14+10       0.7881      1.05  | Q       |       V |         |         |
14+15       0.7955      1.07  | Q       |       V |         |         |
14+20       0.8030      1.09  | Q       |       V |         |         |
14+25       0.8107      1.11  | Q       |       V |         |         |
14+30       0.8185      1.14  | Q       |       V |         |         |
```

```
14+35       0.8265      1.16  | Q       |        V|         |         |
14+40       0.8347      1.19  | Q       |        V|         |         |
14+45       0.8431      1.22  | Q       |        V|         |         |
14+50       0.8517      1.25  | Q       |        V|         |         |
14+55       0.8605      1.29  | Q       |        V|         |         |
15+ 0       0.8697      1.32  | Q       |         V         |         |
15+ 5       0.8791      1.37  | Q       |         V         |         |
15+10       0.8888      1.41  | Q       |         V         |         |
15+15       0.8989      1.47  | Q       |         V         |         |
15+20       0.9094      1.53  |  Q      |         V         |         |
15+25       0.9202      1.56  |  Q      |         |V        |         |
15+30       0.9303      1.47  | Q       |         |V        |         |
15+35       0.9390      1.26  | Q       |         |V        |         |
15+40       0.9475      1.24  | Q       |         |V        |         |
15+45       0.9566      1.31  | Q       |         | V       |         |
15+50       0.9665      1.44  | Q       |         | V       |         |
15+55       0.9781      1.69  |  Q      |         | V       |         |
16+ 0       0.9929      2.14  |   Q     |         | V       |         |
16+ 5       1.0199      3.92  |      Q  |         |  V      |         |
16+10       1.0770      8.29  |         |     Q   |   V     |         |
16+15       1.1566     11.56  |         |         |  Q  V   |         |
16+20       1.1957      5.68  |         |Q        |      V  |         |
16+25       1.2220      3.82  |      Q  |         |       V |         |
16+30       1.2424      2.96  |    Q    |         |       V |         |
16+35       1.2599      2.55  |    Q    |         |        V|         |
16+40       1.2745      2.11  |   Q     |         |        V|         |
16+45       1.2864      1.74  |  Q      |         |        V|         |
16+50       1.2971      1.55  |  Q      |         |        V|         |
16+55       1.3071      1.44  | Q       |         |         V         |
17+ 0       1.3165      1.37  | Q       |         |         V         |
17+ 5       1.3253      1.28  | Q       |         |         V         |
17+10       1.3335      1.19  | Q       |         |         V         |
17+15       1.3411      1.11  | Q       |         |         V         |
17+20       1.3484      1.06  | Q       |         |         |V        |
17+25       1.3555      1.03  | Q       |         |         |V        |
17+30       1.3623      0.99  |Q        |         |         |V        |
17+35       1.3689      0.96  |Q        |         |         |V        |
17+40       1.3753      0.93  |Q        |         |         |V        |
17+45       1.3816      0.91  |Q        |         |         |V        |
17+50       1.3877      0.88  |Q        |         |         |V        |
17+55       1.3936      0.86  |Q        |         |         | V       |
18+ 0       1.3994      0.84  |Q        |         |         | V       |
18+ 5       1.4051      0.83  |Q        |         |         | V       |
18+10       1.4108      0.83  |Q        |         |         | V       |
18+15       1.4168      0.86  |Q        |         |         | V       |
18+20       1.4227      0.86  |Q        |         |         | V       |
18+25       1.4286      0.86  |Q        |         |         | V       |
18+30       1.4344      0.85  |Q        |         |         |  V      |
18+35       1.4402      0.84  |Q        |         |         |  V      |
18+40       1.4460      0.83  |Q        |         |         |  V      |
```

```
18+45       1.4516      0.82  |Q        |         |         |  V      |
18+50       1.4572      0.81  |Q        |         |         |  V      |
18+55       1.4627      0.80  |Q        |         |         |  V      |
19+ 0       1.4682      0.79  |Q        |         |         |  V      |
19+ 5       1.4736      0.78  |Q        |         |         |  V      |
19+10       1.4789      0.78  |Q        |         |         |   V     |
19+15       1.4842      0.77  |Q        |         |         |   V     |
19+20       1.4895      0.76  |Q        |         |         |   V     |
19+25       1.4946      0.75  |Q        |         |         |   V     |
19+30       1.4997      0.74  |Q        |         |         |   V     |
19+35       1.5048      0.74  |Q        |         |         |   V     |
19+40       1.5098      0.73  |Q        |         |         |   V     |
19+45       1.5148      0.72  |Q        |         |         |   V     |
19+50       1.5197      0.72  |Q        |         |         |   V     |
19+55       1.5246      0.71  |Q        |         |         |    V    |
20+ 0       1.5294      0.70  |Q        |         |         |    V    |
20+ 5       1.5342      0.70  |Q        |         |         |    V    |
20+10       1.5390      0.69  |Q        |         |         |    V    |
20+15       1.5437      0.69  |Q        |         |         |    V    |
20+20       1.5484      0.68  |Q        |         |         |    V    |
20+25       1.5530      0.67  |Q        |         |         |    V    |
20+30       1.5577      0.67  |Q        |         |         |    V    |
20+35       1.5622      0.66  |Q        |         |         |    V    |
20+40       1.5668      0.66  |Q        |         |         |     V   |
20+45       1.5713      0.65  |Q        |         |         |     V   |
20+50       1.5757      0.65  |Q        |         |         |     V   |
20+55       1.5802      0.65  |Q        |         |         |     V   |
21+ 0       1.5846      0.64  |Q        |         |         |     V   |
21+ 5       1.5890      0.64  |Q        |         |         |     V   |
21+10       1.5933      0.63  |Q        |         |         |     V   |
21+15       1.5977      0.63  |Q        |         |         |     V   |
21+20       1.6020      0.62  |Q        |         |         |     V   |
21+25       1.6062      0.62  |Q        |         |         |     V   |
21+30       1.6105      0.62  |Q        |         |         |      V  |
21+35       1.6147      0.61  |Q        |         |         |      V  |
21+40       1.6189      0.61  |Q        |         |         |      V  |
21+45       1.6231      0.61  |Q        |         |         |      V  |
21+50       1.6272      0.60  |Q        |         |         |      V  |
21+55       1.6313      0.60  |Q        |         |         |      V  |
22+ 0       1.6354      0.59  |Q        |         |         |      V  |
22+ 5       1.6395      0.59  |Q        |         |         |      V  |
22+10       1.6435      0.59  |Q        |         |         |      V  |
22+15       1.6476      0.59  |Q        |         |         |      V  |
22+20       1.6516      0.58  |Q        |         |         |       V |
22+25       1.6556      0.58  |Q        |         |         |       V |
22+30       1.6595      0.58  |Q        |         |         |       V |
22+35       1.6635      0.57  |Q        |         |         |       V |
22+40       1.6674      0.57  |Q        |         |         |       V |
22+45       1.6713      0.57  |Q        |         |         |       V |
22+50       1.6752      0.56  |Q        |         |         |       V |
```

```
   22+55        1.6791       0.56  |Q          |          |          |       V |
   23+ 0        1.6829       0.56  |Q          |          |          |       V |
   23+ 5        1.6868       0.56  |Q          |          |          |       V |
   23+10        1.6906       0.55  |Q          |          |          |       V |
   23+15        1.6944       0.55  |Q          |          |          |        V|
   23+20        1.6981       0.55  |Q          |          |          |        V|
   23+25        1.7019       0.55  |Q          |          |          |        V|
   23+30        1.7056       0.54  |Q          |          |          |        V|
   23+35        1.7094       0.54  |Q          |          |          |        V|
   23+40        1.7131       0.54  |Q          |          |          |        V|
   23+45        1.7168       0.54  |Q          |          |          |        V|
   23+50        1.7205       0.53  |Q          |          |          |        V|
   23+55        1.7241       0.53  |Q          |          |          |        V|
   24+ 0        1.7278       0.53  |Q          |          |          |        V|
   24+ 5        1.7312       0.50  |Q          |          |          |        V|
   24+10        1.7339       0.39  Q           |          |          |        V|
   24+15        1.7352       0.19  Q           |          |          |        V|
   24+20        1.7360       0.11  Q           |          |          |        V|
   24+25        1.7365       0.07  Q           |          |          |        V|
   24+30        1.7368       0.04  Q           |          |          |        V|
   24+35        1.7370       0.02  Q           |          |          |        V|
   24+40        1.7371       0.01  Q           |          |          |        V|
   24+45        1.7372       0.01  Q           |          |          |        V|
   24+50        1.7372       0.01  Q           |          |          |        V|
   24+55        1.7372       0.00  Q           |          |          |        V|
   25+ 0        1.7372       0.00  Q           |          |          |        V|
   25+ 5        1.7372       0.00  Q           |          |          |          V
------------------------------------------------------------------------
```

```
        U n i t   H y d r o g r a p h   A n a l y s i s

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0

                Study date  03/01/21

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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San Bernardino County Synthetic Unit Hydrology Method
                Manual date - August 1986


Program License Serial Number 6481

---------------------------------------------------------------------
Paradise Ranch
100 yr Hydrograph
DA38

--------------------------------------------------------------------

        Storm Event Year = 100

        Antecedent Moisture Condition = 3

 English (in-lb) Input Units Used

 English Rainfall Data (Inches) Input Values Used

 English Units used in output format




Area averaged rainfall intensity isohyetal data:
        Sub-Area        Duration        Isohyetal
        (Ac.)            (hours)         (In)
Rainfall data for year 10
             4.38            1           0.94
--------------------------------------------------------------------
Rainfall data for year 2
             4.38            6           3.25
--------------------------------------------------------------------
Rainfall data for year 2
             4.38           24           3.52
--------------------------------------------------------------------
Rainfall data for year 100
```

```
             4.38            1            1.50
--------------------------------------------------------------------
Rainfall data for year 100
             4.38            6            1.34
--------------------------------------------------------------------
Rainfall data for year 100
             4.38           24            9.00
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

******** Area-averaged max loss rate, Fm ********


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 3)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 84.0      96.4          4.38      1.000     0.071    1.000    0.071

Area-averaged adjusted loss rate Fm (In/Hr) =  0.071

********* Area-Averaged low loss rate fraction, Yb **********

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
     4.38   1.000         84.0      96.4       0.37     0.952

Area-averaged catchment yield fraction, Y =  0.952
Area-averaged low loss fraction, Yb =  0.048
User entry of time of concentration  =   0.252 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       4.38(Ac.)
Catchment Lag time =   0.202 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 41.3360
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.301(In/Hr)
Average low loss rate fraction (Yb) = 0.310 (decimal)
Note: user entry of the Fm value
Note: user entry of the Yb value
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall =  0.712(In)
Computed peak 30-minute rainfall =  1.218(In)
Specified peak 1-hour rainfall =  1.500(In)
Computed peak 3-hour rainfall =  1.500(In)
Specified peak 6-hour rainfall =  1.501(In)
Specified peak 24-hour rainfall =  9.000(In)


Note: user specified rainfall values used.
Rainfall depth area reduction factors:
Using a total area of       4.38(Ac.) (Ref: fig. E-4)
```

```
5-minute factor = 1.000     Adjusted rainfall =  0.712(In)
30-minute factor = 1.000    Adjusted rainfall =  1.218(In)
1-hour factor = 1.000       Adjusted rainfall =  1.500(In)
3-hour factor = 1.000       Adjusted rainfall =  1.500(In)
6-hour factor = 1.000       Adjusted rainfall =  1.501(In)
24-hour factor = 1.000      Adjusted rainfall =  9.000(In)
---------------------------------------------------------------------

                        U n i t  H y d r o g r a p h
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph         Unit Hydrograph
Number            Mean values            ((CFS))
---------------------------------------------------------------------
                (K =        52.97 (CFS))

  1                3.278                    1.737
  2               15.863                    6.666
  3               49.042                   17.576
  4               70.026                   11.115
  5               79.746                    5.149
  6               86.184                    3.410
  7               90.753                    2.420
  8               94.013                    1.727
  9               96.218                    1.168
 10               97.660                    0.764
 11               98.308                    0.343
 12               98.754                    0.236
 13               99.099                    0.183
 14               99.368                    0.142
 15               99.676                    0.163
 16               99.860                    0.098
 17              100.000                    0.074
---------------------------------------------------------------------
Peak Unit   Adjusted mass rainfall  Unit rainfall
Number              (In)                (In)
  1              0.7116              0.7116
  2              0.8761              0.1645
  3              0.9894              0.1133
  4              1.0786              0.0892
  5              1.1533              0.0747
  6              1.2181              0.0648
  7              1.2758              0.0577
  8              1.3279              0.0521
  9              1.3757              0.0478
 10              1.4199              0.0442
 11              1.4611              0.0412
 12              1.4997              0.0386
 13              1.4997              0.0000
 14              1.4997              0.0000
```

15	1.4997	0.0000
16	1.4998	0.0000
17	1.4998	0.0000
18	1.4998	0.0000
19	1.4998	0.0000
20	1.4998	0.0000
21	1.4998	0.0000
22	1.4998	0.0000
23	1.4999	0.0000
24	1.4999	0.0000
25	1.4999	0.0000
26	1.4999	0.0000
27	1.4999	0.0000
28	1.4999	0.0000
29	1.4999	0.0000
30	1.4999	0.0000
31	1.4999	0.0000
32	1.4999	0.0000
33	1.4999	0.0000
34	1.4999	0.0000
35	1.5000	0.0000
36	1.5000	0.0000
37	1.5000	0.0000
38	1.5000	0.0000
39	1.5001	0.0000
40	1.5001	0.0000
41	1.5002	0.0000
42	1.5002	0.0000
43	1.5002	0.0000
44	1.5003	0.0000
45	1.5003	0.0000
46	1.5003	0.0000
47	1.5004	0.0000
48	1.5004	0.0000
49	1.5004	0.0000
50	1.5004	0.0000
51	1.5005	0.0000
52	1.5005	0.0000
53	1.5005	0.0000
54	1.5006	0.0000
55	1.5006	0.0000
56	1.5006	0.0000
57	1.5006	0.0000
58	1.5007	0.0000
59	1.5007	0.0000
60	1.5007	0.0000
61	1.5007	0.0000
62	1.5008	0.0000
63	1.5008	0.0000
64	1.5008	0.0000

65	1.5008	0.0000
66	1.5009	0.0000
67	1.5009	0.0000
68	1.5009	0.0000
69	1.5009	0.0000
70	1.5009	0.0000
71	1.5010	0.0000
72	1.5010	0.0000
73	1.5280	0.0270
74	1.5551	0.0271
75	1.5823	0.0272
76	1.6096	0.0273
77	1.6370	0.0274
78	1.6645	0.0275
79	1.6921	0.0276
80	1.7199	0.0277
81	1.7477	0.0278
82	1.7756	0.0279
83	1.8036	0.0280
84	1.8318	0.0281
85	1.8600	0.0282
86	1.8883	0.0283
87	1.9167	0.0284
88	1.9452	0.0285
89	1.9738	0.0286
90	2.0025	0.0287
91	2.0313	0.0288
92	2.0602	0.0289
93	2.0892	0.0290
94	2.1183	0.0291
95	2.1474	0.0292
96	2.1767	0.0293
97	2.2060	0.0293
98	2.2355	0.0294
99	2.2650	0.0295
100	2.2946	0.0296
101	2.3243	0.0297
102	2.3540	0.0298
103	2.3839	0.0299
104	2.4138	0.0299
105	2.4439	0.0300
106	2.4740	0.0301
107	2.5042	0.0302
108	2.5345	0.0303
109	2.5648	0.0304
110	2.5953	0.0304
111	2.6258	0.0305
112	2.6564	0.0306
113	2.6871	0.0307
114	2.7178	0.0308

115	2.7487	0.0308
116	2.7796	0.0309
117	2.8106	0.0310
118	2.8417	0.0311
119	2.8728	0.0312
120	2.9041	0.0312
121	2.9354	0.0313
122	2.9667	0.0314
123	2.9982	0.0315
124	3.0297	0.0315
125	3.0613	0.0316
126	3.0930	0.0317
127	3.1248	0.0318
128	3.1566	0.0318
129	3.1885	0.0319
130	3.2205	0.0320
131	3.2525	0.0320
132	3.2846	0.0321
133	3.3168	0.0322
134	3.3491	0.0323
135	3.3814	0.0323
136	3.4138	0.0324
137	3.4462	0.0325
138	3.4788	0.0325
139	3.5114	0.0326
140	3.5441	0.0327
141	3.5768	0.0327
142	3.6096	0.0328
143	3.6425	0.0329
144	3.6754	0.0329
145	3.7084	0.0330
146	3.7415	0.0331
147	3.7747	0.0331
148	3.8079	0.0332
149	3.8411	0.0333
150	3.8745	0.0333
151	3.9079	0.0334
152	3.9414	0.0335
153	3.9749	0.0335
154	4.0085	0.0336
155	4.0421	0.0337
156	4.0759	0.0337
157	4.1097	0.0338
158	4.1435	0.0339
159	4.1774	0.0339
160	4.2114	0.0340
161	4.2454	0.0340
162	4.2795	0.0341
163	4.3137	0.0342
164	4.3479	0.0342

165	4.3822	0.0343
166	4.4165	0.0343
167	4.4510	0.0344
168	4.4854	0.0345
169	4.5199	0.0345
170	4.5545	0.0346
171	4.5892	0.0346
172	4.6239	0.0347
173	4.6586	0.0348
174	4.6935	0.0348
175	4.7283	0.0349
176	4.7633	0.0349
177	4.7983	0.0350
178	4.8333	0.0351
179	4.8684	0.0351
180	4.9036	0.0352
181	4.9388	0.0352
182	4.9741	0.0353
183	5.0095	0.0353
184	5.0449	0.0354
185	5.0803	0.0355
186	5.1158	0.0355
187	5.1514	0.0356
188	5.1870	0.0356
189	5.2227	0.0357
190	5.2584	0.0357
191	5.2942	0.0358
192	5.3300	0.0358
193	5.3659	0.0359
194	5.4019	0.0359
195	5.4379	0.0360
196	5.4739	0.0361
197	5.5100	0.0361
198	5.5462	0.0362
199	5.5824	0.0362
200	5.6187	0.0363
201	5.6550	0.0363
202	5.6914	0.0364
203	5.7278	0.0364
204	5.7643	0.0365
205	5.8008	0.0365
206	5.8374	0.0366
207	5.8741	0.0366
208	5.9107	0.0367
209	5.9475	0.0367
210	5.9843	0.0368
211	6.0211	0.0368
212	6.0580	0.0369
213	6.0950	0.0369
214	6.1320	0.0370

215	6.1690	0.0370
216	6.2061	0.0371
217	6.2432	0.0371
218	6.2804	0.0372
219	6.3177	0.0372
220	6.3550	0.0373
221	6.3923	0.0373
222	6.4297	0.0374
223	6.4672	0.0374
224	6.5047	0.0375
225	6.5422	0.0375
226	6.5798	0.0376
227	6.6174	0.0376
228	6.6551	0.0377
229	6.6929	0.0377
230	6.7306	0.0378
231	6.7685	0.0378
232	6.8064	0.0379
233	6.8443	0.0379
234	6.8823	0.0380
235	6.9203	0.0380
236	6.9584	0.0381
237	6.9965	0.0381
238	7.0346	0.0382
239	7.0729	0.0382
240	7.1111	0.0383
241	7.1494	0.0383
242	7.1878	0.0384
243	7.2262	0.0384
244	7.2646	0.0384
245	7.3031	0.0385
246	7.3416	0.0385
247	7.3802	0.0386
248	7.4188	0.0386
249	7.4575	0.0387
250	7.4962	0.0387
251	7.5350	0.0388
252	7.5738	0.0388
253	7.6127	0.0389
254	7.6516	0.0389
255	7.6905	0.0389
256	7.7295	0.0390
257	7.7685	0.0390
258	7.8076	0.0391
259	7.8467	0.0391
260	7.8859	0.0392
261	7.9251	0.0392
262	7.9643	0.0393
263	8.0036	0.0393
264	8.0430	0.0393

265	8.0824	0.0394
266	8.1218	0.0394
267	8.1613	0.0395
268	8.2008	0.0395
269	8.2403	0.0396
270	8.2799	0.0396
271	8.3196	0.0396
272	8.3593	0.0397
273	8.3990	0.0397
274	8.4388	0.0398
275	8.4786	0.0398
276	8.5184	0.0399
277	8.5583	0.0399
278	8.5983	0.0399
279	8.6382	0.0400
280	8.6783	0.0400
281	8.7183	0.0401
282	8.7584	0.0401
283	8.7986	0.0401
284	8.8388	0.0402
285	8.8790	0.0402
286	8.9193	0.0403
287	8.9596	0.0403
288	9.0000	0.0404

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0404	0.0125	0.0278
2	0.0403	0.0125	0.0278
3	0.0402	0.0125	0.0278
4	0.0402	0.0125	0.0277
5	0.0401	0.0124	0.0277
6	0.0401	0.0124	0.0276
7	0.0400	0.0124	0.0276
8	0.0399	0.0124	0.0276
9	0.0399	0.0124	0.0275
10	0.0398	0.0123	0.0275
11	0.0397	0.0123	0.0274
12	0.0397	0.0123	0.0274
13	0.0396	0.0123	0.0273
14	0.0396	0.0123	0.0273
15	0.0395	0.0122	0.0272
16	0.0394	0.0122	0.0272
17	0.0393	0.0122	0.0271
18	0.0393	0.0122	0.0271
19	0.0392	0.0122	0.0271
20	0.0392	0.0121	0.0270
21	0.0391	0.0121	0.0270

22	0.0390	0.0121	0.0269
23	0.0389	0.0121	0.0269
24	0.0389	0.0121	0.0268
25	0.0388	0.0120	0.0268
26	0.0388	0.0120	0.0267
27	0.0387	0.0120	0.0267
28	0.0386	0.0120	0.0267
29	0.0385	0.0119	0.0266
30	0.0385	0.0119	0.0266
31	0.0384	0.0119	0.0265
32	0.0384	0.0119	0.0265
33	0.0383	0.0119	0.0264
34	0.0382	0.0118	0.0264
35	0.0381	0.0118	0.0263
36	0.0381	0.0118	0.0263
37	0.0380	0.0118	0.0262
38	0.0379	0.0118	0.0262
39	0.0378	0.0117	0.0261
40	0.0378	0.0117	0.0261
41	0.0377	0.0117	0.0260
42	0.0376	0.0117	0.0260
43	0.0375	0.0116	0.0259
44	0.0375	0.0116	0.0259
45	0.0374	0.0116	0.0258
46	0.0373	0.0116	0.0258
47	0.0372	0.0115	0.0257
48	0.0372	0.0115	0.0257
49	0.0371	0.0115	0.0256
50	0.0370	0.0115	0.0256
51	0.0369	0.0115	0.0255
52	0.0369	0.0114	0.0255
53	0.0368	0.0114	0.0254
54	0.0367	0.0114	0.0254
55	0.0366	0.0114	0.0253
56	0.0366	0.0113	0.0252
57	0.0365	0.0113	0.0252
58	0.0364	0.0113	0.0251
59	0.0363	0.0113	0.0251
60	0.0363	0.0112	0.0250
61	0.0362	0.0112	0.0250
62	0.0361	0.0112	0.0249
63	0.0360	0.0112	0.0248
64	0.0359	0.0111	0.0248
65	0.0358	0.0111	0.0247
66	0.0358	0.0111	0.0247
67	0.0357	0.0111	0.0246
68	0.0356	0.0110	0.0246
69	0.0355	0.0110	0.0245
70	0.0355	0.0110	0.0245
71	0.0353	0.0110	0.0244

72	0.0353	0.0109	0.0243
73	0.0352	0.0109	0.0243
74	0.0351	0.0109	0.0242
75	0.0350	0.0108	0.0241
76	0.0349	0.0108	0.0241
77	0.0348	0.0108	0.0240
78	0.0348	0.0108	0.0240
79	0.0346	0.0107	0.0239
80	0.0346	0.0107	0.0239
81	0.0345	0.0107	0.0238
82	0.0344	0.0107	0.0237
83	0.0343	0.0106	0.0237
84	0.0342	0.0106	0.0236
85	0.0341	0.0106	0.0235
86	0.0340	0.0106	0.0235
87	0.0339	0.0105	0.0234
88	0.0339	0.0105	0.0234
89	0.0337	0.0105	0.0233
90	0.0337	0.0104	0.0232
91	0.0335	0.0104	0.0231
92	0.0335	0.0104	0.0231
93	0.0333	0.0103	0.0230
94	0.0333	0.0103	0.0230
95	0.0331	0.0103	0.0229
96	0.0331	0.0103	0.0228
97	0.0329	0.0102	0.0227
98	0.0329	0.0102	0.0227
99	0.0327	0.0101	0.0226
100	0.0327	0.0101	0.0225
101	0.0325	0.0101	0.0224
102	0.0325	0.0101	0.0224
103	0.0323	0.0100	0.0223
104	0.0323	0.0100	0.0223
105	0.0321	0.0100	0.0222
106	0.0320	0.0099	0.0221
107	0.0319	0.0099	0.0220
108	0.0318	0.0099	0.0220
109	0.0317	0.0098	0.0219
110	0.0316	0.0098	0.0218
111	0.0315	0.0098	0.0217
112	0.0314	0.0097	0.0217
113	0.0312	0.0097	0.0215
114	0.0312	0.0097	0.0215
115	0.0310	0.0096	0.0214
116	0.0309	0.0096	0.0213
117	0.0308	0.0095	0.0212
118	0.0307	0.0095	0.0212
119	0.0305	0.0095	0.0211
120	0.0304	0.0094	0.0210
121	0.0303	0.0094	0.0209

122	0.0302	0.0094	0.0208
123	0.0300	0.0093	0.0207
124	0.0299	0.0093	0.0207
125	0.0298	0.0092	0.0205
126	0.0297	0.0092	0.0205
127	0.0295	0.0091	0.0204
128	0.0294	0.0091	0.0203
129	0.0293	0.0091	0.0202
130	0.0292	0.0090	0.0201
131	0.0290	0.0090	0.0200
132	0.0289	0.0090	0.0199
133	0.0287	0.0089	0.0198
134	0.0286	0.0089	0.0197
135	0.0284	0.0088	0.0196
136	0.0283	0.0088	0.0195
137	0.0281	0.0087	0.0194
138	0.0280	0.0087	0.0193
139	0.0278	0.0086	0.0192
140	0.0277	0.0086	0.0191
141	0.0275	0.0085	0.0190
142	0.0274	0.0085	0.0189
143	0.0272	0.0084	0.0188
144	0.0271	0.0084	0.0187
145	0.0000	0.0000	0.0000
146	0.0000	0.0000	0.0000
147	0.0000	0.0000	0.0000
148	0.0000	0.0000	0.0000
149	0.0000	0.0000	0.0000
150	0.0000	0.0000	0.0000
151	0.0000	0.0000	0.0000
152	0.0000	0.0000	0.0000
153	0.0000	0.0000	0.0000
154	0.0000	0.0000	0.0000
155	0.0000	0.0000	0.0000
156	0.0000	0.0000	0.0000
157	0.0000	0.0000	0.0000
158	0.0000	0.0000	0.0000
159	0.0000	0.0000	0.0000
160	0.0000	0.0000	0.0000
161	0.0000	0.0000	0.0000
162	0.0000	0.0000	0.0000
163	0.0000	0.0000	0.0000
164	0.0000	0.0000	0.0000
165	0.0000	0.0000	0.0000
166	0.0000	0.0000	0.0000
167	0.0000	0.0000	0.0000
168	0.0000	0.0000	0.0000
169	0.0000	0.0000	0.0000
170	0.0000	0.0000	0.0000
171	0.0000	0.0000	0.0000

172	0.0000	0.0000	0.0000
173	0.0000	0.0000	0.0000
174	0.0000	0.0000	0.0000
175	0.0000	0.0000	0.0000
176	0.0000	0.0000	0.0000
177	0.0000	0.0000	0.0000
178	0.0000	0.0000	0.0000
179	0.0000	0.0000	0.0000
180	0.0000	0.0000	0.0000
181	0.0000	0.0000	0.0000
182	0.0000	0.0000	0.0000
183	0.0000	0.0000	0.0000
184	0.0000	0.0000	0.0000
185	0.0386	0.0120	0.0267
186	0.0412	0.0128	0.0284
187	0.0478	0.0148	0.0330
188	0.0521	0.0162	0.0360
189	0.0648	0.0201	0.0447
190	0.0747	0.0231	0.0515
191	0.1133	0.0251	0.0882
192	0.1645	0.0251	0.1394
193	0.7116	0.0251	0.6865
194	0.0892	0.0251	0.0641
195	0.0577	0.0179	0.0398
196	0.0442	0.0137	0.0305
197	0.0000	0.0000	0.0000
198	0.0000	0.0000	0.0000
199	0.0000	0.0000	0.0000
200	0.0000	0.0000	0.0000
201	0.0000	0.0000	0.0000
202	0.0000	0.0000	0.0000
203	0.0000	0.0000	0.0000
204	0.0000	0.0000	0.0000
205	0.0000	0.0000	0.0000
206	0.0000	0.0000	0.0000
207	0.0000	0.0000	0.0000
208	0.0000	0.0000	0.0000
209	0.0000	0.0000	0.0000
210	0.0000	0.0000	0.0000
211	0.0000	0.0000	0.0000
212	0.0000	0.0000	0.0000
213	0.0000	0.0000	0.0000
214	0.0000	0.0000	0.0000
215	0.0000	0.0000	0.0000
216	0.0000	0.0000	0.0000
217	0.0270	0.0084	0.0186
218	0.0273	0.0085	0.0188
219	0.0276	0.0086	0.0191
220	0.0279	0.0087	0.0193
221	0.0282	0.0087	0.0195

222	0.0285	0.0088	0.0197
223	0.0288	0.0089	0.0199
224	0.0291	0.0090	0.0201
225	0.0293	0.0091	0.0202
226	0.0296	0.0092	0.0204
227	0.0299	0.0093	0.0206
228	0.0301	0.0093	0.0208
229	0.0304	0.0094	0.0209
230	0.0306	0.0095	0.0211
231	0.0308	0.0096	0.0213
232	0.0311	0.0096	0.0214
233	0.0313	0.0097	0.0216
234	0.0315	0.0098	0.0218
235	0.0318	0.0098	0.0219
236	0.0320	0.0099	0.0221
237	0.0322	0.0100	0.0222
238	0.0324	0.0100	0.0224
239	0.0326	0.0101	0.0225
240	0.0328	0.0102	0.0226
241	0.0330	0.0102	0.0228
242	0.0332	0.0103	0.0229
243	0.0334	0.0104	0.0230
244	0.0336	0.0104	0.0232
245	0.0338	0.0105	0.0233
246	0.0340	0.0105	0.0234
247	0.0342	0.0106	0.0236
248	0.0343	0.0106	0.0237
249	0.0345	0.0107	0.0238
250	0.0347	0.0108	0.0239
251	0.0349	0.0108	0.0241
252	0.0351	0.0109	0.0242
253	0.0352	0.0109	0.0243
254	0.0354	0.0110	0.0244
255	0.0356	0.0110	0.0245
256	0.0357	0.0111	0.0247
257	0.0359	0.0111	0.0248
258	0.0361	0.0112	0.0249
259	0.0362	0.0112	0.0250
260	0.0364	0.0113	0.0251
261	0.0365	0.0113	0.0252
262	0.0367	0.0114	0.0253
263	0.0368	0.0114	0.0254
264	0.0370	0.0115	0.0255
265	0.0371	0.0115	0.0256
266	0.0373	0.0116	0.0257
267	0.0374	0.0116	0.0258
268	0.0376	0.0117	0.0259
269	0.0377	0.0117	0.0260
270	0.0379	0.0117	0.0261
271	0.0380	0.0118	0.0262

272	0.0382	0.0118	0.0263
273	0.0383	0.0119	0.0264
274	0.0384	0.0119	0.0265
275	0.0386	0.0120	0.0266
276	0.0387	0.0120	0.0267
277	0.0389	0.0120	0.0268
278	0.0390	0.0121	0.0269
279	0.0391	0.0121	0.0270
280	0.0393	0.0122	0.0271
281	0.0394	0.0122	0.0272
282	0.0395	0.0122	0.0273
283	0.0396	0.0123	0.0274
284	0.0398	0.0123	0.0274
285	0.0399	0.0124	0.0275
286	0.0400	0.0124	0.0276
287	0.0401	0.0124	0.0277
288	0.0403	0.0125	0.0278

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--------------------------------------------------------------------
--------------------------------------------------------------------
Total soil rain loss =      2.56(In)
Total effective rainfall =      6.44(In)
Peak flow rate in flood hydrograph =     14.98(CFS)
---------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                    24 - H O U R    S T O R M
               R u n o f f      H y d r o g r a p h
--------------------------------------------------------------------
            Hydrograph in   5   Minute intervals ((CFS))

--------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        5.0      10.0      15.0      20.0
-----------------------------------------------------------------------
  0+ 5      0.0003      0.05  Q         |         |         |         |
  0+10      0.0019      0.23  Q         |         |         |         |
  0+15      0.0069      0.72  VQ        |         |         |         |
  0+20      0.0140      1.03  V Q       |         |         |         |
  0+25      0.0221      1.17  V Q       |         |         |         |
  0+30      0.0308      1.27  V Q       |         |         |         |
  0+35      0.0400      1.33  V Q       |         |         |         |
  0+40      0.0495      1.38  V Q       |         |         |         |
  0+45      0.0592      1.41  |VQ       |         |         |         |
  0+50      0.0690      1.43  |VQ       |         |         |         |
  0+55      0.0789      1.43  |VQ       |         |         |         |
  1+ 0      0.0888      1.44  |VQ       |         |         |         |
  1+ 5      0.0988      1.44  |VQ       |         |         |         |
  1+10      0.1087      1.44  |VQ       |         |         |         |
  1+15      0.1186      1.45  | Q       |         |         |         |
  1+20      0.1286      1.45  | Q       |         |         |         |
  1+25      0.1386      1.45  | Q       |         |         |         |
  1+30      0.1485      1.44  | Q       |         |         |         |
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1+35       0.1584      1.44  | Q       |         |         |         |
1+40       0.1683      1.44  | Q       |         |         |         |
1+45       0.1782      1.44  | QV      |         |         |         |
1+50       0.1881      1.43  | QV      |         |         |         |
1+55       0.1980      1.43  | QV      |         |         |         |
2+ 0       0.2078      1.43  | QV      |         |         |         |
2+ 5       0.2176      1.43  | QV      |         |         |         |
2+10       0.2274      1.42  | QV      |         |         |         |
2+15       0.2372      1.42  | Q V     |         |         |         |
2+20       0.2470      1.42  | Q V     |         |         |         |
2+25       0.2568      1.42  | Q V     |         |         |         |
2+30       0.2665      1.41  | Q V     |         |         |         |
2+35       0.2762      1.41  | Q V     |         |         |         |
2+40       0.2859      1.41  | Q V     |         |         |         |
2+45       0.2956      1.41  | Q  V    |         |         |         |
2+50       0.3053      1.40  | Q  V    |         |         |         |
2+55       0.3150      1.40  | Q  V    |         |         |         |
3+ 0       0.3246      1.40  | Q  V    |         |         |         |
3+ 5       0.3342      1.40  | Q  V    |         |         |         |
3+10       0.3438      1.39  | Q  V    |         |         |         |
3+15       0.3534      1.39  | Q   V   |         |         |         |
3+20       0.3630      1.39  | Q   V   |         |         |         |
3+25       0.3725      1.39  | Q   V   |         |         |         |
3+30       0.3820      1.38  | Q   V   |         |         |         |
3+35       0.3916      1.38  | Q   V   |         |         |         |
3+40       0.4011      1.38  | Q   V   |         |         |         |
3+45       0.4105      1.38  | Q   V   |         |         |         |
3+50       0.4200      1.37  | Q    V  |         |         |         |
3+55       0.4294      1.37  | Q    V  |         |         |         |
4+ 0       0.4388      1.37  | Q    V  |         |         |         |
4+ 5       0.4482      1.37  | Q    V  |         |         |         |
4+10       0.4576      1.36  | Q    V  |         |         |         |
4+15       0.4670      1.36  | Q    V  |         |         |         |
4+20       0.4763      1.36  | Q     V |         |         |         |
4+25       0.4857      1.35  | Q     V |         |         |         |
4+30       0.4950      1.35  | Q     V |         |         |         |
4+35       0.5043      1.35  | Q     V |         |         |         |
4+40       0.5135      1.35  | Q     V |         |         |         |
4+45       0.5228      1.34  | Q     V |         |         |         |
4+50       0.5320      1.34  | Q      V|         |         |         |
4+55       0.5412      1.34  | Q      V|         |         |         |
5+ 0       0.5504      1.33  | Q      V|         |         |         |
5+ 5       0.5596      1.33  | Q      V|         |         |         |
5+10       0.5687      1.33  | Q      V|         |         |         |
5+15       0.5779      1.33  | Q      V|         |         |         |
5+20       0.5870      1.32  | Q      V|         |         |         |
5+25       0.5961      1.32  | Q       V         |         |         |
5+30       0.6051      1.32  | Q       V         |         |         |
5+35       0.6142      1.31  | Q       V         |         |         |
5+40       0.6232      1.31  | Q       V         |         |         |
```

```
5+45       0.6322      1.31   | Q       V         |         |         |
5+50       0.6412      1.31   | Q       V         |         |         |
5+55       0.6502      1.30   | Q       |V        |         |         |
6+ 0       0.6591      1.30   | Q       |V        |         |         |
6+ 5       0.6680      1.30   | Q       |V        |         |         |
6+10       0.6769      1.29   | Q       |V        |         |         |
6+15       0.6858      1.29   | Q       |V        |         |         |
6+20       0.6947      1.29   | Q       |V        |         |         |
6+25       0.7035      1.28   | Q       |V        |         |         |
6+30       0.7123      1.28   | Q       | V       |         |         |
6+35       0.7211      1.28   | Q       | V       |         |         |
6+40       0.7299      1.27   | Q       | V       |         |         |
6+45       0.7387      1.27   | Q       | V       |         |         |
6+50       0.7474      1.27   | Q       | V       |         |         |
6+55       0.7561      1.26   | Q       | V       |         |         |
7+ 0       0.7648      1.26   | Q       |  V      |         |         |
7+ 5       0.7734      1.26   | Q       |  V      |         |         |
7+10       0.7821      1.25   | Q       |  V      |         |         |
7+15       0.7907      1.25   | Q       |  V      |         |         |
7+20       0.7993      1.25   | Q       |  V      |         |         |
7+25       0.8079      1.24   | Q       |  V      |         |         |
7+30       0.8164      1.24   | Q       |  V      |         |         |
7+35       0.8249      1.24   | Q       |   V     |         |         |
7+40       0.8334      1.23   | Q       |   V     |         |         |
7+45       0.8419      1.23   | Q       |   V     |         |         |
7+50       0.8504      1.23   | Q       |   V     |         |         |
7+55       0.8588      1.22   | Q       |   V     |         |         |
8+ 0       0.8672      1.22   | Q       |   V     |         |         |
8+ 5       0.8756      1.22   | Q       |   V     |         |         |
8+10       0.8839      1.21   | Q       |    V    |         |         |
8+15       0.8922      1.21   | Q       |    V    |         |         |
8+20       0.9005      1.21   | Q       |    V    |         |         |
8+25       0.9088      1.20   | Q       |    V    |         |         |
8+30       0.9171      1.20   | Q       |    V    |         |         |
8+35       0.9253      1.19   | Q       |    V    |         |         |
8+40       0.9335      1.19   | Q       |    V    |         |         |
8+45       0.9417      1.19   | Q       |     V   |         |         |
8+50       0.9498      1.18   | Q       |     V   |         |         |
8+55       0.9579      1.18   | Q       |     V   |         |         |
9+ 0       0.9660      1.18   | Q       |     V   |         |         |
9+ 5       0.9741      1.17   | Q       |     V   |         |         |
9+10       0.9821      1.17   | Q       |     V   |         |         |
9+15       0.9901      1.16   | Q       |     V   |         |         |
9+20       0.9981      1.16   | Q       |     V   |         |         |
9+25       1.0061      1.16   | Q       |      V  |         |         |
9+30       1.0140      1.15   | Q       |      V  |         |         |
9+35       1.0219      1.15   | Q       |      V  |         |         |
9+40       1.0298      1.14   | Q       |      V  |         |         |
9+45       1.0376      1.14   | Q       |      V  |         |         |
9+50       1.0454      1.13   | Q       |      V  |         |         |
```

```
 9+55       1.0532      1.13  | Q       |      V  |         |         |
10+ 0       1.0610      1.13  | Q       |       V |         |         |
10+ 5       1.0687      1.12  | Q       |       V |         |         |
10+10       1.0764      1.12  | Q       |       V |         |         |
10+15       1.0841      1.11  | Q       |       V |         |         |
10+20       1.0917      1.11  | Q       |       V |         |         |
10+25       1.0993      1.10  | Q       |       V |         |         |
10+30       1.1069      1.10  | Q       |       V |         |         |
10+35       1.1144      1.09  | Q       |       V |         |         |
10+40       1.1219      1.09  | Q       |        V|         |         |
10+45       1.1294      1.09  | Q       |        V|         |         |
10+50       1.1368      1.08  | Q       |        V|         |         |
10+55       1.1442      1.08  | Q       |        V|         |         |
11+ 0       1.1516      1.07  | Q       |        V|         |         |
11+ 5       1.1590      1.07  | Q       |        V|         |         |
11+10       1.1663      1.06  | Q       |        V|         |         |
11+15       1.1735      1.06  | Q       |        V|         |         |
11+20       1.1808      1.05  | Q       |         V         |         |
11+25       1.1880      1.05  | Q       |         V         |         |
11+30       1.1951      1.04  | Q       |         V         |         |
11+35       1.2023      1.04  | Q       |         V         |         |
11+40       1.2094      1.03  | Q       |         V         |         |
11+45       1.2164      1.02  | Q       |         V         |         |
11+50       1.2234      1.02  | Q       |         V         |         |
11+55       1.2304      1.01  | Q       |         V         |         |
12+ 0       1.2374      1.01  | Q       |         |V        |         |
12+ 5       1.2440      0.97  |Q        |         |V        |         |
12+10       1.2498      0.84  |Q        |         |V        |         |
12+15       1.2533      0.51  |Q        |         |V        |         |
12+20       1.2554      0.30  Q         |         |V        |         |
12+25       1.2568      0.20  Q         |         |V        |         |
12+30       1.2578      0.14  Q         |         |V        |         |
12+35       1.2584      0.09  Q         |         |V        |         |
12+40       1.2588      0.06  Q         |         |V        |         |
12+45       1.2591      0.04  Q         |         |V        |         |
12+50       1.2593      0.02  Q         |         |V        |         |
12+55       1.2594      0.02  Q         |         |V        |         |
13+ 0       1.2595      0.01  Q         |         |V        |         |
13+ 5       1.2595      0.01  Q         |         |V        |         |
13+10       1.2596      0.01  Q         |         |V        |         |
13+15       1.2596      0.00  Q         |         |V        |         |
13+20       1.2596      0.00  Q         |         |V        |         |
13+25       1.2596      0.00  Q         |         |V        |         |
13+30       1.2596      0.00  Q         |         |V        |         |
13+35       1.2597      0.00  Q         |         |V        |         |
13+40       1.2597      0.00  Q         |         |V        |         |
13+45       1.2597      0.00  Q         |         |V        |         |
13+50       1.2597      0.00  Q         |         |V        |         |
13+55       1.2597      0.00  Q         |         |V        |         |
14+ 0       1.2597      0.00  Q         |         |V        |         |
```

```
14+ 5       1.2597        0.00  Q         |         |V        |         |
14+10       1.2597        0.00  Q         |         |V        |         |
14+15       1.2597        0.00  Q         |         |V        |         |
14+20       1.2597        0.00  Q         |         |V        |         |
14+25       1.2597        0.00  Q         |         |V        |         |
14+30       1.2597        0.00  Q         |         |V        |         |
14+35       1.2597        0.00  Q         |         |V        |         |
14+40       1.2597        0.00  Q         |         |V        |         |
14+45       1.2597        0.00  Q         |         |V        |         |
14+50       1.2597        0.00  Q         |         |V        |         |
14+55       1.2597        0.00  Q         |         |V        |         |
15+ 0       1.2597        0.00  Q         |         |V        |         |
15+ 5       1.2597        0.00  Q         |         |V        |         |
15+10       1.2597        0.00  Q         |         |V        |         |
15+15       1.2598        0.00  Q         |         |V        |         |
15+20       1.2598        0.00  Q         |         |V        |         |
15+25       1.2601        0.05  Q         |         |V        |         |
15+30       1.2616        0.23  Q         |         |V        |         |
15+35       1.2666        0.72  |Q        |         |V        |         |
15+40       1.2740        1.08  | Q       |         |V        |         |
15+45       1.2833        1.35  | Q       |         |V        |         |
15+50       1.2945        1.62  |  Q      |         | V       |         |
15+55       1.3084        2.01  |   Q     |         | V       |         |
16+ 0       1.3266        2.65  |    Q    |         | V       |         |
16+ 5       1.3593        4.76  |        Q|         |  V      |         |
16+10       1.4195        8.73  |         |      Q  |   V     |         |
16+15       1.5227       14.98  |         |         |    V   Q|         |
16+20       1.5942       10.38  |         |         Q      V  |         |
16+25       1.6357        6.03  |         | Q       |      V  |         |
16+30       1.6650        4.26  |       Q |         |       V |         |
16+35       1.6846        2.85  |    Q    |         |       V |         |
16+40       1.6978        1.91  |  Q      |         |       V |         |
16+45       1.7067        1.29  | Q       |         |        V|         |
16+50       1.7124        0.84  |Q        |         |        V|         |
16+55       1.7156        0.45  Q         |         |        V|         |
17+ 0       1.7176        0.30  Q         |         |        V|         |
17+ 5       1.7192        0.22  Q         |         |        V|         |
17+10       1.7203        0.16  Q         |         |        V|         |
17+15       1.7214        0.16  Q         |         |        V|         |
17+20       1.7221        0.10  Q         |         |        V|         |
17+25       1.7225        0.07  Q         |         |        V|         |
17+30       1.7226        0.01  Q         |         |        V|         |
17+35       1.7227        0.01  Q         |         |        V|         |
17+40       1.7227        0.00  Q         |         |        V|         |
17+45       1.7227        0.00  Q         |         |        V|         |
17+50       1.7227        0.00  Q         |         |        V|         |
17+55       1.7227        0.00  Q         |         |        V|         |
18+ 0       1.7227        0.00  Q         |         |        V|         |
18+ 5       1.7230        0.03  Q         |         |        V|         |
18+10       1.7241        0.16  Q         |         |        V|         |
```

```
18+15       1.7274      0.49  Q         |         |        V|         |
18+20       1.7322      0.70  |Q        |         |        V|         |
18+25       1.7377      0.80  |Q        |         |        V|         |
18+30       1.7438      0.88  |Q        |         |        V|         |
18+35       1.7502      0.93  |Q        |         |        V|         |
18+40       1.7569      0.97  |Q        |         |        V|         |
18+45       1.7638      1.00  | Q       |         |         V         |
18+50       1.7709      1.03  | Q       |         |         V         |
18+55       1.7780      1.04  | Q       |         |         V         |
19+ 0       1.7853      1.06  | Q       |         |         V         |
19+ 5       1.7927      1.07  | Q       |         |         V         |
19+10       1.8002      1.08  | Q       |         |         V         |
19+15       1.8077      1.09  | Q       |         |         V         |
19+20       1.8153      1.11  | Q       |         |         V         |
19+25       1.8230      1.12  | Q       |         |         |V        |
19+30       1.8307      1.12  | Q       |         |         |V        |
19+35       1.8385      1.13  | Q       |         |         |V        |
19+40       1.8464      1.14  | Q       |         |         |V        |
19+45       1.8543      1.15  | Q       |         |         |V        |
19+50       1.8623      1.16  | Q       |         |         |V        |
19+55       1.8703      1.17  | Q       |         |         |V        |
20+ 0       1.8784      1.17  | Q       |         |         |V        |
20+ 5       1.8866      1.18  | Q       |         |         | V       |
20+10       1.8948      1.19  | Q       |         |         | V       |
20+15       1.9030      1.20  | Q       |         |         | V       |
20+20       1.9113      1.20  | Q       |         |         | V       |
20+25       1.9197      1.21  | Q       |         |         | V       |
20+30       1.9281      1.22  | Q       |         |         | V       |
20+35       1.9365      1.23  | Q       |         |         | V       |
20+40       1.9450      1.23  | Q       |         |         |  V      |
20+45       1.9535      1.24  | Q       |         |         |  V      |
20+50       1.9621      1.25  | Q       |         |         |  V      |
20+55       1.9707      1.25  | Q       |         |         |  V      |
21+ 0       1.9794      1.26  | Q       |         |         |  V      |
21+ 5       1.9882      1.27  | Q       |         |         |  V      |
21+10       1.9969      1.27  | Q       |         |         |  V      |
21+15       2.0057      1.28  | Q       |         |         |   V     |
21+20       2.0146      1.29  | Q       |         |         |   V     |
21+25       2.0235      1.29  | Q       |         |         |   V     |
21+30       2.0324      1.30  | Q       |         |         |   V     |
21+35       2.0414      1.30  | Q       |         |         |   V     |
21+40       2.0504      1.31  | Q       |         |         |   V     |
21+45       2.0595      1.32  | Q       |         |         |    V    |
21+50       2.0686      1.32  | Q       |         |         |    V    |
21+55       2.0778      1.33  | Q       |         |         |    V    |
22+ 0       2.0869      1.33  | Q       |         |         |    V    |
22+ 5       2.0962      1.34  | Q       |         |         |    V    |
22+10       2.1054      1.35  | Q       |         |         |    V    |
22+15       2.1147      1.35  | Q       |         |         |    V    |
22+20       2.1241      1.36  | Q       |         |         |     V   |
```

```
   22+25       2.1335      1.36  | Q       |         |         |     V   |
   22+30       2.1429      1.37  | Q       |         |         |     V   |
   22+35       2.1523      1.37  | Q       |         |         |     V   |
   22+40       2.1618      1.38  | Q       |         |         |     V   |
   22+45       2.1713      1.38  | Q       |         |         |     V   |
   22+50       2.1809      1.39  | Q       |         |         |      V  |
   22+55       2.1905      1.39  | Q       |         |         |      V  |
   23+ 0       2.2001      1.40  | Q       |         |         |      V  |
   23+ 5       2.2098      1.40  | Q       |         |         |      V  |
   23+10       2.2195      1.41  | Q       |         |         |      V  |
   23+15       2.2292      1.41  | Q       |         |         |      V  |
   23+20       2.2390      1.42  | Q       |         |         |       V |
   23+25       2.2488      1.42  | Q       |         |         |       V |
   23+30       2.2587      1.43  | Q       |         |         |       V |
   23+35       2.2685      1.43  | Q       |         |         |       V |
   23+40       2.2784      1.44  | Q       |         |         |       V |
   23+45       2.2884      1.44  | Q       |         |         |       V |
   23+50       2.2983      1.45  | Q       |         |         |        V|
   23+55       2.3084      1.45  | Q       |         |         |        V|
   24+ 0       2.3184      1.46  | Q       |         |         |        V|
   24+ 5       2.3281      1.41  | Q       |         |         |        V|
   24+10       2.3366      1.23  | Q       |         |         |        V|
   24+15       2.3417      0.75  |Q        |         |         |        V|
   24+20       2.3448      0.44  Q         |         |         |        V|
   24+25       2.3468      0.30  Q         |         |         |        V|
   24+30       2.3482      0.20  Q         |         |         |        V|
   24+35       2.3491      0.14  Q         |         |         |        V|
   24+40       2.3497      0.09  Q         |         |         |        V|
   24+45       2.3501      0.06  Q         |         |         |        V|
   24+50       2.3503      0.03  Q         |         |         |        V|
   24+55       2.3505      0.02  Q         |         |         |        V|
   25+ 0       2.3506      0.02  Q         |         |         |        V|
   25+ 5       2.3507      0.01  Q         |         |         |        V|
   25+10       2.3508      0.01  Q         |         |         |        V|
   25+15       2.3508      0.00  Q         |         |         |        V|
   25+20       2.3508      0.00  Q         |         |         |        V|
-----------------------------------------------------------------------
```

```
        U n i t   H y d r o g r a p h   A n a l y s i s

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018, Version 9.0

                Study date  02/26/21

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

San Bernardino County Synthetic Unit Hydrology Method
                Manual date - August 1986


Program License Serial Number 6481

---------------------------------------------------------------------
Paradise Ranch
100 yr Hydrograph
DA39

--------------------------------------------------------------------

        Storm Event Year = 100

        Antecedent Moisture Condition = 3

 English (in-lb) Input Units Used

 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



Area averaged rainfall intensity isohyetal data:
        Sub-Area        Duration        Isohyetal
        (Ac.)            (hours)         (In)
Rainfall data for year 10
             5.08            1           0.94
--------------------------------------------------------------------
Rainfall data for year 2
             5.08            6           3.25
--------------------------------------------------------------------
Rainfall data for year 2
             5.08           24           3.52
--------------------------------------------------------------------
Rainfall data for year 100
```

```
             5.08           1           1.50
--------------------------------------------------------------------
Rainfall data for year 100
             5.08           6           1.34
--------------------------------------------------------------------
Rainfall data for year 100
             5.08          24           9.00
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

******** Area-averaged max loss rate, Fm ********


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 3)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 84.0      96.4          5.08      1.000     0.071    1.000    0.071

Area-averaged adjusted loss rate Fm (In/Hr) =  0.071

********* Area-Averaged low loss rate fraction, Yb **********

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
     5.08   1.000         84.0      96.4       0.37     0.952

Area-averaged catchment yield fraction, Y =  0.952
Area-averaged low loss fraction, Yb =  0.048
User entry of time of concentration  =   0.204 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       5.08(Ac.)
Catchment Lag time =   0.163 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 51.0621
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.071(In/Hr)
Average low loss rate fraction (Yb) = 0.048 (decimal)
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall =  0.712(In)
Computed peak 30-minute rainfall =  1.218(In)
Specified peak 1-hour rainfall =  1.500(In)
Computed peak 3-hour rainfall =  1.500(In)
Specified peak 6-hour rainfall =  1.501(In)
Specified peak 24-hour rainfall =  9.000(In)


Note: user specified rainfall values used.
Rainfall depth area reduction factors:
Using a total area of       5.08(Ac.) (Ref: fig. E-4)

5-minute factor = 1.000     Adjusted rainfall =  0.712(In)
```

```
30-minute factor = 1.000    Adjusted rainfall =  1.218(In)
1-hour factor = 1.000       Adjusted rainfall =  1.500(In)
3-hour factor = 1.000       Adjusted rainfall =  1.500(In)
6-hour factor = 1.000       Adjusted rainfall =  1.501(In)
24-hour factor = 1.000      Adjusted rainfall =  9.000(In)
---------------------------------------------------------------------

                        U n i t  H y d r o g r a p h
+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph         Unit Hydrograph
Number            Mean values            ((CFS))
---------------------------------------------------------------------
                (K =        61.44 (CFS))

  1                4.409                 2.709
  2               25.936                13.225
  3               63.898                23.322
  4               78.235                 8.808
  5               86.466                 5.057
  6               91.800                 3.277
  7               95.273                 2.133
  8               97.375                 1.292
  9               98.307                 0.572
 10               98.846                 0.332
 11               99.220                 0.229
 12               99.591                 0.228
 13               99.849                 0.159
 14              100.000                 0.093
---------------------------------------------------------------------
Peak Unit   Adjusted mass rainfall  Unit rainfall
Number              (In)                (In)
  1              0.7116              0.7116
  2              0.8761              0.1645
  3              0.9894              0.1133
  4              1.0786              0.0892
  5              1.1533              0.0747
  6              1.2181              0.0648
  7              1.2757              0.0577
  8              1.3279              0.0521
  9              1.3756              0.0478
 10              1.4198              0.0442
 11              1.4610              0.0412
 12              1.4996              0.0386
 13              1.4997              0.0000
 14              1.4997              0.0000
 15              1.4997              0.0000
 16              1.4997              0.0000
 17              1.4997              0.0000
 18              1.4998              0.0000
 19              1.4998              0.0000
```

20	1.4998	0.0000
21	1.4998	0.0000
22	1.4998	0.0000
23	1.4998	0.0000
24	1.4998	0.0000
25	1.4999	0.0000
26	1.4999	0.0000
27	1.4999	0.0000
28	1.4999	0.0000
29	1.4999	0.0000
30	1.4999	0.0000
31	1.4999	0.0000
32	1.4999	0.0000
33	1.4999	0.0000
34	1.4999	0.0000
35	1.4999	0.0000
36	1.5000	0.0000
37	1.5000	0.0000
38	1.5000	0.0000
39	1.5001	0.0000
40	1.5001	0.0000
41	1.5001	0.0000
42	1.5002	0.0000
43	1.5002	0.0000
44	1.5003	0.0000
45	1.5003	0.0000
46	1.5003	0.0000
47	1.5003	0.0000
48	1.5004	0.0000
49	1.5004	0.0000
50	1.5004	0.0000
51	1.5005	0.0000
52	1.5005	0.0000
53	1.5005	0.0000
54	1.5006	0.0000
55	1.5006	0.0000
56	1.5006	0.0000
57	1.5006	0.0000
58	1.5007	0.0000
59	1.5007	0.0000
60	1.5007	0.0000
61	1.5007	0.0000
62	1.5008	0.0000
63	1.5008	0.0000
64	1.5008	0.0000
65	1.5008	0.0000
66	1.5008	0.0000
67	1.5009	0.0000
68	1.5009	0.0000
69	1.5009	0.0000

70	1.5009	0.0000
71	1.5010	0.0000
72	1.5010	0.0000
73	1.5280	0.0270
74	1.5551	0.0271
75	1.5823	0.0272
76	1.6096	0.0273
77	1.6370	0.0274
78	1.6645	0.0275
79	1.6921	0.0276
80	1.7199	0.0277
81	1.7477	0.0278
82	1.7756	0.0279
83	1.8036	0.0280
84	1.8318	0.0281
85	1.8600	0.0282
86	1.8883	0.0283
87	1.9167	0.0284
88	1.9452	0.0285
89	1.9738	0.0286
90	2.0025	0.0287
91	2.0313	0.0288
92	2.0602	0.0289
93	2.0892	0.0290
94	2.1183	0.0291
95	2.1474	0.0292
96	2.1767	0.0293
97	2.2060	0.0293
98	2.2355	0.0294
99	2.2650	0.0295
100	2.2946	0.0296
101	2.3243	0.0297
102	2.3540	0.0298
103	2.3839	0.0299
104	2.4138	0.0299
105	2.4439	0.0300
106	2.4740	0.0301
107	2.5042	0.0302
108	2.5345	0.0303
109	2.5648	0.0304
110	2.5953	0.0304
111	2.6258	0.0305
112	2.6564	0.0306
113	2.6871	0.0307
114	2.7178	0.0308
115	2.7487	0.0308
116	2.7796	0.0309
117	2.8106	0.0310
118	2.8417	0.0311
119	2.8728	0.0312

120	2.9040	0.0312
121	2.9354	0.0313
122	2.9667	0.0314
123	2.9982	0.0315
124	3.0297	0.0315
125	3.0613	0.0316
126	3.0930	0.0317
127	3.1248	0.0318
128	3.1566	0.0318
129	3.1885	0.0319
130	3.2205	0.0320
131	3.2525	0.0320
132	3.2846	0.0321
133	3.3168	0.0322
134	3.3490	0.0323
135	3.3814	0.0323
136	3.4138	0.0324
137	3.4462	0.0325
138	3.4788	0.0325
139	3.5114	0.0326
140	3.5440	0.0327
141	3.5768	0.0327
142	3.6096	0.0328
143	3.6425	0.0329
144	3.6754	0.0329
145	3.7084	0.0330
146	3.7415	0.0331
147	3.7746	0.0331
148	3.8079	0.0332
149	3.8411	0.0333
150	3.8745	0.0333
151	3.9079	0.0334
152	3.9413	0.0335
153	3.9749	0.0335
154	4.0085	0.0336
155	4.0421	0.0337
156	4.0759	0.0337
157	4.1097	0.0338
158	4.1435	0.0339
159	4.1774	0.0339
160	4.2114	0.0340
161	4.2454	0.0340
162	4.2795	0.0341
163	4.3137	0.0342
164	4.3479	0.0342
165	4.3822	0.0343
166	4.4165	0.0343
167	4.4509	0.0344
168	4.4854	0.0345
169	4.5199	0.0345

170	4.5545	0.0346
171	4.5892	0.0346
172	4.6239	0.0347
173	4.6586	0.0348
174	4.6935	0.0348
175	4.7283	0.0349
176	4.7633	0.0349
177	4.7983	0.0350
178	4.8333	0.0351
179	4.8684	0.0351
180	4.9036	0.0352
181	4.9388	0.0352
182	4.9741	0.0353
183	5.0094	0.0353
184	5.0448	0.0354
185	5.0803	0.0355
186	5.1158	0.0355
187	5.1514	0.0356
188	5.1870	0.0356
189	5.2227	0.0357
190	5.2584	0.0357
191	5.2942	0.0358
192	5.3300	0.0358
193	5.3659	0.0359
194	5.4019	0.0359
195	5.4379	0.0360
196	5.4739	0.0361
197	5.5100	0.0361
198	5.5462	0.0362
199	5.5824	0.0362
200	5.6187	0.0363
201	5.6550	0.0363
202	5.6914	0.0364
203	5.7278	0.0364
204	5.7643	0.0365
205	5.8008	0.0365
206	5.8374	0.0366
207	5.8740	0.0366
208	5.9107	0.0367
209	5.9475	0.0367
210	5.9843	0.0368
211	6.0211	0.0368
212	6.0580	0.0369
213	6.0949	0.0369
214	6.1319	0.0370
215	6.1690	0.0370
216	6.2061	0.0371
217	6.2432	0.0371
218	6.2804	0.0372
219	6.3177	0.0372

220	6.3550	0.0373
221	6.3923	0.0373
222	6.4297	0.0374
223	6.4672	0.0374
224	6.5047	0.0375
225	6.5422	0.0375
226	6.5798	0.0376
227	6.6174	0.0376
228	6.6551	0.0377
229	6.6929	0.0377
230	6.7306	0.0378
231	6.7685	0.0378
232	6.8064	0.0379
233	6.8443	0.0379
234	6.8823	0.0380
235	6.9203	0.0380
236	6.9584	0.0381
237	6.9965	0.0381
238	7.0346	0.0382
239	7.0728	0.0382
240	7.1111	0.0383
241	7.1494	0.0383
242	7.1878	0.0384
243	7.2262	0.0384
244	7.2646	0.0384
245	7.3031	0.0385
246	7.3416	0.0385
247	7.3802	0.0386
248	7.4188	0.0386
249	7.4575	0.0387
250	7.4962	0.0387
251	7.5350	0.0388
252	7.5738	0.0388
253	7.6127	0.0389
254	7.6515	0.0389
255	7.6905	0.0389
256	7.7295	0.0390
257	7.7685	0.0390
258	7.8076	0.0391
259	7.8467	0.0391
260	7.8859	0.0392
261	7.9251	0.0392
262	7.9643	0.0393
263	8.0036	0.0393
264	8.0430	0.0393
265	8.0824	0.0394
266	8.1218	0.0394
267	8.1613	0.0395
268	8.2008	0.0395
269	8.2403	0.0396

270	8.2799	0.0396
271	8.3196	0.0396
272	8.3593	0.0397
273	8.3990	0.0397
274	8.4388	0.0398
275	8.4786	0.0398
276	8.5184	0.0399
277	8.5583	0.0399
278	8.5983	0.0399
279	8.6382	0.0400
280	8.6783	0.0400
281	8.7183	0.0401
282	8.7584	0.0401
283	8.7986	0.0401
284	8.8388	0.0402
285	8.8790	0.0402
286	8.9193	0.0403
287	8.9596	0.0403
288	8.9999	0.0404

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0404	0.0019	0.0384
2	0.0403	0.0019	0.0384
3	0.0402	0.0019	0.0383
4	0.0402	0.0019	0.0383
5	0.0401	0.0019	0.0382
6	0.0401	0.0019	0.0381
7	0.0400	0.0019	0.0381
8	0.0399	0.0019	0.0380
9	0.0399	0.0019	0.0379
10	0.0398	0.0019	0.0379
11	0.0397	0.0019	0.0378
12	0.0397	0.0019	0.0378
13	0.0396	0.0019	0.0377
14	0.0396	0.0019	0.0377
15	0.0395	0.0019	0.0376
16	0.0394	0.0019	0.0375
17	0.0393	0.0019	0.0374
18	0.0393	0.0019	0.0374
19	0.0392	0.0019	0.0373
20	0.0392	0.0019	0.0373
21	0.0391	0.0019	0.0372
22	0.0390	0.0019	0.0372
23	0.0389	0.0019	0.0371
24	0.0389	0.0019	0.0370
25	0.0388	0.0019	0.0369
26	0.0388	0.0019	0.0369

27	0.0387	0.0019	0.0368
28	0.0386	0.0019	0.0368
29	0.0385	0.0019	0.0367
30	0.0385	0.0019	0.0366
31	0.0384	0.0018	0.0365
32	0.0384	0.0018	0.0365
33	0.0383	0.0018	0.0364
34	0.0382	0.0018	0.0364
35	0.0381	0.0018	0.0363
36	0.0381	0.0018	0.0362
37	0.0380	0.0018	0.0361
38	0.0379	0.0018	0.0361
39	0.0378	0.0018	0.0360
40	0.0378	0.0018	0.0360
41	0.0377	0.0018	0.0359
42	0.0376	0.0018	0.0358
43	0.0375	0.0018	0.0357
44	0.0375	0.0018	0.0357
45	0.0374	0.0018	0.0356
46	0.0373	0.0018	0.0355
47	0.0372	0.0018	0.0355
48	0.0372	0.0018	0.0354
49	0.0371	0.0018	0.0353
50	0.0370	0.0018	0.0353
51	0.0369	0.0018	0.0352
52	0.0369	0.0018	0.0351
53	0.0368	0.0018	0.0350
54	0.0367	0.0018	0.0350
55	0.0366	0.0018	0.0349
56	0.0366	0.0018	0.0348
57	0.0365	0.0018	0.0347
58	0.0364	0.0018	0.0347
59	0.0363	0.0017	0.0346
60	0.0363	0.0017	0.0345
61	0.0362	0.0017	0.0344
62	0.0361	0.0017	0.0344
63	0.0360	0.0017	0.0343
64	0.0359	0.0017	0.0342
65	0.0358	0.0017	0.0341
66	0.0358	0.0017	0.0341
67	0.0357	0.0017	0.0340
68	0.0356	0.0017	0.0339
69	0.0355	0.0017	0.0338
70	0.0355	0.0017	0.0337
71	0.0353	0.0017	0.0336
72	0.0353	0.0017	0.0336
73	0.0352	0.0017	0.0335
74	0.0351	0.0017	0.0334
75	0.0350	0.0017	0.0333
76	0.0349	0.0017	0.0333

77	0.0348	0.0017	0.0331
78	0.0348	0.0017	0.0331
79	0.0346	0.0017	0.0330
80	0.0346	0.0017	0.0329
81	0.0345	0.0017	0.0328
82	0.0344	0.0017	0.0327
83	0.0343	0.0016	0.0326
84	0.0342	0.0016	0.0326
85	0.0341	0.0016	0.0325
86	0.0340	0.0016	0.0324
87	0.0339	0.0016	0.0323
88	0.0339	0.0016	0.0322
89	0.0337	0.0016	0.0321
90	0.0337	0.0016	0.0320
91	0.0335	0.0016	0.0319
92	0.0335	0.0016	0.0319
93	0.0333	0.0016	0.0317
94	0.0333	0.0016	0.0317
95	0.0331	0.0016	0.0315
96	0.0331	0.0016	0.0315
97	0.0329	0.0016	0.0314
98	0.0329	0.0016	0.0313
99	0.0327	0.0016	0.0312
100	0.0327	0.0016	0.0311
101	0.0325	0.0016	0.0310
102	0.0325	0.0016	0.0309
103	0.0323	0.0016	0.0308
104	0.0323	0.0016	0.0307
105	0.0321	0.0015	0.0306
106	0.0320	0.0015	0.0305
107	0.0319	0.0015	0.0304
108	0.0318	0.0015	0.0303
109	0.0317	0.0015	0.0302
110	0.0316	0.0015	0.0301
111	0.0315	0.0015	0.0299
112	0.0314	0.0015	0.0299
113	0.0312	0.0015	0.0297
114	0.0312	0.0015	0.0297
115	0.0310	0.0015	0.0295
116	0.0309	0.0015	0.0294
117	0.0308	0.0015	0.0293
118	0.0307	0.0015	0.0292
119	0.0305	0.0015	0.0291
120	0.0304	0.0015	0.0290
121	0.0303	0.0015	0.0288
122	0.0302	0.0015	0.0287
123	0.0300	0.0014	0.0286
124	0.0299	0.0014	0.0285
125	0.0298	0.0014	0.0283
126	0.0297	0.0014	0.0283

127	0.0295	0.0014	0.0281
128	0.0294	0.0014	0.0280
129	0.0293	0.0014	0.0278
130	0.0292	0.0014	0.0278
131	0.0290	0.0014	0.0276
132	0.0289	0.0014	0.0275
133	0.0287	0.0014	0.0273
134	0.0286	0.0014	0.0272
135	0.0284	0.0014	0.0270
136	0.0283	0.0014	0.0270
137	0.0281	0.0014	0.0268
138	0.0280	0.0013	0.0267
139	0.0278	0.0013	0.0265
140	0.0277	0.0013	0.0264
141	0.0275	0.0013	0.0262
142	0.0274	0.0013	0.0261
143	0.0272	0.0013	0.0259
144	0.0271	0.0013	0.0258
145	0.0000	0.0000	0.0000
146	0.0000	0.0000	0.0000
147	0.0000	0.0000	0.0000
148	0.0000	0.0000	0.0000
149	0.0000	0.0000	0.0000
150	0.0000	0.0000	0.0000
151	0.0000	0.0000	0.0000
152	0.0000	0.0000	0.0000
153	0.0000	0.0000	0.0000
154	0.0000	0.0000	0.0000
155	0.0000	0.0000	0.0000
156	0.0000	0.0000	0.0000
157	0.0000	0.0000	0.0000
158	0.0000	0.0000	0.0000
159	0.0000	0.0000	0.0000
160	0.0000	0.0000	0.0000
161	0.0000	0.0000	0.0000
162	0.0000	0.0000	0.0000
163	0.0000	0.0000	0.0000
164	0.0000	0.0000	0.0000
165	0.0000	0.0000	0.0000
166	0.0000	0.0000	0.0000
167	0.0000	0.0000	0.0000
168	0.0000	0.0000	0.0000
169	0.0000	0.0000	0.0000
170	0.0000	0.0000	0.0000
171	0.0000	0.0000	0.0000
172	0.0000	0.0000	0.0000
173	0.0000	0.0000	0.0000
174	0.0000	0.0000	0.0000
175	0.0000	0.0000	0.0000
176	0.0000	0.0000	0.0000

177	0.0000	0.0000	0.0000
178	0.0000	0.0000	0.0000
179	0.0000	0.0000	0.0000
180	0.0000	0.0000	0.0000
181	0.0000	0.0000	0.0000
182	0.0000	0.0000	0.0000
183	0.0000	0.0000	0.0000
184	0.0000	0.0000	0.0000
185	0.0386	0.0019	0.0368
186	0.0412	0.0020	0.0392
187	0.0478	0.0023	0.0455
188	0.0521	0.0025	0.0496
189	0.0648	0.0031	0.0617
190	0.0747	0.0036	0.0711
191	0.1133	0.0055	0.1079
192	0.1645	0.0059	0.1586
193	0.7116	0.0059	0.7057
194	0.0892	0.0043	0.0849
195	0.0577	0.0028	0.0549
196	0.0442	0.0021	0.0421
197	0.0000	0.0000	0.0000
198	0.0000	0.0000	0.0000
199	0.0000	0.0000	0.0000
200	0.0000	0.0000	0.0000
201	0.0000	0.0000	0.0000
202	0.0000	0.0000	0.0000
203	0.0000	0.0000	0.0000
204	0.0000	0.0000	0.0000
205	0.0000	0.0000	0.0000
206	0.0000	0.0000	0.0000
207	0.0000	0.0000	0.0000
208	0.0000	0.0000	0.0000
209	0.0000	0.0000	0.0000
210	0.0000	0.0000	0.0000
211	0.0000	0.0000	0.0000
212	0.0000	0.0000	0.0000
213	0.0000	0.0000	0.0000
214	0.0000	0.0000	0.0000
215	0.0000	0.0000	0.0000
216	0.0000	0.0000	0.0000
217	0.0270	0.0013	0.0257
218	0.0273	0.0013	0.0260
219	0.0276	0.0013	0.0263
220	0.0279	0.0013	0.0266
221	0.0282	0.0014	0.0269
222	0.0285	0.0014	0.0271
223	0.0288	0.0014	0.0274
224	0.0291	0.0014	0.0277
225	0.0293	0.0014	0.0279
226	0.0296	0.0014	0.0282

227	0.0299	0.0014	0.0284
228	0.0301	0.0014	0.0287
229	0.0304	0.0015	0.0289
230	0.0306	0.0015	0.0291
231	0.0308	0.0015	0.0294
232	0.0311	0.0015	0.0296
233	0.0313	0.0015	0.0298
234	0.0315	0.0015	0.0300
235	0.0318	0.0015	0.0302
236	0.0320	0.0015	0.0304
237	0.0322	0.0015	0.0306
238	0.0324	0.0016	0.0308
239	0.0326	0.0016	0.0310
240	0.0328	0.0016	0.0312
241	0.0330	0.0016	0.0314
242	0.0332	0.0016	0.0316
243	0.0334	0.0016	0.0318
244	0.0336	0.0016	0.0320
245	0.0338	0.0016	0.0322
246	0.0340	0.0016	0.0323
247	0.0342	0.0016	0.0325
248	0.0343	0.0017	0.0327
249	0.0345	0.0017	0.0329
250	0.0347	0.0017	0.0330
251	0.0349	0.0017	0.0332
252	0.0351	0.0017	0.0334
253	0.0352	0.0017	0.0335
254	0.0354	0.0017	0.0337
255	0.0356	0.0017	0.0339
256	0.0357	0.0017	0.0340
257	0.0359	0.0017	0.0342
258	0.0361	0.0017	0.0343
259	0.0362	0.0017	0.0345
260	0.0364	0.0018	0.0346
261	0.0365	0.0018	0.0348
262	0.0367	0.0018	0.0349
263	0.0368	0.0018	0.0351
264	0.0370	0.0018	0.0352
265	0.0371	0.0018	0.0354
266	0.0373	0.0018	0.0355
267	0.0374	0.0018	0.0356
268	0.0376	0.0018	0.0358
269	0.0377	0.0018	0.0359
270	0.0379	0.0018	0.0361
271	0.0380	0.0018	0.0362
272	0.0382	0.0018	0.0363
273	0.0383	0.0018	0.0365
274	0.0384	0.0019	0.0366
275	0.0386	0.0019	0.0367
276	0.0387	0.0019	0.0369

```
      277              0.0389           0.0019              0.0370
      278              0.0390           0.0019              0.0371
      279              0.0391           0.0019              0.0372
      280              0.0393           0.0019              0.0374
      281              0.0394           0.0019              0.0375
      282              0.0395           0.0019              0.0376
      283              0.0396           0.0019              0.0377
      284              0.0398           0.0019              0.0379
      285              0.0399           0.0019              0.0380
      286              0.0400           0.0019              0.0381
      287              0.0401           0.0019              0.0382
      288              0.0403           0.0019              0.0383
      --------------------------------------------------------------------
      --------------------------------------------------------------------
      Total soil rain loss =      0.40(In)
      Total effective rainfall =      8.60(In)
      Peak flow rate in flood hydrograph =     20.15(CFS)
      ---------------------------------------------------------------------
      ++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R     S T O R M
                       R u n o f f      H y d r o g r a p h
      --------------------------------------------------------------------
                    Hydrograph in   5   Minute intervals ((CFS))

      --------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        7.5      15.0      22.5      30.0
-----------------------------------------------------------------------
  0+ 5       0.0007      0.10  Q         |         |         |         |
  0+10       0.0049      0.61  Q         |         |         |         |
  0+15       0.0153      1.51  V Q       |         |         |         |
  0+20       0.0280      1.84  V Q       |         |         |         |
  0+25       0.0420      2.03  V Q       |         |         |         |
  0+30       0.0569      2.16  V Q       |         |         |         |
  0+35       0.0723      2.24  V Q       |         |         |         |
  0+40       0.0880      2.28  V  Q      |         |         |         |
  0+45       0.1038      2.30   |V Q     |         |         |         |
  0+50       0.1198      2.31   |V Q     |         |         |         |
  0+55       0.1357      2.32   |V Q     |         |         |         |
  1+ 0       0.1517      2.32   |V Q     |         |         |         |
  1+ 5       0.1677      2.32   |V Q     |         |         |         |
  1+10       0.1837      2.32   | VQ     |         |         |         |
  1+15       0.1996      2.32   | VQ     |         |         |         |
  1+20       0.2156      2.31   | VQ     |         |         |         |
  1+25       0.2315      2.31   | VQ     |         |         |         |
  1+30       0.2474      2.31   | VQ     |         |         |         |
  1+35       0.2633      2.30   | VQ     |         |         |         |
  1+40       0.2791      2.30   |   Q    |         |         |         |
  1+45       0.2949      2.30   |   Q    |         |         |         |
  1+50       0.3107      2.29   |   Q    |         |         |         |
  1+55       0.3264      2.29   |   Q    |         |         |         |
```

```
 2+ 0       0.3422      2.28   |  Q      |         |         |         |
 2+ 5       0.3579      2.28   |  Q      |         |         |         |
 2+10       0.3736      2.28   |  QV     |         |         |         |
 2+15       0.3892      2.27   |  QV     |         |         |         |
 2+20       0.4048      2.27   |  QV     |         |         |         |
 2+25       0.4204      2.26   |  QV     |         |         |         |
 2+30       0.4360      2.26   |  QV     |         |         |         |
 2+35       0.4515      2.26   |  QV     |         |         |         |
 2+40       0.4671      2.25   |  Q V    |         |         |         |
 2+45       0.4825      2.25   | Q  V    |         |         |         |
 2+50       0.4980      2.24   | Q  V    |         |         |         |
 2+55       0.5134      2.24   | Q  V    |         |         |         |
 3+ 0       0.5288      2.24   | Q  V    |         |         |         |
 3+ 5       0.5442      2.23   | Q  V    |         |         |         |
 3+10       0.5596      2.23   | Q   V   |         |         |         |
 3+15       0.5749      2.22   | Q   V   |         |         |         |
 3+20       0.5902      2.22   | Q   V   |         |         |         |
 3+25       0.6054      2.22   | Q   V   |         |         |         |
 3+30       0.6206      2.21   | Q   V   |         |         |         |
 3+35       0.6358      2.21   | Q   V   |         |         |         |
 3+40       0.6510      2.20   | Q    V  |         |         |         |
 3+45       0.6662      2.20   | Q    V  |         |         |         |
 3+50       0.6813      2.19   | Q    V  |         |         |         |
 3+55       0.6964      2.19   | Q    V  |         |         |         |
 4+ 0       0.7114      2.19   | Q    V  |         |         |         |
 4+ 5       0.7264      2.18   | Q    V  |         |         |         |
 4+10       0.7414      2.18   | Q     V |         |         |         |
 4+15       0.7564      2.17   | Q     V |         |         |         |
 4+20       0.7713      2.17   | Q     V |         |         |         |
 4+25       0.7862      2.16   | Q     V |         |         |         |
 4+30       0.8011      2.16   | Q     V |         |         |         |
 4+35       0.8159      2.15   | Q     V |         |         |         |
 4+40       0.8308      2.15   | Q      V|         |         |         |
 4+45       0.8455      2.15   | Q      V|         |         |         |
 4+50       0.8603      2.14   | Q      V|         |         |         |
 4+55       0.8750      2.14   | Q      V|         |         |         |
 5+ 0       0.8897      2.13   | Q      V|         |         |         |
 5+ 5       0.9043      2.13   | Q      V|         |         |         |
 5+10       0.9190      2.12   | Q       V         |         |         |
 5+15       0.9336      2.12   | Q       V         |         |         |
 5+20       0.9481      2.11   | Q       V         |         |         |
 5+25       0.9626      2.11   | Q       V         |         |         |
 5+30       0.9771      2.10   | Q       V         |         |         |
 5+35       0.9916      2.10   | Q       V         |         |         |
 5+40       1.0060      2.09   | Q       |V        |         |         |
 5+45       1.0204      2.09   | Q       |V        |         |         |
 5+50       1.0348      2.09   | Q       |V        |         |         |
 5+55       1.0491      2.08   | Q       |V        |         |         |
 6+ 0       1.0634      2.08   | Q       |V        |         |         |
 6+ 5       1.0776      2.07   | Q       |V        |         |         |
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 6+10       1.0919      2.07  | Q       | V       |         |         |
 6+15       1.1061      2.06  | Q       | V       |         |         |
 6+20       1.1202      2.06  | Q       | V       |         |         |
 6+25       1.1343      2.05  | Q       | V       |         |         |
 6+30       1.1484      2.05  | Q       | V       |         |         |
 6+35       1.1625      2.04  | Q       | V       |         |         |
 6+40       1.1765      2.04  | Q       | V       |         |         |
 6+45       1.1905      2.03  | Q       |  V      |         |         |
 6+50       1.2044      2.02  | Q       |  V      |         |         |
 6+55       1.2183      2.02  | Q       |  V      |         |         |
 7+ 0       1.2322      2.01  | Q       |  V      |         |         |
 7+ 5       1.2460      2.01  | Q       |  V      |         |         |
 7+10       1.2598      2.00  | Q       |  V      |         |         |
 7+15       1.2736      2.00  | Q       |   V     |         |         |
 7+20       1.2873      1.99  | Q       |   V     |         |         |
 7+25       1.3010      1.99  | Q       |   V     |         |         |
 7+30       1.3147      1.98  | Q       |   V     |         |         |
 7+35       1.3283      1.98  | Q       |   V     |         |         |
 7+40       1.3418      1.97  | Q       |   V     |         |         |
 7+45       1.3554      1.97  | Q       |   V     |         |         |
 7+50       1.3689      1.96  | Q       |    V    |         |         |
 7+55       1.3823      1.95  | Q       |    V    |         |         |
 8+ 0       1.3958      1.95  | Q       |    V    |         |         |
 8+ 5       1.4091      1.94  | Q       |    V    |         |         |
 8+10       1.4225      1.94  | Q       |    V    |         |         |
 8+15       1.4358      1.93  | Q       |    V    |         |         |
 8+20       1.4490      1.93  | Q       |    V    |         |         |
 8+25       1.4622      1.92  | Q       |     V   |         |         |
 8+30       1.4754      1.91  | Q       |     V   |         |         |
 8+35       1.4886      1.91  | Q       |     V   |         |         |
 8+40       1.5016      1.90  | Q       |     V   |         |         |
 8+45       1.5147      1.89  | Q       |     V   |         |         |
 8+50       1.5277      1.89  | Q       |     V   |         |         |
 8+55       1.5407      1.88  | Q       |     V   |         |         |
 9+ 0       1.5536      1.88  | Q       |      V  |         |         |
 9+ 5       1.5665      1.87  | Q       |      V  |         |         |
 9+10       1.5793      1.86  | Q       |      V  |         |         |
 9+15       1.5921      1.86  | Q       |      V  |         |         |
 9+20       1.6049      1.85  | Q       |      V  |         |         |
 9+25       1.6176      1.84  | Q       |      V  |         |         |
 9+30       1.6302      1.84  | Q       |      V  |         |         |
 9+35       1.6428      1.83  | Q       |       V |         |         |
 9+40       1.6554      1.82  | Q       |       V |         |         |
 9+45       1.6679      1.82  | Q       |       V |         |         |
 9+50       1.6804      1.81  | Q       |       V |         |         |
 9+55       1.6928      1.80  | Q       |       V |         |         |
10+ 0       1.7052      1.80  | Q       |       V |         |         |
10+ 5       1.7175      1.79  | Q       |       V |         |         |
10+10       1.7298      1.78  | Q       |        V|         |         |
10+15       1.7420      1.78  | Q       |        V|         |         |
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10+20       1.7542      1.77  | Q     |        V|         |         |
10+25       1.7664      1.76  | Q     |        V|         |         |
10+30       1.7784      1.75  | Q     |        V|         |         |
10+35       1.7905      1.75  | Q     |        V|         |         |
10+40       1.8024      1.74  | Q     |        V|         |         |
10+45       1.8144      1.73  | Q     |        V|         |         |
10+50       1.8262      1.72  | Q     |         V         |         |
10+55       1.8381      1.72  | Q     |         V         |         |
11+ 0       1.8498      1.71  | Q     |         V         |         |
11+ 5       1.8615      1.70  | Q     |         V         |         |
11+10       1.8732      1.69  | Q     |         V         |         |
11+15       1.8848      1.68  | Q     |         V         |         |
11+20       1.8964      1.68  | Q     |         V         |         |
11+25       1.9078      1.67  | Q     |         V         |         |
11+30       1.9193      1.66  | Q     |         |V        |         |
11+35       1.9306      1.65  | Q     |         |V        |         |
11+40       1.9420      1.64  | Q     |         |V        |         |
11+45       1.9532      1.63  | Q     |         |V        |         |
11+50       1.9644      1.63  | Q     |         |V        |         |
11+55       1.9755      1.62  | Q     |         |V        |         |
12+ 0       1.9866      1.61  | Q     |         |V        |         |
12+ 5       1.9971      1.53  | Q     |         |V        |         |
12+10       2.0053      1.18  |Q      |         | V       |         |
12+15       2.0092      0.58  Q         |         | V       |         |
12+20       2.0116      0.35  Q         |         | V       |         |
12+25       2.0131      0.22  Q         |         | V       |         |
12+30       2.0140      0.13  Q         |         | V       |         |
12+35       2.0146      0.08  Q         |         | V       |         |
12+40       2.0149      0.04  Q         |         | V       |         |
12+45       2.0151      0.03  Q         |         | V       |         |
12+50       2.0152      0.02  Q         |         | V       |         |
12+55       2.0153      0.01  Q         |         | V       |         |
13+ 0       2.0154      0.01  Q         |         | V       |         |
13+ 5       2.0154      0.00  Q         |         | V       |         |
13+10       2.0154      0.00  Q         |         | V       |         |
13+15       2.0154      0.00  Q         |         | V       |         |
13+20       2.0154      0.00  Q         |         | V       |         |
13+25       2.0154      0.00  Q         |         | V       |         |
13+30       2.0154      0.00  Q         |         | V       |         |
13+35       2.0155      0.00  Q         |         | V       |         |
13+40       2.0155      0.00  Q         |         | V       |         |
13+45       2.0155      0.00  Q         |         | V       |         |
13+50       2.0155      0.00  Q         |         | V       |         |
13+55       2.0155      0.00  Q         |         | V       |         |
14+ 0       2.0155      0.00  Q         |         | V       |         |
14+ 5       2.0155      0.00  Q         |         | V       |         |
14+10       2.0155      0.00  Q         |         | V       |         |
14+15       2.0156      0.00  Q         |         | V       |         |
14+20       2.0156      0.00  Q         |         | V       |         |
14+25       2.0156      0.00  Q         |         | V       |         |
```

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14+30       2.0156      0.00  Q         |         | V       |         |
14+35       2.0156      0.00  Q         |         | V       |         |
14+40       2.0156      0.00  Q         |         | V       |         |
14+45       2.0156      0.00  Q         |         | V       |         |
14+50       2.0156      0.00  Q         |         | V       |         |
14+55       2.0156      0.00  Q         |         | V       |         |
15+ 0       2.0156      0.00  Q         |         | V       |         |
15+ 5       2.0156      0.00  Q         |         | V       |         |
15+10       2.0156      0.00  Q         |         | V       |         |
15+15       2.0156      0.00  Q         |         | V       |         |
15+20       2.0156      0.00  Q         |         | V       |         |
15+25       2.0163      0.10  Q         |         | V       |         |
15+30       2.0204      0.59  Q         |         | V       |         |
15+35       2.0307      1.50  |Q        |         | V       |         |
15+40       2.0443      1.97  | Q       |         | V       |         |
15+45       2.0610      2.42  |  Q      |         | V       |         |
15+50       2.0808      2.89  |  Q      |         | V       |         |
15+55       2.1053      3.55  |   Q     |         |  V      |         |
16+ 0       2.1369      4.59  |     Q   |         |  V      |         |
16+ 5       2.1905      7.79  |         Q         |   V     |         |
16+10       2.2936     14.97  |         |        Q|    V    |         |
16+15       2.4324     20.15  |         |         |     Q   |         |
16+20       2.5046     10.48  |         |  Q      |      V  |         |
16+25       2.5533      7.07  |        Q|         |       V |         |
16+30       2.5862      4.78  |     Q   |         |       V |         |
16+35       2.6052      2.76  |  Q      |         |       V |         |
16+40       2.6166      1.66  | Q       |         |       V |         |
16+45       2.6226      0.88  |Q        |         |       V |         |
16+50       2.6262      0.52  Q         |         |       V |         |
16+55       2.6285      0.34  Q         |         |       V |         |
17+ 0       2.6303      0.26  Q         |         |       V |         |
17+ 5       2.6315      0.17  Q         |         |       V |         |
17+10       2.6322      0.10  Q         |         |       V |         |
17+15       2.6324      0.03  Q         |         |       V |         |
17+20       2.6325      0.01  Q         |         |       V |         |
17+25       2.6325      0.01  Q         |         |       V |         |
17+30       2.6326      0.00  Q         |         |       V |         |
17+35       2.6326      0.00  Q         |         |       V |         |
17+40       2.6326      0.00  Q         |         |       V |         |
17+45       2.6326      0.00  Q         |         |       V |         |
17+50       2.6326      0.00  Q         |         |       V |         |
17+55       2.6326      0.00  Q         |         |       V |         |
18+ 0       2.6326      0.00  Q         |         |       V |         |
18+ 5       2.6331      0.07  Q         |         |       V |         |
18+10       2.6359      0.41  Q         |         |       V |         |
18+15       2.6429      1.01  |Q        |         |        V|         |
18+20       2.6516      1.25  |Q        |         |        V|         |
18+25       2.6612      1.40  |Q        |         |        V|         |
18+30       2.6715      1.50  |Q        |         |        V|         |
18+35       2.6823      1.57  | Q       |         |        V|         |
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18+40       2.6934      1.62  | Q       |         |        V|         |
18+45       2.7047      1.65  | Q       |         |        V|         |
18+50       2.7163      1.67  | Q       |         |        V|         |
18+55       2.7279      1.69  | Q       |         |        V|         |
19+ 0       2.7397      1.71  | Q       |         |         V         |
19+ 5       2.7517      1.73  | Q       |         |         V         |
19+10       2.7637      1.75  | Q       |         |         V         |
19+15       2.7759      1.77  | Q       |         |         V         |
19+20       2.7882      1.78  | Q       |         |         V         |
19+25       2.8005      1.79  | Q       |         |         V         |
19+30       2.8130      1.81  | Q       |         |         V         |
19+35       2.8255      1.82  | Q       |         |         |V        |
19+40       2.8382      1.84  | Q       |         |         |V        |
19+45       2.8509      1.85  | Q       |         |         |V        |
19+50       2.8637      1.86  | Q       |         |         |V        |
19+55       2.8766      1.87  | Q       |         |         |V        |
20+ 0       2.8896      1.89  | Q       |         |         |V        |
20+ 5       2.9027      1.90  | Q       |         |         |V        |
20+10       2.9159      1.91  | Q       |         |         | V       |
20+15       2.9291      1.92  | Q       |         |         | V       |
20+20       2.9424      1.93  | Q       |         |         | V       |
20+25       2.9558      1.95  | Q       |         |         | V       |
20+30       2.9693      1.96  | Q       |         |         | V       |
20+35       2.9829      1.97  | Q       |         |         | V       |
20+40       2.9965      1.98  | Q       |         |         | V       |
20+45       3.0102      1.99  | Q       |         |         |  V      |
20+50       3.0240      2.00  | Q       |         |         |  V      |
20+55       3.0379      2.01  | Q       |         |         |  V      |
21+ 0       3.0518      2.02  | Q       |         |         |  V      |
21+ 5       3.0658      2.03  | Q       |         |         |  V      |
21+10       3.0799      2.04  | Q       |         |         |  V      |
21+15       3.0940      2.05  | Q       |         |         |   V     |
21+20       3.1082      2.06  | Q       |         |         |   V     |
21+25       3.1225      2.07  | Q       |         |         |   V     |
21+30       3.1369      2.08  | Q       |         |         |   V     |
21+35       3.1513      2.09  | Q       |         |         |   V     |
21+40       3.1658      2.10  | Q       |         |         |   V     |
21+45       3.1803      2.11  | Q       |         |         |   V     |
21+50       3.1949      2.12  | Q       |         |         |    V    |
21+55       3.2096      2.13  | Q       |         |         |    V    |
22+ 0       3.2243      2.14  | Q       |         |         |    V    |
22+ 5       3.2391      2.15  | Q       |         |         |    V    |
22+10       3.2540      2.16  | Q       |         |         |    V    |
22+15       3.2689      2.17  | Q       |         |         |    V    |
22+20       3.2839      2.18  | Q       |         |         |     V   |
22+25       3.2989      2.18  | Q       |         |         |     V   |
22+30       3.3140      2.19  | Q       |         |         |     V   |
22+35       3.3292      2.20  | Q       |         |         |     V   |
22+40       3.3444      2.21  | Q       |         |         |     V   |
22+45       3.3597      2.22  | Q       |         |         |     V   |
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   22+50       3.3750      2.23  | Q       |         |         |      V  |
   22+55       3.3904      2.23  | Q       |         |         |      V  |
   23+ 0       3.4059      2.24  | Q       |         |         |      V  |
   23+ 5       3.4214      2.25  |  Q      |         |         |      V  |
   23+10       3.4369      2.26  |  Q      |         |         |      V  |
   23+15       3.4526      2.27  |  Q      |         |         |      V  |
   23+20       3.4682      2.28  |  Q      |         |         |       V |
   23+25       3.4839      2.28  |  Q      |         |         |       V |
   23+30       3.4997      2.29  |  Q      |         |         |       V |
   23+35       3.5155      2.30  |  Q      |         |         |       V |
   23+40       3.5314      2.31  |  Q      |         |         |       V |
   23+45       3.5474      2.31  |  Q      |         |         |        V|
   23+50       3.5633      2.32  |  Q      |         |         |        V|
   23+55       3.5794      2.33  |  Q      |         |         |        V|
   24+ 0       3.5955      2.34  |  Q      |         |         |        V|
   24+ 5       3.6109      2.24  | Q       |         |         |        V|
   24+10       3.6229      1.74  | Q       |         |         |        V|
   24+15       3.6287      0.85  |Q        |         |         |        V|
   24+20       3.6322      0.51  Q         |         |         |        V|
   24+25       3.6344      0.32  Q         |         |         |        V|
   24+30       3.6357      0.19  Q         |         |         |        V|
   24+35       3.6365      0.11  Q         |         |         |        V|
   24+40       3.6369      0.06  Q         |         |         |        V|
   24+45       3.6372      0.04  Q         |         |         |        V|
   24+50       3.6374      0.03  Q         |         |         |        V|
   24+55       3.6375      0.02  Q         |         |         |        V|
   25+ 0       3.6376      0.01  Q         |         |         |        V|
   25+ 5       3.6376      0.00  Q         |         |         |         V
-----------------------------------------------------------------------
```

```
        U n i t   H y d r o g r a p h   A n a l y s i s

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                Study date  02/28/21

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------

San Bernardino County Synthetic Unit Hydrology Method
                Manual date - August 1986


Program License Serial Number 6481

---------------------------------------------------------------------
Paradise Ranch
100 yr Hydrograph
DA40

--------------------------------------------------------------------

        Storm Event Year = 100

        Antecedent Moisture Condition = 3

 English (in-lb) Input Units Used

 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



Area averaged rainfall intensity isohyetal data:
        Sub-Area        Duration        Isohyetal
        (Ac.)            (hours)         (In)
Rainfall data for year 10
             7.33            1           0.94
--------------------------------------------------------------------
Rainfall data for year 2
             7.33            6           3.25
--------------------------------------------------------------------
Rainfall data for year 2
             7.33           24           3.52
--------------------------------------------------------------------
Rainfall data for year 100
```

```
            7.33           1          1.50
--------------------------------------------------------------------
Rainfall data for year 100
            7.33           6          1.34
--------------------------------------------------------------------
Rainfall data for year 100
            7.33          24          9.00
--------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

******** Area-averaged max loss rate, Fm ********


SCS curve  SCS curve     Area     Area     Fp(Fig C6)    Ap      Fm
No.(AMCII) NO.(AMC 3)    (Ac.)    Fraction     (In/Hr)  (dec.)   (In/Hr)
 84.0      96.4          7.33      1.000     0.071    1.000    0.071

Area-averaged adjusted loss rate Fm (In/Hr) =  0.071

********* Area-Averaged low loss rate fraction, Yb **********

Area       Area          SCS CN    SCS CN      S     Pervious
 (Ac.)      Fract         (AMC2)    (AMC3)           Yield Fr
     7.33   1.000         84.0      96.4       0.37     0.952

Area-averaged catchment yield fraction, Y =  0.952
Area-averaged low loss fraction, Yb =  0.048
User entry of time of concentration  =   0.176 (hours)
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Watershed area =       7.33(Ac.)
Catchment Lag time =   0.141 hours
Unit interval =   5.000 minutes
Unit interval percentage of lag time = 59.1856
Hydrograph baseflow =     0.00(CFS)
Average maximum watershed loss rate(Fm) =  0.554(In/Hr)
Average low loss rate fraction (Yb) = 0.048 (decimal)
Note: user entry of the Fm value
FOOTHILL S-Graph Selected
Computed peak 5-minute rainfall =  0.712(In)
Computed peak 30-minute rainfall =  1.218(In)
Specified peak 1-hour rainfall =  1.500(In)
Computed peak 3-hour rainfall =  1.500(In)
Specified peak 6-hour rainfall =  1.501(In)
Specified peak 24-hour rainfall =  9.000(In)


Note: user specified rainfall values used.
Rainfall depth area reduction factors:
Using a total area of       7.33(Ac.) (Ref: fig. E-4)
```

```
5-minute factor = 1.000     Adjusted rainfall =  0.712(In)
30-minute factor = 1.000    Adjusted rainfall =  1.218(In)
1-hour factor = 1.000       Adjusted rainfall =  1.499(In)
3-hour factor = 1.000       Adjusted rainfall =  1.500(In)
6-hour factor = 1.000       Adjusted rainfall =  1.501(In)
24-hour factor = 1.000      Adjusted rainfall =  9.000(In)
--------------------------------------------------------------------

                        U n i t  H y d r o g r a p h
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Interval          'S' Graph         Unit Hydrograph
Number            Mean values            ((CFS))
--------------------------------------------------------------------
                (K =        88.65 (CFS))

  1                5.478                  4.856
  2               36.233                 27.263
  3               70.694                 30.549
  4               83.231                 11.114
  5               90.473                  6.420
  6               94.907                  3.930
  7               97.404                  2.214
  8               98.417                  0.898
  9               98.995                  0.512
 10               99.403                  0.362
 11               99.784                  0.337
 12              100.000                  0.192
--------------------------------------------------------------------
Peak Unit   Adjusted mass rainfall  Unit rainfall
Number              (In)                (In)
  1              0.7115              0.7115
  2              0.8760              0.1645
  3              0.9893              0.1133
  4              1.0785              0.0892
  5              1.1531              0.0747
  6              1.2180              0.0648
  7              1.2756              0.0576
  8              1.3277              0.0521
  9              1.3755              0.0478
 10              1.4197              0.0442
 11              1.4608              0.0412
 12              1.4995              0.0386
 13              1.4995              0.0000
 14              1.4995              0.0000
 15              1.4996              0.0000
 16              1.4996              0.0000
 17              1.4996              0.0000
 18              1.4997              0.0000
 19              1.4997              0.0000
 20              1.4997              0.0000
```

21	1.4997	0.0000
22	1.4997	0.0000
23	1.4998	0.0000
24	1.4998	0.0000
25	1.4998	0.0000
26	1.4998	0.0000
27	1.4998	0.0000
28	1.4998	0.0000
29	1.4998	0.0000
30	1.4999	0.0000
31	1.4999	0.0000
32	1.4999	0.0000
33	1.4999	0.0000
34	1.4999	0.0000
35	1.4999	0.0000
36	1.4999	0.0000
37	1.5000	0.0000
38	1.5000	0.0000
39	1.5001	0.0000
40	1.5001	0.0000
41	1.5001	0.0000
42	1.5002	0.0000
43	1.5002	0.0000
44	1.5002	0.0000
45	1.5003	0.0000
46	1.5003	0.0000
47	1.5003	0.0000
48	1.5004	0.0000
49	1.5004	0.0000
50	1.5004	0.0000
51	1.5005	0.0000
52	1.5005	0.0000
53	1.5005	0.0000
54	1.5005	0.0000
55	1.5006	0.0000
56	1.5006	0.0000
57	1.5006	0.0000
58	1.5006	0.0000
59	1.5007	0.0000
60	1.5007	0.0000
61	1.5007	0.0000
62	1.5007	0.0000
63	1.5008	0.0000
64	1.5008	0.0000
65	1.5008	0.0000
66	1.5008	0.0000
67	1.5009	0.0000
68	1.5009	0.0000
69	1.5009	0.0000
70	1.5009	0.0000

71	1.5009	0.0000
72	1.5010	0.0000
73	1.5280	0.0270
74	1.5551	0.0271
75	1.5823	0.0272
76	1.6096	0.0273
77	1.6370	0.0274
78	1.6645	0.0275
79	1.6921	0.0276
80	1.7198	0.0277
81	1.7477	0.0278
82	1.7756	0.0279
83	1.8036	0.0280
84	1.8318	0.0281
85	1.8600	0.0282
86	1.8883	0.0283
87	1.9167	0.0284
88	1.9452	0.0285
89	1.9738	0.0286
90	2.0025	0.0287
91	2.0313	0.0288
92	2.0602	0.0289
93	2.0892	0.0290
94	2.1183	0.0291
95	2.1474	0.0292
96	2.1767	0.0292
97	2.2060	0.0293
98	2.2354	0.0294
99	2.2650	0.0295
100	2.2946	0.0296
101	2.3242	0.0297
102	2.3540	0.0298
103	2.3839	0.0299
104	2.4138	0.0299
105	2.4439	0.0300
106	2.4740	0.0301
107	2.5042	0.0302
108	2.5344	0.0303
109	2.5648	0.0304
110	2.5952	0.0304
111	2.6258	0.0305
112	2.6564	0.0306
113	2.6871	0.0307
114	2.7178	0.0308
115	2.7487	0.0308
116	2.7796	0.0309
117	2.8106	0.0310
118	2.8417	0.0311
119	2.8728	0.0312
120	2.9040	0.0312

121	2.9353	0.0313
122	2.9667	0.0314
123	2.9982	0.0315
124	3.0297	0.0315
125	3.0613	0.0316
126	3.0930	0.0317
127	3.1247	0.0318
128	3.1566	0.0318
129	3.1885	0.0319
130	3.2204	0.0320
131	3.2525	0.0320
132	3.2846	0.0321
133	3.3168	0.0322
134	3.3490	0.0323
135	3.3814	0.0323
136	3.4138	0.0324
137	3.4462	0.0325
138	3.4788	0.0325
139	3.5114	0.0326
140	3.5440	0.0327
141	3.5768	0.0327
142	3.6096	0.0328
143	3.6425	0.0329
144	3.6754	0.0329
145	3.7084	0.0330
146	3.7415	0.0331
147	3.7746	0.0331
148	3.8078	0.0332
149	3.8411	0.0333
150	3.8745	0.0333
151	3.9079	0.0334
152	3.9413	0.0335
153	3.9749	0.0335
154	4.0085	0.0336
155	4.0421	0.0337
156	4.0758	0.0337
157	4.1096	0.0338
158	4.1435	0.0339
159	4.1774	0.0339
160	4.2114	0.0340
161	4.2454	0.0340
162	4.2795	0.0341
163	4.3137	0.0342
164	4.3479	0.0342
165	4.3822	0.0343
166	4.4165	0.0343
167	4.4509	0.0344
168	4.4854	0.0345
169	4.5199	0.0345
170	4.5545	0.0346

171	4.5891	0.0346
172	4.6239	0.0347
173	4.6586	0.0348
174	4.6934	0.0348
175	4.7283	0.0349
176	4.7633	0.0349
177	4.7982	0.0350
178	4.8333	0.0351
179	4.8684	0.0351
180	4.9036	0.0352
181	4.9388	0.0352
182	4.9741	0.0353
183	5.0094	0.0353
184	5.0448	0.0354
185	5.0803	0.0355
186	5.1158	0.0355
187	5.1513	0.0356
188	5.1870	0.0356
189	5.2226	0.0357
190	5.2584	0.0357
191	5.2942	0.0358
192	5.3300	0.0358
193	5.3659	0.0359
194	5.4018	0.0359
195	5.4378	0.0360
196	5.4739	0.0361
197	5.5100	0.0361
198	5.5462	0.0362
199	5.5824	0.0362
200	5.6187	0.0363
201	5.6550	0.0363
202	5.6914	0.0364
203	5.7278	0.0364
204	5.7643	0.0365
205	5.8008	0.0365
206	5.8374	0.0366
207	5.8740	0.0366
208	5.9107	0.0367
209	5.9475	0.0367
210	5.9842	0.0368
211	6.0211	0.0368
212	6.0580	0.0369
213	6.0949	0.0369
214	6.1319	0.0370
215	6.1690	0.0370
216	6.2061	0.0371
217	6.2432	0.0371
218	6.2804	0.0372
219	6.3177	0.0372
220	6.3550	0.0373

221	6.3923	0.0373
222	6.4297	0.0374
223	6.4671	0.0374
224	6.5046	0.0375
225	6.5422	0.0375
226	6.5798	0.0376
227	6.6174	0.0376
228	6.6551	0.0377
229	6.6928	0.0377
230	6.7306	0.0378
231	6.7684	0.0378
232	6.8063	0.0379
233	6.8443	0.0379
234	6.8822	0.0380
235	6.9203	0.0380
236	6.9583	0.0381
237	6.9964	0.0381
238	7.0346	0.0382
239	7.0728	0.0382
240	7.1111	0.0383
241	7.1494	0.0383
242	7.1877	0.0384
243	7.2261	0.0384
244	7.2646	0.0384
245	7.3031	0.0385
246	7.3416	0.0385
247	7.3802	0.0386
248	7.4188	0.0386
249	7.4575	0.0387
250	7.4962	0.0387
251	7.5350	0.0388
252	7.5738	0.0388
253	7.6126	0.0389
254	7.6515	0.0389
255	7.6905	0.0389
256	7.7295	0.0390
257	7.7685	0.0390
258	7.8076	0.0391
259	7.8467	0.0391
260	7.8859	0.0392
261	7.9251	0.0392
262	7.9643	0.0393
263	8.0036	0.0393
264	8.0429	0.0393
265	8.0823	0.0394
266	8.1218	0.0394
267	8.1612	0.0395
268	8.2007	0.0395
269	8.2403	0.0396
270	8.2799	0.0396

271	8.3195	0.0396
272	8.3592	0.0397
273	8.3990	0.0397
274	8.4387	0.0398
275	8.4785	0.0398
276	8.5184	0.0399
277	8.5583	0.0399
278	8.5982	0.0399
279	8.6382	0.0400
280	8.6782	0.0400
281	8.7183	0.0401
282	8.7584	0.0401
283	8.7986	0.0401
284	8.8387	0.0402
285	8.8790	0.0402
286	8.9192	0.0403
287	8.9596	0.0403
288	8.9999	0.0404

Unit Period (number)	Unit Rainfall (In)	Unit Soil-Loss (In)	Effective Rainfall (In)
1	0.0404	0.0019	0.0384
2	0.0403	0.0019	0.0384
3	0.0402	0.0019	0.0383
4	0.0402	0.0019	0.0383
5	0.0401	0.0019	0.0382
6	0.0401	0.0019	0.0381
7	0.0400	0.0019	0.0381
8	0.0399	0.0019	0.0380
9	0.0399	0.0019	0.0379
10	0.0398	0.0019	0.0379
11	0.0397	0.0019	0.0378
12	0.0397	0.0019	0.0378
13	0.0396	0.0019	0.0377
14	0.0396	0.0019	0.0377
15	0.0395	0.0019	0.0376
16	0.0394	0.0019	0.0375
17	0.0393	0.0019	0.0374
18	0.0393	0.0019	0.0374
19	0.0392	0.0019	0.0373
20	0.0392	0.0019	0.0373
21	0.0391	0.0019	0.0372
22	0.0390	0.0019	0.0372
23	0.0389	0.0019	0.0371
24	0.0389	0.0019	0.0370
25	0.0388	0.0019	0.0369
26	0.0388	0.0019	0.0369
27	0.0387	0.0019	0.0368

28	0.0386	0.0019	0.0368
29	0.0385	0.0019	0.0367
30	0.0385	0.0019	0.0366
31	0.0384	0.0018	0.0365
32	0.0384	0.0018	0.0365
33	0.0383	0.0018	0.0364
34	0.0382	0.0018	0.0364
35	0.0381	0.0018	0.0363
36	0.0381	0.0018	0.0362
37	0.0380	0.0018	0.0361
38	0.0379	0.0018	0.0361
39	0.0378	0.0018	0.0360
40	0.0378	0.0018	0.0360
41	0.0377	0.0018	0.0359
42	0.0376	0.0018	0.0358
43	0.0375	0.0018	0.0357
44	0.0375	0.0018	0.0357
45	0.0374	0.0018	0.0356
46	0.0373	0.0018	0.0355
47	0.0372	0.0018	0.0355
48	0.0372	0.0018	0.0354
49	0.0371	0.0018	0.0353
50	0.0370	0.0018	0.0353
51	0.0369	0.0018	0.0352
52	0.0369	0.0018	0.0351
53	0.0368	0.0018	0.0350
54	0.0367	0.0018	0.0350
55	0.0366	0.0018	0.0349
56	0.0366	0.0018	0.0348
57	0.0365	0.0018	0.0347
58	0.0364	0.0018	0.0347
59	0.0363	0.0017	0.0346
60	0.0363	0.0017	0.0345
61	0.0362	0.0017	0.0344
62	0.0361	0.0017	0.0344
63	0.0360	0.0017	0.0343
64	0.0359	0.0017	0.0342
65	0.0358	0.0017	0.0341
66	0.0358	0.0017	0.0341
67	0.0357	0.0017	0.0340
68	0.0356	0.0017	0.0339
69	0.0355	0.0017	0.0338
70	0.0355	0.0017	0.0337
71	0.0353	0.0017	0.0336
72	0.0353	0.0017	0.0336
73	0.0352	0.0017	0.0335
74	0.0351	0.0017	0.0334
75	0.0350	0.0017	0.0333
76	0.0349	0.0017	0.0333
77	0.0348	0.0017	0.0331

78	0.0348	0.0017	0.0331
79	0.0346	0.0017	0.0330
80	0.0346	0.0017	0.0329
81	0.0345	0.0017	0.0328
82	0.0344	0.0017	0.0327
83	0.0343	0.0016	0.0326
84	0.0342	0.0016	0.0326
85	0.0341	0.0016	0.0325
86	0.0340	0.0016	0.0324
87	0.0339	0.0016	0.0323
88	0.0339	0.0016	0.0322
89	0.0337	0.0016	0.0321
90	0.0337	0.0016	0.0320
91	0.0335	0.0016	0.0319
92	0.0335	0.0016	0.0319
93	0.0333	0.0016	0.0317
94	0.0333	0.0016	0.0317
95	0.0331	0.0016	0.0315
96	0.0331	0.0016	0.0315
97	0.0329	0.0016	0.0314
98	0.0329	0.0016	0.0313
99	0.0327	0.0016	0.0312
100	0.0327	0.0016	0.0311
101	0.0325	0.0016	0.0310
102	0.0325	0.0016	0.0309
103	0.0323	0.0016	0.0308
104	0.0323	0.0016	0.0307
105	0.0321	0.0015	0.0306
106	0.0320	0.0015	0.0305
107	0.0319	0.0015	0.0304
108	0.0318	0.0015	0.0303
109	0.0317	0.0015	0.0302
110	0.0316	0.0015	0.0301
111	0.0315	0.0015	0.0299
112	0.0314	0.0015	0.0299
113	0.0312	0.0015	0.0297
114	0.0312	0.0015	0.0297
115	0.0310	0.0015	0.0295
116	0.0309	0.0015	0.0294
117	0.0308	0.0015	0.0293
118	0.0307	0.0015	0.0292
119	0.0305	0.0015	0.0291
120	0.0304	0.0015	0.0290
121	0.0303	0.0015	0.0288
122	0.0302	0.0015	0.0287
123	0.0300	0.0014	0.0286
124	0.0299	0.0014	0.0285
125	0.0298	0.0014	0.0283
126	0.0297	0.0014	0.0283
127	0.0295	0.0014	0.0281

128	0.0294	0.0014	0.0280
129	0.0292	0.0014	0.0278
130	0.0292	0.0014	0.0278
131	0.0290	0.0014	0.0276
132	0.0289	0.0014	0.0275
133	0.0287	0.0014	0.0273
134	0.0286	0.0014	0.0272
135	0.0284	0.0014	0.0270
136	0.0283	0.0014	0.0270
137	0.0281	0.0014	0.0268
138	0.0280	0.0013	0.0267
139	0.0278	0.0013	0.0265
140	0.0277	0.0013	0.0264
141	0.0275	0.0013	0.0262
142	0.0274	0.0013	0.0261
143	0.0272	0.0013	0.0259
144	0.0271	0.0013	0.0258
145	0.0000	0.0000	0.0000
146	0.0000	0.0000	0.0000
147	0.0000	0.0000	0.0000
148	0.0000	0.0000	0.0000
149	0.0000	0.0000	0.0000
150	0.0000	0.0000	0.0000
151	0.0000	0.0000	0.0000
152	0.0000	0.0000	0.0000
153	0.0000	0.0000	0.0000
154	0.0000	0.0000	0.0000
155	0.0000	0.0000	0.0000
156	0.0000	0.0000	0.0000
157	0.0000	0.0000	0.0000
158	0.0000	0.0000	0.0000
159	0.0000	0.0000	0.0000
160	0.0000	0.0000	0.0000
161	0.0000	0.0000	0.0000
162	0.0000	0.0000	0.0000
163	0.0000	0.0000	0.0000
164	0.0000	0.0000	0.0000
165	0.0000	0.0000	0.0000
166	0.0000	0.0000	0.0000
167	0.0000	0.0000	0.0000
168	0.0000	0.0000	0.0000
169	0.0000	0.0000	0.0000
170	0.0000	0.0000	0.0000
171	0.0000	0.0000	0.0000
172	0.0000	0.0000	0.0000
173	0.0000	0.0000	0.0000
174	0.0000	0.0000	0.0000
175	0.0000	0.0000	0.0000
176	0.0000	0.0000	0.0000
177	0.0000	0.0000	0.0000

178	0.0000	0.0000	0.0000
179	0.0000	0.0000	0.0000
180	0.0000	0.0000	0.0000
181	0.0000	0.0000	0.0000
182	0.0000	0.0000	0.0000
183	0.0000	0.0000	0.0000
184	0.0000	0.0000	0.0000
185	0.0386	0.0019	0.0368
186	0.0412	0.0020	0.0392
187	0.0478	0.0023	0.0455
188	0.0521	0.0025	0.0496
189	0.0648	0.0031	0.0617
190	0.0747	0.0036	0.0711
191	0.1133	0.0055	0.1079
192	0.1645	0.0079	0.1565
193	0.7115	0.0342	0.6773
194	0.0892	0.0043	0.0849
195	0.0576	0.0028	0.0549
196	0.0442	0.0021	0.0420
197	0.0000	0.0000	0.0000
198	0.0000	0.0000	0.0000
199	0.0000	0.0000	0.0000
200	0.0000	0.0000	0.0000
201	0.0000	0.0000	0.0000
202	0.0000	0.0000	0.0000
203	0.0000	0.0000	0.0000
204	0.0000	0.0000	0.0000
205	0.0000	0.0000	0.0000
206	0.0000	0.0000	0.0000
207	0.0000	0.0000	0.0000
208	0.0000	0.0000	0.0000
209	0.0000	0.0000	0.0000
210	0.0000	0.0000	0.0000
211	0.0000	0.0000	0.0000
212	0.0000	0.0000	0.0000
213	0.0000	0.0000	0.0000
214	0.0000	0.0000	0.0000
215	0.0000	0.0000	0.0000
216	0.0000	0.0000	0.0000
217	0.0270	0.0013	0.0257
218	0.0273	0.0013	0.0260
219	0.0276	0.0013	0.0263
220	0.0279	0.0013	0.0266
221	0.0282	0.0014	0.0269
222	0.0285	0.0014	0.0271
223	0.0288	0.0014	0.0274
224	0.0291	0.0014	0.0277
225	0.0293	0.0014	0.0279
226	0.0296	0.0014	0.0282
227	0.0299	0.0014	0.0284

228	0.0301	0.0014	0.0287
229	0.0304	0.0015	0.0289
230	0.0306	0.0015	0.0291
231	0.0308	0.0015	0.0294
232	0.0311	0.0015	0.0296
233	0.0313	0.0015	0.0298
234	0.0315	0.0015	0.0300
235	0.0318	0.0015	0.0302
236	0.0320	0.0015	0.0304
237	0.0322	0.0015	0.0306
238	0.0324	0.0016	0.0308
239	0.0326	0.0016	0.0310
240	0.0328	0.0016	0.0312
241	0.0330	0.0016	0.0314
242	0.0332	0.0016	0.0316
243	0.0334	0.0016	0.0318
244	0.0336	0.0016	0.0320
245	0.0338	0.0016	0.0322
246	0.0340	0.0016	0.0323
247	0.0342	0.0016	0.0325
248	0.0343	0.0017	0.0327
249	0.0345	0.0017	0.0329
250	0.0347	0.0017	0.0330
251	0.0349	0.0017	0.0332
252	0.0351	0.0017	0.0334
253	0.0352	0.0017	0.0335
254	0.0354	0.0017	0.0337
255	0.0356	0.0017	0.0339
256	0.0357	0.0017	0.0340
257	0.0359	0.0017	0.0342
258	0.0361	0.0017	0.0343
259	0.0362	0.0017	0.0345
260	0.0364	0.0018	0.0346
261	0.0365	0.0018	0.0348
262	0.0367	0.0018	0.0349
263	0.0368	0.0018	0.0351
264	0.0370	0.0018	0.0352
265	0.0371	0.0018	0.0354
266	0.0373	0.0018	0.0355
267	0.0374	0.0018	0.0356
268	0.0376	0.0018	0.0358
269	0.0377	0.0018	0.0359
270	0.0379	0.0018	0.0361
271	0.0380	0.0018	0.0362
272	0.0382	0.0018	0.0363
273	0.0383	0.0018	0.0365
274	0.0384	0.0019	0.0366
275	0.0386	0.0019	0.0367
276	0.0387	0.0019	0.0369
277	0.0389	0.0019	0.0370

278	0.0390	0.0019	0.0371
279	0.0391	0.0019	0.0372
280	0.0393	0.0019	0.0374
281	0.0394	0.0019	0.0375
282	0.0395	0.0019	0.0376
283	0.0396	0.0019	0.0377
284	0.0398	0.0019	0.0379
285	0.0399	0.0019	0.0380
286	0.0400	0.0019	0.0381
287	0.0401	0.0019	0.0382
288	0.0403	0.0019	0.0383

```
--------------------------------------------------------------------
--------------------------------------------------------------------
Total soil rain loss =      0.43(In)
Total effective rainfall =      8.57(In)
Peak flow rate in flood hydrograph =     26.21(CFS)
---------------------------------------------------------------------
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                   24 - H O U R    S T O R M
              R u n o f f     H y d r o g r a p h
--------------------------------------------------------------------
            Hydrograph in   5   Minute intervals ((CFS))

--------------------------------------------------------------------
Time(h+m) Volume Ac.Ft   Q(CFS)  0        7.5      15.0      22.5      30.0
-----------------------------------------------------------------------
  0+ 5       0.0013      0.19  Q         |         |         |         |
  0+10       0.0098      1.23  VQ        |         |         |         |
  0+15       0.0263      2.41  V  Q      |         |         |         |
  0+20       0.0458      2.83  V  Q      |         |         |         |
  0+25       0.0670      3.07  V   Q     |         |         |         |
  0+30       0.0891      3.22  V   Q     |         |         |         |
  0+35       0.1119      3.30  V   Q     |         |         |         |
  0+40       0.1348      3.33  |V   Q    |         |         |         |
  0+45       0.1578      3.34  |V   Q    |         |         |         |
  0+50       0.1809      3.35  |V   Q    |         |         |         |
  0+55       0.2040      3.36  |V   Q    |         |         |         |
  1+ 0       0.2271      3.36  |V   Q    |         |         |         |
  1+ 5       0.2502      3.35  |V   Q    |         |         |         |
  1+10       0.2733      3.35  | V Q     |         |         |         |
  1+15       0.2963      3.34  | V Q     |         |         |         |
  1+20       0.3193      3.34  | V Q     |         |         |         |
  1+25       0.3423      3.33  | V Q     |         |         |         |
  1+30       0.3652      3.33  | V Q     |         |         |         |
  1+35       0.3881      3.32  | V Q     |         |         |         |
  1+40       0.4109      3.32  |  VQ     |         |         |         |
  1+45       0.4337      3.31  |  VQ     |         |         |         |
  1+50       0.4565      3.31  |  VQ     |         |         |         |
  1+55       0.4792      3.30  |  VQ     |         |         |         |
  2+ 0       0.5019      3.29  |  VQ     |         |         |         |
```

```
2+ 5       0.5245      3.29  |   Q     |         |         |         |
2+10       0.5471      3.28  |   Q     |         |         |         |
2+15       0.5697      3.28  |   Q     |         |         |         |
2+20       0.5922      3.27  |   Q     |         |         |         |
2+25       0.6147      3.27  |   Q     |         |         |         |
2+30       0.6372      3.26  |   Q     |         |         |         |
2+35       0.6596      3.25  |   QV    |         |         |         |
2+40       0.6819      3.25  |   QV    |         |         |         |
2+45       0.7043      3.24  |   QV    |         |         |         |
2+50       0.7266      3.24  |   QV    |         |         |         |
2+55       0.7488      3.23  |   QV    |         |         |         |
3+ 0       0.7710      3.22  |   QV    |         |         |         |
3+ 5       0.7932      3.22  |   Q V   |         |         |         |
3+10       0.8153      3.21  |   Q V   |         |         |         |
3+15       0.8374      3.21  |   Q V   |         |         |         |
3+20       0.8595      3.20  |   Q V   |         |         |         |
3+25       0.8815      3.19  |   Q V   |         |         |         |
3+30       0.9034      3.19  |   Q V   |         |         |         |
3+35       0.9253      3.18  |   Q  V  |         |         |         |
3+40       0.9472      3.18  |   Q  V  |         |         |         |
3+45       0.9690      3.17  |   Q  V  |         |         |         |
3+50       0.9908      3.16  |   Q  V  |         |         |         |
3+55       1.0126      3.16  |   Q  V  |         |         |         |
4+ 0       1.0343      3.15  |   Q  V  |         |         |         |
4+ 5       1.0560      3.15  |   Q   V |         |         |         |
4+10       1.0776      3.14  |   Q   V |         |         |         |
4+15       1.0992      3.13  |   Q   V |         |         |         |
4+20       1.1207      3.13  |   Q   V |         |         |         |
4+25       1.1422      3.12  |   Q   V |         |         |         |
4+30       1.1636      3.11  |   Q   V |         |         |         |
4+35       1.1850      3.11  |   Q    V|         |         |         |
4+40       1.2064      3.10  |   Q    V|         |         |         |
4+45       1.2277      3.09  |   Q    V|         |         |         |
4+50       1.2489      3.09  |   Q    V|         |         |         |
4+55       1.2702      3.08  |   Q    V|         |         |         |
5+ 0       1.2913      3.07  |   Q    V|         |         |         |
5+ 5       1.3125      3.07  |   Q     V         |         |         |
5+10       1.3335      3.06  |   Q     V         |         |         |
5+15       1.3546      3.05  |   Q     V         |         |         |
5+20       1.3756      3.05  |   Q     V         |         |         |
5+25       1.3965      3.04  |   Q     V         |         |         |
5+30       1.4174      3.03  |   Q     V         |         |         |
5+35       1.4383      3.03  |   Q     V         |         |         |
5+40       1.4591      3.02  |   Q     |V        |         |         |
5+45       1.4798      3.01  |   Q     |V        |         |         |
5+50       1.5005      3.01  |   Q     |V        |         |         |
5+55       1.5212      3.00  |  Q      |V        |         |         |
6+ 0       1.5418      2.99  |  Q      |V        |         |         |
6+ 5       1.5623      2.98  |  Q      |V        |         |         |
6+10       1.5828      2.98  |  Q      | V       |         |         |
```

6+15	1.6033	2.97	Q	V		
6+20	1.6237	2.96	Q	V		
6+25	1.6441	2.96	Q	V		
6+30	1.6644	2.95	Q	V		
6+35	1.6846	2.94	Q	V		
6+40	1.7048	2.93	Q	V		
6+45	1.7250	2.93	Q	V		
6+50	1.7451	2.92	Q	V		
6+55	1.7651	2.91	Q	V		
7+ 0	1.7851	2.90	Q	V		
7+ 5	1.8051	2.90	Q	V		
7+10	1.8250	2.89	Q	V		
7+15	1.8448	2.88	Q	V		
7+20	1.8646	2.87	Q	V		
7+25	1.8843	2.86	Q	V		
7+30	1.9040	2.86	Q	V		
7+35	1.9236	2.85	Q	V		
7+40	1.9432	2.84	Q	V		
7+45	1.9627	2.83	Q	V		
7+50	1.9822	2.82	Q	V		
7+55	2.0015	2.82	Q	V		
8+ 0	2.0209	2.81	Q	V		
8+ 5	2.0402	2.80	Q	V		
8+10	2.0594	2.79	Q	V		
8+15	2.0786	2.78	Q	V		
8+20	2.0977	2.77	Q	V		
8+25	2.1167	2.77	Q	V		
8+30	2.1357	2.76	Q	V		
8+35	2.1547	2.75	Q	V		
8+40	2.1735	2.74	Q	V		
8+45	2.1923	2.73	Q	V		
8+50	2.2111	2.72	Q	V		
8+55	2.2298	2.71	Q	V		
9+ 0	2.2484	2.70	Q	V		
9+ 5	2.2670	2.70	Q	V		
9+10	2.2855	2.69	Q	V		
9+15	2.3039	2.68	Q	V		
9+20	2.3223	2.67	Q	V		
9+25	2.3406	2.66	Q	V		
9+30	2.3588	2.65	Q	V		
9+35	2.3770	2.64	Q	V		
9+40	2.3951	2.63	Q	V		
9+45	2.4131	2.62	Q	V		
9+50	2.4311	2.61	Q	V		
9+55	2.4490	2.60	Q	V		
10+ 0	2.4669	2.59	Q	V		
10+ 5	2.4846	2.58	Q	V		
10+10	2.5023	2.57	Q	V		
10+15	2.5199	2.56	Q	V		
10+20	2.5375	2.55	Q	V		

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10+25       2.5550      2.54  |  Q      |        V|         |         |
10+30       2.5724      2.53  |  Q      |        V|         |         |
10+35       2.5897      2.52  |  Q      |        V|         |         |
10+40       2.6070      2.51  |  Q      |        V|         |         |
10+45       2.6242      2.49  |  Q      |         V         |         |
10+50       2.6413      2.48  |  Q      |         V         |         |
10+55       2.6583      2.47  |  Q      |         V         |         |
11+ 0       2.6752      2.46  |  Q      |         V         |         |
11+ 5       2.6921      2.45  |  Q      |         V         |         |
11+10       2.7089      2.44  |  Q      |         V         |         |
11+15       2.7256      2.43  |  Q      |         V         |         |
11+20       2.7423      2.41  |  Q      |         V         |         |
11+25       2.7588      2.40  |  Q      |         |V        |         |
11+30       2.7753      2.39  |  Q      |         |V        |         |
11+35       2.7916      2.38  |  Q      |         |V        |         |
11+40       2.8079      2.37  |  Q      |         |V        |         |
11+45       2.8241      2.35  |  Q      |         |V        |         |
11+50       2.8403      2.34  |  Q      |         |V        |         |
11+55       2.8563      2.33  |  Q      |         |V        |         |
12+ 0       2.8722      2.31  |  Q      |         |V        |         |
12+ 5       2.8872      2.18  | Q       |         | V       |         |
12+10       2.8973      1.47  |Q        |         | V       |         |
12+15       2.9020      0.68  Q         |         | V       |         |
12+20       2.9046      0.39  Q         |         | V       |         |
12+25       2.9062      0.22  Q         |         | V       |         |
12+30       2.9070      0.12  Q         |         | V       |         |
12+35       2.9074      0.06  Q         |         | V       |         |
12+40       2.9077      0.04  Q         |         | V       |         |
12+45       2.9078      0.03  Q         |         | V       |         |
12+50       2.9079      0.02  Q         |         | V       |         |
12+55       2.9080      0.01  Q         |         | V       |         |
13+ 0       2.9080      0.00  Q         |         | V       |         |
13+ 5       2.9080      0.00  Q         |         | V       |         |
13+10       2.9080      0.00  Q         |         | V       |         |
13+15       2.9081      0.00  Q         |         | V       |         |
13+20       2.9081      0.00  Q         |         | V       |         |
13+25       2.9081      0.00  Q         |         | V       |         |
13+30       2.9081      0.00  Q         |         | V       |         |
13+35       2.9081      0.00  Q         |         | V       |         |
13+40       2.9081      0.00  Q         |         | V       |         |
13+45       2.9082      0.00  Q         |         | V       |         |
13+50       2.9082      0.00  Q         |         | V       |         |
13+55       2.9082      0.00  Q         |         | V       |         |
14+ 0       2.9082      0.00  Q         |         | V       |         |
14+ 5       2.9082      0.00  Q         |         | V       |         |
14+10       2.9083      0.00  Q         |         | V       |         |
14+15       2.9083      0.00  Q         |         | V       |         |
14+20       2.9083      0.00  Q         |         | V       |         |
14+25       2.9083      0.00  Q         |         | V       |         |
14+30       2.9083      0.00  Q         |         | V       |         |
```

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14+35       2.9083      0.00  Q         |         | V       |         |
14+40       2.9083      0.00  Q         |         | V       |         |
14+45       2.9083      0.00  Q         |         | V       |         |
14+50       2.9083      0.00  Q         |         | V       |         |
14+55       2.9083      0.00  Q         |         | V       |         |
15+ 0       2.9084      0.00  Q         |         | V       |         |
15+ 5       2.9084      0.00  Q         |         | V       |         |
15+10       2.9084      0.00  Q         |         | V       |         |
15+15       2.9084      0.00  Q         |         | V       |         |
15+20       2.9084      0.00  Q         |         | V       |         |
15+25       2.9097      0.18  Q         |         | V       |         |
15+30       2.9179      1.19  |Q        |         | V       |         |
15+35       2.9345      2.41  |  Q      |         | V       |         |
15+40       2.9558      3.09  |   Q     |         | V       |         |
15+45       2.9813      3.71  |   Q     |         | V       |         |
15+50       3.0119      4.45  |    Q    |         |  V      |         |
15+55       3.0493      5.43  |      Q  |         |  V      |         |
16+ 0       3.0987      7.17  |        Q|         |  V      |         |
16+ 5       3.1840     12.39  |         |     Q   |   V     |         |
16+10       3.3613     25.74  |         |         |    V    |   Q     |
16+15       3.5419     26.21  |         |         |      V  |   Q     |
16+20       3.6350     13.52  |         |       Q |      V  |         |
16+25       3.6977      9.10  |         | Q       |       V |         |
16+30       3.7365      5.63  |      Q  |         |       V |         |
16+35       3.7565      2.91  |  Q      |         |       V |         |
16+40       3.7664      1.44  |Q        |         |       V |         |
16+45       3.7720      0.82  |Q        |         |       V |         |
16+50       3.7755      0.51  Q         |         |       V |         |
16+55       3.7780      0.36  Q         |         |       V |         |
17+ 0       3.7794      0.20  Q         |         |       V |         |
17+ 5       3.7797      0.05  Q         |         |       V |         |
17+10       3.7799      0.03  Q         |         |       V |         |
17+15       3.7800      0.01  Q         |         |       V |         |
17+20       3.7800      0.00  Q         |         |       V |         |
17+25       3.7800      0.00  Q         |         |       V |         |
17+30       3.7800      0.00  Q         |         |       V |         |
17+35       3.7800      0.00  Q         |         |       V |         |
17+40       3.7801      0.00  Q         |         |       V |         |
17+45       3.7801      0.00  Q         |         |       V |         |
17+50       3.7801      0.00  Q         |         |       V |         |
17+55       3.7801      0.00  Q         |         |       V |         |
18+ 0       3.7801      0.00  Q         |         |       V |         |
18+ 5       3.7810      0.13  Q         |         |       V |         |
18+10       3.7867      0.83  |Q        |         |       V |         |
18+15       3.7979      1.62  | Q       |         |        V|         |
18+20       3.8111      1.93  | Q       |         |        V|         |
18+25       3.8257      2.11  | Q       |         |        V|         |
18+30       3.8411      2.24  | Q       |         |        V|         |
18+35       3.8570      2.32  |  Q      |         |        V|         |
18+40       3.8733      2.36  |  Q      |         |        V|         |
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18+45       3.8898      2.40  |  Q      |         |        V|         |
18+50       3.9066      2.43  |  Q      |         |        V|         |
18+55       3.9236      2.46  |  Q      |         |         V         |
19+ 0       3.9407      2.49  |  Q      |         |         V         |
19+ 5       3.9580      2.51  |  Q      |         |         V         |
19+10       3.9755      2.54  |  Q      |         |         V         |
19+15       3.9931      2.56  |  Q      |         |         V         |
19+20       4.0109      2.58  |  Q      |         |         V         |
19+25       4.0287      2.60  |  Q      |         |         V         |
19+30       4.0468      2.62  |  Q      |         |         V         |
19+35       4.0649      2.64  |  Q      |         |         |V        |
19+40       4.0832      2.66  |  Q      |         |         |V        |
19+45       4.1016      2.67  |  Q      |         |         |V        |
19+50       4.1202      2.69  |  Q      |         |         |V        |
19+55       4.1388      2.71  |  Q      |         |         |V        |
20+ 0       4.1576      2.73  |  Q      |         |         |V        |
20+ 5       4.1765      2.75  |  Q      |         |         |V        |
20+10       4.1956      2.76  |  Q      |         |         | V       |
20+15       4.2147      2.78  |  Q      |         |         | V       |
20+20       4.2340      2.80  |  Q      |         |         | V       |
20+25       4.2534      2.81  |  Q      |         |         | V       |
20+30       4.2729      2.83  |  Q      |         |         | V       |
20+35       4.2925      2.85  |  Q      |         |         | V       |
20+40       4.3122      2.86  |  Q      |         |         | V       |
20+45       4.3320      2.88  |  Q      |         |         |  V      |
20+50       4.3519      2.89  |  Q      |         |         |  V      |
20+55       4.3720      2.91  |  Q      |         |         |  V      |
21+ 0       4.3921      2.92  |  Q      |         |         |  V      |
21+ 5       4.4124      2.94  |  Q      |         |         |  V      |
21+10       4.4327      2.95  |  Q      |         |         |  V      |
21+15       4.4532      2.97  |  Q      |         |         |   V     |
21+20       4.4737      2.98  |  Q      |         |         |   V     |
21+25       4.4943      3.00  |  Q      |         |         |   V     |
21+30       4.5151      3.01  |   Q     |         |         |   V     |
21+35       4.5359      3.03  |   Q     |         |         |   V     |
21+40       4.5568      3.04  |   Q     |         |         |   V     |
21+45       4.5779      3.05  |   Q     |         |         |    V    |
21+50       4.5990      3.07  |   Q     |         |         |    V    |
21+55       4.6202      3.08  |   Q     |         |         |    V    |
22+ 0       4.6415      3.09  |   Q     |         |         |    V    |
22+ 5       4.6629      3.11  |   Q     |         |         |    V    |
22+10       4.6843      3.12  |   Q     |         |         |    V    |
22+15       4.7059      3.13  |   Q     |         |         |    V    |
22+20       4.7276      3.14  |   Q     |         |         |     V   |
22+25       4.7493      3.16  |   Q     |         |         |     V   |
22+30       4.7711      3.17  |   Q     |         |         |     V   |
22+35       4.7930      3.18  |   Q     |         |         |     V   |
22+40       4.8150      3.19  |   Q     |         |         |     V   |
22+45       4.8371      3.21  |   Q     |         |         |     V   |
22+50       4.8593      3.22  |   Q     |         |         |      V  |
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   22+55        4.8815       3.23  |    Q      |         |         |      V   |
   23+ 0        4.9038       3.24  |    Q      |         |         |      V   |
   23+ 5        4.9262       3.25  |    Q      |         |         |      V   |
   23+10        4.9487       3.26  |    Q      |         |         |      V   |
   23+15        4.9713       3.28  |    Q      |         |         |       V  |
   23+20        4.9939       3.29  |    Q      |         |         |       V  |
   23+25        5.0166       3.30  |    Q      |         |         |       V  |
   23+30        5.0394       3.31  |    Q      |         |         |       V  |
   23+35        5.0623       3.32  |    Q      |         |         |       V  |
   23+40        5.0852       3.33  |    Q      |         |         |       V  |
   23+45        5.1082       3.34  |    Q      |         |         |        V|
   23+50        5.1313       3.35  |    Q      |         |         |        V|
   23+55        5.1545       3.36  |    Q      |         |         |        V|
   24+ 0        5.1777       3.37  |    Q      |         |         |        V|
   24+ 5        5.1998       3.20  |    Q      |         |         |        V|
   24+10        5.2146       2.16  |  Q        |         |         |        V|
   24+15        5.2215       0.99  |Q          |         |         |        V|
   24+20        5.2254       0.57  Q           |         |         |        V|
   24+25        5.2276       0.32  Q           |         |         |        V|
   24+30        5.2288       0.17  Q           |         |         |        V|
   24+35        5.2294       0.09  Q           |         |         |        V|
   24+40        5.2298       0.05  Q           |         |         |        V|
   24+45        5.2300       0.03  Q           |         |         |        V|
   24+50        5.2301       0.02  Q           |         |         |        V|
   24+55        5.2302       0.01  Q           |         |         |         V
----------------------------------------------------------------------
```

```
                    FLOOD HYDROGRAPH ROUTING PROGRAM
           Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018
                          Study date: 05/26/21

---------------------------------------------------------------------


Paradise Ranch
2 yr BMP-1



--------------------------------------------------------------------


Program License Serial Number 6481

--------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION **********************

                From study/file name: ParadiseRanch2yrDA38.rte
****************************HYDROGRAPH DATA****************************
                Number of intervals =   304
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =       4.137 (CFS)
                Total volume =       0.397 (Ac.Ft)
        Status of hydrographs being held in storage
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
***********************************************************************



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** RETARDING BASIN ROUTING ****
______________________________________________________________________

User entry of depth-outflow-storage data
--------------------------------------------------------------------
Total number of inflow hydrograph intervals = 304
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
--------------------------------------------------------------------
--------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
```

Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.500	0.052	0.930	0.049	0.055
1.000	0.114	0.930	0.111	0.117
1.500	0.186	0.930	0.183	0.189
2.000	0.261	0.930	0.258	0.264
2.500	0.342	0.930	0.339	0.345
3.000	0.431	1.860	0.425	0.437
3.500	0.527	2.790	0.517	0.537
4.000	0.630	2.790	0.620	0.640

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	1.0	2.07	3.10	4.14	Depth (Ft.)
0.083	0.00	0.00	0.000	O	|	|	|	|	0.00
0.167	0.00	0.00	0.000	O	|	|	|	|	0.00
0.250	0.00	0.00	0.000	O	|	|	|	|	0.00
0.333	0.01	0.00	0.000	O	|	|	|	|	0.00
0.417	0.01	0.00	0.000	O	|	|	|	|	0.00
0.500	0.01	0.00	0.000	O	|	|	|	|	0.00
0.583	0.01	0.00	0.000	O	|	|	|	|	0.00
0.667	0.01	0.00	0.000	O	|	|	|	|	0.00
0.750	0.01	0.00	0.000	O	|	|	|	|	0.00
0.833	0.01	0.01	0.000	O	|	|	|	|	0.00
0.917	0.01	0.01	0.000	O	|	|	|	|	0.00
1.000	0.01	0.01	0.000	O	|	|	|	|	0.00
1.083	0.01	0.01	0.000	O	|	|	|	|	0.00
1.167	0.01	0.01	0.000	O	|	|	|	|	0.00
1.250	0.01	0.01	0.000	O	|	|	|	|	0.00
1.333	0.01	0.01	0.000	O	|	|	|	|	0.00
1.417	0.01	0.01	0.000	O	|	|	|	|	0.00
1.500	0.01	0.01	0.000	O	|	|	|	|	0.00
1.583	0.01	0.01	0.000	O	|	|	|	|	0.00
1.667	0.01	0.01	0.001	O	|	|	|	|	0.00
1.750	0.01	0.01	0.001	O	|	|	|	|	0.00
1.833	0.01	0.01	0.001	O	|	|	|	|	0.01
1.917	0.01	0.01	0.001	O	|	|	|	|	0.01
2.000	0.01	0.01	0.001	O	|	|	|	|	0.01
2.083	0.01	0.01	0.001	O	|	|	|	|	0.01
2.167	0.01	0.01	0.001	O	|	|	|	|	0.01

```
2.250    0.01    0.01     0.001  O       |       |       |       |      0.01
2.333    0.01    0.01     0.001  O       |       |       |       |      0.01
2.417    0.01    0.01     0.001  O       |       |       |       |      0.01
2.500    0.01    0.01     0.001  O       |       |       |       |      0.01
2.583    0.01    0.01     0.001  O       |       |       |       |      0.01
2.667    0.01    0.01     0.001  O       |       |       |       |      0.01
2.750    0.01    0.01     0.001  O       |       |       |       |      0.01
2.833    0.01    0.01     0.001  O       |       |       |       |      0.01
2.917    0.01    0.01     0.001  O       |       |       |       |      0.01
3.000    0.01    0.01     0.001  O       |       |       |       |      0.01
3.083    0.01    0.01     0.001  O       |       |       |       |      0.01
3.167    0.01    0.01     0.001  O       |       |       |       |      0.01
3.250    0.01    0.01     0.001  O       |       |       |       |      0.01
3.333    0.01    0.01     0.001  O       |       |       |       |      0.01
3.417    0.01    0.01     0.001  O       |       |       |       |      0.01
3.500    0.01    0.01     0.001  O       |       |       |       |      0.01
3.583    0.01    0.01     0.001  O       |       |       |       |      0.01
3.667    0.01    0.01     0.001  O       |       |       |       |      0.01
3.750    0.01    0.01     0.001  O       |       |       |       |      0.01
3.833    0.01    0.01     0.001  O       |       |       |       |      0.01
3.917    0.01    0.01     0.001  O       |       |       |       |      0.01
4.000    0.01    0.01     0.001  O       |       |       |       |      0.01
4.083    0.01    0.01     0.001  O       |       |       |       |      0.01
4.167    0.01    0.01     0.001  O       |       |       |       |      0.01
4.250    0.01    0.01     0.001  O       |       |       |       |      0.01
4.333    0.01    0.01     0.001  O       |       |       |       |      0.01
4.417    0.01    0.01     0.001  O       |       |       |       |      0.01
4.500    0.01    0.01     0.001  O       |       |       |       |      0.01
4.583    0.01    0.01     0.001  O       |       |       |       |      0.01
4.667    0.01    0.01     0.001  O       |       |       |       |      0.01
4.750    0.01    0.01     0.001  O       |       |       |       |      0.01
4.833    0.01    0.01     0.001  O       |       |       |       |      0.01
4.917    0.01    0.01     0.001  O       |       |       |       |      0.01
5.000    0.01    0.01     0.001  O       |       |       |       |      0.01
5.083    0.01    0.01     0.001  O       |       |       |       |      0.01
5.167    0.01    0.01     0.001  O       |       |       |       |      0.01
5.250    0.01    0.01     0.001  O       |       |       |       |      0.01
5.333    0.01    0.01     0.001  O       |       |       |       |      0.01
5.417    0.01    0.01     0.001  O       |       |       |       |      0.01
5.500    0.01    0.01     0.001  O       |       |       |       |      0.01
5.583    0.01    0.01     0.001  O       |       |       |       |      0.01
5.667    0.01    0.01     0.001  O       |       |       |       |      0.01
5.750    0.01    0.01     0.001  O       |       |       |       |      0.01
5.833    0.01    0.01     0.001  O       |       |       |       |      0.01
5.917    0.01    0.01     0.001  O       |       |       |       |      0.01
6.000    0.02    0.01     0.001  O       |       |       |       |      0.01
6.083    0.02    0.01     0.001  O       |       |       |       |      0.01
6.167    0.02    0.01     0.001  O       |       |       |       |      0.01
6.250    0.02    0.01     0.001  O       |       |       |       |      0.01
6.333    0.02    0.01     0.001  O       |       |       |       |      0.01
```

6.417	0.02	0.01	0.001	O	0.01
6.500	0.02	0.01	0.001	O	0.01
6.583	0.02	0.02	0.001	O	0.01
6.667	0.02	0.02	0.001	O	0.01
6.750	0.02	0.02	0.001	O	0.01
6.833	0.02	0.02	0.001	O	0.01
6.917	0.02	0.02	0.001	O	0.01
7.000	0.02	0.02	0.001	O	0.01
7.083	0.02	0.02	0.001	O	0.01
7.167	0.02	0.02	0.001	O	0.01
7.250	0.02	0.02	0.001	O	0.01
7.333	0.02	0.02	0.001	O	0.01
7.417	0.02	0.02	0.001	O	0.01
7.500	0.02	0.02	0.001	O	0.01
7.583	0.02	0.02	0.001	O	0.01
7.667	0.02	0.02	0.001	O	0.01
7.750	0.02	0.02	0.001	O	0.01
7.833	0.02	0.02	0.001	O	0.01
7.917	0.02	0.02	0.001	O	0.01
8.000	0.02	0.02	0.001	O	0.01
8.083	0.02	0.02	0.001	O	0.01
8.167	0.02	0.02	0.001	O	0.01
8.250	0.02	0.02	0.001	O	0.01
8.333	0.02	0.02	0.001	O	0.01
8.417	0.02	0.02	0.001	O	0.01
8.500	0.02	0.02	0.001	O	0.01
8.583	0.02	0.02	0.001	O	0.01
8.667	0.02	0.02	0.001	O	0.01
8.750	0.02	0.02	0.001	O	0.01
8.833	0.02	0.02	0.001	O	0.01
8.917	0.02	0.02	0.001	O	0.01
9.000	0.02	0.02	0.001	O	0.01
9.083	0.02	0.02	0.001	O	0.01
9.167	0.02	0.02	0.001	O	0.01
9.250	0.02	0.02	0.001	O	0.01
9.333	0.02	0.02	0.001	O	0.01
9.417	0.02	0.02	0.001	O	0.01
9.500	0.02	0.02	0.001	O	0.01
9.583	0.02	0.02	0.001	O	0.01
9.667	0.02	0.02	0.001	O	0.01
9.750	0.02	0.02	0.001	O	0.01
9.833	0.02	0.02	0.001	O	0.01
9.917	0.02	0.02	0.001	O	0.01
10.000	0.02	0.02	0.001	O	0.01
10.083	0.02	0.02	0.001	O	0.01
10.167	0.02	0.02	0.001	O	0.01
10.250	0.02	0.02	0.001	O	0.01
10.333	0.03	0.02	0.001	O	0.01
10.417	0.03	0.02	0.001	O	0.01
10.500	0.03	0.02	0.001	O	0.01

```
10.583    0.03    0.02      0.001  O       |       |       |       |     0.01
10.667    0.03    0.02      0.001  O       |       |       |       |     0.01
10.750    0.03    0.02      0.001  O       |       |       |       |     0.01
10.833    0.03    0.02      0.001  O       |       |       |       |     0.01
10.917    0.03    0.03      0.001  O       |       |       |       |     0.01
11.000    0.03    0.03      0.001  O       |       |       |       |     0.01
11.083    0.03    0.03      0.001  O       |       |       |       |     0.01
11.167    0.03    0.03      0.001  O       |       |       |       |     0.01
11.250    0.03    0.03      0.001  O       |       |       |       |     0.01
11.333    0.03    0.03      0.002  O       |       |       |       |     0.01
11.417    0.03    0.03      0.002  O       |       |       |       |     0.01
11.500    0.03    0.03      0.002  O       |       |       |       |     0.01
11.583    0.03    0.03      0.002  O       |       |       |       |     0.02
11.667    0.03    0.03      0.002  O       |       |       |       |     0.02
11.750    0.03    0.03      0.002  O       |       |       |       |     0.02
11.833    0.03    0.03      0.002  O       |       |       |       |     0.02
11.917    0.03    0.03      0.002  O       |       |       |       |     0.02
12.000    0.03    0.03      0.002  O       |       |       |       |     0.02
12.083    0.05    0.03      0.002  O       |       |       |       |     0.02
12.167    0.13    0.04      0.002  OI      |       |       |       |     0.02
12.250    0.33    0.06      0.003  O I     |       |       |       |     0.03
12.333    0.46    0.10      0.006  O  I    |       |       |       |     0.05
12.417    0.52    0.14      0.008  |O I    |       |       |       |     0.08
12.500    0.55    0.19      0.011  |O  I   |       |       |       |     0.10
12.583    0.58    0.23      0.013  |O  I   |       |       |       |     0.13
12.667    0.60    0.28      0.015  | O I   |       |       |       |     0.15
12.750    0.61    0.31      0.018  | O I   |       |       |       |     0.17
12.833    0.62    0.35      0.020  | O I   |       |       |       |     0.19
12.917    0.63    0.38      0.021  | O I   |       |       |       |     0.21
13.000    0.63    0.41      0.023  |  OI   |       |       |       |     0.22
13.083    0.63    0.44      0.024  |  OI   |       |       |       |     0.23
13.167    0.63    0.46      0.026  |  OI   |       |       |       |     0.25
13.250    0.64    0.48      0.027  |  OI   |       |       |       |     0.26
13.333    0.64    0.50      0.028  |  OI   |       |       |       |     0.27
13.417    0.64    0.51      0.029  |  OI   |       |       |       |     0.28
13.500    0.64    0.53      0.030  |   O   |       |       |       |     0.28
13.583    0.64    0.54      0.030  |   O   |       |       |       |     0.29
13.667    0.64    0.55      0.031  |   O   |       |       |       |     0.30
13.750    0.64    0.56      0.031  |   O   |       |       |       |     0.30
13.833    0.64    0.57      0.032  |   O   |       |       |       |     0.31
13.917    0.64    0.58      0.032  |   O   |       |       |       |     0.31
14.000    0.64    0.59      0.033  |   O   |       |       |       |     0.32
14.083    0.64    0.59      0.033  |   O   |       |       |       |     0.32
14.167    0.64    0.60      0.033  |   O   |       |       |       |     0.32
14.250    0.64    0.60      0.034  |   O   |       |       |       |     0.32
14.333    0.64    0.61      0.034  |   O   |       |       |       |     0.33
14.417    0.64    0.61      0.034  |   O   |       |       |       |     0.33
14.500    0.64    0.61      0.034  |   O   |       |       |       |     0.33
14.583    0.64    0.62      0.035  |   O   |       |       |       |     0.33
14.667    0.64    0.62      0.035  |   O   |       |       |       |     0.33
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14.750    0.64    0.62      0.035  |   O   |       |       |       |     0.33
14.833    0.64    0.62      0.035  |   O   |       |       |       |     0.34
14.917    0.64    0.63      0.035  |   O   |       |       |       |     0.34
15.000    0.64    0.63      0.035  |   O   |       |       |       |     0.34
15.083    0.64    0.63      0.035  |   O   |       |       |       |     0.34
15.167    0.64    0.63      0.035  |   O   |       |       |       |     0.34
15.250    0.64    0.63      0.035  |   O   |       |       |       |     0.34
15.333    0.64    0.63      0.035  |   O   |       |       |       |     0.34
15.417    0.63    0.63      0.035  |   O   |       |       |       |     0.34
15.500    0.57    0.63      0.035  |   O   |       |       |       |     0.34
15.583    0.43    0.62      0.034  |  IO   |       |       |       |     0.33
15.667    0.35    0.59      0.033  | I O   |       |       |       |     0.32
15.750    0.32    0.56      0.031  | I O   |       |       |       |     0.30
15.833    0.32    0.53      0.030  | I O   |       |       |       |     0.29
15.917    0.34    0.51      0.028  | IO    |       |       |       |     0.27
16.000    0.40    0.49      0.028  |  O    |       |       |       |     0.26
16.083    0.85    0.51      0.028  |  O  I |       |       |       |     0.27
16.167    1.95    0.61      0.034  |   O   |      I|       |       |     0.33
16.250    4.14    0.89      0.050  |     O |       |       |       I     0.48
16.333    2.75    0.93      0.067  |      O|       |    I  |       |     0.62
16.417    1.46    0.93      0.076  |      O|  I    |       |       |     0.69
16.500    1.10    0.93      0.078  |      OI       |       |       |     0.71
16.583    1.00    0.93      0.079  |      O|       |       |       |     0.72
16.667    0.92    0.93      0.079  |      O|       |       |       |     0.72
16.750    0.83    0.93      0.079  |     IO|       |       |       |     0.71
16.833    0.76    0.93      0.078  |    I O|       |       |       |     0.71
16.917    0.69    0.93      0.076  |    I O|       |       |       |     0.69
17.000    0.67    0.93      0.074  |    I O|       |       |       |     0.68
17.083    0.67    0.93      0.073  |    I O|       |       |       |     0.67
17.167    0.67    0.93      0.071  |    I O|       |       |       |     0.65
17.250    0.67    0.93      0.069  |    I O|       |       |       |     0.64
17.333    0.66    0.93      0.067  |    I O|       |       |       |     0.62
17.417    0.65    0.93      0.065  |    I O|       |       |       |     0.61
17.500    0.64    0.93      0.063  |   I  O|       |       |       |     0.59
17.583    0.64    0.93      0.061  |   I  O|       |       |       |     0.58
17.667    0.64    0.93      0.059  |   I  O|       |       |       |     0.56
17.750    0.64    0.93      0.057  |   I  O|       |       |       |     0.54
17.833    0.64    0.93      0.055  |   I  O|       |       |       |     0.53
17.917    0.64    0.93      0.053  |   I  O|       |       |       |     0.51
18.000    0.64    0.92      0.051  |   I  O|       |       |       |     0.49
18.083    0.62    0.88      0.049  |   I O |       |       |       |     0.48
18.167    0.54    0.85      0.047  |   I O |       |       |       |     0.46
18.250    0.34    0.80      0.045  | I   O |       |       |       |     0.43
18.333    0.22    0.74      0.041  |I   O  |       |       |       |     0.40
18.417    0.16    0.68      0.038  |I   O  |       |       |       |     0.36
18.500    0.12    0.61      0.034  I   O   |       |       |       |     0.33
18.583    0.09    0.56      0.031  I   O   |       |       |       |     0.30
18.667    0.07    0.50      0.028  I  O    |       |       |       |     0.27
18.750    0.05    0.45      0.025  I  O    |       |       |       |     0.24
18.833    0.04    0.40      0.022  I  O    |       |       |       |     0.22
```

18.917	0.04	0.36	0.020	I O					0.19
19.000	0.04	0.32	0.018	I O					0.17
19.083	0.03	0.29	0.016	I O					0.16
19.167	0.03	0.26	0.015	I O					0.14
19.250	0.03	0.23	0.013	IO					0.13
19.333	0.03	0.21	0.012	IO					0.11
19.417	0.02	0.19	0.010	IO					0.10
19.500	0.02	0.17	0.009	IO					0.09
19.583	0.02	0.15	0.008	IO					0.08
19.667	0.02	0.14	0.008	IO					0.07
19.750	0.02	0.12	0.007	O					0.07
19.833	0.02	0.11	0.006	O					0.06
19.917	0.02	0.10	0.006	O					0.05
20.000	0.02	0.09	0.005	O					0.05
20.083	0.02	0.08	0.005	O					0.05
20.167	0.02	0.08	0.004	O					0.04
20.250	0.02	0.07	0.004	O					0.04
20.333	0.02	0.06	0.004	O					0.03
20.417	0.02	0.06	0.003	O					0.03
20.500	0.02	0.05	0.003	O					0.03
20.583	0.02	0.05	0.003	O					0.03
20.667	0.02	0.05	0.003	O					0.02
20.750	0.02	0.04	0.002	O					0.02
20.833	0.02	0.04	0.002	O					0.02
20.917	0.02	0.04	0.002	O					0.02
21.000	0.02	0.03	0.002	O					0.02
21.083	0.02	0.03	0.002	O					0.02
21.167	0.02	0.03	0.002	O					0.02
21.250	0.02	0.03	0.002	O					0.02
21.333	0.02	0.03	0.002	O					0.01
21.417	0.02	0.03	0.001	O					0.01
21.500	0.02	0.02	0.001	O					0.01
21.583	0.01	0.02	0.001	O					0.01
21.667	0.01	0.02	0.001	O					0.01
21.750	0.01	0.02	0.001	O					0.01
21.833	0.01	0.02	0.001	O					0.01
21.917	0.01	0.02	0.001	O					0.01
22.000	0.01	0.02	0.001	O					0.01
22.083	0.01	0.02	0.001	O					0.01
22.167	0.01	0.02	0.001	O					0.01
22.250	0.01	0.02	0.001	O					0.01
22.333	0.01	0.02	0.001	O					0.01
22.417	0.01	0.02	0.001	O					0.01
22.500	0.01	0.02	0.001	O					0.01
22.583	0.01	0.02	0.001	O					0.01
22.667	0.01	0.02	0.001	O					0.01
22.750	0.01	0.02	0.001	O					0.01
22.833	0.01	0.01	0.001	O					0.01
22.917	0.01	0.01	0.001	O					0.01
23.000	0.01	0.01	0.001	O					0.01

23.083	0.01	0.01	0.001	O	0.01
23.167	0.01	0.01	0.001	O	0.01
23.250	0.01	0.01	0.001	O	0.01
23.333	0.01	0.01	0.001	O	0.01
23.417	0.01	0.01	0.001	O	0.01
23.500	0.01	0.01	0.001	O	0.01
23.583	0.01	0.01	0.001	O	0.01
23.667	0.01	0.01	0.001	O	0.01
23.750	0.01	0.01	0.001	O	0.01
23.833	0.01	0.01	0.001	O	0.01
23.917	0.01	0.01	0.001	O	0.01
24.000	0.01	0.01	0.001	O	0.01
24.083	0.01	0.01	0.001	O	0.01
24.167	0.01	0.01	0.001	O	0.01
24.250	0.01	0.01	0.001	O	0.01
24.333	0.00	0.01	0.001	O	0.01
24.417	0.00	0.01	0.001	O	0.00
24.500	0.00	0.01	0.000	O	0.00
24.583	0.00	0.01	0.000	O	0.00
24.667	0.00	0.01	0.000	O	0.00
24.750	0.00	0.01	0.000	O	0.00
24.833	0.00	0.01	0.000	O	0.00
24.917	0.00	0.00	0.000	O	0.00
25.000	0.00	0.00	0.000	O	0.00
25.083	0.00	0.00	0.000	O	0.00
25.167	0.00	0.00	0.000	O	0.00
25.250	0.00	0.00	0.000	O	0.00
25.333	0.00	0.00	0.000	O	0.00
25.417	0.00	0.00	0.000	O	0.00
25.500	0.00	0.00	0.000	O	0.00
25.583	0.00	0.00	0.000	O	0.00

```
****************************HYDROGRAPH DATA****************************
                Number of intervals =   307
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =        0.930 (CFS)
                Total volume =       0.397 (Ac.Ft)
        Status of hydrographs being held in storage
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
***********************************************************************

--------------------------------------------------------------------
```

```
                    FLOOD HYDROGRAPH ROUTING PROGRAM
          Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018
                          Study date: 05/26/21

---------------------------------------------------------------------


Paradise Ranch
2 yr BMP-2



--------------------------------------------------------------------


Program License Serial Number 6481

--------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION **********************

                From study/file name: ParadiseRanch2yrDA39.rte
****************************HYDROGRAPH DATA***************************
                Number of intervals =   301
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =        5.377 (CFS)
                Total volume =       0.461 (Ac.Ft)
        Status of hydrographs being held in storage
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
*********************************************************************



+++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** RETARDING BASIN ROUTING ****

User entry of depth-outflow-storage data
--------------------------------------------------------------------
Total number of inflow hydrograph intervals = 301
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
--------------------------------------------------------------------
--------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
```

Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.500	0.044	0.930	0.041	0.047
1.000	0.093	0.930	0.090	0.096
1.500	0.148	1.860	0.142	0.154
2.000	0.210	2.790	0.200	0.220
2.500	0.278	3.720	0.265	0.291
3.000	0.352	4.500	0.337	0.367
3.500	0.433	4.500	0.418	0.448
4.000	0.522	4.500	0.507	0.537

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	1.3	2.69	4.03	5.38	Depth (Ft.)
0.083	0.00	0.00	0.000	O	|	|	|	|	0.00
0.167	0.00	0.00	0.000	O	|	|	|	|	0.00
0.250	0.01	0.00	0.000	O	|	|	|	|	0.00
0.333	0.01	0.00	0.000	O	|	|	|	|	0.00
0.417	0.01	0.00	0.000	O	|	|	|	|	0.00
0.500	0.01	0.00	0.000	O	|	|	|	|	0.00
0.583	0.01	0.00	0.000	O	|	|	|	|	0.00
0.667	0.01	0.01	0.000	O	|	|	|	|	0.00
0.750	0.01	0.01	0.000	O	|	|	|	|	0.00
0.833	0.01	0.01	0.000	O	|	|	|	|	0.00
0.917	0.01	0.01	0.000	O	|	|	|	|	0.00
1.000	0.01	0.01	0.000	O	|	|	|	|	0.00
1.083	0.01	0.01	0.000	O	|	|	|	|	0.00
1.167	0.01	0.01	0.000	O	|	|	|	|	0.01
1.250	0.01	0.01	0.000	O	|	|	|	|	0.01
1.333	0.01	0.01	0.000	O	|	|	|	|	0.01
1.417	0.01	0.01	0.000	O	|	|	|	|	0.01
1.500	0.01	0.01	0.001	O	|	|	|	|	0.01
1.583	0.01	0.01	0.001	O	|	|	|	|	0.01
1.667	0.01	0.01	0.001	O	|	|	|	|	0.01
1.750	0.01	0.01	0.001	O	|	|	|	|	0.01
1.833	0.01	0.01	0.001	O	|	|	|	|	0.01
1.917	0.01	0.01	0.001	O	|	|	|	|	0.01
2.000	0.01	0.01	0.001	O	|	|	|	|	0.01
2.083	0.01	0.01	0.001	O	|	|	|	|	0.01
2.167	0.01	0.01	0.001	O	|	|	|	|	0.01

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2.250    0.01    0.01      0.001  O        |        |        |        |        0.01
2.333    0.01    0.01      0.001  O        |        |        |        |        0.01
2.417    0.01    0.01      0.001  O        |        |        |        |        0.01
2.500    0.01    0.01      0.001  O        |        |        |        |        0.01
2.583    0.01    0.01      0.001  O        |        |        |        |        0.01
2.667    0.01    0.01      0.001  O        |        |        |        |        0.01
2.750    0.01    0.01      0.001  O        |        |        |        |        0.01
2.833    0.01    0.01      0.001  O        |        |        |        |        0.01
2.917    0.01    0.01      0.001  O        |        |        |        |        0.01
3.000    0.01    0.01      0.001  O        |        |        |        |        0.01
3.083    0.01    0.01      0.001  O        |        |        |        |        0.01
3.167    0.01    0.01      0.001  O        |        |        |        |        0.01
3.250    0.01    0.01      0.001  O        |        |        |        |        0.01
3.333    0.01    0.01      0.001  O        |        |        |        |        0.01
3.417    0.01    0.01      0.001  O        |        |        |        |        0.01
3.500    0.01    0.01      0.001  O        |        |        |        |        0.01
3.583    0.01    0.01      0.001  O        |        |        |        |        0.01
3.667    0.01    0.01      0.001  O        |        |        |        |        0.01
3.750    0.01    0.01      0.001  O        |        |        |        |        0.01
3.833    0.01    0.01      0.001  O        |        |        |        |        0.01
3.917    0.01    0.01      0.001  O        |        |        |        |        0.01
4.000    0.01    0.01      0.001  O        |        |        |        |        0.01
4.083    0.01    0.01      0.001  O        |        |        |        |        0.01
4.167    0.02    0.01      0.001  O        |        |        |        |        0.01
4.250    0.02    0.01      0.001  O        |        |        |        |        0.01
4.333    0.02    0.01      0.001  O        |        |        |        |        0.01
4.417    0.02    0.01      0.001  O        |        |        |        |        0.01
4.500    0.02    0.01      0.001  O        |        |        |        |        0.01
4.583    0.02    0.01      0.001  O        |        |        |        |        0.01
4.667    0.02    0.02      0.001  O        |        |        |        |        0.01
4.750    0.02    0.02      0.001  O        |        |        |        |        0.01
4.833    0.02    0.02      0.001  O        |        |        |        |        0.01
4.917    0.02    0.02      0.001  O        |        |        |        |        0.01
5.000    0.02    0.02      0.001  O        |        |        |        |        0.01
5.083    0.02    0.02      0.001  O        |        |        |        |        0.01
5.167    0.02    0.02      0.001  O        |        |        |        |        0.01
5.250    0.02    0.02      0.001  O        |        |        |        |        0.01
5.333    0.02    0.02      0.001  O        |        |        |        |        0.01
5.417    0.02    0.02      0.001  O        |        |        |        |        0.01
5.500    0.02    0.02      0.001  O        |        |        |        |        0.01
5.583    0.02    0.02      0.001  O        |        |        |        |        0.01
5.667    0.02    0.02      0.001  O        |        |        |        |        0.01
5.750    0.02    0.02      0.001  O        |        |        |        |        0.01
5.833    0.02    0.02      0.001  O        |        |        |        |        0.01
5.917    0.02    0.02      0.001  O        |        |        |        |        0.01
6.000    0.02    0.02      0.001  O        |        |        |        |        0.01
6.083    0.02    0.02      0.001  O        |        |        |        |        0.01
6.167    0.02    0.02      0.001  O        |        |        |        |        0.01
6.250    0.02    0.02      0.001  O        |        |        |        |        0.01
6.333    0.02    0.02      0.001  O        |        |        |        |        0.01
```

```
  6.417    0.02    0.02     0.001  O        |        |        |        |      0.01
  6.500    0.02    0.02     0.001  O        |        |        |        |      0.01
  6.583    0.02    0.02     0.001  O        |        |        |        |      0.01
  6.667    0.02    0.02     0.001  O        |        |        |        |      0.01
  6.750    0.02    0.02     0.001  O        |        |        |        |      0.01
  6.833    0.02    0.02     0.001  O        |        |        |        |      0.01
  6.917    0.02    0.02     0.001  O        |        |        |        |      0.01
  7.000    0.02    0.02     0.001  O        |        |        |        |      0.01
  7.083    0.02    0.02     0.001  O        |        |        |        |      0.01
  7.167    0.02    0.02     0.001  O        |        |        |        |      0.01
  7.250    0.02    0.02     0.001  O        |        |        |        |      0.01
  7.333    0.02    0.02     0.001  O        |        |        |        |      0.01
  7.417    0.02    0.02     0.001  O        |        |        |        |      0.01
  7.500    0.02    0.02     0.001  O        |        |        |        |      0.01
  7.583    0.02    0.02     0.001  O        |        |        |        |      0.01
  7.667    0.02    0.02     0.001  O        |        |        |        |      0.01
  7.750    0.02    0.02     0.001  O        |        |        |        |      0.01
  7.833    0.02    0.02     0.001  O        |        |        |        |      0.01
  7.917    0.02    0.02     0.001  O        |        |        |        |      0.01
  8.000    0.02    0.02     0.001  O        |        |        |        |      0.01
  8.083    0.02    0.02     0.001  O        |        |        |        |      0.01
  8.167    0.02    0.02     0.001  O        |        |        |        |      0.01
  8.250    0.02    0.02     0.001  O        |        |        |        |      0.01
  8.333    0.02    0.02     0.001  O        |        |        |        |      0.01
  8.417    0.02    0.02     0.001  O        |        |        |        |      0.01
  8.500    0.02    0.02     0.001  O        |        |        |        |      0.01
  8.583    0.02    0.02     0.001  O        |        |        |        |      0.01
  8.667    0.02    0.02     0.001  O        |        |        |        |      0.01
  8.750    0.02    0.02     0.001  O        |        |        |        |      0.01
  8.833    0.02    0.02     0.001  O        |        |        |        |      0.01
  8.917    0.02    0.02     0.001  O        |        |        |        |      0.01
  9.000    0.02    0.02     0.001  O        |        |        |        |      0.01
  9.083    0.02    0.02     0.001  O        |        |        |        |      0.01
  9.167    0.02    0.02     0.001  O        |        |        |        |      0.01
  9.250    0.03    0.02     0.001  O        |        |        |        |      0.01
  9.333    0.03    0.02     0.001  O        |        |        |        |      0.01
  9.417    0.03    0.02     0.001  O        |        |        |        |      0.01
  9.500    0.03    0.02     0.001  O        |        |        |        |      0.01
  9.583    0.03    0.02     0.001  O        |        |        |        |      0.01
  9.667    0.03    0.02     0.001  O        |        |        |        |      0.01
  9.750    0.03    0.03     0.001  O        |        |        |        |      0.01
  9.833    0.03    0.03     0.001  O        |        |        |        |      0.01
  9.917    0.03    0.03     0.001  O        |        |        |        |      0.01
 10.000    0.03    0.03     0.001  O        |        |        |        |      0.01
 10.083    0.03    0.03     0.001  O        |        |        |        |      0.01
 10.167    0.03    0.03     0.001  O        |        |        |        |      0.01
 10.250    0.03    0.03     0.001  O        |        |        |        |      0.01
 10.333    0.03    0.03     0.001  O        |        |        |        |      0.01
 10.417    0.03    0.03     0.001  O        |        |        |        |      0.01
 10.500    0.03    0.03     0.001  O        |        |        |        |      0.01
```

```
10.583    0.03    0.03      0.001  O       |       |       |       |     0.02
10.667    0.03    0.03      0.001  O       |       |       |       |     0.02
10.750    0.03    0.03      0.001  O       |       |       |       |     0.02
10.833    0.03    0.03      0.001  O       |       |       |       |     0.02
10.917    0.03    0.03      0.001  O       |       |       |       |     0.02
11.000    0.03    0.03      0.001  O       |       |       |       |     0.02
11.083    0.03    0.03      0.001  O       |       |       |       |     0.02
11.167    0.03    0.03      0.001  O       |       |       |       |     0.02
11.250    0.03    0.03      0.001  O       |       |       |       |     0.02
11.333    0.04    0.03      0.002  O       |       |       |       |     0.02
11.417    0.04    0.03      0.002  O       |       |       |       |     0.02
11.500    0.04    0.03      0.002  O       |       |       |       |     0.02
11.583    0.04    0.03      0.002  O       |       |       |       |     0.02
11.667    0.04    0.03      0.002  O       |       |       |       |     0.02
11.750    0.04    0.03      0.002  O       |       |       |       |     0.02
11.833    0.04    0.03      0.002  O       |       |       |       |     0.02
11.917    0.04    0.04      0.002  O       |       |       |       |     0.02
12.000    0.04    0.04      0.002  O       |       |       |       |     0.02
12.083    0.07    0.04      0.002  O       |       |       |       |     0.02
12.167    0.22    0.05      0.003  OI      |       |       |       |     0.03
12.250    0.49    0.09      0.004  O I     |       |       |       |     0.05
12.333    0.59    0.15      0.007  O  I    |       |       |       |     0.08
12.417    0.64    0.22      0.010  |O I    |       |       |       |     0.12
12.500    0.68    0.28      0.013  |O  I   |       |       |       |     0.15
12.583    0.71    0.33      0.016  |O  I   |       |       |       |     0.18
12.667    0.72    0.39      0.018  | O I   |       |       |       |     0.21
12.750    0.73    0.43      0.020  | O I   |       |       |       |     0.23
12.833    0.73    0.47      0.022  | O I   |       |       |       |     0.25
12.917    0.73    0.51      0.024  |  OI   |       |       |       |     0.27
13.000    0.74    0.54      0.025  |  OI   |       |       |       |     0.29
13.083    0.74    0.57      0.027  |  OI   |       |       |       |     0.30
13.167    0.74    0.59      0.028  |  OI   |       |       |       |     0.32
13.250    0.74    0.61      0.029  |  OI   |       |       |       |     0.33
13.333    0.74    0.63      0.030  |  OI   |       |       |       |     0.34
13.417    0.74    0.64      0.030  |  OI   |       |       |       |     0.35
13.500    0.74    0.66      0.031  |  OI   |       |       |       |     0.35
13.583    0.74    0.67      0.032  |  OI   |       |       |       |     0.36
13.667    0.74    0.68      0.032  |   O   |       |       |       |     0.36
13.750    0.74    0.69      0.032  |   O   |       |       |       |     0.37
13.833    0.74    0.69      0.033  |   O   |       |       |       |     0.37
13.917    0.74    0.70      0.033  |   O   |       |       |       |     0.38
14.000    0.74    0.71      0.033  |   O   |       |       |       |     0.38
14.083    0.74    0.71      0.034  |   O   |       |       |       |     0.38
14.167    0.74    0.71      0.034  |   O   |       |       |       |     0.38
14.250    0.74    0.72      0.034  |   O   |       |       |       |     0.39
14.333    0.74    0.72      0.034  |   O   |       |       |       |     0.39
14.417    0.74    0.72      0.034  |   O   |       |       |       |     0.39
14.500    0.74    0.73      0.034  |   O   |       |       |       |     0.39
14.583    0.74    0.73      0.035  |   O   |       |       |       |     0.39
14.667    0.74    0.73      0.035  |   O   |       |       |       |     0.39
```

```
14.750    0.74    0.73      0.035  |   O   |       |       |       |     0.39
14.833    0.74    0.73      0.035  |   O   |       |       |       |     0.39
14.917    0.74    0.74      0.035  |   O   |       |       |       |     0.40
15.000    0.74    0.74      0.035  |   O   |       |       |       |     0.40
15.083    0.75    0.74      0.035  |   O   |       |       |       |     0.40
15.167    0.75    0.74      0.035  |   O   |       |       |       |     0.40
15.250    0.75    0.74      0.035  |   O   |       |       |       |     0.40
15.333    0.75    0.74      0.035  |   O   |       |       |       |     0.40
15.417    0.72    0.74      0.035  |   O   |       |       |       |     0.40
15.500    0.61    0.73      0.035  |  IO   |       |       |       |     0.39
15.583    0.42    0.70      0.033  | I O   |       |       |       |     0.38
15.667    0.37    0.66      0.031  | IO    |       |       |       |     0.35
15.750    0.35    0.62      0.029  | IO    |       |       |       |     0.33
15.833    0.36    0.58      0.028  | IO    |       |       |       |     0.31
15.917    0.40    0.56      0.026  | IO    |       |       |       |     0.30
16.000    0.49    0.54      0.026  | IO    |       |       |       |     0.29
16.083    1.20    0.58      0.028  |  O   I|       |       |       |     0.31
16.167    3.42    0.82      0.039  |   O   |       |   I   |       |     0.44
16.250    5.38    0.93      0.063  |    O  |       |       |      I|     0.69
16.333    2.33    0.93      0.083  |    O  |    I  |       |       |     0.90
16.417    1.48    0.93      0.090  |    O  I       |       |       |     0.97
16.500    1.15    0.93      0.092  |    OI |       |       |       |     0.99
16.583    1.06    0.94      0.094  |    OI |       |       |       |     1.00
16.667    0.94    0.95      0.094  |    O  |       |       |       |     1.01
16.750    0.82    0.94      0.093  |   IO  |       |       |       |     1.00
16.833    0.78    0.93      0.093  |   IO  |       |       |       |     1.00
16.917    0.78    0.93      0.092  |   IO  |       |       |       |     0.98
17.000    0.78    0.93      0.090  |   IO  |       |       |       |     0.97
17.083    0.77    0.93      0.089  |   IO  |       |       |       |     0.96
17.167    0.76    0.93      0.088  |   IO  |       |       |       |     0.95
17.250    0.74    0.93      0.087  |   IO  |       |       |       |     0.94
17.333    0.74    0.93      0.086  |   IO  |       |       |       |     0.93
17.417    0.74    0.93      0.084  |   IO  |       |       |       |     0.91
17.500    0.74    0.93      0.083  |   IO  |       |       |       |     0.90
17.583    0.74    0.93      0.082  |   IO  |       |       |       |     0.89
17.667    0.74    0.93      0.081  |   IO  |       |       |       |     0.87
17.750    0.74    0.93      0.079  |   IO  |       |       |       |     0.86
17.833    0.74    0.93      0.078  |   IO  |       |       |       |     0.85
17.917    0.74    0.93      0.077  |   IO  |       |       |       |     0.83
18.000    0.74    0.93      0.075  |   IO  |       |       |       |     0.82
18.083    0.71    0.93      0.074  |   IO  |       |       |       |     0.81
18.167    0.56    0.93      0.072  |  I O  |       |       |       |     0.78
18.250    0.29    0.93      0.068  |I   O  |       |       |       |     0.75
18.333    0.19    0.93      0.064  |I   O  |       |       |       |     0.70
18.417    0.13    0.93      0.058  I    O  |       |       |       |     0.65
18.500    0.10    0.93      0.053  I    O  |       |       |       |     0.59
18.583    0.07    0.93      0.047  I    O  |       |       |       |     0.53
18.667    0.05    0.87      0.041  I    O  |       |       |       |     0.47
18.750    0.05    0.76      0.036  I   O   |       |       |       |     0.41
18.833    0.04    0.66      0.031  I  O    |       |       |       |     0.36
```

18.917	0.04	0.58	0.027	I O	0.31
19.000	0.04	0.50	0.024	I O	0.27
19.083	0.03	0.44	0.021	I O	0.24
19.167	0.03	0.39	0.018	I O	0.21
19.250	0.03	0.34	0.016	I O	0.18
19.333	0.03	0.30	0.014	IO	0.16
19.417	0.03	0.26	0.012	IO	0.14
19.500	0.03	0.23	0.011	IO	0.12
19.583	0.03	0.20	0.009	IO	0.11
19.667	0.03	0.18	0.008	IO	0.10
19.750	0.03	0.16	0.007	O	0.08
19.833	0.03	0.14	0.007	O	0.07
19.917	0.02	0.12	0.006	O	0.07
20.000	0.02	0.11	0.005	O	0.06
20.083	0.02	0.10	0.005	O	0.05
20.167	0.02	0.09	0.004	O	0.05
20.250	0.02	0.08	0.004	O	0.04
20.333	0.02	0.07	0.003	O	0.04
20.417	0.02	0.06	0.003	O	0.03
20.500	0.02	0.06	0.003	O	0.03
20.583	0.02	0.05	0.003	O	0.03
20.667	0.02	0.05	0.002	O	0.03
20.750	0.02	0.05	0.002	O	0.02
20.833	0.02	0.04	0.002	O	0.02
20.917	0.02	0.04	0.002	O	0.02
21.000	0.02	0.04	0.002	O	0.02
21.083	0.02	0.03	0.002	O	0.02
21.167	0.02	0.03	0.002	O	0.02
21.250	0.02	0.03	0.001	O	0.02
21.333	0.02	0.03	0.001	O	0.02
21.417	0.02	0.03	0.001	O	0.01
21.500	0.02	0.03	0.001	O	0.01
21.583	0.02	0.02	0.001	O	0.01
21.667	0.02	0.02	0.001	O	0.01
21.750	0.02	0.02	0.001	O	0.01
21.833	0.02	0.02	0.001	O	0.01
21.917	0.02	0.02	0.001	O	0.01
22.000	0.02	0.02	0.001	O	0.01
22.083	0.02	0.02	0.001	O	0.01
22.167	0.02	0.02	0.001	O	0.01
22.250	0.02	0.02	0.001	O	0.01
22.333	0.02	0.02	0.001	O	0.01
22.417	0.01	0.02	0.001	O	0.01
22.500	0.01	0.02	0.001	O	0.01
22.583	0.01	0.02	0.001	O	0.01
22.667	0.01	0.02	0.001	O	0.01
22.750	0.01	0.02	0.001	O	0.01
22.833	0.01	0.02	0.001	O	0.01
22.917	0.01	0.02	0.001	O	0.01
23.000	0.01	0.02	0.001	O	0.01

```
23.083    0.01    0.02      0.001  O       |       |       |       |      0.01
23.167    0.01    0.01      0.001  O       |       |       |       |      0.01
23.250    0.01    0.01      0.001  O       |       |       |       |      0.01
23.333    0.01    0.01      0.001  O       |       |       |       |      0.01
23.417    0.01    0.01      0.001  O       |       |       |       |      0.01
23.500    0.01    0.01      0.001  O       |       |       |       |      0.01
23.583    0.01    0.01      0.001  O       |       |       |       |      0.01
23.667    0.01    0.01      0.001  O       |       |       |       |      0.01
23.750    0.01    0.01      0.001  O       |       |       |       |      0.01
23.833    0.01    0.01      0.001  O       |       |       |       |      0.01
23.917    0.01    0.01      0.001  O       |       |       |       |      0.01
24.000    0.01    0.01      0.001  O       |       |       |       |      0.01
24.083    0.01    0.01      0.001  O       |       |       |       |      0.01
24.167    0.01    0.01      0.001  O       |       |       |       |      0.01
24.250    0.00    0.01      0.001  O       |       |       |       |      0.01
24.333    0.00    0.01      0.001  O       |       |       |       |      0.01
24.417    0.00    0.01      0.000  O       |       |       |       |      0.01
24.500    0.00    0.01      0.000  O       |       |       |       |      0.00
24.583    0.00    0.01      0.000  O       |       |       |       |      0.00
24.667    0.00    0.01      0.000  O       |       |       |       |      0.00
24.750    0.00    0.01      0.000  O       |       |       |       |      0.00
24.833    0.00    0.00      0.000  O       |       |       |       |      0.00
24.917    0.00    0.00      0.000  O       |       |       |       |      0.00
25.000    0.00    0.00      0.000  O       |       |       |       |      0.00
25.083    0.00    0.00      0.000  O       |       |       |       |      0.00
25.167    0.00    0.00      0.000  O       |       |       |       |      0.00
25.250    0.00    0.00      0.000  O       |       |       |       |      0.00
25.333    0.00    0.00      0.000  O       |       |       |       |      0.00
25.417    0.00    0.00      0.000  O       |       |       |       |      0.00

       ****************************HYDROGRAPH DATA****************************
                       Number of intervals =   305
                       Time interval =    5.0 (Min.)
                       Maximum/Peak flow rate =       0.946 (CFS)
                       Total volume =       0.461 (Ac.Ft)
               Status of hydrographs being held in storage
                          Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
               Peak (CFS)      0.000     0.000     0.000     0.000     0.000
               Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
       ***********************************************************************

       --------------------------------------------------------------------
```

```
                    FLOOD HYDROGRAPH ROUTING PROGRAM
           Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018
                        Study date: 05/26/21

---------------------------------------------------------------------


Paradise Ranch
2 yr BMP-3



--------------------------------------------------------------------


Program License Serial Number 6481

--------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION **********************

                From study/file name: ParadiseRanch2yrDA40.rte
****************************HYDROGRAPH DATA***************************
                Number of intervals =   299
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =        7.111 (CFS)
                Total volume =       0.665 (Ac.Ft)
        Status of hydrographs being held in storage
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
**********************************************************************



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      10.000 to Point/Station      11.000
**** RETARDING BASIN ROUTING ****
______________________________________________________________________

User entry of depth-outflow-storage data
--------------------------------------------------------------------
Total number of inflow hydrograph intervals = 299
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
--------------------------------------------------------------------
--------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
```

```
Initial basin outflow =   0.00 (CFS)
----------------------------------------------------------------------
---------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)     (Ac.Ft)
----------------------------------------------------------------------
  0.000      0.000      0.000      0.000        0.000
  0.500      0.021      3.720      0.008        0.034
  1.000      0.047      7.440      0.021        0.073
  1.500      0.078      7.440      0.052        0.104
  2.000      0.114      7.440      0.088        0.140
  2.500      0.156     20.000      0.087        0.225
  3.000      0.204     20.000      0.135        0.273
---------------------------------------------------------------------
                Hydrograph Detention Basin Routing
----------------------------------------------------------------------

Graph values: 'I'= unit inflow; 'O'=outflow at time shown
----------------------------------------------------------------------
 Time   Inflow  Outflow    Storage                                 Depth
(Hours)  (CFS)   (CFS)     (Ac.Ft) .0       1.8    3.56    5.33    7.11 (Ft.)
 0.083    0.00    0.00      0.000  O        |       |       |       |     0.00
 0.167    0.01    0.00      0.000  O        |       |       |       |     0.00
 0.250    0.01    0.01      0.000  O        |       |       |       |     0.00
 0.333    0.01    0.01      0.000  O        |       |       |       |     0.00
 0.417    0.02    0.01      0.000  O        |       |       |       |     0.00
 0.500    0.02    0.02      0.000  O        |       |       |       |     0.00
 0.583    0.02    0.02      0.000  O        |       |       |       |     0.00
 0.667    0.02    0.02      0.000  O        |       |       |       |     0.00
 0.750    0.02    0.02      0.000  O        |       |       |       |     0.00
 0.833    0.02    0.02      0.000  O        |       |       |       |     0.00
 0.917    0.02    0.02      0.000  O        |       |       |       |     0.00
 1.000    0.02    0.02      0.000  O        |       |       |       |     0.00
 1.083    0.02    0.02      0.000  O        |       |       |       |     0.00
 1.167    0.02    0.02      0.000  O        |       |       |       |     0.00
 1.250    0.02    0.02      0.000  O        |       |       |       |     0.00
 1.333    0.02    0.02      0.000  O        |       |       |       |     0.00
 1.417    0.02    0.02      0.000  O        |       |       |       |     0.00
 1.500    0.02    0.02      0.000  O        |       |       |       |     0.00
 1.583    0.02    0.02      0.000  O        |       |       |       |     0.00
 1.667    0.02    0.02      0.000  O        |       |       |       |     0.00
 1.750    0.02    0.02      0.000  O        |       |       |       |     0.00
 1.833    0.02    0.02      0.000  O        |       |       |       |     0.00
 1.917    0.02    0.02      0.000  O        |       |       |       |     0.00
 2.000    0.02    0.02      0.000  O        |       |       |       |     0.00
 2.083    0.02    0.02      0.000  O        |       |       |       |     0.00
 2.167    0.02    0.02      0.000  O        |       |       |       |     0.00
 2.250    0.02    0.02      0.000  O        |       |       |       |     0.00
 2.333    0.02    0.02      0.000  O        |       |       |       |     0.00
```

2.417	0.02	0.02	0.000	O					0.00
2.500	0.02	0.02	0.000	O					0.00
2.583	0.02	0.02	0.000	O					0.00
2.667	0.02	0.02	0.000	O					0.00
2.750	0.02	0.02	0.000	O					0.00
2.833	0.02	0.02	0.000	O					0.00
2.917	0.02	0.02	0.000	O					0.00
3.000	0.02	0.02	0.000	O					0.00
3.083	0.02	0.02	0.000	O					0.00
3.167	0.02	0.02	0.000	O					0.00
3.250	0.02	0.02	0.000	O					0.00
3.333	0.02	0.02	0.000	O					0.00
3.417	0.02	0.02	0.000	O					0.00
3.500	0.02	0.02	0.000	O					0.00
3.583	0.02	0.02	0.000	O					0.00
3.667	0.02	0.02	0.000	O					0.00
3.750	0.02	0.02	0.000	O					0.00
3.833	0.02	0.02	0.000	O					0.00
3.917	0.02	0.02	0.000	O					0.00
4.000	0.02	0.02	0.000	O					0.00
4.083	0.02	0.02	0.000	O					0.00
4.167	0.02	0.02	0.000	O					0.00
4.250	0.02	0.02	0.000	O					0.00
4.333	0.02	0.02	0.000	O					0.00
4.417	0.02	0.02	0.000	O					0.00
4.500	0.02	0.02	0.000	O					0.00
4.583	0.02	0.02	0.000	O					0.00
4.667	0.02	0.02	0.000	O					0.00
4.750	0.02	0.02	0.000	O					0.00
4.833	0.02	0.02	0.000	O					0.00
4.917	0.02	0.02	0.000	O					0.00
5.000	0.02	0.02	0.000	O					0.00
5.083	0.02	0.02	0.000	O					0.00
5.167	0.02	0.02	0.000	O					0.00
5.250	0.02	0.02	0.000	O					0.00
5.333	0.02	0.02	0.000	O					0.00
5.417	0.02	0.02	0.000	O					0.00
5.500	0.02	0.02	0.000	O					0.00
5.583	0.02	0.02	0.000	O					0.00
5.667	0.02	0.02	0.000	O					0.00
5.750	0.02	0.02	0.000	O					0.00
5.833	0.03	0.02	0.000	O					0.00
5.917	0.03	0.03	0.000	O					0.00
6.000	0.03	0.03	0.000	O					0.00
6.083	0.03	0.03	0.000	O					0.00
6.167	0.03	0.03	0.000	O					0.00
6.250	0.03	0.03	0.000	O					0.00
6.333	0.03	0.03	0.000	O					0.00
6.417	0.03	0.03	0.000	O					0.00
6.500	0.03	0.03	0.000	O					0.00

6.583	0.03	0.03	0.000	O	|	|	|	|	0.00
6.667	0.03	0.03	0.000	O	|	|	|	|	0.00
6.750	0.03	0.03	0.000	O	|	|	|	|	0.00
6.833	0.03	0.03	0.000	O	|	|	|	|	0.00
6.917	0.03	0.03	0.000	O	|	|	|	|	0.00
7.000	0.03	0.03	0.000	O	|	|	|	|	0.00
7.083	0.03	0.03	0.000	O	|	|	|	|	0.00
7.167	0.03	0.03	0.000	O	|	|	|	|	0.00
7.250	0.03	0.03	0.000	O	|	|	|	|	0.00
7.333	0.03	0.03	0.000	O	|	|	|	|	0.00
7.417	0.03	0.03	0.000	O	|	|	|	|	0.00
7.500	0.03	0.03	0.000	O	|	|	|	|	0.00
7.583	0.03	0.03	0.000	O	|	|	|	|	0.00
7.667	0.03	0.03	0.000	O	|	|	|	|	0.00
7.750	0.03	0.03	0.000	O	|	|	|	|	0.00
7.833	0.03	0.03	0.000	O	|	|	|	|	0.00
7.917	0.03	0.03	0.000	O	|	|	|	|	0.00
8.000	0.03	0.03	0.000	O	|	|	|	|	0.00
8.083	0.03	0.03	0.000	O	|	|	|	|	0.00
8.167	0.03	0.03	0.000	O	|	|	|	|	0.00
8.250	0.03	0.03	0.000	O	|	|	|	|	0.00
8.333	0.03	0.03	0.000	O	|	|	|	|	0.00
8.417	0.03	0.03	0.000	O	|	|	|	|	0.00
8.500	0.03	0.03	0.000	O	|	|	|	|	0.00
8.583	0.03	0.03	0.000	O	|	|	|	|	0.00
8.667	0.03	0.03	0.000	O	|	|	|	|	0.00
8.750	0.03	0.03	0.000	O	|	|	|	|	0.00
8.833	0.03	0.03	0.000	O	|	|	|	|	0.00
8.917	0.03	0.03	0.000	O	|	|	|	|	0.00
9.000	0.04	0.03	0.000	O	|	|	|	|	0.00
9.083	0.04	0.04	0.000	O	|	|	|	|	0.00
9.167	0.04	0.04	0.000	O	|	|	|	|	0.00
9.250	0.04	0.04	0.000	O	|	|	|	|	0.00
9.333	0.04	0.04	0.000	O	|	|	|	|	0.00
9.417	0.04	0.04	0.000	O	|	|	|	|	0.00
9.500	0.04	0.04	0.000	O	|	|	|	|	0.01
9.583	0.04	0.04	0.000	O	|	|	|	|	0.01
9.667	0.04	0.04	0.000	O	|	|	|	|	0.01
9.750	0.04	0.04	0.000	O	|	|	|	|	0.01
9.833	0.04	0.04	0.000	O	|	|	|	|	0.01
9.917	0.04	0.04	0.000	O	|	|	|	|	0.01
10.000	0.04	0.04	0.000	O	|	|	|	|	0.01
10.083	0.04	0.04	0.000	O	|	|	|	|	0.01
10.167	0.04	0.04	0.000	O	|	|	|	|	0.01
10.250	0.04	0.04	0.000	O	|	|	|	|	0.01
10.333	0.04	0.04	0.000	O	|	|	|	|	0.01
10.417	0.04	0.04	0.000	O	|	|	|	|	0.01
10.500	0.04	0.04	0.000	O	|	|	|	|	0.01
10.583	0.04	0.04	0.000	O	|	|	|	|	0.01
10.667	0.05	0.04	0.000	O	|	|	|	|	0.01

```
10.750    0.05    0.05      0.000  O       |       |       |       |     0.01
10.833    0.05    0.05      0.000  O       |       |       |       |     0.01
10.917    0.05    0.05      0.000  O       |       |       |       |     0.01
11.000    0.05    0.05      0.000  O       |       |       |       |     0.01
11.083    0.05    0.05      0.000  O       |       |       |       |     0.01
11.167    0.05    0.05      0.000  O       |       |       |       |     0.01
11.250    0.05    0.05      0.000  O       |       |       |       |     0.01
11.333    0.05    0.05      0.000  O       |       |       |       |     0.01
11.417    0.05    0.05      0.000  O       |       |       |       |     0.01
11.500    0.05    0.05      0.000  O       |       |       |       |     0.01
11.583    0.05    0.05      0.000  O       |       |       |       |     0.01
11.667    0.05    0.05      0.000  O       |       |       |       |     0.01
11.750    0.06    0.05      0.000  O       |       |       |       |     0.01
11.833    0.06    0.06      0.000  O       |       |       |       |     0.01
11.917    0.06    0.06      0.000  O       |       |       |       |     0.01
12.000    0.06    0.06      0.000  O       |       |       |       |     0.01
12.083    0.11    0.08      0.000  O       |       |       |       |     0.01
12.167    0.42    0.22      0.001  |O      |       |       |       |     0.03
12.250    0.77    0.51      0.003  | OI    |       |       |       |     0.07
12.333    0.90    0.76      0.004  |  OI   |       |       |       |     0.10
12.417    0.97    0.89      0.005  |   O   |       |       |       |     0.12
12.500    1.02    0.97      0.005  |   O   |       |       |       |     0.13
12.583    1.04    1.01      0.006  |   O   |       |       |       |     0.14
12.667    1.05    1.04      0.006  |   O   |       |       |       |     0.14
12.750    1.06    1.05      0.006  |   O   |       |       |       |     0.14
12.833    1.06    1.06      0.006  |   O   |       |       |       |     0.14
12.917    1.07    1.06      0.006  |   O   |       |       |       |     0.14
13.000    1.07    1.07      0.006  |   O   |       |       |       |     0.14
13.083    1.07    1.07      0.006  |   O   |       |       |       |     0.14
13.167    1.07    1.07      0.006  |   O   |       |       |       |     0.14
13.250    1.07    1.07      0.006  |   O   |       |       |       |     0.14
13.333    1.07    1.07      0.006  |   O   |       |       |       |     0.14
13.417    1.07    1.07      0.006  |   O   |       |       |       |     0.14
13.500    1.07    1.07      0.006  |   O   |       |       |       |     0.14
13.583    1.07    1.07      0.006  |   O   |       |       |       |     0.14
13.667    1.07    1.07      0.006  |   O   |       |       |       |     0.14
13.750    1.07    1.07      0.006  |   O   |       |       |       |     0.14
13.833    1.07    1.07      0.006  |   O   |       |       |       |     0.14
13.917    1.07    1.07      0.006  |   O   |       |       |       |     0.14
14.000    1.07    1.07      0.006  |   O   |       |       |       |     0.14
14.083    1.07    1.07      0.006  |   O   |       |       |       |     0.14
14.167    1.07    1.07      0.006  |   O   |       |       |       |     0.14
14.250    1.07    1.07      0.006  |   O   |       |       |       |     0.14
14.333    1.07    1.07      0.006  |   O   |       |       |       |     0.14
14.417    1.07    1.07      0.006  |   O   |       |       |       |     0.14
14.500    1.07    1.07      0.006  |   O   |       |       |       |     0.14
14.583    1.07    1.07      0.006  |   O   |       |       |       |     0.14
14.667    1.07    1.07      0.006  |   O   |       |       |       |     0.14
14.750    1.07    1.07      0.006  |   O   |       |       |       |     0.14
14.833    1.07    1.07      0.006  |   O   |       |       |       |     0.14
```

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14.917    1.07    1.07      0.006  |   O   |       |       |       |     0.14
15.000    1.08    1.07      0.006  |   O   |       |       |       |     0.14
15.083    1.08    1.08      0.006  |   O   |       |       |       |     0.14
15.167    1.08    1.08      0.006  |   O   |       |       |       |     0.14
15.250    1.08    1.08      0.006  |   O   |       |       |       |     0.14
15.333    1.08    1.08      0.006  |   O   |       |       |       |     0.14
15.417    1.04    1.06      0.006  |   O   |       |       |       |     0.14
15.500    0.81    0.96      0.005  |  IO   |       |       |       |     0.13
15.583    0.56    0.75      0.004  | IO    |       |       |       |     0.10
15.667    0.50    0.59      0.003  | O     |       |       |       |     0.08
15.750    0.49    0.51      0.003  | O     |       |       |       |     0.07
15.833    0.51    0.50      0.003  | O     |       |       |       |     0.07
15.917    0.59    0.54      0.003  | O     |       |       |       |     0.07
16.000    0.76    0.64      0.004  | OI    |       |       |       |     0.09
16.083    1.99    1.20      0.007  |    O  I       |       |       |     0.16
16.167    6.59    3.54      0.020  |       |      O|       |    I  |     0.48
16.250    7.11    5.75      0.035  |       |       |       |O      I     0.77
16.333    3.00    5.29      0.032  |       |    I  |      O|       |     0.71
16.417    1.92    3.38      0.019  |       I      O|       |       |     0.45
16.500    1.54    2.13      0.012  |     I |O      |       |       |     0.29
16.583    1.38    1.62      0.009  |     IO|       |       |       |     0.22
16.667    1.17    1.36      0.008  |    IO |       |       |       |     0.18
16.750    1.13    1.20      0.007  |    O  |       |       |       |     0.16
16.833    1.12    1.15      0.006  |    O  |       |       |       |     0.15
16.917    1.13    1.13      0.006  |    O  |       |       |       |     0.15
17.000    1.11    1.12      0.006  |   IO  |       |       |       |     0.15
17.083    1.07    1.09      0.006  |   O   |       |       |       |     0.15
17.167    1.07    1.07      0.006  |   O   |       |       |       |     0.14
17.250    1.07    1.07      0.006  |   O   |       |       |       |     0.14
17.333    1.07    1.07      0.006  |   O   |       |       |       |     0.14
17.417    1.07    1.07      0.006  |   O   |       |       |       |     0.14
17.500    1.07    1.07      0.006  |   O   |       |       |       |     0.14
17.583    1.07    1.07      0.006  |   O   |       |       |       |     0.14
17.667    1.07    1.07      0.006  |   O   |       |       |       |     0.14
17.750    1.07    1.07      0.006  |   O   |       |       |       |     0.14
17.833    1.07    1.07      0.006  |   O   |       |       |       |     0.14
17.917    1.07    1.07      0.006  |   O   |       |       |       |     0.14
18.000    1.07    1.07      0.006  |   O   |       |       |       |     0.14
18.083    1.01    1.05      0.006  |   O   |       |       |       |     0.14
18.167    0.70    0.90      0.005  |  IO   |       |       |       |     0.12
18.250    0.36    0.62      0.003  |IO     |       |       |       |     0.08
18.333    0.23    0.37      0.002  |O      |       |       |       |     0.05
18.417    0.15    0.23      0.001  IO      |       |       |       |     0.03
18.500    0.11    0.16      0.001  O       |       |       |       |     0.02
18.583    0.08    0.11      0.001  O       |       |       |       |     0.01
18.667    0.07    0.08      0.000  O       |       |       |       |     0.01
18.750    0.06    0.07      0.000  O       |       |       |       |     0.01
18.833    0.05    0.06      0.000  O       |       |       |       |     0.01
18.917    0.05    0.05      0.000  O       |       |       |       |     0.01
19.000    0.05    0.05      0.000  O       |       |       |       |     0.01
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19.083	0.04	0.05	0.000	O	|	|	|	|	0.01
19.167	0.04	0.04	0.000	O	|	|	|	|	0.01
19.250	0.04	0.04	0.000	O	|	|	|	|	0.01
19.333	0.04	0.04	0.000	O	|	|	|	|	0.01
19.417	0.04	0.04	0.000	O	|	|	|	|	0.01
19.500	0.04	0.04	0.000	O	|	|	|	|	0.01
19.583	0.04	0.04	0.000	O	|	|	|	|	0.01
19.667	0.04	0.04	0.000	O	|	|	|	|	0.01
19.750	0.04	0.04	0.000	O	|	|	|	|	0.01
19.833	0.04	0.04	0.000	O	|	|	|	|	0.00
19.917	0.04	0.04	0.000	O	|	|	|	|	0.00
20.000	0.03	0.03	0.000	O	|	|	|	|	0.00
20.083	0.03	0.03	0.000	O	|	|	|	|	0.00
20.167	0.03	0.03	0.000	O	|	|	|	|	0.00
20.250	0.03	0.03	0.000	O	|	|	|	|	0.00
20.333	0.03	0.03	0.000	O	|	|	|	|	0.00
20.417	0.03	0.03	0.000	O	|	|	|	|	0.00
20.500	0.03	0.03	0.000	O	|	|	|	|	0.00
20.583	0.03	0.03	0.000	O	|	|	|	|	0.00
20.667	0.03	0.03	0.000	O	|	|	|	|	0.00
20.750	0.03	0.03	0.000	O	|	|	|	|	0.00
20.833	0.03	0.03	0.000	O	|	|	|	|	0.00
20.917	0.03	0.03	0.000	O	|	|	|	|	0.00
21.000	0.03	0.03	0.000	O	|	|	|	|	0.00
21.083	0.03	0.03	0.000	O	|	|	|	|	0.00
21.167	0.03	0.03	0.000	O	|	|	|	|	0.00
21.250	0.03	0.03	0.000	O	|	|	|	|	0.00
21.333	0.03	0.03	0.000	O	|	|	|	|	0.00
21.417	0.03	0.03	0.000	O	|	|	|	|	0.00
21.500	0.02	0.03	0.000	O	|	|	|	|	0.00
21.583	0.02	0.02	0.000	O	|	|	|	|	0.00
21.667	0.02	0.02	0.000	O	|	|	|	|	0.00
21.750	0.02	0.02	0.000	O	|	|	|	|	0.00
21.833	0.02	0.02	0.000	O	|	|	|	|	0.00
21.917	0.02	0.02	0.000	O	|	|	|	|	0.00
22.000	0.02	0.02	0.000	O	|	|	|	|	0.00
22.083	0.02	0.02	0.000	O	|	|	|	|	0.00
22.167	0.02	0.02	0.000	O	|	|	|	|	0.00
22.250	0.02	0.02	0.000	O	|	|	|	|	0.00
22.333	0.02	0.02	0.000	O	|	|	|	|	0.00
22.417	0.02	0.02	0.000	O	|	|	|	|	0.00
22.500	0.02	0.02	0.000	O	|	|	|	|	0.00
22.583	0.02	0.02	0.000	O	|	|	|	|	0.00
22.667	0.02	0.02	0.000	O	|	|	|	|	0.00
22.750	0.02	0.02	0.000	O	|	|	|	|	0.00
22.833	0.02	0.02	0.000	O	|	|	|	|	0.00
22.917	0.02	0.02	0.000	O	|	|	|	|	0.00
23.000	0.02	0.02	0.000	O	|	|	|	|	0.00
23.083	0.02	0.02	0.000	O	|	|	|	|	0.00
23.167	0.02	0.02	0.000	O	|	|	|	|	0.00

```
23.250    0.02    0.02      0.000  O       |       |       |       |      0.00
23.333    0.02    0.02      0.000  O       |       |       |       |      0.00
23.417    0.02    0.02      0.000  O       |       |       |       |      0.00
23.500    0.02    0.02      0.000  O       |       |       |       |      0.00
23.583    0.02    0.02      0.000  O       |       |       |       |      0.00
23.667    0.02    0.02      0.000  O       |       |       |       |      0.00
23.750    0.02    0.02      0.000  O       |       |       |       |      0.00
23.833    0.02    0.02      0.000  O       |       |       |       |      0.00
23.917    0.02    0.02      0.000  O       |       |       |       |      0.00
24.000    0.02    0.02      0.000  O       |       |       |       |      0.00
24.083    0.02    0.02      0.000  O       |       |       |       |      0.00
24.167    0.01    0.01      0.000  O       |       |       |       |      0.00
24.250    0.01    0.01      0.000  O       |       |       |       |      0.00
24.333    0.00    0.01      0.000  O       |       |       |       |      0.00
24.417    0.00    0.00      0.000  O       |       |       |       |      0.00
24.500    0.00    0.00      0.000  O       |       |       |       |      0.00
24.583    0.00    0.00      0.000  O       |       |       |       |      0.00
24.667    0.00    0.00      0.000  O       |       |       |       |      0.00
24.750    0.00    0.00      0.000  O       |       |       |       |      0.00
24.833    0.00    0.00      0.000  O       |       |       |       |      0.00
24.917    0.00    0.00      0.000  O       |       |       |       |      0.00
25.000    0.00    0.00      0.000  O       |       |       |       |      0.00

       ****************************HYDROGRAPH DATA****************************
                       Number of intervals =   300
                       Time interval =    5.0 (Min.)
                       Maximum/Peak flow rate =        5.749 (CFS)
                       Total volume =       0.665 (Ac.Ft)
               Status of hydrographs being held in storage
                          Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
               Peak (CFS)      0.000     0.000     0.000     0.000     0.000
               Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
       ***********************************************************************

       --------------------------------------------------------------------
```

```
                 FLOOD HYDROGRAPH ROUTING PROGRAM
          Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018
                       Study date: 05/26/21

---------------------------------------------------------------------


Paradise Ranch
10 yr BMP-1



--------------------------------------------------------------------


Program License Serial Number 6481

--------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION **********************

                From study/file name: ParadiseRanch10yrDA38.rte
****************************HYDROGRAPH DATA****************************
                Number of intervals =   304
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =        9.101 (CFS)
                Total volume =       1.498 (Ac.Ft)
        Status of hydrographs being held in storage
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
***********************************************************************



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** RETARDING BASIN ROUTING ****
______________________________________________________________________

User entry of depth-outflow-storage data
--------------------------------------------------------------------
Total number of inflow hydrograph intervals = 304
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
--------------------------------------------------------------------
--------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
```

```
Initial basin outflow =   0.00 (CFS)
---------------------------------------------------------------------
--------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
---------------------------------------------------------------------
  0.000      0.000      0.000      0.000        0.000
  0.500      0.052      0.930      0.049        0.055
  1.000      0.114      0.930      0.111        0.117
  1.500      0.186      0.930      0.183        0.189
  2.000      0.261      0.930      0.258        0.264
  2.500      0.342      0.930      0.339        0.345
  3.000      0.431      1.860      0.425        0.437
  3.500      0.527      2.790      0.517        0.537
  4.000      0.630      2.790      0.620        0.640
--------------------------------------------------------------------
                Hydrograph Detention Basin Routing
---------------------------------------------------------------------

Graph values: 'I'= unit inflow; 'O'=outflow at time shown
---------------------------------------------------------------------
 Time   Inflow  Outflow    Storage                                   Depth
(Hours)  (CFS)   (CFS)      (Ac.Ft) .0       2.3    4.55    6.83    9.10 (Ft.)
 0.083    0.01    0.00       0.000  O        |       |       |       |       0.00
 0.167    0.07    0.01       0.000  O        |       |       |       |       0.00
 0.250    0.22    0.02       0.001  O        |       |       |       |       0.01
 0.333    0.32    0.05       0.003  OI       |       |       |       |       0.03
 0.417    0.36    0.08       0.005  OI       |       |       |       |       0.05
 0.500    0.39    0.12       0.007  OI       |       |       |       |       0.06
 0.583    0.41    0.15       0.008  OI       |       |       |       |       0.08
 0.667    0.43    0.18       0.010  OI       |       |       |       |       0.10
 0.750    0.44    0.21       0.012  OI       |       |       |       |       0.11
 0.833    0.45    0.24       0.013  OI       |       |       |       |       0.13
 0.917    0.45    0.26       0.015  OI       |       |       |       |       0.14
 1.000    0.45    0.28       0.016  OI       |       |       |       |       0.15
 1.083    0.45    0.30       0.017  |O       |       |       |       |       0.16
 1.167    0.46    0.32       0.018  |O       |       |       |       |       0.17
 1.250    0.46    0.34       0.019  |O       |       |       |       |       0.18
 1.333    0.46    0.35       0.020  |O       |       |       |       |       0.19
 1.417    0.46    0.36       0.020  |O       |       |       |       |       0.20
 1.500    0.46    0.38       0.021  |O       |       |       |       |       0.20
 1.583    0.46    0.39       0.022  |O       |       |       |       |       0.21
 1.667    0.47    0.40       0.022  |O       |       |       |       |       0.21
 1.750    0.47    0.40       0.023  |O       |       |       |       |       0.22
 1.833    0.47    0.41       0.023  |O       |       |       |       |       0.22
 1.917    0.47    0.42       0.023  |O       |       |       |       |       0.22
 2.000    0.47    0.42       0.024  |O       |       |       |       |       0.23
 2.083    0.47    0.43       0.024  |O       |       |       |       |       0.23
 2.167    0.47    0.43       0.024  |O       |       |       |       |       0.23
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2.250	0.47	0.44	0.025	O					0.24
2.333	0.47	0.44	0.025	O					0.24
2.417	0.48	0.45	0.025	O					0.24
2.500	0.48	0.45	0.025	O					0.24
2.583	0.48	0.45	0.025	O					0.24
2.667	0.48	0.46	0.025	O					0.24
2.750	0.48	0.46	0.026	O					0.25
2.833	0.48	0.46	0.026	O					0.25
2.917	0.48	0.46	0.026	O					0.25
3.000	0.48	0.47	0.026	O					0.25
3.083	0.48	0.47	0.026	O					0.25
3.167	0.49	0.47	0.026	O					0.25
3.250	0.49	0.47	0.026	O					0.25
3.333	0.49	0.47	0.026	O					0.25
3.417	0.49	0.48	0.027	O					0.26
3.500	0.49	0.48	0.027	O					0.26
3.583	0.49	0.48	0.027	O					0.26
3.667	0.49	0.48	0.027	O					0.26
3.750	0.49	0.48	0.027	O					0.26
3.833	0.50	0.48	0.027	O					0.26
3.917	0.50	0.48	0.027	O					0.26
4.000	0.50	0.49	0.027	O					0.26
4.083	0.50	0.49	0.027	O					0.26
4.167	0.50	0.49	0.027	O					0.26
4.250	0.50	0.49	0.027	O					0.26
4.333	0.50	0.49	0.027	O					0.26
4.417	0.50	0.49	0.028	O					0.27
4.500	0.51	0.49	0.028	O					0.27
4.583	0.51	0.50	0.028	O					0.27
4.667	0.51	0.50	0.028	O					0.27
4.750	0.51	0.50	0.028	O					0.27
4.833	0.51	0.50	0.028	O					0.27
4.917	0.51	0.50	0.028	O					0.27
5.000	0.51	0.50	0.028	O					0.27
5.083	0.52	0.50	0.028	O					0.27
5.167	0.52	0.51	0.028	O					0.27
5.250	0.52	0.51	0.028	O					0.27
5.333	0.52	0.51	0.028	O					0.27
5.417	0.52	0.51	0.029	O					0.27
5.500	0.52	0.51	0.029	O					0.28
5.583	0.52	0.51	0.029	O					0.28
5.667	0.53	0.51	0.029	O					0.28
5.750	0.53	0.52	0.029	O					0.28
5.833	0.53	0.52	0.029	O					0.28
5.917	0.53	0.52	0.029	O					0.28
6.000	0.53	0.52	0.029	O					0.28
6.083	0.53	0.52	0.029	O					0.28
6.167	0.54	0.52	0.029	O					0.28
6.250	0.54	0.53	0.029	O					0.28
6.333	0.54	0.53	0.029	O					0.28

6.417	0.54	0.53	0.030	O				0.28
6.500	0.54	0.53	0.030	O				0.28
6.583	0.55	0.53	0.030	O				0.29
6.667	0.55	0.53	0.030	O				0.29
6.750	0.55	0.54	0.030	O				0.29
6.833	0.55	0.54	0.030	O				0.29
6.917	0.55	0.54	0.030	O				0.29
7.000	0.55	0.54	0.030	O				0.29
7.083	0.56	0.54	0.030	O				0.29
7.167	0.56	0.54	0.030	O				0.29
7.250	0.56	0.55	0.031	O				0.29
7.333	0.56	0.55	0.031	O				0.29
7.417	0.56	0.55	0.031	O				0.30
7.500	0.57	0.55	0.031	O				0.30
7.583	0.57	0.55	0.031	O				0.30
7.667	0.57	0.55	0.031	OI				0.30
7.750	0.57	0.56	0.031	OI				0.30
7.833	0.57	0.56	0.031	OI				0.30
7.917	0.58	0.56	0.031	OI				0.30
8.000	0.58	0.56	0.031	OI				0.30
8.083	0.58	0.56	0.032	OI				0.30
8.167	0.58	0.57	0.032	OI				0.30
8.250	0.59	0.57	0.032	O				0.31
8.333	0.59	0.57	0.032	O				0.31
8.417	0.59	0.57	0.032	O				0.31
8.500	0.59	0.58	0.032	O				0.31
8.583	0.60	0.58	0.032	O				0.31
8.667	0.60	0.58	0.032	O				0.31
8.750	0.60	0.58	0.033	O				0.31
8.833	0.60	0.58	0.033	O				0.31
8.917	0.61	0.59	0.033	O				0.32
9.000	0.61	0.59	0.033	O				0.32
9.083	0.61	0.59	0.033	O				0.32
9.167	0.61	0.59	0.033	O				0.32
9.250	0.62	0.60	0.033	O				0.32
9.333	0.62	0.60	0.033	O				0.32
9.417	0.62	0.60	0.034	O				0.32
9.500	0.63	0.60	0.034	O				0.32
9.583	0.63	0.61	0.034	O				0.33
9.667	0.63	0.61	0.034	O				0.33
9.750	0.63	0.61	0.034	O				0.33
9.833	0.64	0.61	0.034	O				0.33
9.917	0.64	0.62	0.035	O				0.33
10.000	0.64	0.62	0.035	O				0.33
10.083	0.65	0.62	0.035	O				0.34
10.167	0.65	0.63	0.035	O				0.34
10.250	0.65	0.63	0.035	O				0.34
10.333	0.66	0.63	0.035	O				0.34
10.417	0.66	0.64	0.036	O				0.34
10.500	0.66	0.64	0.036	O				0.34

10.583	0.67	0.64	0.036	O				0.35
10.667	0.67	0.65	0.036	O				0.35
10.750	0.68	0.65	0.036	O				0.35
10.833	0.68	0.65	0.036	O				0.35
10.917	0.68	0.66	0.037	O				0.35
11.000	0.69	0.66	0.037	O				0.35
11.083	0.69	0.66	0.037	O				0.36
11.167	0.70	0.67	0.037	O				0.36
11.250	0.70	0.67	0.037	O				0.36
11.333	0.71	0.67	0.038	O				0.36
11.417	0.71	0.68	0.038	O				0.36
11.500	0.71	0.68	0.038	O				0.37
11.583	0.72	0.69	0.038	O				0.37
11.667	0.72	0.69	0.039	O				0.37
11.750	0.73	0.69	0.039	O				0.37
11.833	0.73	0.70	0.039	O				0.38
11.917	0.74	0.70	0.039	O				0.38
12.000	0.75	0.71	0.040	O				0.38
12.083	0.75	0.71	0.040	O				0.38
12.167	0.74	0.72	0.040	O				0.38
12.250	0.72	0.72	0.040	O				0.39
12.333	0.70	0.72	0.040	O				0.39
12.417	0.70	0.71	0.040	O				0.38
12.500	0.70	0.71	0.040	O				0.38
12.583	0.70	0.71	0.040	O				0.38
12.667	0.71	0.71	0.040	O				0.38
12.750	0.71	0.71	0.040	O				0.38
12.833	0.72	0.71	0.040	O				0.38
12.917	0.73	0.71	0.040	O				0.38
13.000	0.73	0.71	0.040	O				0.38
13.083	0.74	0.72	0.040	O				0.39
13.167	0.75	0.72	0.040	O				0.39
13.250	0.76	0.72	0.041	O				0.39
13.333	0.77	0.73	0.041	O				0.39
13.417	0.78	0.73	0.041	O				0.39
13.500	0.79	0.74	0.041	O				0.40
13.583	0.80	0.75	0.042	O				0.40
13.667	0.81	0.75	0.042	O				0.41
13.750	0.82	0.76	0.043	O				0.41
13.833	0.84	0.77	0.043	O				0.41
13.917	0.85	0.78	0.043	O				0.42
14.000	0.86	0.79	0.044	OI				0.42
14.083	0.88	0.80	0.045	OI				0.43
14.167	0.89	0.81	0.045	OI				0.43
14.250	0.91	0.82	0.046	OI				0.44
14.333	0.93	0.83	0.046	OI				0.45
14.417	0.95	0.84	0.047	OI				0.45
14.500	0.97	0.86	0.048	O				0.46
14.583	0.99	0.87	0.049	O				0.47
14.667	1.01	0.89	0.050	O				0.48

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14.750    1.04    0.90      0.050  |  O    |       |       |       |     0.48
14.833    1.06    0.92      0.051  |  O    |       |       |       |     0.49
14.917    1.09    0.93      0.052  |  O    |       |       |       |     0.50
15.000    1.12    0.93      0.054  |  O    |       |       |       |     0.51
15.083    1.16    0.93      0.055  |  OI   |       |       |       |     0.53
15.167    1.20    0.93      0.057  |  OI   |       |       |       |     0.54
15.250    1.24    0.93      0.059  |  OI   |       |       |       |     0.55
15.333    1.29    0.93      0.061  |  OI   |       |       |       |     0.57
15.417    1.32    0.93      0.064  |  OI   |       |       |       |     0.59
15.500    1.30    0.93      0.066  |  OI   |       |       |       |     0.62
15.583    1.14    0.93      0.068  |  OI   |       |       |       |     0.63
15.667    1.08    0.93      0.070  |  O    |       |       |       |     0.64
15.750    1.12    0.93      0.071  |  O    |       |       |       |     0.65
15.833    1.21    0.93      0.072  |  OI   |       |       |       |     0.66
15.917    1.38    0.93      0.075  |  OI   |       |       |       |     0.68
16.000    1.68    0.93      0.079  |  O I  |       |       |       |     0.72
16.083    2.84    0.93      0.088  |  O    | I     |       |       |     0.79
16.167    5.21    0.93      0.109  |  O    |       | I     |       |     0.96
16.250    9.10    0.93      0.152  |  O    |       |       |       I     1.27
16.333    6.32    0.93      0.199  |  O    |       |     I |       |     1.59
16.417    3.73    0.93      0.227  |  O    |    I  |       |       |     1.77
16.500    2.84    0.93      0.243  |  O    |I      |       |       |     1.88
16.583    2.45    0.93      0.255  |  O    I       |       |       |     1.96
16.667    2.13    0.93      0.265  |  O   I|       |       |       |     2.02
16.750    1.82    0.93      0.272  |  O  I |       |       |       |     2.07
16.833    1.57    0.93      0.277  |  O I  |       |       |       |     2.10
16.917    1.34    0.93      0.281  |  OI   |       |       |       |     2.12
17.000    1.23    0.93      0.283  |  OI   |       |       |       |     2.14
17.083    1.16    0.93      0.285  |  OI   |       |       |       |     2.15
17.167    1.09    0.93      0.286  |  O    |       |       |       |     2.16
17.250    1.05    0.93      0.287  |  O    |       |       |       |     2.16
17.333    0.99    0.93      0.288  |  O    |       |       |       |     2.17
17.417    0.94    0.93      0.288  |  O    |       |       |       |     2.17
17.500    0.88    0.93      0.288  |  O    |       |       |       |     2.17
17.583    0.85    0.93      0.287  | IO    |       |       |       |     2.16
17.667    0.82    0.93      0.287  | IO    |       |       |       |     2.16
17.750    0.80    0.93      0.286  | IO    |       |       |       |     2.15
17.833    0.78    0.93      0.285  | IO    |       |       |       |     2.15
17.917    0.76    0.93      0.284  | IO    |       |       |       |     2.14
18.000    0.74    0.93      0.283  | IO    |       |       |       |     2.13
18.083    0.72    0.93      0.281  | IO    |       |       |       |     2.13
18.167    0.72    0.93      0.280  | IO    |       |       |       |     2.12
18.250    0.74    0.93      0.278  | IO    |       |       |       |     2.11
18.333    0.74    0.93      0.277  | IO    |       |       |       |     2.10
18.417    0.74    0.93      0.276  | IO    |       |       |       |     2.09
18.500    0.74    0.93      0.275  | IO    |       |       |       |     2.08
18.583    0.73    0.93      0.273  | IO    |       |       |       |     2.08
18.667    0.72    0.93      0.272  | IO    |       |       |       |     2.07
18.750    0.71    0.93      0.270  | IO    |       |       |       |     2.06
18.833    0.70    0.93      0.269  | IO    |       |       |       |     2.05
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18.917	0.70	0.93	0.267	IO				2.04
19.000	0.69	0.93	0.266	IO				2.03
19.083	0.68	0.93	0.264	IO				2.02
19.167	0.67	0.93	0.262	IO				2.01
19.250	0.67	0.93	0.260	IO				2.00
19.333	0.66	0.93	0.258	IO				1.98
19.417	0.65	0.93	0.257	IO				1.97
19.500	0.64	0.93	0.255	IO				1.96
19.583	0.64	0.93	0.253	IO				1.94
19.667	0.63	0.93	0.251	IO				1.93
19.750	0.63	0.93	0.249	IO				1.92
19.833	0.62	0.93	0.246	IO				1.90
19.917	0.61	0.93	0.244	IO				1.89
20.000	0.61	0.93	0.242	IO				1.87
20.083	0.60	0.93	0.240	IO				1.86
20.167	0.60	0.93	0.238	IO				1.84
20.250	0.59	0.93	0.235	IO				1.83
20.333	0.59	0.93	0.233	IO				1.81
20.417	0.58	0.93	0.231	IO				1.80
20.500	0.58	0.93	0.228	IO				1.78
20.583	0.58	0.93	0.226	IO				1.77
20.667	0.57	0.93	0.223	IO				1.75
20.750	0.57	0.93	0.221	I O				1.73
20.833	0.56	0.93	0.218	I O				1.72
20.917	0.56	0.93	0.216	I O				1.70
21.000	0.55	0.93	0.213	I O				1.68
21.083	0.55	0.93	0.211	I O				1.66
21.167	0.55	0.93	0.208	I O				1.65
21.250	0.54	0.93	0.205	I O				1.63
21.333	0.54	0.93	0.203	I O				1.61
21.417	0.54	0.93	0.200	I O				1.59
21.500	0.53	0.93	0.197	I O				1.57
21.583	0.53	0.93	0.195	I O				1.56
21.667	0.53	0.93	0.192	I O				1.54
21.750	0.52	0.93	0.189	I O				1.52
21.833	0.52	0.93	0.186	I O				1.50
21.917	0.52	0.93	0.183	I O				1.48
22.000	0.51	0.93	0.180	I O				1.46
22.083	0.51	0.93	0.178	I O				1.44
22.167	0.51	0.93	0.175	I O				1.42
22.250	0.51	0.93	0.172	I O				1.40
22.333	0.50	0.93	0.169	I O				1.38
22.417	0.50	0.93	0.166	I O				1.36
22.500	0.50	0.93	0.163	I O				1.34
22.583	0.50	0.93	0.160	I O				1.32
22.667	0.49	0.93	0.157	I O				1.30
22.750	0.49	0.93	0.154	I O				1.28
22.833	0.49	0.93	0.151	I O				1.26
22.917	0.49	0.93	0.148	I O				1.24
23.000	0.48	0.93	0.145	I O				1.21

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23.083     0.48     0.93      0.142  |I O     |       |       |       |     1.19
23.167     0.48     0.93      0.139  |I O     |       |       |       |     1.17
23.250     0.48     0.93      0.136  |I O     |       |       |       |     1.15
23.333     0.47     0.93      0.132  |I O     |       |       |       |     1.13
23.417     0.47     0.93      0.129  |I O     |       |       |       |     1.11
23.500     0.47     0.93      0.126  |I O     |       |       |       |     1.08
23.583     0.47     0.93      0.123  |I O     |       |       |       |     1.06
23.667     0.47     0.93      0.120  |I O     |       |       |       |     1.04
23.750     0.46     0.93      0.117  |I O     |       |       |       |     1.02
23.833     0.46     0.93      0.113  |I O     |       |       |       |     0.99
23.917     0.46     0.93      0.110  |I O     |       |       |       |     0.97
24.000     0.46     0.93      0.107  |I O     |       |       |       |     0.94
24.083     0.44     0.93      0.104  |I O     |       |       |       |     0.92
24.167     0.38     0.93      0.100  |I O     |       |       |       |     0.89
24.250     0.23     0.93      0.096  I  O     |       |       |       |     0.85
24.333     0.14     0.93      0.091  I  O     |       |       |       |     0.81
24.417     0.09     0.93      0.085  I  O     |       |       |       |     0.77
24.500     0.06     0.93      0.079  I  O     |       |       |       |     0.72
24.583     0.04     0.93      0.073  I  O     |       |       |       |     0.67
24.667     0.03     0.93      0.067  I  O     |       |       |       |     0.62
24.750     0.02     0.93      0.061  I  O     |       |       |       |     0.57
24.833     0.01     0.93      0.054  I  O     |       |       |       |     0.52
24.917     0.01     0.86      0.048  I  O     |       |       |       |     0.46
25.000     0.01     0.76      0.043  I O      |       |       |       |     0.41
25.083     0.00     0.67      0.038  I O      |       |       |       |     0.36
25.167     0.00     0.60      0.033  I O      |       |       |       |     0.32
25.250     0.00     0.53      0.029  IO       |       |       |       |     0.28
25.333     0.00     0.47      0.026  IO       |       |       |       |     0.25
25.417     0.00     0.41      0.023  IO       |       |       |       |     0.22
25.500     0.00     0.36      0.020  IO       |       |       |       |     0.20
25.583     0.00     0.32      0.018  IO       |       |       |       |     0.17
25.667     0.00     0.28      0.016  IO       |       |       |       |     0.15
25.750     0.00     0.25      0.014  O        |       |       |       |     0.14
25.833     0.00     0.22      0.012  O        |       |       |       |     0.12
25.917     0.00     0.20      0.011  O        |       |       |       |     0.11
26.000     0.00     0.17      0.010  O        |       |       |       |     0.09
26.083     0.00     0.15      0.009  O        |       |       |       |     0.08
26.167     0.00     0.14      0.008  O        |       |       |       |     0.07
26.250     0.00     0.12      0.007  O        |       |       |       |     0.06
26.333     0.00     0.11      0.006  O        |       |       |       |     0.06
26.417     0.00     0.09      0.005  O        |       |       |       |     0.05
26.500     0.00     0.08      0.005  O        |       |       |       |     0.04
26.583     0.00     0.07      0.004  O        |       |       |       |     0.04
26.667     0.00     0.06      0.004  O        |       |       |       |     0.03
26.750     0.00     0.06      0.003  O        |       |       |       |     0.03
26.833     0.00     0.05      0.003  O        |       |       |       |     0.03
26.917     0.00     0.04      0.003  O        |       |       |       |     0.02
27.000     0.00     0.04      0.002  O        |       |       |       |     0.02
27.083     0.00     0.03      0.002  O        |       |       |       |     0.02
27.167     0.00     0.03      0.002  O        |       |       |       |     0.02
```

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27.250    0.00    0.03      0.002  O       |       |       |       |      0.01
27.333    0.00    0.02      0.001  O       |       |       |       |      0.01
27.417    0.00    0.02      0.001  O       |       |       |       |      0.01
27.500    0.00    0.02      0.001  O       |       |       |       |      0.01
27.583    0.00    0.02      0.001  O       |       |       |       |      0.01
27.667    0.00    0.01      0.001  O       |       |       |       |      0.01
27.750    0.00    0.01      0.001  O       |       |       |       |      0.01
27.833    0.00    0.01      0.001  O       |       |       |       |      0.01
27.917    0.00    0.01      0.001  O       |       |       |       |      0.01
28.000    0.00    0.01      0.001  O       |       |       |       |      0.00
28.083    0.00    0.01      0.000  O       |       |       |       |      0.00
28.167    0.00    0.01      0.000  O       |       |       |       |      0.00
28.250    0.00    0.01      0.000  O       |       |       |       |      0.00
28.333    0.00    0.01      0.000  O       |       |       |       |      0.00
28.417    0.00    0.00      0.000  O       |       |       |       |      0.00
28.500    0.00    0.00      0.000  O       |       |       |       |      0.00
28.583    0.00    0.00      0.000  O       |       |       |       |      0.00
28.667    0.00    0.00      0.000  O       |       |       |       |      0.00
28.750    0.00    0.00      0.000  O       |       |       |       |      0.00
28.833    0.00    0.00      0.000  O       |       |       |       |      0.00
28.917    0.00    0.00      0.000  O       |       |       |       |      0.00
29.000    0.00    0.00      0.000  O       |       |       |       |      0.00
29.083    0.00    0.00      0.000  O       |       |       |       |      0.00

       ****************************HYDROGRAPH DATA****************************
                       Number of intervals =   349
                       Time interval =    5.0 (Min.)
                       Maximum/Peak flow rate =       0.930 (CFS)
                       Total volume =       1.498 (Ac.Ft)
               Status of hydrographs being held in storage
                          Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
               Peak (CFS)      0.000     0.000     0.000     0.000     0.000
               Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
       ***********************************************************************

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                 FLOOD HYDROGRAPH ROUTING PROGRAM
         Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018
                     Study date: 05/26/21

--------------------------------------------------------------------


Paradise Ranch
10 yr BMP-2



--------------------------------------------------------------------


Program License Serial Number 6481

--------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION **********************

                From study/file name: ParadiseRanch10yrDA39.rte
****************************HYDROGRAPH DATA***************************
                Number of intervals =   301
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =       11.558 (CFS)
                Total volume =       1.737 (Ac.Ft)
        Status of hydrographs being held in storage
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
**********************************************************************



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** RETARDING BASIN ROUTING ****
______________________________________________________________________

User entry of depth-outflow-storage data
--------------------------------------------------------------------
Total number of inflow hydrograph intervals = 301
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
--------------------------------------------------------------------
--------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
```

```
Initial basin outflow =   0.00 (CFS)
---------------------------------------------------------------------
--------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
---------------------------------------------------------------------
   0.000      0.000      0.000      0.000        0.000
   0.500      0.044      0.930      0.041        0.047
   1.000      0.093      0.930      0.090        0.096
   1.500      0.148      1.860      0.142        0.154
   2.000      0.210      2.790      0.200        0.220
   2.500      0.278      3.720      0.265        0.291
   3.000      0.352      4.500      0.337        0.367
   3.500      0.433      4.500      0.418        0.448
   4.000      0.522      4.500      0.507        0.537
--------------------------------------------------------------------
                Hydrograph Detention Basin Routing
---------------------------------------------------------------------

Graph values: 'I'= unit inflow; 'O'=outflow at time shown
---------------------------------------------------------------------
 Time   Inflow  Outflow    Storage                                 Depth
(Hours)  (CFS)   (CFS)      (Ac.Ft) .0       2.9    5.78    8.67   11.56 (Ft.)
 0.083    0.02    0.00       0.000  O       |       |       |       |       0.00
 0.167    0.14    0.01       0.001  O       |       |       |       |       0.01
 0.250    0.33    0.04       0.002  O       |       |       |       |       0.02
 0.333    0.41    0.09       0.004  OI      |       |       |       |       0.05
 0.417    0.45    0.13       0.006  OI      |       |       |       |       0.07
 0.500    0.48    0.18       0.008  OI      |       |       |       |       0.10
 0.583    0.50    0.22       0.010  OI      |       |       |       |       0.12
 0.667    0.51    0.26       0.012  OI      |       |       |       |       0.14
 0.750    0.52    0.30       0.014  OI      |       |       |       |       0.16
 0.833    0.52    0.33       0.015  OI      |       |       |       |       0.18
 0.917    0.53    0.35       0.017  OI      |       |       |       |       0.19
 1.000    0.53    0.38       0.018  |O      |       |       |       |       0.20
 1.083    0.53    0.40       0.019  |O      |       |       |       |       0.21
 1.167    0.53    0.42       0.020  |O      |       |       |       |       0.22
 1.250    0.54    0.43       0.020  |O      |       |       |       |       0.23
 1.333    0.54    0.45       0.021  |O      |       |       |       |       0.24
 1.417    0.54    0.46       0.022  |O      |       |       |       |       0.25
 1.500    0.54    0.47       0.022  |O      |       |       |       |       0.25
 1.583    0.54    0.48       0.023  |O      |       |       |       |       0.26
 1.667    0.54    0.49       0.023  |O      |       |       |       |       0.26
 1.750    0.54    0.49       0.023  |O      |       |       |       |       0.27
 1.833    0.54    0.50       0.024  |O      |       |       |       |       0.27
 1.917    0.54    0.51       0.024  |O      |       |       |       |       0.27
 2.000    0.55    0.51       0.024  |O      |       |       |       |       0.28
 2.083    0.55    0.52       0.024  |O      |       |       |       |       0.28
 2.167    0.55    0.52       0.025  |O      |       |       |       |       0.28
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2.250	0.55	0.52	0.025	O	0.28
2.333	0.55	0.53	0.025	O	0.28
2.417	0.55	0.53	0.025	O	0.29
2.500	0.55	0.53	0.025	O	0.29
2.583	0.55	0.54	0.025	O	0.29
2.667	0.56	0.54	0.026	O	0.29
2.750	0.56	0.54	0.026	O	0.29
2.833	0.56	0.54	0.026	O	0.29
2.917	0.56	0.55	0.026	O	0.29
3.000	0.56	0.55	0.026	O	0.29
3.083	0.56	0.55	0.026	O	0.30
3.167	0.56	0.55	0.026	O	0.30
3.250	0.57	0.55	0.026	O	0.30
3.333	0.57	0.56	0.026	O	0.30
3.417	0.57	0.56	0.026	O	0.30
3.500	0.57	0.56	0.026	O	0.30
3.583	0.57	0.56	0.026	O	0.30
3.667	0.57	0.56	0.027	O	0.30
3.750	0.57	0.56	0.027	O	0.30
3.833	0.58	0.56	0.027	O	0.30
3.917	0.58	0.57	0.027	O	0.30
4.000	0.58	0.57	0.027	O	0.31
4.083	0.58	0.57	0.027	O	0.31
4.167	0.58	0.57	0.027	O	0.31
4.250	0.58	0.57	0.027	O	0.31
4.333	0.58	0.57	0.027	O	0.31
4.417	0.59	0.58	0.027	O	0.31
4.500	0.59	0.58	0.027	O	0.31
4.583	0.59	0.58	0.027	O	0.31
4.667	0.59	0.58	0.027	O	0.31
4.750	0.59	0.58	0.028	O	0.31
4.833	0.59	0.58	0.028	O	0.31
4.917	0.60	0.58	0.028	O	0.31
5.000	0.60	0.59	0.028	O	0.32
5.083	0.60	0.59	0.028	O	0.32
5.167	0.60	0.59	0.028	O	0.32
5.250	0.60	0.59	0.028	O	0.32
5.333	0.60	0.59	0.028	O	0.32
5.417	0.61	0.59	0.028	O	0.32
5.500	0.61	0.60	0.028	O	0.32
5.583	0.61	0.60	0.028	O	0.32
5.667	0.61	0.60	0.028	O	0.32
5.750	0.61	0.60	0.028	O	0.32
5.833	0.62	0.60	0.029	O	0.32
5.917	0.62	0.61	0.029	O	0.33
6.000	0.62	0.61	0.029	O	0.33
6.083	0.62	0.61	0.029	O	0.33
6.167	0.62	0.61	0.029	O	0.33
6.250	0.63	0.61	0.029	O	0.33
6.333	0.63	0.61	0.029	O	0.33

6.417	0.63	0.62	0.029	O				0.33
6.500	0.63	0.62	0.029	O				0.33
6.583	0.63	0.62	0.029	O				0.33
6.667	0.64	0.62	0.029	O				0.33
6.750	0.64	0.62	0.030	O				0.34
6.833	0.64	0.63	0.030	O				0.34
6.917	0.64	0.63	0.030	O				0.34
7.000	0.64	0.63	0.030	O				0.34
7.083	0.65	0.63	0.030	O				0.34
7.167	0.65	0.63	0.030	O				0.34
7.250	0.65	0.64	0.030	O				0.34
7.333	0.65	0.64	0.030	O				0.34
7.417	0.66	0.64	0.030	O				0.34
7.500	0.66	0.64	0.030	O				0.35
7.583	0.66	0.65	0.031	O				0.35
7.667	0.66	0.65	0.031	O				0.35
7.750	0.67	0.65	0.031	O				0.35
7.833	0.67	0.65	0.031	O				0.35
7.917	0.67	0.65	0.031	O				0.35
8.000	0.67	0.66	0.031	O				0.35
8.083	0.68	0.66	0.031	O				0.35
8.167	0.68	0.66	0.031	O				0.36
8.250	0.68	0.66	0.031	O				0.36
8.333	0.68	0.67	0.032	O				0.36
8.417	0.69	0.67	0.032	O				0.36
8.500	0.69	0.67	0.032	O				0.36
8.583	0.69	0.67	0.032	O				0.36
8.667	0.70	0.68	0.032	O				0.36
8.750	0.70	0.68	0.032	O				0.37
8.833	0.70	0.68	0.032	O				0.37
8.917	0.70	0.69	0.032	O				0.37
9.000	0.71	0.69	0.033	O				0.37
9.083	0.71	0.69	0.033	O				0.37
9.167	0.71	0.69	0.033	O				0.37
9.250	0.72	0.70	0.033	O				0.37
9.333	0.72	0.70	0.033	O				0.38
9.417	0.72	0.70	0.033	OI				0.38
9.500	0.73	0.71	0.033	OI				0.38
9.583	0.73	0.71	0.034	OI				0.38
9.667	0.73	0.71	0.034	OI				0.38
9.750	0.74	0.72	0.034	OI				0.38
9.833	0.74	0.72	0.034	OI				0.39
9.917	0.75	0.72	0.034	OI				0.39
10.000	0.75	0.73	0.034	O				0.39
10.083	0.75	0.73	0.034	O				0.39
10.167	0.76	0.73	0.035	O				0.39
10.250	0.76	0.74	0.035	O				0.40
10.333	0.76	0.74	0.035	O				0.40
10.417	0.77	0.74	0.035	O				0.40
10.500	0.77	0.75	0.035	O				0.40

10.583	0.78	0.75	0.036	O				0.40
10.667	0.78	0.75	0.036	O				0.41
10.750	0.79	0.76	0.036	O				0.41
10.833	0.79	0.76	0.036	O				0.41
10.917	0.80	0.77	0.036	O				0.41
11.000	0.80	0.77	0.036	O				0.41
11.083	0.81	0.78	0.037	O				0.42
11.167	0.81	0.78	0.037	O				0.42
11.250	0.82	0.78	0.037	O				0.42
11.333	0.82	0.79	0.037	O				0.42
11.417	0.83	0.79	0.038	O				0.43
11.500	0.83	0.80	0.038	O				0.43
11.583	0.84	0.80	0.038	O				0.43
11.667	0.84	0.81	0.038	O				0.43
11.750	0.85	0.81	0.039	O				0.44
11.833	0.86	0.82	0.039	O				0.44
11.917	0.86	0.82	0.039	O				0.44
12.000	0.87	0.83	0.039	O				0.45
12.083	0.87	0.84	0.040	O				0.45
12.167	0.85	0.84	0.040	O				0.45
12.250	0.82	0.84	0.040	O				0.45
12.333	0.81	0.84	0.040	O				0.45
12.417	0.81	0.83	0.039	O				0.45
12.500	0.81	0.83	0.039	O				0.45
12.583	0.81	0.83	0.039	O				0.44
12.667	0.82	0.83	0.039	O				0.44
12.750	0.83	0.83	0.039	O				0.44
12.833	0.84	0.83	0.039	O				0.44
12.917	0.85	0.83	0.039	O				0.45
13.000	0.86	0.83	0.039	O				0.45
13.083	0.87	0.84	0.040	O				0.45
13.167	0.88	0.84	0.040	O				0.45
13.250	0.89	0.85	0.040	O				0.45
13.333	0.90	0.85	0.040	O				0.46
13.417	0.91	0.86	0.041	O				0.46
13.500	0.92	0.87	0.041	O				0.47
13.583	0.94	0.88	0.041	O				0.47
13.667	0.95	0.89	0.042	O				0.48
13.750	0.97	0.89	0.042	O				0.48
13.833	0.98	0.91	0.043	O				0.49
13.917	1.00	0.92	0.043	O				0.49
14.000	1.01	0.93	0.044	O				0.50
14.083	1.03	0.93	0.045	O				0.51
14.167	1.05	0.93	0.045	O				0.51
14.250	1.07	0.93	0.046	O				0.52
14.333	1.09	0.93	0.047	OI				0.53
14.417	1.11	0.93	0.048	OI				0.54
14.500	1.14	0.93	0.050	OI				0.56
14.583	1.16	0.93	0.051	OI				0.57
14.667	1.19	0.93	0.053	OI				0.59

```
14.750    1.22    0.93      0.055 | OI    |       |       |       |     0.61
14.833    1.25    0.93      0.057 | OI    |       |       |       |     0.63
14.917    1.29    0.93      0.059 | OI    |       |       |       |     0.66
15.000    1.32    0.93      0.062 | OI    |       |       |       |     0.68
15.083    1.37    0.93      0.065 | OI    |       |       |       |     0.71
15.167    1.41    0.93      0.068 | OI    |       |       |       |     0.74
15.250    1.47    0.93      0.071 | O I   |       |       |       |     0.78
15.333    1.53    0.93      0.075 | O I   |       |       |       |     0.82
15.417    1.56    0.93      0.080 | O I   |       |       |       |     0.86
15.500    1.47    0.93      0.084 | O I   |       |       |       |     0.90
15.583    1.26    0.93      0.087 | OI    |       |       |       |     0.93
15.667    1.24    0.93      0.089 | OI    |       |       |       |     0.96
15.750    1.31    0.93      0.091 | OI    |       |       |       |     0.98
15.833    1.44    0.95      0.094 | OI    |       |       |       |     1.01
15.917    1.69    1.02      0.098 | O I   |       |       |       |     1.05
16.000    2.14    1.12      0.104 |  O I  |       |       |       |     1.10
16.083    3.92    1.33      0.116 |  O    | I     |       |       |     1.21
16.167    8.29    1.85      0.148 |    O  |       |     I |       |     1.50
16.250   11.56    2.65      0.200 |      O|       |       |       I     1.92
16.333    5.68    3.20      0.240 |       O      I|       |       |     2.22
16.417    3.82    3.34      0.250 |       |OI     |       |       |     2.29
16.500    2.96    3.34      0.250 |       IO      |       |       |     2.30
16.583    2.55    3.29      0.246 |      I|O      |       |       |     2.27
16.667    2.11    3.20      0.240 |    I  O       |       |       |     2.22
16.750    1.74    3.09      0.232 |   I   O       |       |       |     2.16
16.833    1.55    2.96      0.222 |   I   O       |       |       |     2.09
16.917    1.44    2.83      0.213 |  I   O|       |       |       |     2.02
17.000    1.37    2.69      0.203 |  I   O|       |       |       |     1.95
17.083    1.28    2.56      0.194 |  I   O|       |       |       |     1.87
17.167    1.19    2.43      0.186 |  I  O |       |       |       |     1.80
17.250    1.11    2.30      0.177 |  I  O |       |       |       |     1.74
17.333    1.06    2.18      0.169 | I   O |       |       |       |     1.67
17.417    1.03    2.07      0.162 | I  O  |       |       |       |     1.61
17.500    0.99    1.96      0.155 | I  O  |       |       |       |     1.56
17.583    0.96    1.87      0.148 | I  O  |       |       |       |     1.50
17.667    0.93    1.77      0.142 | I O   |       |       |       |     1.45
17.750    0.91    1.67      0.137 | I O   |       |       |       |     1.40
17.833    0.88    1.59      0.132 | I O   |       |       |       |     1.35
17.917    0.86    1.51      0.127 | I O   |       |       |       |     1.31
18.000    0.84    1.44      0.123 | IO    |       |       |       |     1.27
18.083    0.83    1.37      0.119 | IO    |       |       |       |     1.24
18.167    0.83    1.31      0.116 | IO    |       |       |       |     1.20
18.250    0.86    1.26      0.113 | IO    |       |       |       |     1.18
18.333    0.86    1.22      0.110 | IO    |       |       |       |     1.15
18.417    0.86    1.18      0.108 | IO    |       |       |       |     1.13
18.500    0.85    1.14      0.106 | IO    |       |       |       |     1.11
18.583    0.84    1.11      0.104 | IO    |       |       |       |     1.10
18.667    0.83    1.08      0.102 | O     |       |       |       |     1.08
18.750    0.82    1.05      0.100 | O     |       |       |       |     1.07
18.833    0.81    1.03      0.099 | O     |       |       |       |     1.05
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18.917    0.80    1.00      0.097  | O      |       |       |       |     1.04
19.000    0.79    0.98      0.096  | O      |       |       |       |     1.03
19.083    0.78    0.96      0.095  | O      |       |       |       |     1.02
19.167    0.78    0.94      0.093  | O      |       |       |       |     1.00
19.250    0.77    0.93      0.092  | O      |       |       |       |     0.99
19.333    0.76    0.93      0.091  | O      |       |       |       |     0.98
19.417    0.75    0.93      0.090  | O      |       |       |       |     0.97
19.500    0.74    0.93      0.089  | O      |       |       |       |     0.96
19.583    0.74    0.93      0.087  | O      |       |       |       |     0.94
19.667    0.73    0.93      0.086  | O      |       |       |       |     0.93
19.750    0.72    0.93      0.085  |IO      |       |       |       |     0.91
19.833    0.72    0.93      0.083  |IO      |       |       |       |     0.90
19.917    0.71    0.93      0.082  |IO      |       |       |       |     0.88
20.000    0.70    0.93      0.080  |IO      |       |       |       |     0.87
20.083    0.70    0.93      0.079  |IO      |       |       |       |     0.85
20.167    0.69    0.93      0.077  |IO      |       |       |       |     0.84
20.250    0.69    0.93      0.075  |IO      |       |       |       |     0.82
20.333    0.68    0.93      0.074  |IO      |       |       |       |     0.80
20.417    0.67    0.93      0.072  |IO      |       |       |       |     0.78
20.500    0.67    0.93      0.070  |IO      |       |       |       |     0.77
20.583    0.66    0.93      0.068  |IO      |       |       |       |     0.75
20.667    0.66    0.93      0.066  |IO      |       |       |       |     0.73
20.750    0.65    0.93      0.065  |IO      |       |       |       |     0.71
20.833    0.65    0.93      0.063  |IO      |       |       |       |     0.69
20.917    0.65    0.93      0.061  |IO      |       |       |       |     0.67
21.000    0.64    0.93      0.059  |IO      |       |       |       |     0.65
21.083    0.64    0.93      0.057  |IO      |       |       |       |     0.63
21.167    0.63    0.93      0.055  |IO      |       |       |       |     0.61
21.250    0.63    0.93      0.053  |IO      |       |       |       |     0.59
21.333    0.62    0.93      0.050  |IO      |       |       |       |     0.57
21.417    0.62    0.93      0.048  |IO      |       |       |       |     0.54
21.500    0.62    0.93      0.046  |IO      |       |       |       |     0.52
21.583    0.61    0.93      0.044  |IO      |       |       |       |     0.50
21.667    0.61    0.89      0.042  |IO      |       |       |       |     0.48
21.750    0.61    0.85      0.040  |IO      |       |       |       |     0.46
21.833    0.60    0.82      0.039  |IO      |       |       |       |     0.44
21.917    0.60    0.79      0.037  |IO      |       |       |       |     0.42
22.000    0.59    0.76      0.036  |IO      |       |       |       |     0.41
22.083    0.59    0.74      0.035  |IO      |       |       |       |     0.40
22.167    0.59    0.72      0.034  |O       |       |       |       |     0.39
22.250    0.59    0.70      0.033  |O       |       |       |       |     0.38
22.333    0.58    0.68      0.032  |O       |       |       |       |     0.37
22.417    0.58    0.67      0.032  |O       |       |       |       |     0.36
22.500    0.58    0.66      0.031  |O       |       |       |       |     0.35
22.583    0.57    0.65      0.031  |O       |       |       |       |     0.35
22.667    0.57    0.64      0.030  |O       |       |       |       |     0.34
22.750    0.57    0.63      0.030  |O       |       |       |       |     0.34
22.833    0.56    0.62      0.029  |O       |       |       |       |     0.33
22.917    0.56    0.61      0.029  |O       |       |       |       |     0.33
23.000    0.56    0.60      0.029  |O       |       |       |       |     0.32
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23.083    0.56    0.60     0.028  |O       |       |       |       |     0.32
23.167    0.55    0.59     0.028  |O       |       |       |       |     0.32
23.250    0.55    0.59     0.028  |O       |       |       |       |     0.32
23.333    0.55    0.58     0.028  |O       |       |       |       |     0.31
23.417    0.55    0.58     0.027  |O       |       |       |       |     0.31
23.500    0.54    0.57     0.027  |O       |       |       |       |     0.31
23.583    0.54    0.57     0.027  |O       |       |       |       |     0.31
23.667    0.54    0.56     0.027  |O       |       |       |       |     0.30
23.750    0.54    0.56     0.027  |O       |       |       |       |     0.30
23.833    0.53    0.56     0.026  |O       |       |       |       |     0.30
23.917    0.53    0.55     0.026  |O       |       |       |       |     0.30
24.000    0.53    0.55     0.026  |O       |       |       |       |     0.30
24.083    0.50    0.55     0.026  |O       |       |       |       |     0.29
24.167    0.39    0.53     0.025  |O       |       |       |       |     0.29
24.250    0.19    0.50     0.024  IO       |       |       |       |     0.27
24.333    0.11    0.45     0.021  IO       |       |       |       |     0.24
24.417    0.07    0.40     0.019  IO       |       |       |       |     0.22
24.500    0.04    0.36     0.017  O        |       |       |       |     0.19
24.583    0.02    0.31     0.015  O        |       |       |       |     0.17
24.667    0.01    0.27     0.013  O        |       |       |       |     0.15
24.750    0.01    0.24     0.011  O        |       |       |       |     0.13
24.833    0.01    0.21     0.010  O        |       |       |       |     0.11
24.917    0.00    0.18     0.008  O        |       |       |       |     0.10
25.000    0.00    0.16     0.007  O        |       |       |       |     0.08
25.083    0.00    0.13     0.006  O        |       |       |       |     0.07
25.167    0.00    0.12     0.006  O        |       |       |       |     0.06
25.250    0.00    0.10     0.005  O        |       |       |       |     0.05
25.333    0.00    0.09     0.004  O        |       |       |       |     0.05
25.417    0.00    0.08     0.004  O        |       |       |       |     0.04
25.500    0.00    0.06     0.003  O        |       |       |       |     0.03
25.583    0.00    0.06     0.003  O        |       |       |       |     0.03
25.667    0.00    0.05     0.002  O        |       |       |       |     0.03
25.750    0.00    0.04     0.002  O        |       |       |       |     0.02
25.833    0.00    0.04     0.002  O        |       |       |       |     0.02
25.917    0.00    0.03     0.001  O        |       |       |       |     0.02
26.000    0.00    0.03     0.001  O        |       |       |       |     0.01
26.083    0.00    0.02     0.001  O        |       |       |       |     0.01
26.167    0.00    0.02     0.001  O        |       |       |       |     0.01
26.250    0.00    0.02     0.001  O        |       |       |       |     0.01
26.333    0.00    0.02     0.001  O        |       |       |       |     0.01
26.417    0.00    0.01     0.001  O        |       |       |       |     0.01
26.500    0.00    0.01     0.001  O        |       |       |       |     0.01
26.583    0.00    0.01     0.000  O        |       |       |       |     0.01
26.667    0.00    0.01     0.000  O        |       |       |       |     0.00
26.750    0.00    0.01     0.000  O        |       |       |       |     0.00
26.833    0.00    0.01     0.000  O        |       |       |       |     0.00
26.917    0.00    0.01     0.000  O        |       |       |       |     0.00
27.000    0.00    0.00     0.000  O        |       |       |       |     0.00
27.083    0.00    0.00     0.000  O        |       |       |       |     0.00
27.167    0.00    0.00     0.000  O        |       |       |       |     0.00
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27.250    0.00    0.00      0.000  O       |       |       |       |     0.00
27.333    0.00    0.00      0.000  O       |       |       |       |     0.00
27.417    0.00    0.00      0.000  O       |       |       |       |     0.00
27.500    0.00    0.00      0.000  O       |       |       |       |     0.00
27.583    0.00    0.00      0.000  O       |       |       |       |     0.00

       ***************************HYDROGRAPH DATA****************************
                      Number of intervals =   331
                      Time interval =    5.0 (Min.)
                      Maximum/Peak flow rate =       3.340 (CFS)
                      Total volume =       1.737 (Ac.Ft)
              Status of hydrographs being held in storage
                         Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
              Peak (CFS)      0.000     0.000     0.000     0.000     0.000
              Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
       **********************************************************************

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                    FLOOD HYDROGRAPH ROUTING PROGRAM
           Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018
                        Study date: 05/26/21

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Paradise Ranch
10 yr BMP-3



--------------------------------------------------------------------


Program License Serial Number 6481

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********************* HYDROGRAPH INFORMATION **********************

                From study/file name: ParadiseRanch10yrDA40.rte
****************************HYDROGRAPH DATA****************************
                Number of intervals =   299
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =       14.726 (CFS)
                Total volume =       2.490 (Ac.Ft)
        Status of hydrographs being held in storage
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
***********************************************************************



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      10.000 to Point/Station      11.000
**** RETARDING BASIN ROUTING ****
______________________________________________________________________

User entry of depth-outflow-storage data
--------------------------------------------------------------------
Total number of inflow hydrograph intervals = 299
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
--------------------------------------------------------------------
--------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
```

Initial basin outflow =   0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.500	0.021	3.720	0.008	0.034
1.000	0.047	7.440	0.021	0.073
1.500	0.078	7.440	0.052	0.104
2.000	0.114	7.440	0.088	0.140
2.500	0.156	20.000	0.087	0.225
3.000	0.204	20.000	0.135	0.273

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0	3.7	7.36	11.04	14.73	Depth (Ft.)
0.083	0.04	0.02	0.000	O	|	|	|	|	0.00
0.167	0.27	0.12	0.001	O	|	|	|	|	0.02
0.250	0.53	0.34	0.002	OI	|	|	|	|	0.05
0.333	0.63	0.52	0.003	|O	|	|	|	|	0.07
0.417	0.69	0.62	0.004	|O	|	|	|	|	0.08
0.500	0.72	0.68	0.004	|O	|	|	|	|	0.09
0.583	0.74	0.72	0.004	|O	|	|	|	|	0.10
0.667	0.75	0.74	0.004	|O	|	|	|	|	0.10
0.750	0.76	0.75	0.004	|O	|	|	|	|	0.10
0.833	0.76	0.76	0.004	|O	|	|	|	|	0.10
0.917	0.76	0.76	0.004	|O	|	|	|	|	0.10
1.000	0.77	0.76	0.004	|O	|	|	|	|	0.10
1.083	0.77	0.77	0.004	|O	|	|	|	|	0.10
1.167	0.77	0.77	0.004	|O	|	|	|	|	0.10
1.250	0.77	0.77	0.004	|O	|	|	|	|	0.10
1.333	0.77	0.77	0.004	|O	|	|	|	|	0.10
1.417	0.78	0.77	0.004	|O	|	|	|	|	0.10
1.500	0.78	0.78	0.004	|O	|	|	|	|	0.10
1.583	0.78	0.78	0.004	|O	|	|	|	|	0.10
1.667	0.78	0.78	0.004	|O	|	|	|	|	0.10
1.750	0.78	0.78	0.004	|O	|	|	|	|	0.11
1.833	0.78	0.78	0.004	|O	|	|	|	|	0.11
1.917	0.79	0.78	0.004	|O	|	|	|	|	0.11
2.000	0.79	0.79	0.004	|O	|	|	|	|	0.11
2.083	0.79	0.79	0.004	|O	|	|	|	|	0.11
2.167	0.79	0.79	0.004	|O	|	|	|	|	0.11
2.250	0.79	0.79	0.004	|O	|	|	|	|	0.11
2.333	0.80	0.79	0.004	|O	|	|	|	|	0.11

2.417	0.80	0.80	0.004	O					0.11
2.500	0.80	0.80	0.005	O					0.11
2.583	0.80	0.80	0.005	O					0.11
2.667	0.80	0.80	0.005	O					0.11
2.750	0.80	0.80	0.005	O					0.11
2.833	0.81	0.80	0.005	O					0.11
2.917	0.81	0.81	0.005	O					0.11
3.000	0.81	0.81	0.005	O					0.11
3.083	0.81	0.81	0.005	O					0.11
3.167	0.81	0.81	0.005	O					0.11
3.250	0.82	0.81	0.005	O					0.11
3.333	0.82	0.82	0.005	O					0.11
3.417	0.82	0.82	0.005	O					0.11
3.500	0.82	0.82	0.005	O					0.11
3.583	0.82	0.82	0.005	O					0.11
3.667	0.83	0.82	0.005	O					0.11
3.750	0.83	0.83	0.005	O					0.11
3.833	0.83	0.83	0.005	O					0.11
3.917	0.83	0.83	0.005	O					0.11
4.000	0.84	0.83	0.005	O					0.11
4.083	0.84	0.84	0.005	O					0.11
4.167	0.84	0.84	0.005	O					0.11
4.250	0.84	0.84	0.005	O					0.11
4.333	0.84	0.84	0.005	O					0.11
4.417	0.85	0.84	0.005	O					0.11
4.500	0.85	0.85	0.005	O					0.11
4.583	0.85	0.85	0.005	O					0.11
4.667	0.85	0.85	0.005	O					0.11
4.750	0.86	0.85	0.005	O					0.11
4.833	0.86	0.86	0.005	O					0.12
4.917	0.86	0.86	0.005	O					0.12
5.000	0.86	0.86	0.005	O					0.12
5.083	0.87	0.86	0.005	O					0.12
5.167	0.87	0.87	0.005	O					0.12
5.250	0.87	0.87	0.005	O					0.12
5.333	0.87	0.87	0.005	O					0.12
5.417	0.88	0.87	0.005	O					0.12
5.500	0.88	0.88	0.005	O					0.12
5.583	0.88	0.88	0.005	O					0.12
5.667	0.88	0.88	0.005	O					0.12
5.750	0.89	0.88	0.005	O					0.12
5.833	0.89	0.89	0.005	O					0.12
5.917	0.89	0.89	0.005	O					0.12
6.000	0.89	0.89	0.005	O					0.12
6.083	0.90	0.90	0.005	O					0.12
6.167	0.90	0.90	0.005	O					0.12
6.250	0.90	0.90	0.005	O					0.12
6.333	0.91	0.90	0.005	O					0.12
6.417	0.91	0.91	0.005	O					0.12
6.500	0.91	0.91	0.005	O					0.12

6.583	0.92	0.91	0.005	O				0.12
6.667	0.92	0.92	0.005	O				0.12
6.750	0.92	0.92	0.005	OI				0.12
6.833	0.92	0.92	0.005	O				0.12
6.917	0.93	0.93	0.005	O				0.12
7.000	0.93	0.93	0.005	O				0.12
7.083	0.93	0.93	0.005	O				0.13
7.167	0.94	0.93	0.005	O				0.13
7.250	0.94	0.94	0.005	O				0.13
7.333	0.94	0.94	0.005	O				0.13
7.417	0.95	0.94	0.005	O				0.13
7.500	0.95	0.95	0.005	O				0.13
7.583	0.95	0.95	0.005	O				0.13
7.667	0.96	0.96	0.005	O				0.13
7.750	0.96	0.96	0.005	O				0.13
7.833	0.97	0.96	0.005	O				0.13
7.917	0.97	0.97	0.005	O				0.13
8.000	0.97	0.97	0.005	O				0.13
8.083	0.98	0.97	0.005	O				0.13
8.167	0.98	0.98	0.006	O				0.13
8.250	0.98	0.98	0.006	O				0.13
8.333	0.99	0.99	0.006	O				0.13
8.417	0.99	0.99	0.006	O				0.13
8.500	1.00	0.99	0.006	O				0.13
8.583	1.00	1.00	0.006	O				0.13
8.667	1.00	1.00	0.006	O				0.13
8.750	1.01	1.01	0.006	O				0.14
8.833	1.01	1.01	0.006	O				0.14
8.917	1.02	1.01	0.006	O				0.14
9.000	1.02	1.02	0.006	O				0.14
9.083	1.03	1.02	0.006	O				0.14
9.167	1.03	1.03	0.006	O				0.14
9.250	1.04	1.03	0.006	O				0.14
9.333	1.04	1.04	0.006	O				0.14
9.417	1.05	1.04	0.006	O				0.14
9.500	1.05	1.05	0.006	O				0.14
9.583	1.06	1.05	0.006	O				0.14
9.667	1.06	1.06	0.006	O				0.14
9.750	1.07	1.06	0.006	O				0.14
9.833	1.07	1.07	0.006	O				0.14
9.917	1.08	1.07	0.006	O				0.14
10.000	1.08	1.08	0.006	O				0.14
10.083	1.09	1.08	0.006	O				0.15
10.167	1.09	1.09	0.006	O				0.15
10.250	1.10	1.10	0.006	O				0.15
10.333	1.11	1.10	0.006	O				0.15
10.417	1.11	1.11	0.006	O				0.15
10.500	1.12	1.11	0.006	O				0.15
10.583	1.12	1.12	0.006	O				0.15
10.667	1.13	1.13	0.006	O				0.15

```
10.750    1.14    1.13     0.006 | O      |       |       |       0.15
10.833    1.14    1.14     0.006 | O      |       |       |       0.15
10.917    1.15    1.15     0.006 | O      |       |       |       0.15
11.000    1.16    1.15     0.007 | O      |       |       |       0.15
11.083    1.17    1.16     0.007 | O      |       |       |       0.16
11.167    1.17    1.17     0.007 | O      |       |       |       0.16
11.250    1.18    1.17     0.007 | O      |       |       |       0.16
11.333    1.19    1.18     0.007 | O      |       |       |       0.16
11.417    1.20    1.19     0.007 | O      |       |       |       0.16
11.500    1.20    1.20     0.007 | O      |       |       |       0.16
11.583    1.21    1.21     0.007 | O      |       |       |       0.16
11.667    1.22    1.21     0.007 | O      |       |       |       0.16
11.750    1.23    1.22     0.007 | O      |       |       |       0.16
11.833    1.24    1.23     0.007 | O      |       |       |       0.17
11.917    1.25    1.24     0.007 | O      |       |       |       0.17
12.000    1.26    1.25     0.007 | O      |       |       |       0.17
12.083    1.26    1.25     0.007 | O      |       |       |       0.17
12.167    1.22    1.24     0.007 | O      |       |       |       0.17
12.250    1.17    1.21     0.007 | O      |       |       |       0.16
12.333    1.16    1.18     0.007 | O      |       |       |       0.16
12.417    1.16    1.17     0.007 | O      |       |       |       0.16
12.500    1.17    1.17     0.007 | O      |       |       |       0.16
12.583    1.18    1.17     0.007 | O      |       |       |       0.16
12.667    1.19    1.18     0.007 | O      |       |       |       0.16
12.750    1.20    1.19     0.007 | O      |       |       |       0.16
12.833    1.21    1.20     0.007 | O      |       |       |       0.16
12.917    1.23    1.21     0.007 | O      |       |       |       0.16
13.000    1.24    1.23     0.007 | O      |       |       |       0.17
13.083    1.25    1.24     0.007 | O      |       |       |       0.17
13.167    1.27    1.26     0.007 | O      |       |       |       0.17
13.250    1.29    1.27     0.007 | O      |       |       |       0.17
13.333    1.30    1.29     0.007 | O      |       |       |       0.17
13.417    1.32    1.31     0.007 | O      |       |       |       0.18
13.500    1.34    1.32     0.007 | O      |       |       |       0.18
13.583    1.36    1.34     0.008 | O      |       |       |       0.18
13.667    1.38    1.36     0.008 | O      |       |       |       0.18
13.750    1.40    1.38     0.008 |  O     |       |       |       0.19
13.833    1.42    1.40     0.008 |  O     |       |       |       0.19
13.917    1.44    1.43     0.008 |  O     |       |       |       0.19
14.000    1.47    1.45     0.008 |  O     |       |       |       0.19
14.083    1.50    1.47     0.008 |  O     |       |       |       0.20
14.167    1.52    1.50     0.008 |  O     |       |       |       0.20
14.250    1.55    1.53     0.009 |  O     |       |       |       0.21
14.333    1.58    1.56     0.009 |  O     |       |       |       0.21
14.417    1.62    1.59     0.009 |  O     |       |       |       0.21
14.500    1.65    1.62     0.009 |  O     |       |       |       0.22
14.583    1.69    1.66     0.009 |  O     |       |       |       0.22
14.667    1.73    1.70     0.010 |  O     |       |       |       0.23
14.750    1.77    1.74     0.010 |  O     |       |       |       0.23
14.833    1.82    1.78     0.010 |  O     |       |       |       0.24
```

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14.917    1.87    1.83      0.010 |  OI   |       |       |       |     0.25
15.000    1.93    1.89      0.011 |   O   |       |       |       |     0.25
15.083    1.99    1.94      0.011 |   O   |       |       |       |     0.26
15.167    2.06    2.01      0.011 |   O   |       |       |       |     0.27
15.250    2.14    2.08      0.012 |   O   |       |       |       |     0.28
15.333    2.23    2.16      0.012 |   O   |       |       |       |     0.29
15.417    2.27    2.23      0.013 |   O   |       |       |       |     0.30
15.500    2.04    2.17      0.012 |   O   |       |       |       |     0.29
15.583    1.78    1.97      0.011 |  IO   |       |       |       |     0.27
15.667    1.79    1.83      0.010 |  O    |       |       |       |     0.25
15.750    1.91    1.85      0.010 |   O   |       |       |       |     0.25
15.833    2.14    1.98      0.011 |   O   |       |       |       |     0.27
15.917    2.53    2.25      0.013 |   OI  |       |       |       |     0.30
16.000    3.30    2.75      0.016 |    O I|       |       |       |     0.37
16.083    6.10    4.16      0.024 |       |O   I  |       |       |     0.56
16.167   14.22    7.44      0.054 |       |       O       |     I |     1.11
16.250   14.73    7.44      0.103 |       |       O       |       I     1.84
16.333    7.17    9.31      0.120 |       |      I|   O   |       |     2.07
16.417    4.87    7.44      0.104 |       | I     O       |       |     1.86
16.500    3.82    7.44      0.083 |       I       O       |       |     1.57
16.583    3.22    7.44      0.056 |     I |       O       |       |     1.14
16.667    2.60    5.28      0.032 |    I  |  O    |       |       |     0.71
16.750    2.32    3.38      0.019 |    I O|       |       |       |     0.45
16.833    2.15    2.51      0.014 |   IO  |       |       |       |     0.34
16.917    2.03    2.19      0.012 |   O   |       |       |       |     0.29
17.000    1.87    2.01      0.011 |   O   |       |       |       |     0.27
17.083    1.71    1.84      0.010 |  IO   |       |       |       |     0.25
17.167    1.63    1.71      0.010 |  O    |       |       |       |     0.23
17.250    1.57    1.63      0.009 |  O    |       |       |       |     0.22
17.333    1.51    1.56      0.009 |  O    |       |       |       |     0.21
17.417    1.46    1.50      0.008 |  O    |       |       |       |     0.20
17.500    1.41    1.45      0.008 |  O    |       |       |       |     0.20
17.583    1.37    1.40      0.008 | IO    |       |       |       |     0.19
17.667    1.33    1.36      0.008 | O     |       |       |       |     0.18
17.750    1.29    1.32      0.007 | O     |       |       |       |     0.18
17.833    1.26    1.29      0.007 | O     |       |       |       |     0.17
17.917    1.23    1.26      0.007 | O     |       |       |       |     0.17
18.000    1.20    1.23      0.007 | O     |       |       |       |     0.16
18.083    1.19    1.20      0.007 | O     |       |       |       |     0.16
18.167    1.21    1.20      0.007 | O     |       |       |       |     0.16
18.250    1.24    1.22      0.007 | O     |       |       |       |     0.16
18.333    1.24    1.24      0.007 | O     |       |       |       |     0.17
18.417    1.24    1.24      0.007 | O     |       |       |       |     0.17
18.500    1.22    1.23      0.007 | O     |       |       |       |     0.17
18.583    1.21    1.22      0.007 | O     |       |       |       |     0.16
18.667    1.20    1.21      0.007 | O     |       |       |       |     0.16
18.750    1.18    1.19      0.007 | O     |       |       |       |     0.16
18.833    1.17    1.18      0.007 | O     |       |       |       |     0.16
18.917    1.15    1.16      0.007 | O     |       |       |       |     0.16
19.000    1.14    1.15      0.006 | O     |       |       |       |     0.15
```

19.083	1.13	1.14	0.006	O				0.15
19.167	1.11	1.12	0.006	O				0.15
19.250	1.10	1.11	0.006	O				0.15
19.333	1.09	1.10	0.006	O				0.15
19.417	1.08	1.09	0.006	O				0.15
19.500	1.07	1.08	0.006	O				0.14
19.583	1.06	1.07	0.006	O				0.14
19.667	1.05	1.06	0.006	O				0.14
19.750	1.04	1.05	0.006	O				0.14
19.833	1.03	1.04	0.006	O				0.14
19.917	1.02	1.03	0.006	O				0.14
20.000	1.01	1.02	0.006	O				0.14
20.083	1.00	1.01	0.006	O				0.14
20.167	0.99	1.00	0.006	O				0.13
20.250	0.99	0.99	0.006	O				0.13
20.333	0.98	0.98	0.006	O				0.13
20.417	0.97	0.98	0.006	O				0.13
20.500	0.96	0.97	0.005	O				0.13
20.583	0.96	0.96	0.005	O				0.13
20.667	0.95	0.95	0.005	O				0.13
20.750	0.94	0.95	0.005	O				0.13
20.833	0.94	0.94	0.005	O				0.13
20.917	0.93	0.93	0.005	O				0.13
21.000	0.92	0.93	0.005	O				0.12
21.083	0.92	0.92	0.005	IO				0.12
21.167	0.91	0.92	0.005	O				0.12
21.250	0.90	0.91	0.005	O				0.12
21.333	0.90	0.90	0.005	O				0.12
21.417	0.89	0.90	0.005	O				0.12
21.500	0.89	0.89	0.005	O				0.12
21.583	0.88	0.89	0.005	O				0.12
21.667	0.88	0.88	0.005	O				0.12
21.750	0.87	0.88	0.005	O				0.12
21.833	0.87	0.87	0.005	O				0.12
21.917	0.86	0.87	0.005	O				0.12
22.000	0.86	0.86	0.005	O				0.12
22.083	0.85	0.86	0.005	O				0.12
22.167	0.85	0.85	0.005	O				0.11
22.250	0.84	0.85	0.005	O				0.11
22.333	0.84	0.84	0.005	O				0.11
22.417	0.83	0.84	0.005	O				0.11
22.500	0.83	0.83	0.005	O				0.11
22.583	0.83	0.83	0.005	O				0.11
22.667	0.82	0.82	0.005	O				0.11
22.750	0.82	0.82	0.005	O				0.11
22.833	0.81	0.82	0.005	O				0.11
22.917	0.81	0.81	0.005	O				0.11
23.000	0.81	0.81	0.005	O				0.11
23.083	0.80	0.80	0.005	O				0.11
23.167	0.80	0.80	0.005	O				0.11

```
23.250    0.79    0.80      0.004  |O       |       |       |       |      0.11
23.333    0.79    0.79      0.004  |O       |       |       |       |      0.11
23.417    0.79    0.79      0.004  |O       |       |       |       |      0.11
23.500    0.78    0.79      0.004  |O       |       |       |       |      0.11
23.583    0.78    0.78      0.004  |O       |       |       |       |      0.11
23.667    0.78    0.78      0.004  |O       |       |       |       |      0.10
23.750    0.77    0.78      0.004  |O       |       |       |       |      0.10
23.833    0.77    0.77      0.004  |O       |       |       |       |      0.10
23.917    0.77    0.77      0.004  |O       |       |       |       |      0.10
24.000    0.76    0.77      0.004  |O       |       |       |       |      0.10
24.083    0.72    0.75      0.004  |O       |       |       |       |      0.10
24.167    0.48    0.64      0.004  |O       |       |       |       |      0.09
24.250    0.22    0.42      0.002  O        |       |       |       |      0.06
24.333    0.13    0.23      0.001  O        |       |       |       |      0.03
24.417    0.07    0.13      0.001  O        |       |       |       |      0.02
24.500    0.04    0.07      0.000  O        |       |       |       |      0.01
24.583    0.02    0.04      0.000  O        |       |       |       |      0.01
24.667    0.01    0.02      0.000  O        |       |       |       |      0.00
24.750    0.01    0.01      0.000  O        |       |       |       |      0.00
24.833    0.00    0.01      0.000  O        |       |       |       |      0.00
24.917    0.00    0.00      0.000  O        |       |       |       |      0.00
25.000    0.00    0.00      0.000  O        |       |       |       |      0.00

       ****************************HYDROGRAPH DATA****************************
                       Number of intervals =   300
                       Time interval =    5.0 (Min.)
                       Maximum/Peak flow rate =       9.309 (CFS)
                       Total volume =       2.490 (Ac.Ft)
               Status of hydrographs being held in storage
                          Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
               Peak (CFS)      0.000     0.000     0.000     0.000     0.000
               Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
       ***********************************************************************

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```

```
                     FLOOD HYDROGRAPH ROUTING PROGRAM
            Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018
                        Study date: 05/26/21

---------------------------------------------------------------------


Paradise Ranch
100 yr BMP-1



--------------------------------------------------------------------


Program License Serial Number 6481

--------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION **********************

                From study/file name: ParadiseRanch100yrDA38.rte
****************************HYDROGRAPH DATA***************************
                Number of intervals =   304
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =       15.955 (CFS)
                Total volume =       3.136 (Ac.Ft)
        Status of hydrographs being held in storage
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
***********************************************************************



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** RETARDING BASIN ROUTING ****
______________________________________________________________________

User entry of depth-outflow-storage data
--------------------------------------------------------------------
Total number of inflow hydrograph intervals = 304
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
--------------------------------------------------------------------
--------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
```

```
Initial basin outflow =   0.00 (CFS)
---------------------------------------------------------------------
--------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
---------------------------------------------------------------------
  0.000      0.000      0.000      0.000        0.000
  0.500      0.052      0.930      0.049        0.055
  1.000      0.114      0.930      0.111        0.117
  1.500      0.186      0.930      0.183        0.189
  2.000      0.261      0.930      0.258        0.264
  2.500      0.342      0.930      0.339        0.345
  3.000      0.431      1.860      0.425        0.437
  3.500      0.527      2.790      0.517        0.537
  4.000      0.630      2.790      0.620        0.640
--------------------------------------------------------------------
                Hydrograph Detention Basin Routing
---------------------------------------------------------------------

Graph values: 'I'= unit inflow; 'O'=outflow at time shown
---------------------------------------------------------------------
  Time   Inflow  Outflow    Storage                                Depth
 (Hours)  (CFS)   (CFS)      (Ac.Ft) .0       4.0    7.98   11.97   15.96 (Ft.)
  0.083    0.07    0.00      0.000  O        |       |       |       |      0.00
  0.167    0.32    0.03      0.001  O        |       |       |       |      0.01
  0.250    1.00    0.10      0.006  O I      |       |       |       |      0.05
  0.333    1.42    0.23      0.013  O I      |       |       |       |      0.12
  0.417    1.62    0.38      0.021  O  I     |       |       |       |      0.20
  0.500    1.75    0.53      0.030  |O I     |       |       |       |      0.28
  0.583    1.84    0.68      0.038  |O I     |       |       |       |      0.36
  0.667    1.90    0.81      0.046  |O I     |       |       |       |      0.44
  0.750    1.94    0.93      0.053  |O I     |       |       |       |      0.51
  0.833    1.97    0.93      0.060  |O I     |       |       |       |      0.56
  0.917    1.98    0.93      0.067  |O I     |       |       |       |      0.62
  1.000    1.99    0.93      0.074  |O I     |       |       |       |      0.68
  1.083    1.99    0.93      0.082  |O I     |       |       |       |      0.74
  1.167    1.99    0.93      0.089  |O I     |       |       |       |      0.80
  1.250    1.99    0.93      0.096  |O  I    |       |       |       |      0.86
  1.333    2.00    0.93      0.104  |O  I    |       |       |       |      0.92
  1.417    1.99    0.93      0.111  |O  I    |       |       |       |      0.97
  1.500    1.99    0.93      0.118  |O I     |       |       |       |      1.03
  1.583    1.99    0.93      0.125  |O I     |       |       |       |      1.08
  1.667    1.98    0.93      0.133  |O I     |       |       |       |      1.13
  1.750    1.98    0.93      0.140  |O I     |       |       |       |      1.18
  1.833    1.98    0.93      0.147  |O I     |       |       |       |      1.23
  1.917    1.97    0.93      0.154  |O I     |       |       |       |      1.28
  2.000    1.97    0.93      0.162  |O I     |       |       |       |      1.33
  2.083    1.97    0.93      0.169  |O I     |       |       |       |      1.38
  2.167    1.96    0.93      0.176  |O I     |       |       |       |      1.43
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2.250     1.96     0.93       0.183   |O I     |        |        |        |     1.48
2.333     1.96     0.93       0.190   |O I     |        |        |        |     1.53
2.417     1.95     0.93       0.197   |O I     |        |        |        |     1.57
2.500     1.95     0.93       0.204   |O I     |        |        |        |     1.62
2.583     1.95     0.93       0.211   |O I     |        |        |        |     1.67
2.667     1.94     0.93       0.218   |O I     |        |        |        |     1.72
2.750     1.94     0.93       0.225   |O I     |        |        |        |     1.76
2.833     1.94     0.93       0.232   |O I     |        |        |        |     1.81
2.917     1.93     0.93       0.239   |O I     |        |        |        |     1.85
3.000     1.93     0.93       0.246   |O I     |        |        |        |     1.90
3.083     1.93     0.93       0.253   |O I     |        |        |        |     1.95
3.167     1.92     0.93       0.260   |O I     |        |        |        |     1.99
3.250     1.92     0.93       0.267   |O I     |        |        |        |     2.03
3.333     1.92     0.93       0.273   |O I     |        |        |        |     2.08
3.417     1.91     0.93       0.280   |O I     |        |        |        |     2.12
3.500     1.91     0.93       0.287   |O I     |        |        |        |     2.16
3.583     1.91     0.93       0.294   |O I     |        |        |        |     2.20
3.667     1.90     0.93       0.300   |O I     |        |        |        |     2.24
3.750     1.90     0.93       0.307   |O I     |        |        |        |     2.28
3.833     1.89     0.93       0.314   |O I     |        |        |        |     2.33
3.917     1.89     0.93       0.320   |O I     |        |        |        |     2.37
4.000     1.89     0.93       0.327   |O I     |        |        |        |     2.41
4.083     1.88     0.93       0.333   |O I     |        |        |        |     2.45
4.167     1.88     0.93       0.340   |O I     |        |        |        |     2.49
4.250     1.88     0.98       0.346   |O I     |        |        |        |     2.52
4.333     1.87     1.04       0.352   | OI     |        |        |        |     2.56
4.417     1.87     1.10       0.358   | OI     |        |        |        |     2.59
4.500     1.86     1.15       0.363   | OI     |        |        |        |     2.62
4.583     1.86     1.20       0.368   | OI     |        |        |        |     2.64
4.667     1.86     1.25       0.372   | OI     |        |        |        |     2.67
4.750     1.85     1.29       0.376   | OI     |        |        |        |     2.69
4.833     1.85     1.33       0.380   | OI     |        |        |        |     2.71
4.917     1.84     1.36       0.383   | OI     |        |        |        |     2.73
5.000     1.84     1.40       0.387   | OI     |        |        |        |     2.75
5.083     1.84     1.43       0.390   | OI     |        |        |        |     2.77
5.167     1.83     1.46       0.392   | OI     |        |        |        |     2.78
5.250     1.83     1.48       0.395   | OI     |        |        |        |     2.80
5.333     1.82     1.51       0.397   |  O     |        |        |        |     2.81
5.417     1.82     1.53       0.399   |  O     |        |        |        |     2.82
5.500     1.82     1.55       0.401   |  O     |        |        |        |     2.83
5.583     1.81     1.57       0.403   |  O     |        |        |        |     2.84
5.667     1.81     1.58       0.405   |  O     |        |        |        |     2.85
5.750     1.80     1.60       0.406   |  O     |        |        |        |     2.86
5.833     1.80     1.61       0.407   |  O     |        |        |        |     2.87
5.917     1.80     1.63       0.409   |  O     |        |        |        |     2.87
6.000     1.79     1.64       0.410   |  O     |        |        |        |     2.88
6.083     1.79     1.65       0.411   |  O     |        |        |        |     2.89
6.167     1.78     1.66       0.412   |  O     |        |        |        |     2.89
6.250     1.78     1.67       0.412   |  O     |        |        |        |     2.90
6.333     1.77     1.67       0.413   |  O     |        |        |        |     2.90
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6.417	1.77	1.68	0.414	O				2.90
6.500	1.77	1.69	0.414	O				2.91
6.583	1.76	1.69	0.415	O				2.91
6.667	1.76	1.70	0.415	O				2.91
6.750	1.75	1.70	0.416	O				2.91
6.833	1.75	1.70	0.416	O				2.92
6.917	1.74	1.71	0.416	O				2.92
7.000	1.74	1.71	0.417	O				2.92
7.083	1.73	1.71	0.417	O				2.92
7.167	1.73	1.71	0.417	O				2.92
7.250	1.73	1.71	0.417	O				2.92
7.333	1.72	1.71	0.417	O				2.92
7.417	1.72	1.71	0.417	O				2.92
7.500	1.71	1.71	0.417	O				2.92
7.583	1.71	1.71	0.417	O				2.92
7.667	1.70	1.71	0.417	O				2.92
7.750	1.70	1.71	0.417	O				2.92
7.833	1.69	1.71	0.417	O				2.92
7.917	1.69	1.71	0.417	O				2.92
8.000	1.68	1.71	0.416	O				2.92
8.083	1.68	1.71	0.416	O				2.92
8.167	1.67	1.70	0.416	O				2.92
8.250	1.67	1.70	0.416	O				2.92
8.333	1.66	1.70	0.416	O				2.91
8.417	1.66	1.70	0.415	O				2.91
8.500	1.65	1.69	0.415	O				2.91
8.583	1.65	1.69	0.415	O				2.91
8.667	1.64	1.69	0.415	O				2.91
8.750	1.64	1.68	0.414	O				2.91
8.833	1.63	1.68	0.414	O				2.90
8.917	1.63	1.68	0.414	O				2.90
9.000	1.62	1.67	0.413	O				2.90
9.083	1.62	1.67	0.413	O				2.90
9.167	1.61	1.67	0.412	O				2.90
9.250	1.60	1.66	0.412	O				2.89
9.333	1.60	1.66	0.412	O				2.89
9.417	1.59	1.65	0.411	O				2.89
9.500	1.59	1.65	0.411	O				2.89
9.583	1.58	1.64	0.410	O				2.88
9.667	1.58	1.64	0.410	O				2.88
9.750	1.57	1.64	0.410	O				2.88
9.833	1.57	1.63	0.409	O				2.88
9.917	1.56	1.63	0.409	O				2.87
10.000	1.55	1.62	0.408	O				2.87
10.083	1.55	1.62	0.408	O				2.87
10.167	1.54	1.61	0.407	O				2.87
10.250	1.54	1.61	0.407	O				2.86
10.333	1.53	1.60	0.406	O				2.86
10.417	1.52	1.60	0.406	O				2.86
10.500	1.52	1.59	0.405	O				2.86

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10.583     1.51     1.59      0.405   |  O     |        |        |        |      2.85
10.667     1.50     1.58      0.404   |  O     |        |        |        |      2.85
10.750     1.50     1.57      0.404   |  O     |        |        |        |      2.85
10.833     1.49     1.57      0.403   | IO     |        |        |        |      2.84
10.917     1.48     1.56      0.403   | IO     |        |        |        |      2.84
11.000     1.48     1.56      0.402   | IO     |        |        |        |      2.84
11.083     1.47     1.55      0.401   | IO     |        |        |        |      2.83
11.167     1.46     1.55      0.401   | IO     |        |        |        |      2.83
11.250     1.46     1.54      0.400   | IO     |        |        |        |      2.83
11.333     1.45     1.53      0.400   | IO     |        |        |        |      2.82
11.417     1.44     1.53      0.399   | IO     |        |        |        |      2.82
11.500     1.44     1.52      0.399   | IO     |        |        |        |      2.82
11.583     1.43     1.52      0.398   | IO     |        |        |        |      2.81
11.667     1.42     1.51      0.397   | IO     |        |        |        |      2.81
11.750     1.41     1.50      0.397   | IO     |        |        |        |      2.81
11.833     1.41     1.50      0.396   | IO     |        |        |        |      2.80
11.917     1.40     1.49      0.396   | O      |        |        |        |      2.80
12.000     1.39     1.48      0.395   | O      |        |        |        |      2.80
12.083     1.34     1.47      0.394   | O      |        |        |        |      2.79
12.167     1.16     1.46      0.393   | O      |        |        |        |      2.78
12.250     0.70     1.42      0.389   |IO      |        |        |        |      2.76
12.333     0.41     1.36      0.383   I O      |        |        |        |      2.73
12.417     0.28     1.29      0.377   I O      |        |        |        |      2.69
12.500     0.19     1.22      0.370   I O      |        |        |        |      2.66
12.583     0.13     1.15      0.363   I O      |        |        |        |      2.62
12.667     0.08     1.07      0.356   I O      |        |        |        |      2.58
12.750     0.05     1.00      0.349   I O      |        |        |        |      2.54
12.833     0.03     0.94      0.343   IO       |        |        |        |      2.50
12.917     0.02     0.93      0.336   IO       |        |        |        |      2.47
13.000     0.02     0.93      0.330   IO       |        |        |        |      2.43
13.083     0.01     0.93      0.324   IO       |        |        |        |      2.39
13.167     0.01     0.93      0.318   IO       |        |        |        |      2.35
13.250     0.01     0.93      0.311   IO       |        |        |        |      2.31
13.333     0.00     0.93      0.305   IO       |        |        |        |      2.27
13.417     0.00     0.93      0.298   IO       |        |        |        |      2.23
13.500     0.00     0.93      0.292   IO       |        |        |        |      2.19
13.583     0.00     0.93      0.286   IO       |        |        |        |      2.15
13.667     0.00     0.93      0.279   IO       |        |        |        |      2.11
13.750     0.00     0.93      0.273   IO       |        |        |        |      2.07
13.833     0.00     0.93      0.266   IO       |        |        |        |      2.03
13.917     0.00     0.93      0.260   IO       |        |        |        |      1.99
14.000     0.00     0.93      0.254   IO       |        |        |        |      1.95
14.083     0.00     0.93      0.247   IO       |        |        |        |      1.91
14.167     0.00     0.93      0.241   IO       |        |        |        |      1.87
14.250     0.00     0.93      0.234   IO       |        |        |        |      1.82
14.333     0.00     0.93      0.228   IO       |        |        |        |      1.78
14.417     0.00     0.93      0.222   IO       |        |        |        |      1.74
14.500     0.00     0.93      0.215   IO       |        |        |        |      1.70
14.583     0.00     0.93      0.209   IO       |        |        |        |      1.65
14.667     0.00     0.93      0.202   IO       |        |        |        |      1.61
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14.750    0.00    0.93     0.196  IO      |       |       |       |     1.57
14.833    0.00    0.93     0.190  IO      |       |       |       |     1.52
14.917    0.00    0.93     0.183  IO      |       |       |       |     1.48
15.000    0.00    0.93     0.177  IO      |       |       |       |     1.44
15.083    0.00    0.93     0.170  IO      |       |       |       |     1.39
15.167    0.00    0.93     0.164  IO      |       |       |       |     1.35
15.250    0.00    0.93     0.158  IO      |       |       |       |     1.30
15.333    0.00    0.93     0.151  IO      |       |       |       |     1.26
15.417    0.06    0.93     0.145  IO      |       |       |       |     1.22
15.500    0.31    0.93     0.140  IO      |       |       |       |     1.18
15.583    0.99    0.93     0.138  |O      |       |       |       |     1.17
15.667    1.49    0.93     0.140  |OI     |       |       |       |     1.18
15.750    1.86    0.93     0.145  |O I    |       |       |       |     1.22
15.833    2.24    0.93     0.153  |O  I   |       |       |       |     1.27
15.917    2.75    0.93     0.164  |O   I  |       |       |       |     1.35
16.000    3.50    0.93     0.179  |O     I|       |       |       |     1.45
16.083    5.68    0.93     0.204  |O      |  I    |       |       |     1.62
16.167    9.69    0.93     0.251  |O      |       |  I    |       |     1.93
16.250   15.96    0.93     0.333  |O      |       |       |       I     2.44
16.333   11.35    1.72     0.417  |  O    |       |     I |       |     2.92
16.417    6.89    2.21     0.467  |   O   |    I  |       |       |     3.19
16.500    4.93    2.45     0.491  |   O   |I      |       |       |     3.31
16.583    3.25    2.55     0.502  |    OI |       |       |       |     3.37
16.667    2.16    2.56     0.503  |   IO  |       |       |       |     3.38
16.750    1.45    2.51     0.498  | I  O  |       |       |       |     3.35
16.833    0.95    2.43     0.490  |I  O   |       |       |       |     3.31
16.917    0.53    2.32     0.478  |I  O   |       |       |       |     3.25
17.000    0.35    2.20     0.466  I   O   |       |       |       |     3.18
17.083    0.25    2.08     0.453  I   O   |       |       |       |     3.12
17.167    0.19    1.96     0.441  I  O    |       |       |       |     3.05
17.250    0.17    1.84     0.429  I  O    |       |       |       |     2.99
17.333    0.11    1.72     0.418  I  O    |       |       |       |     2.93
17.417    0.08    1.61     0.407  I  O    |       |       |       |     2.86
17.500    0.02    1.50     0.397  I  O    |       |       |       |     2.81
17.583    0.01    1.40     0.387  I O     |       |       |       |     2.75
17.667    0.00    1.30     0.377  I O     |       |       |       |     2.70
17.750    0.00    1.21     0.369  I O     |       |       |       |     2.65
17.833    0.00    1.13     0.361  I O     |       |       |       |     2.61
17.917    0.00    1.05     0.353  I O     |       |       |       |     2.56
18.000    0.00    0.98     0.346  IO      |       |       |       |     2.52
18.083    0.05    0.93     0.340  IO      |       |       |       |     2.49
18.167    0.22    0.93     0.334  IO      |       |       |       |     2.45
18.250    0.67    0.93     0.331  |O      |       |       |       |     2.43
18.333    0.96    0.93     0.330  |O      |       |       |       |     2.43
18.417    1.11    0.93     0.331  |OI     |       |       |       |     2.43
18.500    1.21    0.93     0.333  |OI     |       |       |       |     2.44
18.583    1.28    0.93     0.335  |OI     |       |       |       |     2.46
18.667    1.34    0.93     0.337  |OI     |       |       |       |     2.47
18.750    1.38    0.93     0.340  |OI     |       |       |       |     2.49
18.833    1.42    0.95     0.344  |OI     |       |       |       |     2.51
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18.917	1.44	0.98	0.347	OI				2.53
19.000	1.46	1.01	0.350	O				2.54
19.083	1.48	1.04	0.353	O				2.56
19.167	1.49	1.08	0.356	O				2.58
19.250	1.51	1.10	0.359	OI				2.59
19.333	1.53	1.13	0.361	OI				2.61
19.417	1.54	1.16	0.364	OI				2.62
19.500	1.55	1.19	0.367	OI				2.64
19.583	1.56	1.21	0.369	OI				2.65
19.667	1.58	1.24	0.371	OI				2.67
19.750	1.59	1.26	0.374	OI				2.68
19.833	1.60	1.29	0.376	OI				2.69
19.917	1.61	1.31	0.378	OI				2.70
20.000	1.62	1.33	0.380	OI				2.71
20.083	1.63	1.35	0.382	OI				2.73
20.167	1.64	1.37	0.384	OI				2.74
20.250	1.65	1.39	0.386	OI				2.75
20.333	1.66	1.41	0.388	OI				2.76
20.417	1.67	1.42	0.389	OI				2.77
20.500	1.68	1.44	0.391	OI				2.78
20.583	1.69	1.46	0.393	OI				2.78
20.667	1.70	1.48	0.394	OI				2.79
20.750	1.71	1.49	0.396	OI				2.80
20.833	1.72	1.51	0.397	O				2.81
20.917	1.73	1.52	0.399	O				2.82
21.000	1.74	1.54	0.400	O				2.83
21.083	1.75	1.55	0.401	O				2.83
21.167	1.76	1.57	0.403	O				2.84
21.250	1.77	1.58	0.404	O				2.85
21.333	1.77	1.59	0.405	O				2.86
21.417	1.78	1.61	0.407	O				2.86
21.500	1.79	1.62	0.408	O				2.87
21.583	1.80	1.63	0.409	O				2.88
21.667	1.81	1.64	0.410	O				2.88
21.750	1.82	1.65	0.411	O				2.89
21.833	1.82	1.67	0.412	O				2.90
21.917	1.83	1.68	0.413	O				2.90
22.000	1.84	1.69	0.415	O				2.91
22.083	1.85	1.70	0.416	O				2.91
22.167	1.86	1.71	0.417	O				2.92
22.250	1.86	1.72	0.418	O				2.92
22.333	1.87	1.73	0.419	O				2.93
22.417	1.88	1.74	0.420	O				2.94
22.500	1.89	1.75	0.420	O				2.94
22.583	1.89	1.76	0.421	O				2.95
22.667	1.90	1.77	0.422	O				2.95
22.750	1.91	1.78	0.423	O				2.96
22.833	1.92	1.79	0.424	O				2.96
22.917	1.92	1.80	0.425	O				2.97
23.000	1.93	1.81	0.426	O				2.97

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23.083    1.94    1.81      0.427  |  O    |       |       |       |     2.98
23.167    1.94    1.82      0.428  |  O    |       |       |       |     2.98
23.250    1.95    1.83      0.428  |  O    |       |       |       |     2.98
23.333    1.96    1.84      0.429  |  O    |       |       |       |     2.99
23.417    1.96    1.85      0.430  |  O    |       |       |       |     2.99
23.500    1.97    1.86      0.431  |  O    |       |       |       |     3.00
23.583    1.98    1.86      0.432  |  O    |       |       |       |     3.00
23.667    1.98    1.87      0.432  |  O    |       |       |       |     3.01
23.750    1.99    1.88      0.433  |  O    |       |       |       |     3.01
23.833    2.00    1.89      0.434  |  OI   |       |       |       |     3.01
23.917    2.00    1.89      0.435  |  OI   |       |       |       |     3.02
24.000    2.01    1.90      0.435  |  OI   |       |       |       |     3.02
24.083    1.95    1.91      0.436  |  O    |       |       |       |     3.03
24.167    1.70    1.90      0.435  |  O    |       |       |       |     3.02
24.250    1.03    1.87      0.432  | IO    |       |       |       |     3.00
24.333    0.60    1.79      0.425  |I O    |       |       |       |     2.96
24.417    0.41    1.70      0.416  I  O    |       |       |       |     2.92
24.500    0.28    1.61      0.407  I  O    |       |       |       |     2.87
24.583    0.19    1.51      0.398  I  O    |       |       |       |     2.81
24.667    0.12    1.42      0.389  I O     |       |       |       |     2.76
24.750    0.08    1.33      0.380  I O     |       |       |       |     2.71
24.833    0.05    1.24      0.372  I O     |       |       |       |     2.67
24.917    0.03    1.16      0.364  I O     |       |       |       |     2.62
25.000    0.03    1.08      0.356  I O     |       |       |       |     2.58
25.083    0.02    1.01      0.349  I O     |       |       |       |     2.54
25.167    0.01    0.94      0.343  IO      |       |       |       |     2.50
25.250    0.01    0.93      0.336  IO      |       |       |       |     2.46
25.333    0.00    0.93      0.330  IO      |       |       |       |     2.43
25.417    0.00    0.93      0.323  IO      |       |       |       |     2.39
25.500    0.00    0.93      0.317  IO      |       |       |       |     2.35
25.583    0.00    0.93      0.311  IO      |       |       |       |     2.31
25.667    0.00    0.93      0.304  IO      |       |       |       |     2.27
25.750    0.00    0.93      0.298  IO      |       |       |       |     2.23
25.833    0.00    0.93      0.291  IO      |       |       |       |     2.19
25.917    0.00    0.93      0.285  IO      |       |       |       |     2.15
26.000    0.00    0.93      0.279  IO      |       |       |       |     2.11
26.083    0.00    0.93      0.272  IO      |       |       |       |     2.07
26.167    0.00    0.93      0.266  IO      |       |       |       |     2.03
26.250    0.00    0.93      0.259  IO      |       |       |       |     1.99
26.333    0.00    0.93      0.253  IO      |       |       |       |     1.95
26.417    0.00    0.93      0.247  IO      |       |       |       |     1.90
26.500    0.00    0.93      0.240  IO      |       |       |       |     1.86
26.583    0.00    0.93      0.234  IO      |       |       |       |     1.82
26.667    0.00    0.93      0.227  IO      |       |       |       |     1.78
26.750    0.00    0.93      0.221  IO      |       |       |       |     1.73
26.833    0.00    0.93      0.215  IO      |       |       |       |     1.69
26.917    0.00    0.93      0.208  IO      |       |       |       |     1.65
27.000    0.00    0.93      0.202  IO      |       |       |       |     1.61
27.083    0.00    0.93      0.195  IO      |       |       |       |     1.56
27.167    0.00    0.93      0.189  IO      |       |       |       |     1.52
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27.250	0.00	0.93	0.183	IO					1.48
27.333	0.00	0.93	0.176	IO					1.43
27.417	0.00	0.93	0.170	IO					1.39
27.500	0.00	0.93	0.163	IO					1.34
27.583	0.00	0.93	0.157	IO					1.30
27.667	0.00	0.93	0.151	IO					1.25
27.750	0.00	0.93	0.144	IO					1.21
27.833	0.00	0.93	0.138	IO					1.16
27.917	0.00	0.93	0.131	IO					1.12
28.000	0.00	0.93	0.125	IO					1.08
28.083	0.00	0.93	0.119	IO					1.03
28.167	0.00	0.93	0.112	IO					0.98
28.250	0.00	0.93	0.106	IO					0.93
28.333	0.00	0.93	0.099	IO					0.88
28.417	0.00	0.93	0.093	IO					0.83
28.500	0.00	0.93	0.087	IO					0.78
28.583	0.00	0.93	0.080	IO					0.73
28.667	0.00	0.93	0.074	IO					0.68
28.750	0.00	0.93	0.067	IO					0.62
28.833	0.00	0.93	0.061	IO					0.57
28.917	0.00	0.93	0.054	IO					0.52
29.000	0.00	0.86	0.048	IO					0.46
29.083	0.00	0.76	0.043	IO					0.41
29.167	0.00	0.68	0.038	IO					0.36
29.250	0.00	0.60	0.033	IO					0.32
29.333	0.00	0.53	0.029	IO					0.28
29.417	0.00	0.47	0.026	O					0.25
29.500	0.00	0.41	0.023	O					0.22
29.583	0.00	0.36	0.020	O					0.20
29.667	0.00	0.32	0.018	O					0.17
29.750	0.00	0.28	0.016	O					0.15
29.833	0.00	0.25	0.014	O					0.14
29.917	0.00	0.22	0.012	O					0.12
30.000	0.00	0.20	0.011	O					0.11
30.083	0.00	0.17	0.010	O					0.09
30.167	0.00	0.15	0.009	O					0.08
30.250	0.00	0.14	0.008	O					0.07
30.333	0.00	0.12	0.007	O					0.06
30.417	0.00	0.11	0.006	O					0.06
30.500	0.00	0.09	0.005	O					0.05
30.583	0.00	0.08	0.005	O					0.04
30.667	0.00	0.07	0.004	O					0.04
30.750	0.00	0.06	0.004	O					0.03
30.833	0.00	0.06	0.003	O					0.03
30.917	0.00	0.05	0.003	O					0.03
31.000	0.00	0.04	0.003	O					0.02
31.083	0.00	0.04	0.002	O					0.02
31.167	0.00	0.03	0.002	O					0.02
31.250	0.00	0.03	0.002	O					0.02
31.333	0.00	0.03	0.002	O					0.01

```
31.417    0.00    0.02      0.001  O       |       |       |       |      0.01
31.500    0.00    0.02      0.001  O       |       |       |       |      0.01
31.583    0.00    0.02      0.001  O       |       |       |       |      0.01
31.667    0.00    0.02      0.001  O       |       |       |       |      0.01
31.750    0.00    0.01      0.001  O       |       |       |       |      0.01
31.833    0.00    0.01      0.001  O       |       |       |       |      0.01
31.917    0.00    0.01      0.001  O       |       |       |       |      0.01
32.000    0.00    0.01      0.001  O       |       |       |       |      0.01
32.083    0.00    0.01      0.001  O       |       |       |       |      0.00
32.167    0.00    0.01      0.000  O       |       |       |       |      0.00
32.250    0.00    0.01      0.000  O       |       |       |       |      0.00
32.333    0.00    0.01      0.000  O       |       |       |       |      0.00
32.417    0.00    0.01      0.000  O       |       |       |       |      0.00
32.500    0.00    0.00      0.000  O       |       |       |       |      0.00
32.583    0.00    0.00      0.000  O       |       |       |       |      0.00
32.667    0.00    0.00      0.000  O       |       |       |       |      0.00
32.750    0.00    0.00      0.000  O       |       |       |       |      0.00
32.833    0.00    0.00      0.000  O       |       |       |       |      0.00
32.917    0.00    0.00      0.000  O       |       |       |       |      0.00
33.000    0.00    0.00      0.000  O       |       |       |       |      0.00
33.083    0.00    0.00      0.000  O       |       |       |       |      0.00
33.167    0.00    0.00      0.000  O       |       |       |       |      0.00

       ****************************HYDROGRAPH DATA****************************
                       Number of intervals =   398
                       Time interval =    5.0 (Min.)
                       Maximum/Peak flow rate =        2.562 (CFS)
                       Total volume =       3.136 (Ac.Ft)
               Status of hydrographs being held in storage
                          Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
               Peak (CFS)      0.000     0.000     0.000     0.000     0.000
               Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
       ***********************************************************************

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                    FLOOD HYDROGRAPH ROUTING PROGRAM
           Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018
                       Study date: 05/26/21

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Paradise Ranch
100 yr BMP-2



--------------------------------------------------------------------


Program License Serial Number 6481

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********************* HYDROGRAPH INFORMATION **********************

                From study/file name: ParadiseRanch100yrDA39.rte
****************************HYDROGRAPH DATA***************************
                Number of intervals =   301
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =       20.148 (CFS)
                Total volume =       3.638 (Ac.Ft)
        Status of hydrographs being held in storage
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
***********************************************************************



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      101.000 to Point/Station      102.000
**** RETARDING BASIN ROUTING ****
______________________________________________________________________

User entry of depth-outflow-storage data
--------------------------------------------------------------------
Total number of inflow hydrograph intervals = 301
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
--------------------------------------------------------------------
--------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
```

Initial basin outflow = 0.00 (CFS)

Depth vs. Storage and Depth vs. Discharge data:

Basin Depth (Ft.)	Storage (Ac.Ft)	Outflow (CFS)	(S-O*dt/2) (Ac.Ft)	(S+O*dt/2) (Ac.Ft)
0.000	0.000	0.000	0.000	0.000
0.500	0.044	0.930	0.041	0.047
1.000	0.093	0.930	0.090	0.096
1.500	0.148	1.860	0.142	0.154
2.000	0.210	2.790	0.200	0.220
2.500	0.278	3.720	0.265	0.291
3.000	0.352	4.500	0.337	0.367
3.500	0.433	4.500	0.418	0.448
4.000	0.522	4.500	0.507	0.537

Hydrograph Detention Basin Routing

Graph values: 'I'= unit inflow; 'O'=outflow at time shown

Time (Hours)	Inflow (CFS)	Outflow (CFS)	Storage (Ac.Ft)	.0 5.0 10.07 15.11 20.15	Depth (Ft.)
0.083	0.10	0.01	0.000	O	0.00
0.167	0.61	0.05	0.003	O	0.03
0.250	1.51	0.19	0.009	O I	0.10
0.333	1.84	0.39	0.019	O I	0.21
0.417	2.03	0.60	0.028	O I	0.32
0.500	2.16	0.80	0.038	O I	0.43
0.583	2.24	0.93	0.047	O I	0.53
0.667	2.28	0.93	0.056	O I	0.63
0.750	2.30	0.93	0.066	O I	0.72
0.833	2.31	0.93	0.075	O I	0.82
0.917	2.32	0.93	0.085	O I	0.92
1.000	2.32	0.95	0.094	O I	1.01
1.083	2.32	1.10	0.103	O I	1.09
1.167	2.32	1.24	0.111	O I	1.16
1.250	2.32	1.36	0.118	OI	1.23
1.333	2.31	1.46	0.124	OI	1.29
1.417	2.31	1.56	0.130	OI	1.34
1.500	2.31	1.64	0.135	OI	1.38
1.583	2.30	1.71	0.139	OI	1.42
1.667	2.30	1.78	0.143	OI	1.46
1.750	2.30	1.83	0.146	OI	1.49
1.833	2.29	1.88	0.149	OI	1.51
1.917	2.29	1.92	0.152	O	1.53
2.000	2.28	1.96	0.155	O	1.55
2.083	2.28	1.99	0.157	O	1.57
2.167	2.28	2.02	0.159	O	1.58

2.250	2.27	2.04	0.160	O				1.60
2.333	2.27	2.07	0.162	O				1.61
2.417	2.26	2.09	0.163	O				1.62
2.500	2.26	2.10	0.164	O				1.63
2.583	2.26	2.12	0.165	O				1.64
2.667	2.25	2.13	0.166	O				1.65
2.750	2.25	2.14	0.167	O				1.65
2.833	2.24	2.15	0.168	O				1.66
2.917	2.24	2.16	0.168	O				1.66
3.000	2.24	2.17	0.169	O				1.67
3.083	2.23	2.18	0.169	O				1.67
3.167	2.23	2.18	0.169	O				1.67
3.250	2.22	2.19	0.170	O				1.68
3.333	2.22	2.19	0.170	O				1.68
3.417	2.22	2.19	0.170	O				1.68
3.500	2.21	2.19	0.170	O				1.68
3.583	2.21	2.20	0.170	O				1.68
3.667	2.20	2.20	0.170	O				1.68
3.750	2.20	2.20	0.170	O				1.68
3.833	2.19	2.20	0.170	O				1.68
3.917	2.19	2.20	0.170	O				1.68
4.000	2.19	2.20	0.170	O				1.68
4.083	2.18	2.19	0.170	O				1.68
4.167	2.18	2.19	0.170	O				1.68
4.250	2.17	2.19	0.170	O				1.68
4.333	2.17	2.19	0.170	O				1.68
4.417	2.16	2.19	0.170	O				1.68
4.500	2.16	2.18	0.170	O				1.67
4.583	2.15	2.18	0.169	O				1.67
4.667	2.15	2.18	0.169	O				1.67
4.750	2.15	2.18	0.169	O				1.67
4.833	2.14	2.17	0.169	O				1.67
4.917	2.14	2.17	0.169	O				1.67
5.000	2.13	2.17	0.168	O				1.66
5.083	2.13	2.16	0.168	O				1.66
5.167	2.12	2.16	0.168	O				1.66
5.250	2.12	2.16	0.168	O				1.66
5.333	2.11	2.15	0.167	O				1.66
5.417	2.11	2.15	0.167	O				1.65
5.500	2.10	2.14	0.167	O				1.65
5.583	2.10	2.14	0.167	O				1.65
5.667	2.09	2.14	0.166	O				1.65
5.750	2.09	2.13	0.166	O				1.65
5.833	2.09	2.13	0.166	O				1.64
5.917	2.08	2.12	0.165	O				1.64
6.000	2.08	2.12	0.165	O				1.64
6.083	2.07	2.11	0.165	O				1.64
6.167	2.07	2.11	0.165	O				1.63
6.250	2.06	2.10	0.164	O				1.63
6.333	2.06	2.10	0.164	O				1.63

6.417	2.05	2.10	0.164	O				1.63
6.500	2.05	2.09	0.163	O				1.62
6.583	2.04	2.09	0.163	O				1.62
6.667	2.04	2.08	0.163	O				1.62
6.750	2.03	2.08	0.162	O				1.62
6.833	2.02	2.07	0.162	O				1.61
6.917	2.02	2.07	0.162	O				1.61
7.000	2.01	2.06	0.161	O				1.61
7.083	2.01	2.06	0.161	O				1.61
7.167	2.00	2.05	0.161	O				1.60
7.250	2.00	2.05	0.160	O				1.60
7.333	1.99	2.04	0.160	O				1.60
7.417	1.99	2.04	0.160	O				1.60
7.500	1.98	2.03	0.159	O				1.59
7.583	1.98	2.03	0.159	O				1.59
7.667	1.97	2.02	0.159	O				1.59
7.750	1.97	2.02	0.158	O				1.58
7.833	1.96	2.01	0.158	O				1.58
7.917	1.95	2.01	0.158	O				1.58
8.000	1.95	2.00	0.157	O				1.58
8.083	1.94	1.99	0.157	O				1.57
8.167	1.94	1.99	0.157	O				1.57
8.250	1.93	1.98	0.156	O				1.57
8.333	1.93	1.98	0.156	O				1.56
8.417	1.92	1.97	0.156	O				1.56
8.500	1.91	1.97	0.155	O				1.56
8.583	1.91	1.96	0.155	O				1.55
8.667	1.90	1.96	0.154	O				1.55
8.750	1.89	1.95	0.154	O				1.55
8.833	1.89	1.94	0.154	O				1.55
8.917	1.88	1.94	0.153	IO				1.54
9.000	1.88	1.93	0.153	IO				1.54
9.083	1.87	1.93	0.152	IO				1.54
9.167	1.86	1.92	0.152	IO				1.53
9.250	1.86	1.92	0.152	IO				1.53
9.333	1.85	1.91	0.151	IO				1.53
9.417	1.84	1.90	0.151	IO				1.52
9.500	1.84	1.90	0.150	IO				1.52
9.583	1.83	1.89	0.150	IO				1.52
9.667	1.82	1.88	0.150	O				1.51
9.750	1.82	1.88	0.149	O				1.51
9.833	1.81	1.87	0.149	O				1.51
9.917	1.80	1.87	0.148	O				1.50
10.000	1.80	1.86	0.148	O				1.50
10.083	1.79	1.85	0.148	O				1.50
10.167	1.78	1.85	0.147	O				1.49
10.250	1.78	1.84	0.147	O				1.49
10.333	1.77	1.83	0.146	O				1.48
10.417	1.76	1.82	0.146	O				1.48
10.500	1.75	1.82	0.145	O				1.48

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10.583     1.75     1.81      0.145   | O      |       |       |       |      1.47
10.667     1.74     1.80      0.145   | O      |       |       |       |      1.47
10.750     1.73     1.79      0.144   | O      |       |       |       |      1.46
10.833     1.72     1.79      0.144   | O      |       |       |       |      1.46
10.917     1.72     1.78      0.143   | O      |       |       |       |      1.46
11.000     1.71     1.77      0.143   | O      |       |       |       |      1.45
11.083     1.70     1.76      0.142   | O      |       |       |       |      1.45
11.167     1.69     1.76      0.142   | O      |       |       |       |      1.44
11.250     1.68     1.75      0.141   | O      |       |       |       |      1.44
11.333     1.68     1.74      0.141   | O      |       |       |       |      1.44
11.417     1.67     1.73      0.141   | O      |       |       |       |      1.43
11.500     1.66     1.73      0.140   | O      |       |       |       |      1.43
11.583     1.65     1.72      0.140   | O      |       |       |       |      1.42
11.667     1.64     1.71      0.139   | O      |       |       |       |      1.42
11.750     1.63     1.70      0.139   | O      |       |       |       |      1.42
11.833     1.63     1.69      0.138   | O      |       |       |       |      1.41
11.917     1.62     1.69      0.138   | O      |       |       |       |      1.41
12.000     1.61     1.68      0.137   | O      |       |       |       |      1.40
12.083     1.53     1.67      0.137   | O      |       |       |       |      1.40
12.167     1.18     1.63      0.135   |IO      |       |       |       |      1.38
12.250     0.58     1.55      0.130   I O      |       |       |       |      1.33
12.333     0.35     1.43      0.123   I O      |       |       |       |      1.27
12.417     0.22     1.30      0.115   I O      |       |       |       |      1.20
12.500     0.13     1.18      0.108   IO       |       |       |       |      1.13
12.583     0.08     1.06      0.101   IO       |       |       |       |      1.07
12.667     0.04     0.95      0.094   IO       |       |       |       |      1.01
12.750     0.03     0.93      0.088   IO       |       |       |       |      0.95
12.833     0.02     0.93      0.082   IO       |       |       |       |      0.89
12.917     0.01     0.93      0.075   IO       |       |       |       |      0.82
13.000     0.01     0.93      0.069   IO       |       |       |       |      0.76
13.083     0.00     0.93      0.063   IO       |       |       |       |      0.69
13.167     0.00     0.93      0.056   IO       |       |       |       |      0.63
13.250     0.00     0.93      0.050   IO       |       |       |       |      0.56
13.333     0.00     0.92      0.044   IO       |       |       |       |      0.50
13.417     0.00     0.80      0.038   IO       |       |       |       |      0.43
13.500     0.00     0.69      0.033   IO       |       |       |       |      0.37
13.583     0.00     0.60      0.028   O        |       |       |       |      0.32
13.667     0.00     0.52      0.024   O        |       |       |       |      0.28
13.750     0.00     0.45      0.021   O        |       |       |       |      0.24
13.833     0.00     0.39      0.018   O        |       |       |       |      0.21
13.917     0.00     0.33      0.016   O        |       |       |       |      0.18
14.000     0.00     0.29      0.014   O        |       |       |       |      0.16
14.083     0.00     0.25      0.012   O        |       |       |       |      0.13
14.167     0.00     0.22      0.010   O        |       |       |       |      0.12
14.250     0.00     0.19      0.009   O        |       |       |       |      0.10
14.333     0.00     0.16      0.008   O        |       |       |       |      0.09
14.417     0.00     0.14      0.007   O        |       |       |       |      0.08
14.500     0.00     0.12      0.006   O        |       |       |       |      0.07
14.583     0.00     0.10      0.005   O        |       |       |       |      0.06
14.667     0.00     0.09      0.004   O        |       |       |       |      0.05
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14.750    0.00    0.08      0.004  O       |       |       |       |     0.04
14.833    0.00    0.07      0.003  O       |       |       |       |     0.04
14.917    0.00    0.06      0.003  O       |       |       |       |     0.03
15.000    0.00    0.05      0.002  O       |       |       |       |     0.03
15.083    0.00    0.04      0.002  O       |       |       |       |     0.02
15.167    0.00    0.04      0.002  O       |       |       |       |     0.02
15.250    0.00    0.03      0.002  O       |       |       |       |     0.02
15.333    0.00    0.03      0.001  O       |       |       |       |     0.02
15.417    0.10    0.03      0.002  O       |       |       |       |     0.02
15.500    0.59    0.07      0.004  O       |       |       |       |     0.04
15.583    1.50    0.21      0.010  O I     |       |       |       |     0.11
15.667    1.97    0.41      0.020  O  I    |       |       |       |     0.22
15.750    2.42    0.66      0.031  |O I    |       |       |       |     0.35
15.833    2.89    0.93      0.044  |O  I   |       |       |       |     0.50
15.917    3.55    0.93      0.060  |O   I  |       |       |       |     0.66
16.000    4.59    0.93      0.081  |O     I|       |       |       |     0.88
16.083    7.79    1.32      0.116  | O     |   I   |       |       |     1.21
16.167   14.97    2.37      0.182  |  O    |       |      I|       |     1.77
16.250   20.15    3.76      0.282  |    O  |       |       |       I     2.52
16.333   10.48    4.50      0.359  |      O|       I       |       |     3.04
16.417    7.07    4.50      0.388  |      O|  I    |       |       |     3.22
16.500    4.78    4.50      0.398  |      O|       |       |       |     3.28
16.583    2.76    4.50      0.393  |   I  O|       |       |       |     3.25
16.667    1.66    4.50      0.377  | I    O|       |       |       |     3.15
16.750    0.88    4.50      0.355  |I     O|       |       |       |     3.02
16.833    0.52    4.26      0.329  I     O |       |       |       |     2.85
16.917    0.34    3.99      0.304  I     O |       |       |       |     2.68
17.000    0.26    3.73      0.279  I    O  |       |       |       |     2.51
17.083    0.17    3.42      0.256  I    O  |       |       |       |     2.34
17.167    0.10    3.13      0.235  I   O   |       |       |       |     2.18
17.250    0.03    2.85      0.215  I   O   |       |       |       |     2.03
17.333    0.01    2.58      0.196  I   O   |       |       |       |     1.89
17.417    0.01    2.33      0.179  I  O    |       |       |       |     1.75
17.500    0.00    2.10      0.164  I  O    |       |       |       |     1.63
17.583    0.00    1.89      0.150  I  O    |       |       |       |     1.52
17.667    0.00    1.69      0.138  I O     |       |       |       |     1.41
17.750    0.00    1.50      0.127  I O     |       |       |       |     1.31
17.833    0.00    1.34      0.117  I O     |       |       |       |     1.22
17.917    0.00    1.19      0.108  IO      |       |       |       |     1.14
18.000    0.00    1.06      0.101  IO      |       |       |       |     1.07
18.083    0.07    0.95      0.094  IO      |       |       |       |     1.01
18.167    0.41    0.93      0.089  IO      |       |       |       |     0.96
18.250    1.01    0.93      0.088  |O      |       |       |       |     0.95
18.333    1.25    0.93      0.089  |O      |       |       |       |     0.96
18.417    1.40    0.93      0.092  |OI     |       |       |       |     0.99
18.500    1.50    0.97      0.095  |OI     |       |       |       |     1.02
18.583    1.57    1.03      0.099  |OI     |       |       |       |     1.05
18.667    1.62    1.09      0.103  |OI     |       |       |       |     1.09
18.750    1.65    1.15      0.106  |OI     |       |       |       |     1.12
18.833    1.67    1.21      0.109  |OI     |       |       |       |     1.15
```

18.917	1.69	1.26	0.112	O				1.18
19.000	1.71	1.31	0.115	O				1.20
19.083	1.73	1.35	0.118	O				1.23
19.167	1.75	1.40	0.121	O				1.25
19.250	1.77	1.44	0.123	O				1.27
19.333	1.78	1.47	0.125	O				1.29
19.417	1.79	1.51	0.127	O				1.31
19.500	1.81	1.54	0.129	O				1.33
19.583	1.82	1.57	0.131	O				1.34
19.667	1.84	1.60	0.133	O				1.36
19.750	1.85	1.63	0.134	O				1.37
19.833	1.86	1.65	0.136	O				1.39
19.917	1.87	1.68	0.137	O				1.40
20.000	1.89	1.70	0.138	O				1.41
20.083	1.90	1.72	0.140	OI				1.42
20.167	1.91	1.74	0.141	OI				1.44
20.250	1.92	1.76	0.142	OI				1.45
20.333	1.93	1.78	0.143	OI				1.46
20.417	1.95	1.80	0.144	OI				1.47
20.500	1.96	1.81	0.145	OI				1.47
20.583	1.97	1.83	0.146	OI				1.48
20.667	1.98	1.85	0.147	OI				1.49
20.750	1.99	1.86	0.148	OI				1.50
20.833	2.00	1.87	0.149	OI				1.51
20.917	2.01	1.89	0.150	OI				1.51
21.000	2.02	1.90	0.151	O				1.52
21.083	2.03	1.91	0.151	O				1.53
21.167	2.04	1.92	0.152	O				1.53
21.250	2.05	1.94	0.153	O				1.54
21.333	2.06	1.95	0.154	O				1.55
21.417	2.07	1.96	0.155	O				1.55
21.500	2.08	1.97	0.155	O				1.56
21.583	2.09	1.98	0.156	O				1.57
21.667	2.10	1.99	0.157	O				1.57
21.750	2.11	2.01	0.158	O				1.58
21.833	2.12	2.02	0.158	O				1.58
21.917	2.13	2.03	0.159	O				1.59
22.000	2.14	2.04	0.160	O				1.60
22.083	2.15	2.05	0.161	O				1.60
22.167	2.16	2.06	0.161	O				1.61
22.250	2.17	2.07	0.162	O				1.61
22.333	2.18	2.08	0.163	O				1.62
22.417	2.18	2.09	0.163	O				1.62
22.500	2.19	2.10	0.164	O				1.63
22.583	2.20	2.11	0.165	O				1.63
22.667	2.21	2.12	0.165	O				1.64
22.750	2.22	2.13	0.166	O				1.64
22.833	2.23	2.14	0.166	O				1.65
22.917	2.23	2.15	0.167	O				1.65
23.000	2.24	2.16	0.168	O				1.66

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23.083    2.25    2.16     0.168  |  O     |       |       |       |     1.66
23.167    2.26    2.17     0.169  |  O     |       |       |       |     1.67
23.250    2.27    2.18     0.169  |  O     |       |       |       |     1.67
23.333    2.28    2.19     0.170  |  O     |       |       |       |     1.68
23.417    2.28    2.20     0.171  |  O     |       |       |       |     1.68
23.500    2.29    2.21     0.171  |  O     |       |       |       |     1.69
23.583    2.30    2.22     0.172  |  O     |       |       |       |     1.69
23.667    2.31    2.22     0.172  |  O     |       |       |       |     1.70
23.750    2.31    2.23     0.173  |  O     |       |       |       |     1.70
23.833    2.32    2.24     0.173  |  O     |       |       |       |     1.71
23.917    2.33    2.25     0.174  |  O     |       |       |       |     1.71
24.000    2.34    2.26     0.175  |  O     |       |       |       |     1.71
24.083    2.24    2.26     0.175  |  O     |       |       |       |     1.72
24.167    1.74    2.23     0.173  | IO     |       |       |       |     1.70
24.250    0.85    2.14     0.167  |I O     |       |       |       |     1.65
24.333    0.51    2.00     0.157  I  O     |       |       |       |     1.57
24.417    0.32    1.84     0.147  I O      |       |       |       |     1.49
24.500    0.19    1.67     0.136  I O      |       |       |       |     1.40
24.583    0.11    1.50     0.127  I O      |       |       |       |     1.31
24.667    0.06    1.34     0.117  I O      |       |       |       |     1.22
24.750    0.04    1.20     0.109  IO       |       |       |       |     1.15
24.833    0.03    1.07     0.101  IO       |       |       |       |     1.08
24.917    0.02    0.96     0.095  IO       |       |       |       |     1.01
25.000    0.01    0.93     0.088  IO       |       |       |       |     0.95
25.083    0.00    0.93     0.082  IO       |       |       |       |     0.89
25.167    0.00    0.93     0.075  IO       |       |       |       |     0.82
25.250    0.00    0.93     0.069  IO       |       |       |       |     0.76
25.333    0.00    0.93     0.063  IO       |       |       |       |     0.69
25.417    0.00    0.93     0.056  IO       |       |       |       |     0.62
25.500    0.00    0.93     0.050  IO       |       |       |       |     0.56
25.583    0.00    0.92     0.043  IO       |       |       |       |     0.49
25.667    0.00    0.79     0.038  IO       |       |       |       |     0.43
25.750    0.00    0.69     0.032  IO       |       |       |       |     0.37
25.833    0.00    0.59     0.028  O        |       |       |       |     0.32
25.917    0.00    0.51     0.024  O        |       |       |       |     0.28
26.000    0.00    0.44     0.021  O        |       |       |       |     0.24
26.083    0.00    0.38     0.018  O        |       |       |       |     0.21
26.167    0.00    0.33     0.016  O        |       |       |       |     0.18
26.250    0.00    0.29     0.014  O        |       |       |       |     0.15
26.333    0.00    0.25     0.012  O        |       |       |       |     0.13
26.417    0.00    0.21     0.010  O        |       |       |       |     0.11
26.500    0.00    0.18     0.009  O        |       |       |       |     0.10
26.583    0.00    0.16     0.008  O        |       |       |       |     0.09
26.667    0.00    0.14     0.007  O        |       |       |       |     0.07
26.750    0.00    0.12     0.006  O        |       |       |       |     0.06
26.833    0.00    0.10     0.005  O        |       |       |       |     0.06
26.917    0.00    0.09     0.004  O        |       |       |       |     0.05
27.000    0.00    0.08     0.004  O        |       |       |       |     0.04
27.083    0.00    0.07     0.003  O        |       |       |       |     0.04
27.167    0.00    0.06     0.003  O        |       |       |       |     0.03
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27.250    0.00    0.05      0.002  O       |       |       |       |      0.03
27.333    0.00    0.04      0.002  O       |       |       |       |      0.02
27.417    0.00    0.04      0.002  O       |       |       |       |      0.02
27.500    0.00    0.03      0.002  O       |       |       |       |      0.02
27.583    0.00    0.03      0.001  O       |       |       |       |      0.01
27.667    0.00    0.02      0.001  O       |       |       |       |      0.01
27.750    0.00    0.02      0.001  O       |       |       |       |      0.01
27.833    0.00    0.02      0.001  O       |       |       |       |      0.01
27.917    0.00    0.02      0.001  O       |       |       |       |      0.01
28.000    0.00    0.01      0.001  O       |       |       |       |      0.01
28.083    0.00    0.01      0.001  O       |       |       |       |      0.01
28.167    0.00    0.01      0.000  O       |       |       |       |      0.01
28.250    0.00    0.01      0.000  O       |       |       |       |      0.00
28.333    0.00    0.01      0.000  O       |       |       |       |      0.00
28.417    0.00    0.01      0.000  O       |       |       |       |      0.00
28.500    0.00    0.01      0.000  O       |       |       |       |      0.00
28.583    0.00    0.00      0.000  O       |       |       |       |      0.00
28.667    0.00    0.00      0.000  O       |       |       |       |      0.00
28.750    0.00    0.00      0.000  O       |       |       |       |      0.00
28.833    0.00    0.00      0.000  O       |       |       |       |      0.00
28.917    0.00    0.00      0.000  O       |       |       |       |      0.00
29.000    0.00    0.00      0.000  O       |       |       |       |      0.00
29.083    0.00    0.00      0.000  O       |       |       |       |      0.00
29.167    0.00    0.00      0.000  O       |       |       |       |      0.00

       ****************************HYDROGRAPH DATA****************************
                       Number of intervals =   350
                       Time interval =    5.0 (Min.)
                       Maximum/Peak flow rate =       4.500 (CFS)
                       Total volume =       3.637 (Ac.Ft)
               Status of hydrographs being held in storage
                          Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
               Peak (CFS)      0.000     0.000     0.000     0.000     0.000
               Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
       ***********************************************************************

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```

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                    FLOOD HYDROGRAPH ROUTING PROGRAM
           Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2018
                        Study date: 05/26/21

---------------------------------------------------------------------


Paradise Ranch
100 yr BMP-3



--------------------------------------------------------------------


Program License Serial Number 6481

--------------------------------------------------------------------
********************* HYDROGRAPH INFORMATION *********************

                From study/file name: ParadiseRanch100yrDA40.rte
****************************HYDROGRAPH DATA****************************
                Number of intervals =   299
                Time interval =    5.0 (Min.)
                Maximum/Peak flow rate =       26.213 (CFS)
                Total volume =       5.230 (Ac.Ft)
        Status of hydrographs being held in storage
                   Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
        Peak (CFS)      0.000     0.000     0.000     0.000     0.000
        Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
***********************************************************************



++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station      10.000 to Point/Station      11.000
**** RETARDING BASIN ROUTING ****
______________________________________________________________________

User entry of depth-outflow-storage data
--------------------------------------------------------------------
Total number of inflow hydrograph intervals = 299
Hydrograph time unit =  5.000 (Min.)
Initial depth in storage basin =   0.00(Ft.)
--------------------------------------------------------------------
--------------------------------------------------------------------
Initial basin depth =   0.00 (Ft.)
Initial basin storage =      0.00 (Ac.Ft)
```

```
Initial basin outflow =   0.00 (CFS)
---------------------------------------------------------------------
--------------------------------------------------------------------
Depth vs. Storage and Depth vs. Discharge data:
 Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
     (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
---------------------------------------------------------------------
  0.000      0.000      0.000      0.000        0.000
  0.500      0.021      3.720      0.008        0.034
  1.000      0.047      7.440      0.021        0.073
  1.500      0.078      7.440      0.052        0.104
  2.000      0.114      7.440      0.088        0.140
  2.500      0.156     20.000      0.087        0.225
  3.000      0.204     20.000      0.135        0.273
--------------------------------------------------------------------
                Hydrograph Detention Basin Routing
---------------------------------------------------------------------

Graph values: 'I'= unit inflow; 'O'=outflow at time shown
---------------------------------------------------------------------
 Time   Inflow  Outflow    Storage                                   Depth
(Hours)  (CFS)   (CFS)     (Ac.Ft) .0       6.6   13.11   19.66   26.21 (Ft.)
 0.083    0.19    0.07      0.000  O       |       |       |       |      0.01
 0.167    1.23    0.56      0.003  OI      |       |       |       |      0.07
 0.250    2.41    1.51      0.009  |OI     |       |       |       |      0.20
 0.333    2.83    2.35      0.013  | OI    |       |       |       |      0.32
 0.417    3.07    2.80      0.016  |  O    |       |       |       |      0.38
 0.500    3.22    3.06      0.017  |  O    |       |       |       |      0.41
 0.583    3.30    3.21      0.018  |  OI   |       |       |       |      0.43
 0.667    3.33    3.29      0.019  |   O   |       |       |       |      0.44
 0.750    3.34    3.32      0.019  |   O   |       |       |       |      0.45
 0.833    3.35    3.34      0.019  |   O   |       |       |       |      0.45
 0.917    3.36    3.35      0.019  |   O   |       |       |       |      0.45
 1.000    3.36    3.36      0.019  |   O   |       |       |       |      0.45
 1.083    3.35    3.36      0.019  |   O   |       |       |       |      0.45
 1.167    3.35    3.35      0.019  |   O   |       |       |       |      0.45
 1.250    3.34    3.35      0.019  |   O   |       |       |       |      0.45
 1.333    3.34    3.34      0.019  |   O   |       |       |       |      0.45
 1.417    3.33    3.34      0.019  |   O   |       |       |       |      0.45
 1.500    3.33    3.33      0.019  |   O   |       |       |       |      0.45
 1.583    3.32    3.33      0.019  |   O   |       |       |       |      0.45
 1.667    3.32    3.32      0.019  |   O   |       |       |       |      0.45
 1.750    3.31    3.32      0.019  |   O   |       |       |       |      0.45
 1.833    3.31    3.31      0.019  |   O   |       |       |       |      0.44
 1.917    3.30    3.30      0.019  |   O   |       |       |       |      0.44
 2.000    3.29    3.30      0.019  |   O   |       |       |       |      0.44
 2.083    3.29    3.29      0.019  |   O   |       |       |       |      0.44
 2.167    3.28    3.29      0.019  |   O   |       |       |       |      0.44
 2.250    3.28    3.28      0.019  |   O   |       |       |       |      0.44
 2.333    3.27    3.28      0.018  |  O    |       |       |       |      0.44
```

2.417	3.27	3.27	0.018	O				0.44
2.500	3.26	3.26	0.018	O				0.44
2.583	3.25	3.26	0.018	O				0.44
2.667	3.25	3.25	0.018	O				0.44
2.750	3.24	3.25	0.018	O				0.44
2.833	3.24	3.24	0.018	O				0.44
2.917	3.23	3.24	0.018	O				0.43
3.000	3.22	3.23	0.018	O				0.43
3.083	3.22	3.22	0.018	O				0.43
3.167	3.21	3.22	0.018	O				0.43
3.250	3.21	3.21	0.018	O				0.43
3.333	3.20	3.21	0.018	O				0.43
3.417	3.19	3.20	0.018	O				0.43
3.500	3.19	3.19	0.018	O				0.43
3.583	3.18	3.19	0.018	O				0.43
3.667	3.18	3.18	0.018	O				0.43
3.750	3.17	3.18	0.018	O				0.43
3.833	3.16	3.17	0.018	O				0.43
3.917	3.16	3.16	0.018	O				0.43
4.000	3.15	3.16	0.018	O				0.42
4.083	3.15	3.15	0.018	O				0.42
4.167	3.14	3.14	0.018	O				0.42
4.250	3.13	3.14	0.018	O				0.42
4.333	3.13	3.13	0.018	O				0.42
4.417	3.12	3.13	0.018	O				0.42
4.500	3.11	3.12	0.018	O				0.42
4.583	3.11	3.11	0.018	O				0.42
4.667	3.10	3.11	0.018	O				0.42
4.750	3.09	3.10	0.017	O				0.42
4.833	3.09	3.09	0.017	O				0.42
4.917	3.08	3.09	0.017	O				0.41
5.000	3.07	3.08	0.017	O				0.41
5.083	3.07	3.07	0.017	O				0.41
5.167	3.06	3.07	0.017	O				0.41
5.250	3.05	3.06	0.017	O				0.41
5.333	3.05	3.05	0.017	O				0.41
5.417	3.04	3.05	0.017	O				0.41
5.500	3.03	3.04	0.017	O				0.41
5.583	3.03	3.03	0.017	O				0.41
5.667	3.02	3.03	0.017	O				0.41
5.750	3.01	3.02	0.017	O				0.41
5.833	3.01	3.01	0.017	O				0.40
5.917	3.00	3.00	0.017	O				0.40
6.000	2.99	3.00	0.017	O				0.40
6.083	2.98	2.99	0.017	O				0.40
6.167	2.98	2.98	0.017	O				0.40
6.250	2.97	2.98	0.017	O				0.40
6.333	2.96	2.97	0.017	O				0.40
6.417	2.96	2.96	0.017	O				0.40
6.500	2.95	2.95	0.017	O				0.40

6.583	2.94	2.95	0.017	O					0.40
6.667	2.93	2.94	0.017	O					0.40
6.750	2.93	2.93	0.017	O					0.39
6.833	2.92	2.93	0.017	O					0.39
6.917	2.91	2.92	0.016	O					0.39
7.000	2.90	2.91	0.016	O					0.39
7.083	2.90	2.90	0.016	O					0.39
7.167	2.89	2.89	0.016	O					0.39
7.250	2.88	2.89	0.016	O					0.39
7.333	2.87	2.88	0.016	O					0.39
7.417	2.86	2.87	0.016	O					0.39
7.500	2.86	2.86	0.016	O					0.38
7.583	2.85	2.86	0.016	O					0.38
7.667	2.84	2.85	0.016	O					0.38
7.750	2.83	2.84	0.016	O					0.38
7.833	2.82	2.83	0.016	O					0.38
7.917	2.82	2.82	0.016	O					0.38
8.000	2.81	2.82	0.016	O					0.38
8.083	2.80	2.81	0.016	O					0.38
8.167	2.79	2.80	0.016	O					0.38
8.250	2.78	2.79	0.016	O					0.38
8.333	2.77	2.78	0.016	O					0.37
8.417	2.77	2.77	0.016	O					0.37
8.500	2.76	2.76	0.016	O					0.37
8.583	2.75	2.76	0.016	O					0.37
8.667	2.74	2.75	0.016	O					0.37
8.750	2.73	2.74	0.015	O					0.37
8.833	2.72	2.73	0.015	O					0.37
8.917	2.71	2.72	0.015	O					0.37
9.000	2.70	2.71	0.015	O					0.36
9.083	2.70	2.70	0.015	O					0.36
9.167	2.69	2.69	0.015	O					0.36
9.250	2.68	2.68	0.015	O					0.36
9.333	2.67	2.68	0.015	O					0.36
9.417	2.66	2.67	0.015	O					0.36
9.500	2.65	2.66	0.015	O					0.36
9.583	2.64	2.65	0.015	O					0.36
9.667	2.63	2.64	0.015	O					0.35
9.750	2.62	2.63	0.015	O					0.35
9.833	2.61	2.62	0.015	O					0.35
9.917	2.60	2.61	0.015	O					0.35
10.000	2.59	2.60	0.015	O					0.35
10.083	2.58	2.59	0.015	O					0.35
10.167	2.57	2.58	0.015	O					0.35
10.250	2.56	2.57	0.014	O					0.35
10.333	2.55	2.56	0.014	O					0.34
10.417	2.54	2.55	0.014	O					0.34
10.500	2.53	2.54	0.014	O					0.34
10.583	2.52	2.53	0.014	O					0.34
10.667	2.51	2.51	0.014	O					0.34

10.750	2.49	2.50	0.014	O	0.34
10.833	2.48	2.49	0.014	O	0.34
10.917	2.47	2.48	0.014	O	0.33
11.000	2.46	2.47	0.014	O	0.33
11.083	2.45	2.46	0.014	IO	0.33
11.167	2.44	2.45	0.014	O	0.33
11.250	2.43	2.44	0.014	O	0.33
11.333	2.41	2.42	0.014	O	0.33
11.417	2.40	2.41	0.014	O	0.32
11.500	2.39	2.40	0.014	O	0.32
11.583	2.38	2.39	0.013	O	0.32
11.667	2.37	2.38	0.013	O	0.32
11.750	2.35	2.36	0.013	O	0.32
11.833	2.34	2.35	0.013	O	0.32
11.917	2.33	2.34	0.013	O	0.31
12.000	2.31	2.32	0.013	O	0.31
12.083	2.18	2.26	0.013	O	0.30
12.167	1.47	1.93	0.011	IO	0.26
12.250	0.68	1.28	0.007	IO	0.17
12.333	0.39	0.71	0.004	O	0.10
12.417	0.22	0.40	0.002	O	0.05
12.500	0.12	0.23	0.001	O	0.03
12.583	0.06	0.12	0.001	O	0.02
12.667	0.04	0.07	0.000	O	0.01
12.750	0.03	0.04	0.000	O	0.01
12.833	0.02	0.03	0.000	O	0.00
12.917	0.01	0.01	0.000	O	0.00
13.000	0.00	0.01	0.000	O	0.00
13.083	0.00	0.00	0.000	O	0.00
13.167	0.00	0.00	0.000	O	0.00
13.250	0.00	0.00	0.000	O	0.00
13.333	0.00	0.00	0.000	O	0.00
13.417	0.00	0.00	0.000	O	0.00
13.500	0.00	0.00	0.000	O	0.00
13.583	0.00	0.00	0.000	O	0.00
13.667	0.00	0.00	0.000	O	0.00
13.750	0.00	0.00	0.000	O	0.00
13.833	0.00	0.00	0.000	O	0.00
13.917	0.00	0.00	0.000	O	0.00
14.000	0.00	0.00	0.000	O	0.00
14.083	0.00	0.00	0.000	O	0.00
14.167	0.00	0.00	0.000	O	0.00
14.250	0.00	0.00	0.000	O	0.00
14.333	0.00	0.00	0.000	O	0.00
14.417	0.00	0.00	0.000	O	0.00
14.500	0.00	0.00	0.000	O	0.00
14.583	0.00	0.00	0.000	O	0.00
14.667	0.00	0.00	0.000	O	0.00
14.750	0.00	0.00	0.000	O	0.00
14.833	0.00	0.00	0.000	O	0.00

```
14.917    0.00    0.00      0.000  O       |       |       |       |     0.00
15.000    0.00    0.00      0.000  O       |       |       |       |     0.00
15.083    0.00    0.00      0.000  O       |       |       |       |     0.00
15.167    0.00    0.00      0.000  O       |       |       |       |     0.00
15.250    0.00    0.00      0.000  O       |       |       |       |     0.00
15.333    0.00    0.00      0.000  O       |       |       |       |     0.00
15.417    0.18    0.07      0.000  O       |       |       |       |     0.01
15.500    1.19    0.54      0.003  OI      |       |       |       |     0.07
15.583    2.41    1.50      0.008  |OI     |       |       |       |     0.20
15.667    3.09    2.45      0.014  | OI    |       |       |       |     0.33
15.750    3.71    3.17      0.018  |  OI   |       |       |       |     0.43
15.833    4.45    3.84      0.022  |   OI  |       |       |       |     0.52
15.917    5.43    4.56      0.027  |    OI |       |       |       |     0.61
16.000    7.17    5.71      0.035  |     O I       |       |       |     0.77
16.083   12.39    7.44      0.057  |       |O     I|       |       |     1.16
16.167   25.74   10.84      0.125  |       |    O  |              I|     2.14
16.250   26.21   20.00      0.198  |       |       |       O      I|     2.94
16.333   13.52   20.00      0.197  |       |       I       O       |     2.93
16.417    9.10   17.25      0.147  |       |  I    |    O  |       |     2.39
16.500    5.63    7.44      0.113  |     I |O      |       |       |     1.98
16.583    2.91    7.44      0.091  |  I    |O      |       |       |     1.68
16.667    1.44    7.44      0.054  |I      |O      |       |       |     1.12
16.750    0.82    3.98      0.023  I   O   |       |       |       |     0.54
16.833    0.51    1.51      0.008  IO      |       |       |       |     0.20
16.917    0.36    0.69      0.004  O       |       |       |       |     0.09
17.000    0.20    0.38      0.002  O       |       |       |       |     0.05
17.083    0.05    0.19      0.001  O       |       |       |       |     0.03
17.167    0.03    0.07      0.000  O       |       |       |       |     0.01
17.250    0.01    0.03      0.000  O       |       |       |       |     0.00
17.333    0.00    0.01      0.000  O       |       |       |       |     0.00
17.417    0.00    0.01      0.000  O       |       |       |       |     0.00
17.500    0.00    0.00      0.000  O       |       |       |       |     0.00
17.583    0.00    0.00      0.000  O       |       |       |       |     0.00
17.667    0.00    0.00      0.000  O       |       |       |       |     0.00
17.750    0.00    0.00      0.000  O       |       |       |       |     0.00
17.833    0.00    0.00      0.000  O       |       |       |       |     0.00
17.917    0.00    0.00      0.000  O       |       |       |       |     0.00
18.000    0.00    0.00      0.000  O       |       |       |       |     0.00
18.083    0.13    0.05      0.000  O       |       |       |       |     0.01
18.167    0.83    0.37      0.002  OI      |       |       |       |     0.05
18.250    1.62    1.02      0.006  |O      |       |       |       |     0.14
18.333    1.93    1.59      0.009  |OI     |       |       |       |     0.21
18.417    2.11    1.92      0.011  | O     |       |       |       |     0.26
18.500    2.24    2.11      0.012  | O     |       |       |       |     0.28
18.583    2.32    2.24      0.013  | O     |       |       |       |     0.30
18.667    2.36    2.32      0.013  | O     |       |       |       |     0.31
18.750    2.40    2.37      0.013  | O     |       |       |       |     0.32
18.833    2.43    2.40      0.014  | O     |       |       |       |     0.32
18.917    2.46    2.44      0.014  | OI    |       |       |       |     0.33
19.000    2.49    2.47      0.014  |  O    |       |       |       |     0.33
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19.083	2.51	2.49	0.014	O					0.34
19.167	2.54	2.52	0.014	O					0.34
19.250	2.56	2.54	0.014	O					0.34
19.333	2.58	2.56	0.014	O					0.34
19.417	2.60	2.58	0.015	O					0.35
19.500	2.62	2.60	0.015	O					0.35
19.583	2.64	2.62	0.015	O					0.35
19.667	2.66	2.64	0.015	O					0.35
19.750	2.67	2.66	0.015	O					0.36
19.833	2.69	2.68	0.015	O					0.36
19.917	2.71	2.70	0.015	O					0.36
20.000	2.73	2.71	0.015	O					0.36
20.083	2.75	2.73	0.015	O					0.37
20.167	2.76	2.75	0.016	O					0.37
20.250	2.78	2.77	0.016	O					0.37
20.333	2.80	2.78	0.016	O					0.37
20.417	2.81	2.80	0.016	O					0.38
20.500	2.83	2.82	0.016	O					0.38
20.583	2.85	2.83	0.016	O					0.38
20.667	2.86	2.85	0.016	O					0.38
20.750	2.88	2.87	0.016	O					0.39
20.833	2.89	2.88	0.016	O					0.39
20.917	2.91	2.90	0.016	O					0.39
21.000	2.92	2.91	0.016	O					0.39
21.083	2.94	2.93	0.017	O					0.39
21.167	2.95	2.94	0.017	O					0.40
21.250	2.97	2.96	0.017	O					0.40
21.333	2.98	2.97	0.017	O					0.40
21.417	3.00	2.99	0.017	O					0.40
21.500	3.01	3.00	0.017	O					0.40
21.583	3.03	3.01	0.017	O					0.41
21.667	3.04	3.03	0.017	O					0.41
21.750	3.05	3.04	0.017	O					0.41
21.833	3.07	3.05	0.017	O					0.41
21.917	3.08	3.07	0.017	O					0.41
22.000	3.09	3.08	0.017	O					0.41
22.083	3.11	3.09	0.017	O					0.42
22.167	3.12	3.11	0.018	O					0.42
22.250	3.13	3.12	0.018	O					0.42
22.333	3.14	3.13	0.018	O					0.42
22.417	3.16	3.15	0.018	O					0.42
22.500	3.17	3.16	0.018	O					0.42
22.583	3.18	3.17	0.018	O					0.43
22.667	3.19	3.18	0.018	O					0.43
22.750	3.21	3.20	0.018	O					0.43
22.833	3.22	3.21	0.018	O					0.43
22.917	3.23	3.22	0.018	O					0.43
23.000	3.24	3.23	0.018	O					0.43
23.083	3.25	3.24	0.018	O					0.44
23.167	3.26	3.25	0.018	O					0.44

```
23.250    3.28    3.27      0.018  |  O     |       |       |       |     0.44
23.333    3.29    3.28      0.019  |   O    |       |       |       |     0.44
23.417    3.30    3.29      0.019  |   O    |       |       |       |     0.44
23.500    3.31    3.30      0.019  |   O    |       |       |       |     0.44
23.583    3.32    3.31      0.019  |   O    |       |       |       |     0.45
23.667    3.33    3.32      0.019  |   O    |       |       |       |     0.45
23.750    3.34    3.33      0.019  |   O    |       |       |       |     0.45
23.833    3.35    3.34      0.019  |   O    |       |       |       |     0.45
23.917    3.36    3.35      0.019  |   O    |       |       |       |     0.45
24.000    3.37    3.37      0.019  |   O    |       |       |       |     0.45
24.083    3.20    3.31      0.019  |  IO    |       |       |       |     0.44
24.167    2.16    2.83      0.016  | IO     |       |       |       |     0.38
24.250    0.99    1.88      0.011  |IO      |       |       |       |     0.25
24.333    0.57    1.05      0.006  IO      |       |       |       |     0.14
24.417    0.32    0.59      0.003  O       |       |       |       |     0.08
24.500    0.17    0.33      0.002  O       |       |       |       |     0.04
24.583    0.09    0.18      0.001  O       |       |       |       |     0.02
24.667    0.05    0.10      0.001  O       |       |       |       |     0.01
24.750    0.03    0.06      0.000  O       |       |       |       |     0.01
24.833    0.02    0.03      0.000  O       |       |       |       |     0.00
24.917    0.01    0.02      0.000  O       |       |       |       |     0.00
25.000    0.00    0.01      0.000  O       |       |       |       |     0.00

       ****************************HYDROGRAPH DATA****************************
                       Number of intervals =   300
                       Time interval =    5.0 (Min.)
                       Maximum/Peak flow rate =       20.000 (CFS)
                       Total volume =       5.230 (Ac.Ft)
               Status of hydrographs being held in storage
                          Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
               Peak (CFS)      0.000     0.000     0.000     0.000     0.000
               Vol (Ac.Ft)      0.000     0.000     0.000     0.000     0.000
       ***********************************************************************

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HYDROLOGY MAP

Pre-Development Exhibit
Post Development Exhibit

PLANS PREPARED BY:

BLUE Engineering & Consulting, Inc
12223 HIGHLAND AVE. #106-594 – RANCHO CUCAMONGA, CA 91739
PHONE: 909-248-6557 – E-MAIL ANGEL@BLUECIVILENG.COM WWW.BLUECIVILENG.COM

PLANS PREPARED UNDER THE SUPERVISION OF: ANGEL CESAR, P.E. 87222 — DATE

BENCH MARK:

ELEVATIONS ARE BASED ON CITY OF CHINO BENCH MARK "74-1-13", A BRASS DISK IN CONCRETE LOCATED AT THE SOUTHWEST CORNER OF PEYTON DRIVE AND ENGLISH AVENUE. ELEV = 711.3339 FEET (LEVELED 05/01/81)

BASIS OF BEARINGS:

COORDINATES SHOWN ARE BASED ON THE CALIFORNIA COORDINATE SYSTEM (CCS83), ZONE 5, 1983 NAD (2004.00 EPOCH) USING CALIFORNIA SPATIAL REFERENCE CENTER COORDINATES FOR CORS STATIONS "TWMS", "SPMS" AND "PSDM".

DIGALERT
DIAL TOLL FREE
8-1-1
AT LEAST TWO DAYS BEFORE YOU DIG
UNDERGROUND SERVICE ALERT OF NORTHERN CALIFORNIA

CITY OF CHINO HILLS INCORPORATED 1991

REGISTERED PROFESSIONAL ENGINEER
ANGEL CESAR
No. 87222
CIVIL
STATE OF CALIFORNIA

REVISIONS

MARK		APPR	DATE

SIZE D

CITY OF CHINO HILLS
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

DESIGNED BY | DRAWN BY | CHECKED BY

APPROVED BY:
NADEEM MAJAJ — DATE
PUBLIC WORKS DIRECTOR/CITY ENGINEER
R.C.E. No. 44552 EXP. 3/31/20

SUBMITTED BY
REVIEWED BY:
ASSISTANT CITY ENGINEER — DATE

PARADISE RANCH RESIDENTIAL DEVELOPMENT

MAP # 20286

PRECISE GRADING PLAN

EXISTING HYDROLOGY MAP

CIP No.

PROJECT PLAN SHEET No.

SHEET OF 13

PLANS PREPARED BY:

BLUE Engineering & Consulting, Inc

12223 HIGHLAND AVE. #106-594 – RANCHO CUCAMONGA, CA 91739
PHONE: 909-248-6557 – E-MAIL ANGEL@BLUECIVILENG.COM WWW.BLUECIVILENG.COM

PLANS PREPARED UNDER THE SUPERVISION OF: DATE
ANGEL CESAR, P.E. 87222

BENCH MARK:

ELEVATIONS ARE BASED ON CITY OF CHINO BENCH MARK "74-1-13", A BRASS DISK IN CONCRETE LOCATED AT THE SOUTHWEST CORNER OF PEYTON DRIVE AND ENGLISH AVENUE. ELEV = 711.3339 FEET (LEVELED 05/01/81)

BASIS OF BEARINGS:

COORDINATES SHOWN ARE BASED ON THE CALIFORNIA COORDINATE SYSTEM (CCS83), ZONE 5, 1983 NAD (2004.00 EPOCH) USING CALIFORNIA SPATIAL REFERENCE CENTER COORDINATES FOR CORS STATIONS "TWMS", "SPMS" AND "PSDM".

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REGISTERED PROFESSIONAL ENGINEER
ANGEL CESAR
No. 87222
CIVIL
STATE OF CALIFORNIA

REVISIONS			
MARK		APPR	DATE

SIZE D

CITY OF CHINO HILLS
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

DESIGNED BY | DRAWN BY | CHECKED BY | APPROVED BY:

SUBMITTED BY
REVIEWED BY:
ASSISTANT CITY ENGINEER DATE

DANIEL BOBADILLA DATE
PUBLIC WORKS DIRECTOR/CITY ENGINEER
R.C.E. No. 68495 EXP. 9/30/23

PARADISE RANCH RESIDENTIAL DEVELOPMENT

MAP # 20286
PRECISE GRADING PLAN

PROPOSED HYDROLOGY MAP

CIP No.

PROJECT PLAN SHEET No.

SHEET OF 13

FIRE PROTECTION PLAN
Paradise Ranch, Tracts No. 20286, 16200 & 16220
Chino Hills, California
April 30, 2020 (Revised 10/30 & 12/10, 2020)

Owner: Philip J. Gentile Jr. Trustee
Philip J. Gentile Jr. Living Trust

Prepared by: Herbert A. Spitzer
Senior Wildland Fire Associate
*FIRE*WISE 2000, LLC

Certified by: ________________________

Melvin Johnson, Owner
Certified CEQA Wildland Fire Consultant
*FIRE*WISE 2000, LLC
PO Box 39
Valley Center, CA 92082
(760) 745-3947

TABLE OF CONTENTS

Appendix A – Recommended Plant List
Appendix B – Prohibited Invasive Plant List
Appendix C – Literature References
Appendix D - Non-combustible & Fire-Resistant Building Materials
Appendix E – Ignition-Resistive and Building Construction Requirements
Appendix F - Off-Site Fuel Treatment Agreement (Provided by Developer/Owner)

Paradise Ranch, Tracts No. 20286, 16200 & 16220
FIRE PROTECTION PLAN
Chino Hills, California
April 30, 2020 (Revised 10/30 & 12/10, 2020)

1.0 General Description

The Paradise Ranch project site is located on the west side of Canyon Hills Road, approximately 1,700 feet north of Carbon Canyon Road, in the southwestern portion of the City of Chino Hills, California. The project is located within a state and locally declared Very High Fire Hazard Severity Zone and is surrounded by developed and undeveloped land (Photo 1). Vacant land consisting of incised drainages and moderately steep hillsides are present to the west and south sides of the project site. The Chino Valley Fire District (CVFD) is the fire authority for the project.

↑ Photo 1 – Aerial view of the project site. Note the current existing development to the north and east.

This proposed project area consists of 82.6 acres, of which approximately ¼ will be developed. The balance will remain dedicated open space, trails and undeveloped land retained by the current owner. Construction is proposed for 50 single family dwelling units, plus one existing home will remain for a total of 51 units. The area designated for development within Paradise Ranch is currently designated by the City as Rural Residential on the General Plan Land Use Map and Zoned R-R Rural Residential.

↑ Photo 2 - View of the existing residence and associated stables and pasture.

The development is to be built partially on previously developed land. Prior use includes a residential home, barn, stables, and fenced pasture (Photo 2).

Maintenance of all roads, gates, sidewalks and similar improvements will become the responsibility of the HOA once the project is completed.

1.1 General Information

Owner:	Philip J. Gentile Jr. Trustee Philip J. Gentile Jr. Living Trust Dated November 13, 2001
Subdivider:	TTLC CHINO HILLS – PARADISE RANCH, LLC 2942 Century Place Suite 121 Costa Mesa, CA 92626 Phone: (949) 645-5370 Contact: Michael Torres
Approving Departments:	
Fire Authority:	Chino Valley Fire District (CVFD)
Engineering:	Chino Hills Public Works
Water:	City of Chino Hills Public Works

In conjunction with building plan check, a final Fire Protection Plan (FPP) should be submitted and approved. Prior to owner occupancy, several aspects of the FPP shall be implemented. The FPP assesses the overall (onsite and offsite) wildland fire hazards and risks that may threaten life and property associated with the proposed residential development. In addition, the FPP establishes both short and long-term fuel modification actions to minimize any projected fire hazard and risk while assigning annual maintenance responsibilities for each of the recommended fuel modification actions. Fuel modification areas will be required to be installed prior to occupancy.

1.2 Purpose

The purpose of this FPP is to provide Fuel Modification Zone treatment direction and building features for developers, architects, builders, and fire officials to use in making all proposed structures safe from wildland fires. The goal of this FPP is to minimize any potential loss of life, homes, or personal property due to a wildland fire. A conjunction with building plan check, a final FPP shall be submitted and approved prior to construction or owner occupancy. Appendices attached to this FPP that provide additional information and shall be considered part of this FPP.

This FPP includes:

- A wildland fire hazard rating assessment and calculations of the expected fire behavior in the event a wildland fire should occur within the offsite and onsite native and exotic vegetation.
- A long-term perimeter vegetative fuel modification treatment and maintenance plan to minimize any loss to residential structures within the planned development due to wildland fire.

- A long-term interior open space fuel modification treatment plan and *"firewise landscaping"* criteria to be deployed around all planned structures.

- Building construction and design criteria to be applied to the perimeter lots next to any high fire hazard wildland fuels.

- A review of existing architectural plans, ignition resistant building features, and community protection systems (e.g. water and access), and specifications to assure these plans, features and systems adequately protect life and property.

This FPP is based upon requirements listed in the San Bernardino County Fire Agency Urban Wildland Interface Requirements; City of Chino Hills Ordinance No. 306 adopted 12/16/2016; CVFD Fire Protection Standard - Fuel Modification Zones, Standard #130 established 04/01/2019; and the criteria identified in the most current versions of the following documents including the National Fire Protection Association (NFPA) 1144 – Standard for Reducing Structure Ignition Hazard from Wildland Fire; the California Fire Code California Code of Regulations Title 24, Part 9; Chapter 7A (SFM) Materials and Construction Methods for Exterior Wildfire Exposure; California Public Resources Codes sections 4201 through 4204; and NFPA Standard 13-D, Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes. See Appendix C for referenced codes and ordinances.

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2.0 Wildland Fire Hazard and Risk Assessment

The assessment of wildland fire hazards and risks are divided between those that are offsite and those that are onsite. Herein, offsite refers to outside the area where grading will occur while onsite are those areas that are to be graded. Onsite assessments are the most easily managed while those from offsite sources can be more complex and require special solutions.

2.1 Offsite Fire Hazard and Risk Assessment

The Paradise Ranch Project is located within an area classified by the City of Chino Hills and the California Department of Forestry and Fire Protection as a Very High Fire Hazard Area. The project is immediately surrounded by both undeveloped and fully developed residential land. The area to the east and north, are developed with existing fuel treatment zones. A blue line stream with riparian vegetation exists between the development and these adjacent developed lands.

To the west and south of the project are undeveloped land that is owned partially by the Paradise Ranch Project property owner (Photo 3) and an unknown owner adjacent to the development. A portion of the undeveloped land (approximately 10.37 acres) west of the homes is scheduled to become dedicated open space. The western property boundary abuts the Hillcrest development which currently under construction. All the land is fenced and has been grazed as ***FIREWISE 2000, LLC*** found animal droppings while taking photographs. Typical ridgeline view (Photo 4). Only fuels within designated fuel treatment zones are to be removed.

The prevailing winds are generally from the southwest to west. These winds typically have higher moisture (relative humidity) during summer months and normally the wind speed subsides at sunset. Approximately 85% to 90% of wildland fires in this area burn under prevailing winds.

↑ Photo 3 – Overview of a typical hillside adjacent to the planned residences. The view is to the northwest.

↑ Photo 4 – Looking Northwest toward the Ridge west of the planned homes.

The major threat of an offsite wildland fire is from the south and west of the project. This threat comes from the adjacent vegetative fuels, history of severe fire weather, and terrain. In 1990, a 6,600-acre fire in Carbon Canyon was started by a transient. This fire occurred during a period of offshore northeast "Santa Ana" winds. As the strong wind abated, the fire extended to the north and east destroying a total of fourteen homes. ***FIREWISE 2000, LLC*** found no evidence of severe fire activity in the project area as there were no structure foundations or chimneys visible nor were any fire scars seen on any of the larger trees. Regardless, the fuels, topography and weather combine to make wildland fire conditions favorable.

One of the most recent wildfires that burned in the vicinity of project site was the November 2008 Freeway Complex Fire that burned 30,305 acres under Santa Ana wind conditions. This fire originated to the south and east in Orange County and moved west and northward into lower Carbon Canyon and Olinda Ranch eventually spreading northwest into Diamond Bar while destroying 314 homes.

↑ Photo 5 – Looking north into the drainage separating the proposed development from adjoining developed lands. Oak trees dominate the landscape. Some fuel treatment has occurred, likely from property owners located to the north.

Northern Boundary Fuels (Lots 27-38) – The vegetation is primarily Oak Woodland as shown in Photos 5 and 6. Hot and dry Santa Ana winds blowing embers across the development from the north or northeast could easily land and start a fire within the dedicated open space or Oak Woodland that lies to the north of the Paradise Ranch project. A fire burning in the Oak Woodland would be of a lower intensity than intermediate chaparral or moderate grass which is of benefit to the project. Of considerable benefit is the fact that to the north of the intermittent streambed are several large custom homes with established fuel treatment zones.

↑ Photo 6 - Looking north toward the northern boundary and the intermittent stream channel. The stream vegetation is dominated by oak trees while mustard and grass lie in the foreground on drier ground.

The typical fuel model for this northern boundary is a Combined Fuel Model Gr4 – Moderate load, dry climate grass (60%) and Fuel Model Tl6 – Moderate load broadleaf litter (40%). Uphill slopes in this area range from 10 - 40 percent. The lowest elevations in the project occur along the intermittent stream channel.

It is reasonable to expect Santa Ana winds in the range of 60-80 MPH within this portion of San Bernardino County. The Oak Woodland, along a portion of the northern boundry and the fact that it is located adjacent to a streambed covered by trees in a canyon bottom, provides significant wind protection. For planning purposes, it is reasonable to calculate fire behavior projections for a worst case 80-MPH Santa Ana wind. The anticipated wind, mild upslope topography, and fuels are in direct alignment with the proposed structures. A fire burning under this wind condition and in the fuels along the northern boundary will burn uphill toward the project, thereby increasing fire intensity and the impact on the proposed structures.

Eastern Boundary Fuels (Lots 1-11 and 39-50) – A significant portion of the eastern boundary of the project abuts offsite Oak Woodland vegetation including a blue line stream (Photo 7). Of considerable benefit is the fact that both a road and several homes with established fuel treatment zones exist east of the Oak Woodland (Photo 1).

↑ Photo 7 - Looking Southeast along the Eastern Boundary. Note the slopes are only slightly downhill which is beneficial. Much of the land in the foreground is to become dedicated open space. Oak Woodland exists within the intermittent streambed.

The typical fuel model for this eastern boundary is a Combined Fuel Model – Gr4 – Moderate load dry climate grass (70%) and Tl9 - Moderate load broadleaf litter (30%). Slopes in this area range from 5-40 percent and are uphill into the development which results in slightly higher fire intensity and flame lengths.

Southern Boundary Fuels (Lots 1, 12, 25-32) – The southern and boundary will abut offsite private property as shown in Photo 8. Hot and dry summertime *rare event* southwest winds blowing from the west or southwest will push fires starting in the private land south of the project boundary fence toward the Paradise Ranch Development. Embers could easily ignite the fuels in the open space area. This new fire would be pushed by the *rare event* winds towards these Lots.

↑ Photo 8: Looking southwest along the southern project boundary near lot 1.

The typical fuel model for this southern boundary is a Combined Fuel Model Sh5 – High load, dry climate shrub (70%) and Fuel Model Tl6 – Moderate load broadleaf litter (30%). Downhill slopes in this area range from 5 - 50 percent.

It is reasonable to expect *rare event* summer winds in the range of 20-30 MPH within this portion of San Bernardino County. For planning purposes, fire behavior projections were developed for a 30-MPH Southwest wind. The anticipated wind, and fuels are in direct alignment with the proposed structures. A fire burning under this wind condition and in the fuels described along the southern boundary will burn slightly downhill thereby reducing fire intensity and the impact on the nearby structures.

Western Boundary Fuels (Lots 1-22, 26 and 27) – The homes built on these Lots will be exposed to wildland fire threats from the adjoining open space and undeveloped hillside areas (Photo 9). Under present conditions, a fire burning in the open space area during a strong south or southwest wind could spread into the Tract. Strong *rare event* southwest winds of 30 MPH may occur once every decade. Regardless of the time interval, these winds combined with adjacent fuels pose a threat to the project. Recommended actions in Section 6.1 will mitigate the wildland fire threat to less than significant values once implemented.

↑ Photo 9: Looking West from the current access road to the residence on the ridge near proposed Lot No 27. The area to the right of the concrete tank will require fuel treatment.

Approximately a quarter of a mile to the west is another development currently under construction. The properties within this development will have their own fuel treatments. The presence of this development helps break up wildland vegetation continuity by creating barriers to fire spread including fuel treatments, paved roads and water and debris detention basins.

The forecast fuel model for this southern boundary is a Combined Fuel Model – Sh5 – High load, dry climate shrub (60%) and Fuel Model Tl6 – Moderate load broadleaf litter (40%). Slopes along the southern boundary range between 20 - 50 percent and are all downhill into the development which is of significant benefit.

2.2 Onsite Fire Hazard and Risk Assessment

The area within the Paradise Ranch development footprint currently consists of vacant land and a home associated with stables, several storage buildings and fenced pasture that are all scheduled to be removed. One existing single-family home will remain that is located to the Southwest of the proposed development. The project is aligned in a northwest to southeast direction within a valley. Water detention structures are planned to collect and disperse overland water flows. During the dry summer months, the vegetation within these detention structures can become a fire hazard and will require periodic treatment. To the west, is an area of approximately 10.37 acres of planned open space and to the north and east along the streambed is another 1.81 acres of planned open space. Fuel treatment of a portion of the larger open space lot and all the smaller lot will be required. Topography in the area ranges from nearly level on the ridge tops and canyon bottom to 10 – 50% slopes between the ridge and the valley. A variety of vegetative species are located on the site including a variety of oaks, California buckwheat, elderberry, annual grasses, black mustard, and related species. With fuel treatments, fire behavior and intensities will be significantly reduced.

Northern Boundary Fuels - All onsite native vegetation will be removed during grading for each lot and several manufactured slopes will be created adjacent to these building pads. Only a narrow area within and along the intermittent stream will continue to support wildland vegetation, a portion of which is scheduled to be dedicated open space. Once the actions recommended in Section 6.1 are implemented, the wildland fire threat will be mitigated to less than significant values.

Eastern Boundary Fuels - The existing vegetative fuels located onsite will be removed as depicted in Photo 10. Under present conditions, a fire burning in this area during a strong east, northeast, or southeast wind could spread into the Tract. Once grading is performed and the actions recommended in Section 6.1 are implemented, the wildland fire threat will be mitigated to less than significant values.

↑ Photo 10: Looking south along the eastern project boundary where lots 1-4 are to be located.

Southern Boundary Fuels – Within the project, nearly all the onsite southern boundary fuels will be removed during grading. The fuel treatments and maintenance described in Section 6.1 will provide significant fire protection.

Western Boundary Fuels – Several large manufactured slopes will be created near the lot building pads. As a result, no native vegetation will exist directly adjacent to any of the planned home. The fuel treatment and maintenance described in Section 6.1 will provide significant fire protection.

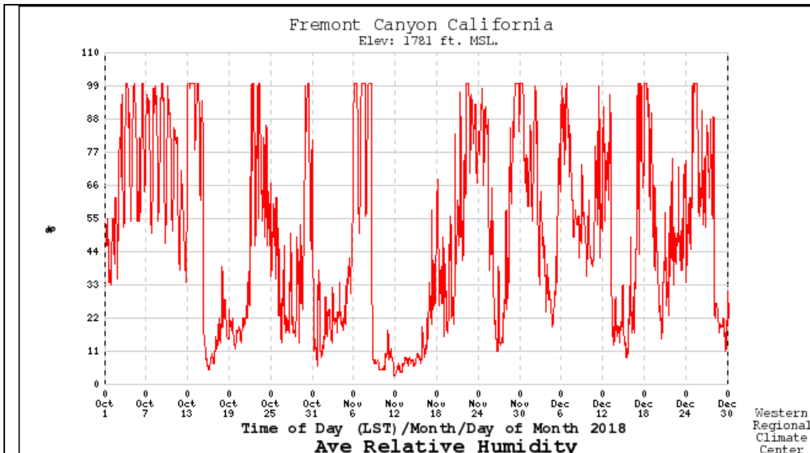
2.3 Weather Review and Assessment

Weather has a dramatic influence on wildland fire behavior. The most critical weather pattern to the project area is a hot, dry offshore wind, typically called a Santa Ana. Such wind conditions are usually associated with strong (>40 MPH), hot, dry winds with very low (<15%) relative humidity. Santa Ana winds originate over the dry desert land and can occur anytime of the year. However, they generally occur in the late fall (September through November) before the onset of winter rains as noted by Robert G. Fovell, Ph.D., UCLA Atmospheric and Oceanic Sciences. This is also when non-irrigated vegetation is at its lowest moisture content.

Fire agencies throughout the western United States rely on a sophisticated system of Remote Automated Weather Stations (RAWS) to monitor weather conditions and aid in the forecasting of fire danger. The closest RAWS with significant historical data to the Paradise Ranch Project is the Fremont Canyon RAWS located at Latitude 33° 48' 29" N and Longitude 117° 42' 40" W at an elevation of 1,781 feet in Orange County and located on a ridgetop. Data for all RAWS is archived in the Western Region Climate Center in Reno, Nevada. Data for October 1, 2018 for a 90 day period is provided in Figures 1 and 2. The typical prevailing summer time wind pattern is out of the west/southwest and normally is of a much lower velocity (5-10 MPH with occassional gusts to 20 MPH) and is associated with relative humidity readings ranging between 30% and occasionally more than 60% due to the sites proximity to onshore winds from the ocean.

In addition to Santa Ana winds, there is a historic pattern of wildland fires burning from the southwest to northeast. Every 5-10 years, a "rare event" hot, dry southwest to west wind of 30 MPH will occur. This moderately strong, dry wind condition usually occurs in the late afternoon or early evenings on very hot days, especially during the normal summertime (June through September) months.

Below in Figures 1 and 2 are weather charts of relative humidity and wind speed data obtained from the Fremont Canyon RAWS which is located on a ridge exposed to high wind velocities. Note the timing of the very low relative humdity that coincides with the high winds.



Statistics

Begin Date/Time
Oct. 1, 2018
:00 LST

End Date/Time
Dec. 30, 2018
:00 LST

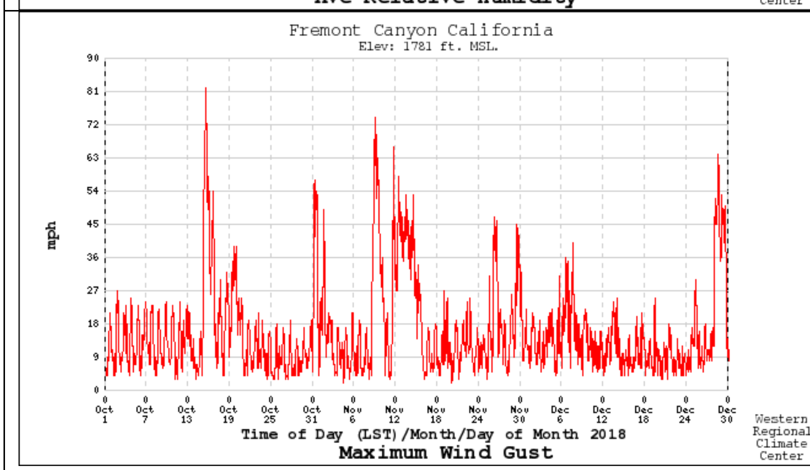
Ave Relative Humidity
%

Average
49

Max. | Min.
100 | 3

Figure 1: Relative Humidity at the Fremont Canyon RAWS for the 90 day period of October 1, 2018 until December 30. Note the periods when relative humidty was between 3 and 20 percent.

All data is from the Western Region Climate Center



Statistics

Begin Date/Time
Oct. 1, 2018
:00 LST

End Date/Time
Dec. 30, 2018
:00 LST

Maximum Wind Gust
mph

Average
16

Max. | Min.
82 | 2

Figure 2: Peak Wind Gusts at the Fremont Canyon RAWS. These gusts occurred over several days. For the purposes of this FPP, peak winds of 80 MPH will be utilized to represent "*worst case*" weather.

All the data is from the Western Region Climate Center

All other (northwest, southeast and south) wind directions may be occasionally strong and gusty. However, they are generally associated with cooler moist air and have higher relative humidity (>40%). They are considered a serious wildland fire weather condition when wind speeds reach >20-MPH.

3.0 Predicting Wildland Fire Behavior

The BEHAVE Plus 5.0.5 Fire Behavior Prediction and Fuel Modeling System developed by USDA–Forest Service research scientists Patricia L. Andrews and Faith Ann Heinsch at the Intermountain Forest Fire Laboratory, Missoula, Montana, is one of the best systematic methods for predicting wildland fire behavior. The BEHAVE Plus fire behavior computer modeling system is utilized by over 90 percent of wildland fire experts nationwide. Wildland fire managers use the BEHAVE Plus modeling system to project the expected fire intensity, rate-of-spread and flame lengths with a reasonable degree of certainty for use in Fire Protection Planning. ***FIREWISE 2000, LLC***. used the BEHAVE Plus 5.0.5. Fire Behavior Prediction Model to make the fire behavior assessments for the Paradise Ranch Development discussed below.

Because the model was designed to predict the spread of a surface fire, the fire model describes the fire behavior only within the flaming front. The primary driving force in the fire behavior calculations is the dead fuel, less than one-fourth inch in diameter; these are the fine fuels that carry the fire. Fuels larger than 1/4-inch contribute to fire intensity, but not necessarily to fire spread. The BEHAVE PLUS fire model includes a model (Surface fire spread and intensity) to describe a wildfire spreading through surface fuels, which are the burnable materials within six (6') feet of the ground and contiguous to the ground. Regardless of the limitations expressed, experienced wildland fire managers can use the BEHAVE PLUS modeling system to project the expected fire intensity (expressed as Btu/ft/sec), rate-of-spread (feet/minute) and flame lengths (feet) with a reasonable degree of certainty for use in fire protection planning purposes. Of these three fire behavior projections, flame length is the most critical in determining structure protection requirements.

Comparisons of computer calculations to observed fire behavior by ***FIREWISE* 2000, *LLC.*** wildland fire staff has validated the modeling system for use in wildland planning.

3.1 Wildland Fire Behavior Calculations For The Off-and Onsite Hazardous Vegetative Fuels
Wildland fire behavior calculations have been projected for the hazardous vegetative fuels located adjacent to and within the proposed Paradise Ranch Development. These projections are based on scenarios that are "worst case" fire weather assumptions in the vicinity of the project area. Weather data was obtained from the RAWS (Remote Automatic Weather Station) network stations closest to the project area.

The scenarios are depicted on the following two pages in Tables 3.1.1 through 3.1.4. All tables display the expected Rate of Fire Spread (expressed in feet per minute), Fireline Intensity (expressed in British Thermal Units per foot per second) and Flame Length (expressed in feet) and include the calculation inputs used in the BEHAVE Plus program which were obtained from project site observations and fuel moisture levels typically observed during the local fire season. The tables also show the change in Rate of Fire Spread, Fireline Intensity, and Flame Length, following the completion of the required fuel treatment work in Zone 2 which is characterized by a combined fuel model of Fuel Model 9 - Hardwood Litter (60%) and Fuel Model 1 short grass (40%).

Table 3.1.1

Northern Boundary Untreated Fuels (Lots 27-38)

Fire Scenario # 1 - Fire Approaching from the North or Northeast

(Late Fire Season With 80 MPH North, Northeast and East Wind Conditions)

Fire Behavior Calculation Input Data	Anticipated Fuel Moistures
• 40 percent slope • 80 mph 20-foot wind speed • 225º aspect from north • 45º wind direction from north	1-Hour Fine Fuel Moisture of..………....2% 10-Hour Fuel Moisture of.…………...…3% 100-Hour Fuel Moisture of.....……...…..5% * Live Herbaceous Fuel Moisture of.…....30% * Live Woody Fuel Moisture of.……........50%

Expected Fire Behavior Combined Fuel Fuel [GR4 – Moderate Load, Dry Climate Grass (60%) and TL9 – Very High Load Broadleaf Litter (40%)]	
Rate of Spread	- 260.9 ft/min
Fireline Intensity	- 3893.0 BTU/ft/s
Flame Length	- 20.2 feet
Expected Fire Behavior in Treated Fuels (Zone 2) Combined Fuel Fuel [Model Tl6 – Moderate Load Hardwood Litter (60%) and GR1 Short, Sparce, Dry Climate Grass (40%)]	
Rate of Spread	- 39.0 ft/min
Fireline Intensity	- 234.0 BTU/ft/s
Flame Length	- 5.5 feet

Table 3.1.2

Eastern Boundary Untreated Fuels (Lots 1-11 and 39-50)

Fire Scenario # 2 - Fire Approaching from the East or Northeast

(Late Fire Season With 80 MPH North, Northeast and East Wind Conditions)

Fire Behavior Calculation Input Data	Anticipated Fuel Moistures
• 40 percent slope • 80 mph 20-foot wind speed • 45º aspect from north • 270º wind direction from north	* 1-Hour Fine Fuel Moisture of..………....2% * 10-Hour Fuel Moisture of.…………...…3% * 100-Hour Fuel Moisture of.....……...…..5% * Live Herbaceous Fuel Moisture of.…....30% * Live Woody Fuel Moisture of.……........50%

Expected Fire Behavior Combined Fuel Fuel [GR4 – Moderate Load, Dry Climate Grass (70%) and TL9 – Very High Load Broadleaf Litter (30%)]	
Rate of Spread	- 315.1 ft/min
Fireline Intensity	- 4102.0 BTU/ft/s
Flame Length	- 20.7 feet
Expected Fire Behavior in Treated Fuels (Zone 2) Combined Fuel Fuel [Model Tl6 – Moderate Load Hardwood Litter (60%) and GR1 Short, Sparce, Dry Climate Grass (50%)]	
Rate of Spread	- 64.5 ft/min
Fireline Intensity	- 248.0 BTU/ft/s
Flame Length	- 5.7 feet

Table 3.1.3 **Southern Boundary Untreated Fuels (Lots 1, 12, 25-32)** ***<u>Fire Scenario # 3 - Fire Approaching from the South or Southwest</u>*** ***(Late Fire Season With 30 MPH South, Southwest and West Wind Conditions)***	
Fire Behavior Calculation Input Data • **20 percent slope** • **30 mph 20-foot wind speed** • **60º aspect from north** • **225º wind direction from north**	**Anticipated Fuel Moistures** *** 1-Hour Fine Fuel Moisture of..………...2%** *** 10-Hour Fuel Moisture of.…………..…3%** *** 100-Hour Fuel Moisture of.....……..…..5%** *** Live Herbaceous Fuel Moisture of.…...30%** *** Live Woody Fuel Moisture of.…….......60%**
Expected Fire Behavior **Combined Fuel Model [SH5 – High Load, Dry Climate Shrub 70% and TL9 Very High Load Broadleaf Litter (30%)]**	
Rate of Spread - 305.2 ft/min	
Fireline Intensity - 14,344.0 BTU/ft/s	
Flame Length - 36.8 feet	
Expected Fire Behavior in Treated Fuels Fuels (Zone 2) **Combined Fuel Fuel [Model Tl6 – Moderate Load Hardwood Litter (20%) and GR1 Short, Sparce, Dry Climate Grass (80%)]**	
Rate of Spread - 77.9 ft/min	
Fireline Intensity - 209.0 BTU/ft/s	
Flame Length - 5.2 feet	

Table 3.1.4 **Western Boundary Untreated Fuels (Lots 1-22, 26 and 27)** ***<u>Fire Scenario # 4 - Fire Approaching from the West or Southwest</u>*** ***(Late Fire Season With 30 MPH South, Southwest and West Wind Conditions)***	
Fire Behavior Calculation Input Data • **50 percent slope** • **30 mph 20-foot wind speed** • **60º aspect from north** • **225º wind direction from north**	**Anticipated Fuel Moistures** *** 1-Hour Fine Fuel Moisture of..………...2%** *** 10-Hour Fuel Moisture of.…………..…3%** *** 100-Hour Fuel Moisture of.....……..…..5%** *** Live Herbaceous Fuel Moisture of.…...30%** *** Live Woody Fuel Moisture of.…….......60%**
Combined Fuel Model [SH5 – High Load, Dry Climate Shrub 70% and TL9 Very High Load Broadleaf Litter (30%)]	
Rate of Spread - 283.7 ft/min	
Fireline Intensity - 13,402.0 BTU/ft/s	
Flame Length - 35.6 feet	
Expected Fire Behavior in Treated Fuels Fuels (Zone 2) **Combined Fuel Fuel [Model Tl6 – Moderate Load Hardwood Litter (40%) and GR1 Short, Sparce, Dry Climate Grass (60%)]**	
Rate of Spread - 55.6 ft/min	
Fireline Intensity - 176.0 BTU/ft/s	
Flame Length - 4.9 feet	

3.2 Interpreting Fire Behavior

Flame length and rate of spread are generally easily visualized. However, Fireline Intensity is not easily comprehended. Fireline intensity is a product of the available heat of combustion per unit of ground and the rate of spread of the fire, interpreted as the heat released per unit of time for each unit of length of fire edge. To help visualize this parameter, the following chart is meant to help homeowners interpret the calculations:

Flame Length	**Fireline Intensity**	**Interpretation**
Feet	Btu/ft/s	
< 4	<100	Fire can generally be attached at the head or flanks by persons using hand tools. Handline should hold the fire.
4-8	100-500	Fires are too intense for direct attack on the head by persons using hand tools. Handline cannot be relied on to hold the fire.
8-11	500-1,000	Fires may present serious control problems – torching out, crowning, and spotting. Control efforts at the fires head will probably be ineffective.
>11	>1,000	Crowning, spotting, and major fire runs are probable. Control efforts at the head of the fire are ineffective.

4.0 Assessing Structure Ignitions in the Wildland/Urban Interface

Structure ignitions from wildland wildfires basically come from three sources of heat: convective firebrands (flying embers), direct flame impingement, and radiant heat. The Behave Plus Fire Behavior Computer Modeling Program does not address wind blown embers or firebrands from a structure ignition perspective. However, even though ignition resistant exterior building materials will be used in the construction of the Paradise Ranch Development (see APPENDIX 'E' for the description of Ignition Resistant Construction), wind driven embers and radiant heat issues are addressed in this FPP.

4.1 Firebrands

Firebrands are pieces of burning materials that detach from burning fuels due to the strong convection drafts in the flaming zone. Firebrands may also be referred to as embers. Firebrands can be carried a long distance (one mile or more) by fire drafts and strong winds. Severe wildland/urban interface fires can produce heavy showers of firebrands. The chance of these firebrands igniting a structure will depend on the number and size of the firebrands, how long they burn after contact, and the type of building materials, building design, and construction features of the structure. Firebrands landing on combustible roofing and decks and adjacent flammable vegetation are common sources for structure ignition. They can also enter a structure through unscreened vents and chimneys, decks, unprotected skylights, and overhangs.

Even with non-combustible roofing, firebrands landing on leaves, needles, and other combustibles located on a roof (due to lack of maintenance) or adjacent to a structure can cause structure ignition.

Any open windows, doors or other types of unscreened openings are sources for embers to enter a structure during a wildland fire. Additionally, the CVFD Standard 153 prohibits outdoors fires as are wood burning fireplaces. If landscape guidelines are followed and the above-mentioned maintenance issues are addressed on a regular basis, firebrands should not be a concern for the Paradise Ranch residences, as the buildings will be constructed with ignition resistant building materials.

4.2 Radiant Heat/Direct Flame Impingement

Radiation and convection involve the transfer of heat directly from the flame. Unlike radiation heat transfer, convection requires that the flames or heat column contact the structure. An ignition from radiation (given an exposed flammable surface) heat transfer depends on two aspects of the flame: 1) the radiant heat flux to a combustible surface and, 2) the duration (length of time) of the radiant flux. The radiant heat flux depends on the flame zone size, flame-structure distance, and how much the combustible material of the structure is exposed to the flame. While the flame from a wildfire may approach 1,800 degrees Fahrenheit, it is the duration of heat that is more critical. For example, a blow torch flame typically approaches 2,100 degrees Fahrenheit, yet a person can easily pass their hand through the flame. Heat duration only becomes critical to a home with a wood exterior surface if the heat is allowed to remain for 30-90 seconds.

USDA Research Scientist Jack Cohen has found that a home's characteristics (its exterior materials and design in relation to the immediate area around a home within 100 feet) principally determine the home’s ignition potential. He calls the home and its immediate surroundings the ‘home ignition zone’. A USDA Forest Service research team studied the ignition of wood wallboard and found that “flame impingement for a sufficient length of time (approximately 1 minute) ignites typical hardboard siding material” further described in the Proceedings, 1st International Fire and Materials Conference. Fire agencies consider fuel treatment as a principal approach to wildland fire hazard reduction. Whenever the flame length is equal to or more than the separation of combustible vegetation from a combustible structure for 1-2 minutes in duration or more, there is a high probability of structure ignition. Contact with a fire's convection heat column also may cause ignition but the temperature of the column’s gases are generally not hot enough or long enough in duration to sustain the ignition of the structure.

Comparing the expected wildland fire behavior projections in each of the scenarios in Section 3..1 against the required fuel modification zones outlined in Section 6.0, demonstrates substantial reductions in the expected flame length. By requiring the structures exposed to the threat of wildfire to incorporate the following guidelines, those structures will be provided with the most effective treatment for minimizing losses from flame impingement and associated radiant heat intensities.

- Each structure is constructed of ignition resistant building materials.
- The area surrounding each structure contains an Irrigated Zone (defensible space) and a Thinning Zone (low fuel volume buffer strip) between the Irrigated Zone and the untreated fuels.

The eventual homeowners shall be required to maintain their properties to the fuel treatment standards outlined in this FPP and shall keep the roof and any rain gutters free of leaves, needles and other combustible debris. All combustible materials must be properly stored away from the structure so that burning embers falling on or near the structure have no suitable host. Paradise Ranch lot owners are responsible for maintaining their homes and for keeping all doors and windows tightly closed whenever a wildland fire is reported in the vicinity.

4.3 Fire Resistant Plant Palette

Wildland fire research has shown that some types of plants, including many natives, are more fire resistant than others. These low fuel volume, non-oily, non-resinous plants are commonly refered to as "fire resistant". This term comes with the proviso that each year these plants are pruned, all dead wood is removed and all grasses or other plant material are removed from beneath the circumference of their canopies. Some native species are not considered "undesirable" from a wildfire risk management perspective provided they are properly maintained year round. Refer to APPENDIX 'B' for a list of prohibited plant species.

5.0 Fire Department Response Times

The proposed project is within the CVFD. Fire Station #64 located at 16231 Canon Lane is within 0.75 miles of the site with a 2-4-minute initial response time (travel and get away). Brea Fire Department Station #4 is the second closest engine, located at 170 Olinda Pl, Brea, CA 92823 and is 3.2 miles away and approximately 6 minutes away. Fire Station #66 located at 13707 Peyton Dr is the next closet engine within 5.2 miles and a 10-minute initial response time.

Fire Station #64 would typically be the first engine to arrive at the proposed tract (2 - 4 minutes depending on traffic and get away time). Additional equipment can be requested through mutual aid. Additional agencies including CalFire would also likely respond equipment, but they would likely arrive after the CVFD engines were on-scene.

Although CVFD Fire Station Engine #64 may be 2-4 minutes away and Engine #66 is 10 minutes away, there is no assurance that either Engine Company will be in their station on the day a wildfire threatens the Paradise Ranch Development. On high/extreme fire danger days there often may be multiple fire starts and engine companies may be already deployed on other incidents. Therefore ***FIREWISE 2000, LLC.*** planned projects use *"*defensible space*"*, Ignition Resistant building features, and key fuel treatment strategies that enable residents to substantially increase their ability to survive a wildfire on their own and without the loss of their structure. The goal of this FPP, therefore, is to make the Paradise Ranch development and its occupants as safe as possible and able to survive on their own until such time as firefighting equipment arrives and/or residents can be safely evacuated.

6.0 Fuel Modification Zone Descriptions & Required Treatments

Below are the required treatments for the Fuel Modification Zones. All distances in this report are measured horizontally. Zones 1 and 2 together provide a minimum of 100 feet of treated area which should mitigate the radiant and convective heat effects of a wildland fire. In some cases more than 100 feet of treated area or additional mitigation measures may be required.

Northern Boundary fuel treatments consist of Irrigated Zone 1/Zone 1A followed by Zone 2 treatment to the project boundary will provide a total of 100 feet or more of treatment. To the projects benefit, as can be seen in the Photo 11, north of lots 31-35 there exists two large custom homes with existing fuel modication zones that extend into the Oak Woodland and riparian vegetation. The combination of fuel treatments and special construction features should more than mitigate for the projected **20.2 foot** flame lengths and associated fire intensities (Table 3.1.1).

↑ Photo 11 - The yellow lines represent 150 feet and extend from the existing homes to the northern edge of the project boundary near Lots 31-35.

Due to there being insufficient space within the project to establish the necessary Fuel Modification Zones for Lots 27-32, a special construction feature shall be installed by the developer and maintained by each lot homeowner. The feature is a solid non-combustible 6 foot tall wall as described in Section 6.7. The wall shall wrap around to the west side of Lot 27 for a distance of 60 feet (see Fuel Treatment Map for a visual representation).

Eastern Boundary fuel treatment shall consist of 50 feet of Irrigated Zone 1/Zone 1A combined with HOA maintained thinning Zone 2 should more than mitigate for the projected **22.7 foot** flame lengths calculated for these lots (Table 3.1.2). To the east of all eastern boundary lots (Lots 1-36), a 40 foot wide access road eliminates all vegetative fuel hazards within its width.

Southern Boundary fuel treatment shall consist of of Irrigated Zone 1/Zone 1A combined with HOA maintained thinning Zone 2 should be more than sufficient to mitigate for the radiant and convective heat threat of the projected **36.8 foot** flame lengths calculated for these lots (Table 3.1.3). The Southern Boundary adjacent to Lot No. 1 lacks space for fuel treatment as there is but 70 feet between the home and southern project boundary. An offsite fuel treatment agreement will need to be secured with the adjoining property owner as shown on the Fuel Treatment Map. The offsite agreement will allow the HOA to enter and maintain a 30-foot wide by 350-foot long fuel treatment zone meeting Zone 2 criteria to mitigate against southwest *rare event* wind driven wildfire threats (see APPENDIX 'F' for a copy of this agreement).

Western Boundary fuel treatment will be met by a combination of Irrigated Zone 1/Zone 1A followed by HOA maintained thinning Zone 2 and roadside fuel treatment. These fuel treatments totaling over 100 feet should more than mitigate projected **35.6 foot** flame lengths for extreme southwest wind driven wildfire threats (Table 3.1.4).

Each individual homeowner shall be responsible for maintaining Fuel Modification Zones within their lots and the HOA responsible for maintaining fuel treatments outside the property owners lot boundaries. In the event a lot is repossessed, the unit/agency holding title to the lot will be responsible for the maintenance. Long-term fuel management maintenance for all described common areas will be the developer's responsibility until transferred to the HOA or lot owner per conditions specified by the California Department of Real Estate. These areas shall be maintained at least once each year and maintained such that they do not form a fire hazard.

6.1 Irrigated Zone 1 – Lot Owner Maintained (*Shown as uncolored within lot boundaries on the Fire Protection Plan Map*)

Defined

Irrigated Zone 1 is an irrigated landscaped zone (except when irrigation may cause erosion) beginning at the structure and extending 50 feet in width or more within the lot boundary that is absent of any combustible construction.

Required Landscaping

- Plants in this zone need to be fire resistant and shall not include any pyrophytes that are high in oils and resins such as pines, eucalyptus, cedar, cypress or juniper species. Thick, succulent or leathery leaf species with high moisture content are the most "fire resistant". For proper plant selection refer to APPENDIX 'A' for a list of acceptable and desirable plants and APPENDIX 'B' for the Prohibited Plant list.
- Zone 1 will be cleared of all fire prone and undesirable plant species (see APPENDIX 'B').
- Landscape designs using hardscape features such as driveways, swimming pools, concrete, rock, pavers, and similar non-combustible features to break up fuel continuity within Zone 1 are encouraged.
- Landscaping shall be irrigated and primarily consist of maintained fire-resistant native or ornamental plantings.
- Shrubs and groundcovers shall be low-growing and selected from the plant list in APPENDIX 'A' or plants approved by the CVFD. Mature height of plants shall not exceed 18 inches.
- Trees shall be single specimens or groupings of not more than three trees selected from the approved plant list. Trees are to be planted such that the mature canopies will be at least 10 feet from the exterior walls of the structure or from the most distal point of a combustible projection, an attached accessory structure, or an accessory structure within 10 feet of a habitable building.
- Trees must have a minimum of six feet of vertical separation from low growing, irrigated vegetation beneath the canopy of each tree.

Required Maintenance

- Lots shall be maintained year round by the individual property owners within their property boundary (lot lines), or the HOA outside lot boundaries, as required by this FPP or the CVFD. All undeveloped lots are to be maintained by the developer, under weed abatement regulations, until sold.
- Remove and replace any dead or dying plant material monthly.
- Native annual and perennial grasses will be allowed to grow and produce seed during the winter and spring. As grasses begin to cure (dry out), they shall be cut to four inches or less in height.
- Trees must be maintained to have a minimum of six feet of vertical separation from low growing, irrigated vegetation beneath the canopy of each tree.
- All trees must be maintained to the most current version of ANSI A300 standards [*Tree, Shrub, and Other Woody Plant Maintenance —Standard Practices (Pruning)]* (see https://www.tcia.org/TCIA/BUSINESS/A300_Standards/Part_1.aspx).

6.2 Irrigated Zone 1A - HOA Maintained (*Shown as Green on the Fire Protection Plan Map*)

The zone contains all the manufactured slopes in common areas and shall be planted with fire resistant vegetation and maintained to Irrigated Zone 1 criteria outlined in Section 6.1.

6.3 Thinning Zone 2 – HOA Maintained (*Shown as Tan on the Fire Protection Plan Map*)
Defined

Thinning Zone 2 is an area 50 - 150 feet in width, depending on its location, beginning and extending outward from Irrigated Zone 1/Zone 1A. Fuel treatment shall include the removal of 50 percent of the above ground vegetation including the designated fire prone species found in APPENDIX 'B'. Root systems are to be retained to protect the hillsides from erosion. This zone includes single or small clusters of trimmed fire resistant native and ornamental plants, up to 48 inches in height, and trimmed native or ornamental trees limbed up 6 feet from the ground.

Required Landscaping

- Thinning the native vegetation to a point where 50% open space is created.
- Removal of all dead, woody debris, and exotic or native flammable vegetation (see APPENDIX 'B')
- Allowances for the needs of protected species and habitats will be considered in this zone.
- No combustible construction or materials are allowed in Zone 2.
- The City of Chino Hills Community Development Department permits tree removal for native tree species as California live oak, California black walnut, scrub oak and California sycamore. The permit is required for trees larger than 4 inches in diamter at DBH or 4 ½ feet above the ground. The permit as of this writing is not required for pruning, only removal. A copy of the requirement and permit application can be found here:
  https://www.chinohills.org/DocumentCenter/Home/View/1615

Required Maintenance

- Annually maintain all tree crowns to keep a separation of six feet between the ground fuels (shrubs and ground covers) and the lower limbs. All trees must be maintained to the current ANSI A300 standards [*Tree, Shrub, and Other Woody Plant Maintenance —Standard Practices (Pruning)]* (see https://www.tcia.org/TCIA/BUSINESS/A300_Standards/Part_1.aspx.
- Annually prune vegetation (see APPENDIX 'B') to maintain a 50% thinning from the original vegetation cover. Selected native plant clusters must be separated by at least 1 ½ times the fully developed height of the retained plants.
- Annually, native annual and perennial grasses will be allowed to grow and produce seed during the winter and spring. As grasses begin to cure (dry out), they shall be cut to 4 inches or less in height. Note that the CVFD requires weed abate to be performed by May 15th. The owners shall provide an additional cutting should the rainy season be prolonged into June.
- Annually remove all dead and dying vegetation and highly flammable exotic species (see APPENDIX 'B') by May 15th of each year.
- Any vegetative biomass (debris and trimmings) produced by thinning and pruning shall be removed from the site or converted to mulch by course chipping or multi-cut into 4 inch lengths and evenly distributed to a maximum depth of four (4) inches.
- Mulches, chips, and other small multi-cuttings (cut to less than two (2) inches in diameter and four (4) inches in length) should be evenly spread over the area to prevent grass and weed encroachment within the treated areas. This mulching concept helps to maintain soil moisture

for the designated plants, reduces the growth of annual grass, minimizes soil erosion, and recycles plant residue thus reducing disposal cost.

6.4 Thinning Zone 3 - HOA Maintained (*Shown as Orange on the Fire Protection Plan Map*)

Zone 3 is a offsite non-irrigated thinning zone 40 feet in width beginning at the southeastern corner of project boundary adjacent to Canyon Hills Road near Lot 1. The zone extends westward from its beginning along the parcel boundary for a distance of approximately 300 feet. An agreement or easement from the adjacent property owner must be obtained to treat this area and is attached as APPENDIX ‘F’; see Fire Protection Plan Map for a visualization of this zone.

6.5 Roadside Fuel Treatment- HOA or Lot Owner Maintained *(Shown as Purple on the Fire Protection Plan Map*)

All publicly accessible roads within the Paradise Ranch development shall be cleared of all combustible vegetation for a minimum of 20-feet on the uphill side or level ground and 30-feet on the downhill side of the roadway prism. Should the fuel treatment zone lie within a Irrigated Zone 1, the Roadside Fuel Treatment shall be maintained to Irrigated Zone 1 criteria as outlined in Section 6.1. Sidewalks and related non-combustible improvements may be placed in this fuel treatment zone to further increase the level of protection. The purpose of this action is to minimize the cutting-off of the home owners egress due to a wildland fire occurrence and for safe ingress by emergency responders.

6.6 Zone Markers

All exterior boundaries of Fuel Modification Zones 1 and 2 shall be permanently marked on the ground for the purpose of guiding annual fuel treatment maintenance and inspection operations. The most reliable markers are steel fence posts with a baked on painted finish. The upper half of the above ground portion of the fence post is then painted a bright “day glow” orange to improve visibility. These Fuel Modification Zone markers must be spaced so that the markers on each side of an installed marker can be seen from that adjacent marker.

6.7 Construction Standards and Features

All structures within the Paradise Ranch Project shall meet all wildland/interface standards to the satisfaction of the CVFD and be designed and constructed with ignition resistant construction requirements meeting the current California Fire Code. For a description of the current construction requirements as of the date of this report, see APPENDIX ‘E’. The fire protection features described herein shall be maintained to equivilent or greater ignition resistance.

All homes built within Paradise Ranch shall have Automatic Residential Fire Sprinklers installed per the latest edition of NFPA 13D.

All non-habitable accessory structures such as decks, balconies, patio, covers, gazebos and fences shall be built from non-combustible materials. The owner is not restricted from having concrete/brick patios, walkways or a swimming pool within the Fuel Modification Zones in compliance with other codes. Refer to APPENDIX ‘D’ for photos and descriptions of non-combustible decks, patio covers, and railings for these non-habitable accessory structures.

Construction or building permits shall not be issued until the fire code official inspects and approves required fire apparatus access and water supply for the construction site. Prior to the delivery of combustible building construction materials to the project site the following conditions shall be completed to the satisifaction of the CVFD:

- All life safety utilities shall be installed and approved by the appropriate inspecting department or agency.
- Approved Zone 2 fuel treatments shall be provided prior to combustible material arriving on the site and shall be maintained throughout the duration of construction. Zone 1 and 1A shall be cleared of all vegetation prior to construction and subsequently planted to the requirments stated in Section 6.0 after construction is completed.

In addition to the above requirements a 6-foot non-combustible wall shall be erected along the top of the slope just south of the northern project boundary of Lots 27-32 to mitigate for reduced fuel treatments on and adjacent to those lots. The wall may have a door if the door is solid, non-combustible and can be secured to prevent it from blowing open during strong winds. A view wall may be installed where a portion of the wall is tempered glass if the wall remains solid and non-combustible.

During the writing of this FPP, the development team for the project consulted with the City of Chino Hills and the CVFD for clarification of code requirements and additional mitigation measures for secondary emergency access and the requirement for 30 feet of separation between structures per City of Chino Hills Ordinance 329. The result of coordination resulted in the following agreement to include the following alternative means and methods to allow 20 feet of building separation (calculated wall-to-wall) between structures. Below are those agreed upon additional mitigation measures:

- Fuel Modification Zone be increased to 150 feet.
- Install “Brandguard” or equivalent type ember resistant baffled vents on all structures, or if necessary, eliminate attic vents entirely – vents will be 1/16” diameter or smaller.
- All exterior doors that swing shall have self-closing hardware, e.g., spring loaded or pneumatic hinges (side yard doors cannot be sliding doors; rear yard doors can be sliding doors when rear yard setbacks are 15’ or greater).
- All structures shall have automatic door closers on all vehicle garage doors (standard on most new automatic garage door openers as a security feature) that can be set to close after a certain period of time with no activity.
- Fire sprinklers shall be installed per NFPA 13D and shall also be installed in all areas of the home that are not required by NFPA 13D – i.e., in all walk-in closets or rooms in excess of 55 square feet, attics, all bathrooms regardless of size, and all garages.
- Metal mesh window bug screens shall be installed on all operable windows.
- Exterior wall construction between buildings to conform to 2-hour construction assembly as shown in Gypsum Association Fire Resistance Design Manual.
- Fences or walls installed on the lot lines between structures shall be of non-combustible materials. Upon submission of the Conceptual Fire Protection Plan, consideration may be given to alternative materials in situations where not between homes (i.e., small front yard fences depending upon materials and design components).
- All outside hinged entry doors shall have a 90-minute fire rating.
- Builder shall deliver a copy of the FPP at time of sale to each initial homeowner.

6.8 Fuel Modification Access Way

Between lots 30-31, a 12 foot wide maximum 12% grade fuel modification access should be provided from the street to the fuel modification at the rear of lots 27-34. At the end of the access, a pipe gate or Fire Department approved gate that is non-combustible shall be installed with a Knox pad lock for Fire Department access.

6.9 Mandated Inclusions in the Paradise Ranch Project Covenant and Agreement

The Paradise Ranch CC & R's shall include the following statements:

1) The HOA will be responsible for all required fuel treatment and fire protection measures in the common areas. Homeowners shall be responsible for all required fuel treatment and fire protection measures on their respective Lot(s).

2) The HOA shall have authority for enforcing required fuel treatment measures around all structures and restrictions on placing combustible structures within the Fuel Modification Zones.

3) The HOA will hold each lot owner within the Paradise Ranch Project accountable for enforcement of all wildland fire protection issues discussed in this plan.

4) <u>TRASH DUMPING OR DISPOSAL OF YARD TRIMMINGS IN THE FUEL MODIFICATION ZONES IS PROHIBITED.</u>

5) All landscaping plans, including additional structures, must be reviewed and approved by the HOA. Landscape plans will not be required to be reviewed by the Chino Valley Fire District. The constructio of any additional structures shall require review/permits in accordance with the City and CBC requirements.

6) Any disputes related to individual lot landscaping or fuel treatment, with respect to interpretation of the Paradise Ranch Fire Protection Plan, shall be decided by the City of Chino Hills or its designated representative and whose decision shall be final and binding on the lot owner.

7) The HOA to provide a copy of the FPP to all homebuyers as part of the escrow papers at the time of future resales.

8) The HOA is responsible for the maintenance of all roads and fuel modification accessways including but not limited to gates and supporting equipment.

7.0 INFRASTRUCTURE

All residences shall be built to the most current version of the Chino Hills Fire Hazard Overlay District requirements including Section 7A of the California Building Code. All structures shall be built with fire resistive designs intended to assist firefighter access. To support firefighting operations, the following are required:

7.1 Water Supply

Paradise Ranch Tracts No. 20286, 16200 & 16220 water supply will be attached to the City of Chino Hills Public Works Department water system. Hydrants, mains and water pressures shall be designed to comply with the Chino Hills Water Department and CVFD requirements.

Required irrigation systems shall be periodically inspected each month to insure their proper function and any repairs need shall be performed immediately. Additonal information concerning maintenance is addressed in the CCR's.

7.2 Access Roads and Gates

Primary access into the project is via Canyon Hills Road which connects to Carbon Canyon Road (State Highway 142). All the roads, gates, and related infrastructure shall be built with the most current fire protection standards and maintained by the HOA.

All streets shall be a minimum of 40 feet in width. Parking is allowed on both sides as long as 26 feet of fire access is maintained clear of any obstruction. Cul-de-sacs shall be designed to the City of Chino Hills Development Code standards. All fire access roads shall meet the requirements of the CVFD, and shall be capable of supporting loads of 75,000 lbs. gross vehicle weight. Per the City, the surface is limited to the installation of concrete and asphalt. Access to all portions of each structure must be within 150 feet of the available fire department access. Access roads and driveways shall be cleared along their sides as described in Section 6.5.

Any access gates to be installed shall meet CVFD standards including Standard #116, and shall be approved by the CVFD prior to fabrication and installation. A 'Knox' override key switch or similar device must be installed outside the gate in an approved, readily visible, and unobstructed location at or near the gate to provide emergency access. Gates accessing more than four residences or residential lots shall also be equipped with approved emergency traffic control-activating strobe light sensor(s), or other devices approved by the Fire Chief, which will activate the gate on the approach of emergency apparatus with a battery back-up or manual mechanical disconnect in case of a power failure.

8.0 Homeowner Education

Each homeowner in the Paradise Ranch subdivision should ensure that all doors and windows (including the garage) are closed to prevent embers from entering their structure in the event of a wildland fire. Doors should be left unlocked to allow emergency personnel unimpeded access. Both inside and outside lights should be placed on to allow emergency personnel to know that a home is present when smoke or darkness may otherwise obscure visibility. In addition, no combustible materials shall not be stored within 30-feet of any structure. Additional information concerning relocation and preparation for wildfire can be acquired from the CVFD.

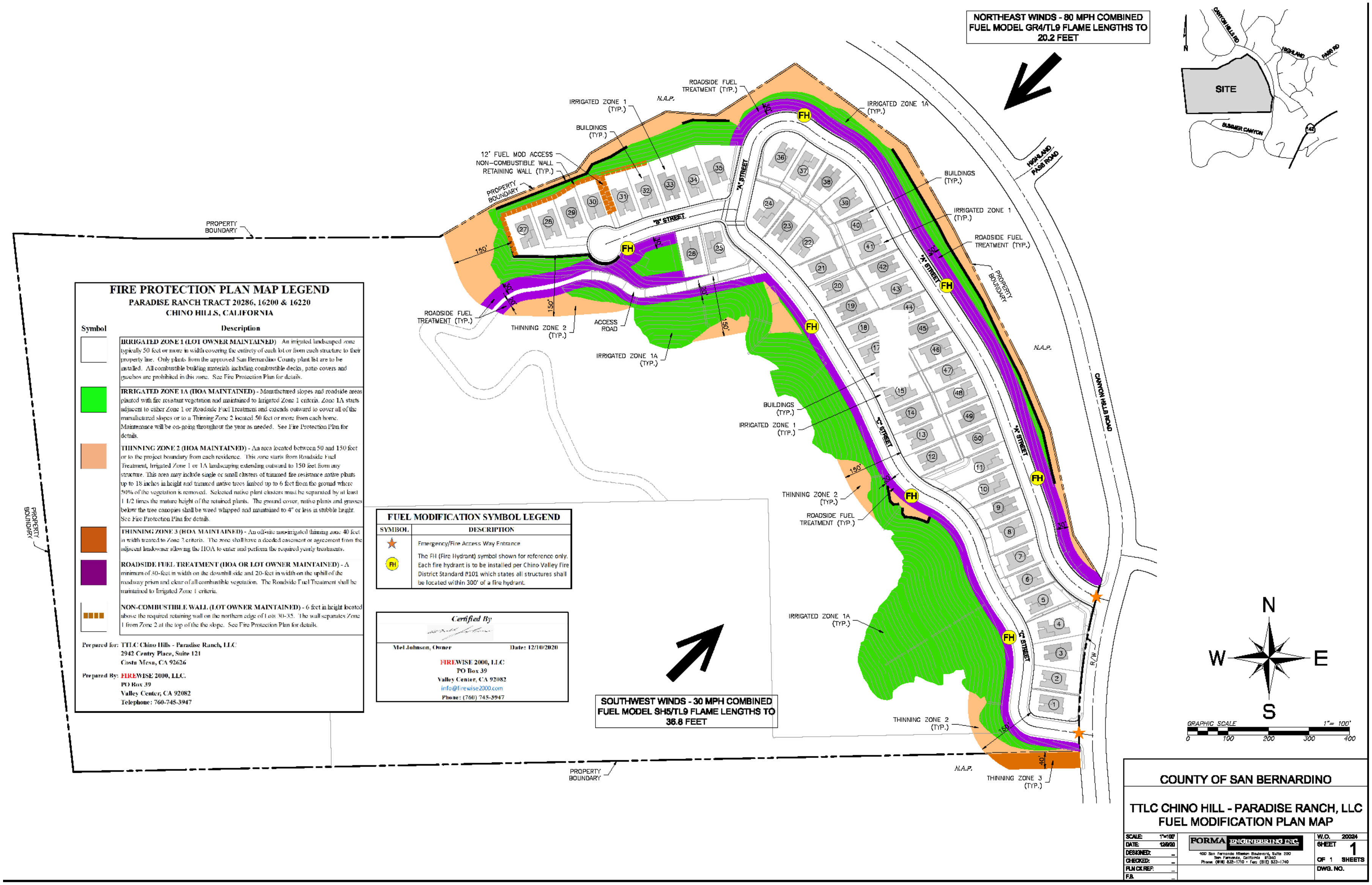
The operation of mechanical equipment used in the maintenace of Thinning Zones such as gas powered chainsaws, weed eaters and similar equipment should be limited to mornings when fuel moistures are higher and pose less of a threat of ignition. Battery powered tools pose much less of a risk to starting a fire.

Each homeowner shall be aware of the herein described fire protection measures by reviewing this FPP of the types of non-combustible construction and plant materials that are allowed within their lot boundary. A copy of this plan shall be provided to each resident during escrow procedures. Of particular importance to homeowners are APPENDICES ‘A’, ‘B’, and ‘D’ of this plan which provide guidance in the types of plants that are not allowed to be established in landscaped areas and appropriate construction within fuel modification zones. Plant selection is critical as embers often travel over a mile during Santa Ana wind events.

Where the Paradise Ranch Fire Protection Plan requires specific construction features, these features shall not be changed without the approval of the CVFD. These features are required to maintain reasonable fire safety.

9.0 Fire Protection Plan Map

Attached to this FPP is the full-scale Fire Protection Plan Map depicting the location of all proposed fuel treatments and the required additional construction features. On the following page is a photo of the Fire Protection Plan Map for reference.



April 30, 2020

APPENDIX ‘A’

Recommended Plant List

SAN BERNARDINO COUNTY

RECOMMENDED PLANTS FOR HIGH FIRE HAZARD AREAS

	Code	Botanical Name	Common Name	Plant Form
	Any plant with the abbreviation Ncn in the Common Name column below means that there is No Common Name. The code is found at the bottom of the last page of this list.			
1	W	Abelia x grandiflora	Glossy Abelia	Shrub
2	N□	Acacia redolens desert carpet	Desert Carpet	Shrub
3	□	Acer macrophyllum	Big Leaf Maple	Tree
4	X	Achillea millefolium	Common Yarrow	Low shrub
5	W	Achillea tomentosa	Wooly Yarrow	Low shrub
6	X	Aeonium decorum	Aeonium	Ground cover
7	X	Aeonium simsii	Ncn	Ground cover
8	W	Agaave attenuata	Century Plant	Succulent
9	W	Agave shawii	Shaw's Century Plant	Succulent
10	N	Agave victoriae-reginae	Ncn	Ground cover
11	X	Ajuga reptans	Carpet Bugle	Ground cover
12	W	Alnus cordata	Italian Alder	Tree
13	□	Alnus rhombifolia	White Alder	Tree
14	N	Aloe aborescens	Tree Aloe	Shrub
15	N	Aloe aristata	Ncn	Ground cover
16	N	Aloe brevifolia	Ncn	Ground cover
17	W	Aloe vera	Medicinal Aloe	Succulent
18	W	Alyogyne huegelii	Blue Hibiscus	Shrub
19	□	Ambrosia chamissonis	Beach Bur-Sage	Perennial
20	□	Amorpha fruticosa	Western False Indigobush	Shrub
21	W	Anigozanthus flavidus	Kangaroo Paw	Perennial accent
22	□	Antirrhinum nuttalianum ssp. Nuttatianum	Ncn	Subshrub
23	X	Aptenia cordifolia x 'Red Apple'	Red Apple Aptenia	Ground cover
24	W	Arbutus unedo	Strawberry Tree	Tree
25	W	Arctostaphylos 'Pacific Mist'	Pacific Mist Manzanita	Ground cover
26	W	Arctostaphyics edmundsil	Little Sur Manzanita	Ground cover
27	□	Arctostaphylos glandulosa ssp.glandulosa	Eastwood Manzanita	Shrub
28	W	Arctostaphylos hookeri 'Monterey Carpet'	Monterey Carpet Manzanita	Low shrub
29	N	Arctostaphylos pungens	Ncn	Shrub
30	N	Arctostaphylos fefugioensis	Refugio Manzanita	Shrub
31	W	Arctostaphylos uva-ursi	Bearberry	Ground cover
32	W	Arctostaphylos x 'Greensphere'	Greensphere Manzanita	Shrub

33	**N**	Artemisia caucasica	Caucasian Artemisia	Ground cover
34	**X**	Artemisia pycnocephaia	Beach Sagewort	Perennial
35	**X**	Atriplex canescens	Four-Wing Saltbush	Shrub
36	**X**	Atriplex lentiformis ssp. Breweri	Brewer Saltbush	Shrub
37	□	Baccharis emoryi	Emory Baccharis	Shrub
38	**W** □	Baccharis pilularis ssp. Consanguinea	Chaparral Bloom	Shrub
39	**X**	Baccharis pilularis var. pilulaaris "Twin Peaks #2'	Twin Peaks	Ground cover
40	□	Baccharis salicifolia	Mulefat	Shrub
41	**N**	Baileya multiradiata	Desert Marigold	Ground cover
42	**W**	Beaucarnea recurvata	Bottle Palm	Shrub/Small tree
43	**N** □	Bougainvillea spectabilis	Bougainvillea	Shrub
44	**N** □	Brahea armata	Mexican Blue Palm, Blue Hesper Palm	Palm
45	**N** □	Brahea brandegeei	San Jose Hesper Palm	Palm
46	**N** □	Brahea edulis	Guadalupe Palm	Palm
47	□	Brickellia acalifornica		Subshrub
48	**W** □	Bromus carinatus	California Brome	Grass
49	□	Camissonia cheiranthifolia	Beach Evening Primrose	Perennial subshrub
50	**N**	Carissa macrocarpa	Green Carpet Natal Plum	Ground cover/Shrub
51	**X**	Carpobrotus chilensis	Sea Fig Ice Plant	Ground cover
52	**W**	Ceanothus gloriosus 'Point Reyes'	Point Reyes Ceanothus	Shrub
53	**W**	Ceanothus griseus "Louise Edmunds'	Louis Edmunds Ceanothus	Shrub
54	**W**	Ceanothus griseus horizontalis	Yankee Point	Ground Cover
55	**W**	Ceanothus griseus var. horizontalis	Carmel Creeper Ceanothus	Shrub
56	**W**	Ceanothus griseus var. horizontalis "Yankee Point"	Yankee Point Ceanothus	Shrub
57	□	Ceanothus megacar;us	Big Pod Ceanothus	Shrub
58	**W**	Ceanothus prostratus	Squaw carpet ceanothus	Shrub
59	□	Ceanothus spinosus	Green bark ceanothus	Shrub
60	**W**	Ceanothus verrucosus	Wart-Stem Ceanothus	Shrub
61	**W**	Cerastium tomentosum	Snow-in-summer	Ground cover/shrub
62	**W**	Ceratonia siliqua	Carob	Tree
63	**W**	Cercis occidentalis	Western Redbud	Tree/shrub

64	**X**	Chrysanthemum leucanthemum	Oxeye Daisy	Groundcover
65	**W**	Cistus hybridus	White Rockrose	Shrub
66	**W**	Cistus incanus	Ncn	Shrub
67	**W**	Cistus incanus	Ncn	Shrub
68	**W**	Cistus incanus ssp. Corsicus	Ncn	Shrub
69	**W**	Cistus salviifoliu	Sageleaf Rockrose	Shrub
70	**W**	Cistus x purpureus	Orchid Rockrose	Shrub
71	**W**	Citrus species	Citrus	Tree
72	□	Clarkia bottae	Showy Fairwell to Spring	Annual
73	□	Cneoridium dumosum	Bushrue	Shrub
74	□	Collinsia heterophylla	Chinese Houses	Annual
75	**W** □	Comarostaphylis diversifolia	Summer Holly	Shrub
76	**N**	Convolvulus cneorum	Bush Morning Glory	Shrub
77	**W**	Coprosma kirkii	Creeping Coprosma	Ground cover/Shrub
78	**W**	Coprosma pumila	Prostrate Coprosma	Low Shrub
79	□	Coreopsis californica	California Coreopsis	Annual
80	**W**	Coreopsis lanceolata	Coreopsis	Ground cover
81	**N**	Correa pulchella	Australian Fuchsia	Ground cover
82	**W**	Cotoneaster buxifolius	Ncn	Shrub
83	**W**	Cotoneaster congestus 'Likiang'	Likiang Cotoneaster	Ground cover/Vine
84	**W**	Cotoneaster parneyi	Ncn	Shrub
85	**X**	Crassula lactea	Ncn	Ground cover
86	**X**	Crassula multicava	Ncn	Ground cover
87	**X**	Crassula ovata	Jade Tree	Shrub
88	**X**	Crassula tetragona	Ncn	Ground cover
89	**W** □	Croton californicus	California Croton	Ground cover
90	**X**	Delosperma 'alba'	White Trailing Ice Plant	Ground cover
91	□	Dendromecon rigida	Bush Poppy	Shrub
92	□	Dichelostemma capitatum	Blue Dicks	Herb
93	**N**	Distictis buccinatoria	Blood-Red Trumpet Vine	Vine/Climing vine
94	**N**	Dodonaea viscosa	Hopseed Bush	Shrub
95	**X**	Drosanthemum floribundum	Rosea Ice Plant	Ground cover
96	**X**	Drosanthemum hispidum	Ncn	Ground cover
97	**X**	Drosanthemum speciosum	Dewflower	Ground cover
98	□	Dudleya lanceolata	Lance-leaved Dudleya	Succulent
99	□	Dudleya pulverulenta	Chalk Dudleya	Succulent
100	**W**	Elaeagnus pungens	Silberberry	Shrub
101	□	Encelia californica	California Encelia	Small shrub
102	□ •	Epilobium canum [Zauschneria californica]	Hoary California Fuchsia	Shrub

103	□	Eriastrum sapphirinum	Mojave Wooly Star	Annual
104	**N**	Eriobotrya japonica	Loquat	Tree
105	□	Eriodictycon crassifolium	Thick-Leaf Yerba Santa	Shrub
106	□	Eriodictycon trichocalyx	Yerba Santa	Shrub
107	**W** □	Eriophyllum confertiflorum	Ncn	Shrub
108	**W**	Erythrina species	Coral Tree	Tree
109	**N**	Escallonia species	Several varieties	Shrub
110	**W** □	Eschscholzia californica	California Poppy	Flower
111	**X**	Eschscholzia mexicana	Mexican Poppy	Herb
112	**N**	Euonymus fortunei	Winter Creeper Euonymus	Ground cover
113	**N**	Feijoa sellowiana	Pineapple Guava	Shrub/Tree
114	**N**	Fragaria chiloensis	Wild Strawberry/ Sand Strawberry	Ground cover
115	□	Frankenia salina	Alkali Heath	Ground cover
116	**W**	Fremontodendron californicum	California Flannelbush	Shrub
117	**X**	Gaillardiaa x grandiflora	Blanketflower	Ground cover
118	**W**	Galvezia speciosa	Bush Snapdragon	Shrub
119	**W**	Garrya ellipta	Silktassel	Shrub
120	**X**	Gazania hybrids	South African Daisy	Ground cover
121	**X**	Ggazania rigens leucolaena	Trailing Gazania	Ground cover
122	□	Gilia capitata	Globe Gilia	Perennial
123	**W**	Gilia lepthantha	Showy Gilia	Perennial
124	**W**	Gilia tricolor	Bird's Eyes	Perennial
125	**W**	Ginkgo biloba	Maidenhair Tree	Tree
126	□	Gnaphalium californicum	California Everlasting	Annual
127	**W**	Grewia occidentalis	Starflower	Shrub
128	□	Grindelia stricta	Gum Plant	Ground cover
129	**N** □	Hakea suaveolens	Sweet Hakea	Shrub
130	**W**	Harde bergia comptoniana	Lilac Vine	Shrub
131	**N**	Helianthemum mutabile	Sunrose	Ground cover/Shrub
132	□	Helianthemum scoparium	Rush Rose	Shrub
133	□	Heliotropium curassavicum	Salt Heliptrope	Ground cover
134	**X**	Helix canariensis	English Ivy	Ground cover
135	**W**	Hesperaloe parviflora	Red Yucca	Perennial
136	□ □	Heteromeles arbutifolia	Toyon	Shrub
137	**X**	Hypericum calycinum	Aaron's-Beard	Shrub
138	**N**	Iberis sempervirens	Edging Caandytuft	Ground cover
139	**N**	Iberis umbellatum	Globe Candytuft	Ground cover
140	□	Isocoma menziesii	Coastal Goldenbush	Small shrub
141	□	Isomeris arborea	Bladderpod	Shrub
142	**W**	Iva hayesiana	Poverty Weed	Ground cover

143	**N**	Jublans californica	California Black Walnut	Tree
144	□	Juncus acutus	Spiny Rush	Perennial
145	□	Keckiella antirrhinoides	Yellow Bush Penstemon	Subshrub
146	□	Keckiella cordifolia	Heart Leaved Penstemon	Subshrub
147	□	Keckiella ternata	Blue Stemmed Bush Penstemon	Subshrub
148	**W**	Kniphofia uvaria	Red Hot Poker	Perennial
149	**W**	Lagerstroemia indica	Crape Myrtel	Tree
150	**W**	Lagunaria patersonii	Primrose Tree	Tree
151	**X**	Lampranthus aurantiacus	Bush Ice Plant	Ground cover
152	**X**	Lampranthus filicaulis	Redondo Creeper	Ground cover
153	**X**	Lampranthus spectabilis	Trailing Ice Plant	Ground cover
154	**W**	Lantana camara cultivars	Yellow Sage	Shrub
155	**W**	Lantana montevidensis	Trailing Lantana	Shrub
156	□	Lasthenia californica	Dwarf Goldfields	Annual
157	**W**	Lavandula dentataq	French Lavendar	Shrub
158	**W**	Leptospermum laevigatum	Australian Tea Tree	Shrub
159	**W**	Leucophyllum frutescens	Texas Ranger	Shrub
160	□	Leymus condensatus	Giant Wild Rye	Large grass
161	**N**	Ligustrum japonicum	Texas Privet	Shrub
162	**X**	Limonium pectinatum	Ncn	Ground cover
163	**X**	Limonium perezii	Sea Lavender	Shrub
164	**W** □	Liquidambar styraciflua	American Sweet Gum	Tree
165	**W**	Liriodendron tulipifera	Tulip Tree	Tree
166	**X**	Lonicera japonica 'Halliana'	Hall's Japanese Honeysuckle	Vining shrub
167	□	Lonicera subspicata	Wild Honeysuckle	Vining shrub
168	**X**	Lotus corniculatus	Bird's Foot Trefoil	Ground cover
169	□	Lotus heermannii	Northern Woolly Lotus	Perennial
170	□	Lotus scoparius	Deerweed	Shrub
171	**W**	Lupinus arizonicus	Desert Lupine	Annual
172	**W**	Lupinus benthamil	Spider Lupine	Annual
173	□	Lupinus bicolor	Sky Lupine	Flowering annual
174	□	Lupinus sparsiflorus	Loosely Flowered Annual Lupini/Coulter's Lupine	Annual
175	**W**	Lyonothamnus floribundus ssp. Asplenifolius	Fernleaf Ironwood	Tree
176	**W**	Macadamia Integrifolia	Macadamia Nut	Tree
177	**W**	Mahonia aquifolium 'Golden Abundance'	Golden Abundance Oregon Grape	Shrub
178	**W**	Mahonia nevinii	Nevin Mahonia	Shrub
179	□	Malacothamnus fasciculatus	Chaparral Mallow	Shrub

180	**X**	Malephora luteola	Trailing Ice Plant	Ground cover
181	**W**	Maytenus boaria	Mayten Tree	Tree
182	**W**	Melaleuca nesophila	Pink Melaleuca	Shrub
183	**N**	Metrosideros excelsus	New Zealand Christmas Tree	Tree
184	□ •	Mimulus species	Monkeyflower	Flower
185	□	Mirabilis californica	Wishbone Bush	Perennial
186	**N**	Myoporum debile	Ncn	Shrub
187	**N**	Myoporum insulare	Boobyalla	Shrub
188	**W**	Myoporum parvifolium	Ncn	Ground cover
189	**W**	Myoporurn 'Pacificum'	Ncn	Shrub
190	□	Nassella [stipa] lepida	Foothill needlegrass	Ground cover
191	□	Nassella [stipa] pulchra	Purple needlegrass	Ground cover
192	□	Nemophila menziesii	Baby Blue Eyes	Annual
193	**X**	Nerium oleander	Oleander	Shrub
194	□	Oenothera hookeri	California Evening Primrose	Flower
195	**W**	Oenothera speciosa	Showy Evening Primrose	Perennial
196	**X**	Ophiopogon japonicus	Mondo Grass	Ground cover
197	□ •	Opuntia littoralis	Prickly Pear	Cactus
198	□ •	Opuntia oricola	Oracle Cactus	Cactus
199	□ •	Opuntia prolifera	Coast Cholla	Cactus
200	**W**	Osmanthus fragrans	Sweet6 Olive	Shrub
201	**X**	Osteospermum fruticosum	Trailing African Daisy	Ground cover
202	**X**	Parkinsonia aculeata	Mexican Palo Verde	Tree
203	**W**	Pelargonium peltatum	Ivy Geranium	Ground cover
204	**X**	Penstemon species	Beard Tongue	Shrub
205	**W**	Photinia fraseri	Ncn	Shrub
206	**W**	Pistacia chinensis	Chinese Pistache	Tree
207	**X**	Pittosporum undulatum	Victorian Box	Tree
208	□	Plantago erecta	California Plantain	Annual
209	• •	Plantago insularis	Woolly Plantain	Annual
210	**X**	Plantago sempervirens	Evaergreen Plaintain	Ground cover
211	**W**	Platanus racemosa	California Sycamore	Tree
212	**W**	Plumbago auriculata	Plumbago Cape	Shrub
213	□	Populus fremontii	Western Cottonwood	Tree
214	**X**	Portulacaria afra	Elephant's Food	Shrub
215	□	Potentilla glandulosa	Sticky Cinquefoil	Subshrub
216	**X**	Potentilla tabernaemontanii	Spring Cinquefoil	Ground cover
217	**X**	Prunus caroliniana	Carolina Cherry Laurel	Shrub/Tree
218	□	Prusus ilicifolia ssp. Ilicifolia	Holly Leaved Cherry	Shrub
219	**X**	Prunus lyonii	Catalina Cherry	Shrub/Tree
220	**N**	Punica granatum	Pomegranate	Shrub/Tree

221	**W**	Puya species	Puya	Succulent/shrub
222	**W**	Pyraacantha species	Firethorn	Shrub
223	□	Quercus agrifolia	Coast Live Oak	Shrub
224	□ □ •	Quercus berberdifolia	California Scrub Oak	Shrub
225	□ □ •	Quercus dumosa	Coastal Scrub Oak	Shrub
226	**X**	Quercus engelmannii	Engelmann Oak	Tree
227	**X**	Quercus suber	Cork Oak	Tree
228	**X**	Rhamnus alaternus	Italian Buckthorn	Shrub
229	□	Rhamnus californica	California Coffee Berry	Shrub
230	□	Rhamnus crocea	Redberry	Shrub
231	□	Rhamnus crocea ssp. Ilicifolia	Hollyleaf Redberry	Shrub
232	**N**	Rhaphiolepis species	Indian Hawthorn	Shrub
233	□	Rhus integrifolia	Lemonade Berry	Shrub
234	**N**	Rhus lancea	African Sumac	Tree
235	□ □	Rhus ovataa	Sugarbush	Shrub
236	□	Ribes aureum	Golden Currant	Shrub
237	□	Ribes indecorum	White Flowering Currant	Shrub
238	□	Ribes speciosum	Fuchsia Flowering Gooseberry	Shrub
239	**W**	Ribes viburnifolium	Evergreen Currant	Shrub
240	□ •	Romneya coulteri	Matilija Poppy	Shrub
241	**X**	Romneya coulteri 'White Cloud'	White Cloud Matilija Poppy	Shrub
242	**W** □	Rosmarinus officinalis	Rosemary	Shrub
243	**W** □	Salvia greggii	Autumn Sage	Shrub
244	**W** □	Salvia sonomensis	Creeping Sage	Ground cover
245	□	Sambucus mexicana	Mexican Elderberry	Tree
246	**W**	Santolinaa chamaecyparissus	Lavender Cotton	Ground cover
247	**W**	Santolina virens	Green Lavender Cotton	Shrub
248	□	Ssatureja chandleri	San Miguel Savory	Perennial
249	□	Scirpus acutus	Hard-Stem Bulrush	Perennial
250	□	Scirpus californicus	California Bulrush	Perennial
251	**X**	Sedum acre	Goldmoss Sedum	Ground cover
252	**X**	Sedum album	Green Stonecrop	Ground cover
253	**X**	Sedum confusum	Ncn	Ground cover
254	**X**	Sedum llineare	Ncn	Ground cover
255	**X**	Sedum x rubrotinctum	Pork and Beans	Ground cover
256	**X**	Senecio serpens	Ncn	Ground cover
257	□	Sisyrinchium bellum	Blue-Eyed Grass	Ground cover
258	□	Solanum douglasii	Douglas Nightshade	Shrub
259	□	Solanum xantii	Purple Nightshade	Perennial
260	**W**	Stenocarpus sinuatus	Firewheel Tree	Tree
261	**W**	Strelitzia nicolai	Giant Bird of Paradise	Perennial

262	**W**	Strelitzia reginae	Bird of Paradise	Perennial
263	□	Symphoricarpos mollis	Creeping Snowberry	Shrub
264	**W**	Tecoma stans [Stenolobium sttans]	Yellow Bells	Shrub/Small tree
265	**X**	Tecomaria capensis	Cape Honeysuckle	Ground cover
266	**N**	Teucrium chamaedrys	Germander	Ground cover
267	**N**	Thymus serpyllum	Lemon Thyme	Ground cover
268	**N**	Trachelospermum jasminoides	Star Jasmine	Shrub
269	□	Trichostema lanatum	Woolly Blue-Curls	Shrub
270	**X**	Trifolium hirtum 'Hyron'	Hyron Rose Clover	Ground cover
271	**X**	Trifolium fragiferum 'O'Connor's'	O'Connor's Legume	Ground cover
272	□	Umbellularia californica	California Laurel	Tree
273	□	Verbena lasiostachys	Western Vervain	Perennial
274	**N**	Verbena peruviana	Ncn	Ground cover
275	**X**	Verbena species	Verbena	Ground cover
276	**X**	Vinca minor	Dwarf Periwinkle	Ground cover
277	□	Vitis girdiana	Desert Wild Grape	Vine
278	**X**	Vulpia myuros 'Zorro'	Zorro Annual Fescue	Grass
279	**W**	Westringia fruticosa		Shrub
280	**W**	Xanthorrhoea species	Grass Tree	Perennial accent/ Shrub
281	**W**	Xylosma congestum	Shiny Xylosma	Shrub
282	**X**	Yucca species	Yucca	Shrub
283	□	Yucca whippiei	Yucca	Shrub

CODE

X = Plant species prohibited in wet and dry fuel modification zones adjacent to native open space lands. Acceptable on all other fuel modification locations and zones.

W = Plant species appropriate for use in wet fuel modification zones adjacent to native open space lands. Acceptable in all other wet and irrigated dry (manufactured slopes) fuel modification locations and zones.

□ = Plant species native to San Diego County. Acceptable in all fuel modification (wet or dry zones) in all locations.

N = Plant species acceptable on a limited basis (maximum 30% of the area at time of planting) in wet fuel modification zones adjacent to native open space reserve lands. Acceptable in all other fuel modification locations and zones. Refer to qualification requirements starting on page 13.

● If seed collected from local seed source.

● ● Not native plant species but can be used in all fuel modification zones.

APPENDIX 'B'

Prohibited/Invasive Plant List

APPENDIX 'B'

UNDESIRABLE PLANT LIST

The following species are highly flammable and should be avoided when planting within 50 feet of a structure. The plants listed below are more susceptible to burning, due to rough or peeling bark, production of large amounts of litter, vegetation that contains oils, resin, wax, or pitch, large amounts of dead material in the plant, or plantings with a high dead to live fuel ratio. Many of these species, if existing on the property and adequately maintained (pruning, thinning, irrigation, litter removal, and weeding) may remain if the potential for spreading a fire has been reduced or eliminated.

BOTANICAL NAME	COMMON NAME
Abies species	Fir Trees
Acacia species	Acacia (trees, shrubs, groundcovers)
Adenostoma sparsifolium**	Red Shanks
Adenostoma fasciculatum**	Chamise
Agonis juniperina	Juniper Myrtle
Araucaria species	Monkey Puzzle, Norfolk Island Pine
Artemesia californica**	California Sagebrush
Bambusa species	Bamboo
Cedrus species	Cedar
Chamaecyparis species	False Cypress
Coprosma pumila	Prostrate Coprosma
Cryptomeria japonica	Japanese Cryptomeria
Cupressocyparis leylandii	Leylandii Cypress
Cupressus forbesii**	Tecate Cypress
Cupressus glabra	Arizona Cypress
Cupressus sempervirens	Italian Cypress
Dodonea viscosa	Hopseed Bush
Eriogonum fasciculatum**	Common Buckwheat
Eucalyptus species	Eucalyptus
Heterotheca grandiflora**	Telegraph Plant
Juniperus species	Junipers
Larix species	Larch
Lonicera japonica	Japanese Honeysuckle
Miscanthus species	Eulalia Grass
Muehlenbergia species**	Deer Grass
Palmae species	Palms
Picea species	Spruce Trees
Pickeringia Montana**	Chaparral Pea
Pinus species	Pines
Podocarpus species	Fern Pine
Pseudotsuga menziesii	Douglas Fir
Rosmarinus species	Rosemary
Salvia mellifera**	Black Sage
Taxodium species	Cypress
Taxus species	Yew
Thuja species	Arborvitae
Tsuga species	Hemlock
Urtica urens**	Burning Nettle

** San Diego County native species

APPENDIX 'B' References:

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City of Vista, California 1997. Undesirable Plants. Section 18.56.999. Landscaping Design, Development and Maintenance Standards.

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www.ucfpl.ucop.edu. 2004. University of California, Berkeley, Forest Products Laboratory, College of Natural Resources. Defensible Space Landscaping in the Urban/Wildland Interface. A Compilation of Fire Performance Ratings of Residential Landscape Plants.

County of Los Angeles Fire Department. Fuel Modification Plan Guidelines. Plant Selection Guidelines by Zone, including Undesirable Plant List.

APPENDIX 'C'

Literature References

Literature References

1. *Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model,* General Technical Report RMRS-GTR-153. June 2005. Joe H. Scott, Robert E. Burgan, United States Department of Agriculture - Forest Service, Rocky Mountain Research Station, Missoula, Montana.

2. BehavePlus Modeling System 3.0.1 by Patricia L. Andrews and Collin D. Bevins, USDA–Forest Service, Rocky Mountain Research Station – Fire Sciences Lab, Missoula, Montana, and System for Environmental Managmement of Missoula, Montana. 2005.

3. Andrews, Patricia L. 2013. Current status and future needs of the BehavePlus Fire Modeling System. International Journal of Wildland Fire 23(1):21-33.

4. California Code of Regulations Title 24 and Title 14, section 1280

5. California Public Resources Code Sections 4201 through 4204

6. California Government Code, sections 51175 through 51189; the 2019 Fire Code portion of the CBSC, including appendices to Chapters 1 & 4 and appendices B, F & H

7. Archives of the *Los Angeles Times* newspaper**.** Robert G. Fovell, Ph.D., UCLA Atmospheric and Oceanic Sciences, January 2008 (and slightly revised May, 2014).

8. National Fire Protection Association - NFPA 13 Standard for the Installation of Sprinkler Systems in One and Two-Family Dwellings and Manufactured Homes, 13-R &13-D, 2019 Edition

9. National Fire Protection Association - NFPA 1142 Standard on Water Supplies for Suburban and Rural Fire Fighting, 2017 Edition.

10. National Fire Protection Association - NFPA 1144 *Standard for Reducing Structure Ignition Hazards from Wildfire* (2018 edition).

11. *The 2019 California Fire Code and Local Amendments*

12. California Building Code- Chapter 7A- *Materials and Construction Methods for Exterior Fire Exposure.* January 2019.

13. *The California State and Local Responsibility Area Fire Hazard Severity Zone Map – Fire and Resource Assessment Program of CAL FIRE*

14. Ordinance 3918 (Fire Safety Overlay District Regulations). An ordinance of the County of San Bernardino, State of California. June 3, 2004.

15. Western Region Climate Center. *Historic Climate Data from Remote Automated Weather Stations.* RAWS USA Climate Archive. Reno, NV. Data for all Remote Automated Weather Stations is available at: http://www.raws.dri.edu/index.html

16. San Bernardino County Fire Agency Urban Wildland Interface Requirements

17. Chino Valley Independent Fire District Standards 104, 111 and 153

APPENDIX ‘D’

Non-combustible & Ignition-Resistant Building Materials

APPENDIX 'D'

Non-Combustible & Ignition-Resistant Building Materials For Balconies, Carports, Decks, Patio Covers and Floors

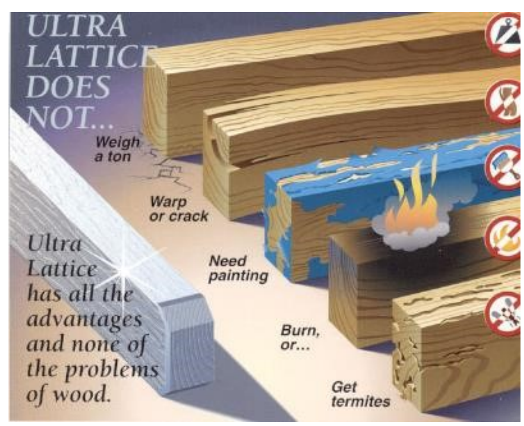
Examples of non-combustible & fire-resistant building materials for balconies, carports decks, patio covers, and floors are as follow:

I. **NON-COMBUSTIBLE HEAVY GAGE ALUMINUM MATERIALS** - *Metals USA Building Products Group - Ultra-Lattice*

Ultra-Lattice Stand Alone Patio Cover

Ultra-Lattice Attached Patio Cover

Ultra-Lattice Solid Patio Cover



Ultra-Lattice Vs. Wood

II. FRX Exterior Fire-Retardant Treated Wood

Exterior Fire Retardant Treated (FRT) Wood

FRX® fire retardant treated wood may be used in exterior applications permitted by the codes where: public safety is critical, other materials would transfer heat or allow fires to spread, sprinkler systems cannot easily be installed, corrosive atmospheres necessitate excessive maintenance of other materials, or fire protection is inadequate or not readily available. The International Building, Residential and Urban-Wildland Interface Codes and regulations permit the use of fire-retardant treated wood in specific instances. See below for typical exterior uses and typical residential uses.

Typical Exterior Uses

- Balconies
- Decks

Homeowners and Residential Architects: See this 2-minute video and the diagram below.

For information on fire retardant treated wood for exterior uses, visit www.frxwood.com.

Decking (SFM Standard 12-7A-4)

III. **TREX COMPANY, INC –**"Trex Accents ®: Fire Defense ™ " wood and polyethylene composite deck board, nominal 5/4" thick x 5-1/2" width, nominal density of 0.036 lb/in^3.

Trex Accents®: Fire Defense™

The perfect blend of beauty and brawn.

Trex's #1 selling platform, Trex Accents®, exceeds the strict fire regulations set by the State of California and San Diego County.

- Offers superior safety performance:
  - Exceeds ASTM E84 Class B Flame Spread.
  - Exceeds 12-7A-4 Part A (underflame) and Part B (Burning Brand).
- Self-extinguishing even under extreme fire exposure.
- Approved for use by the California State Fire Marshal's Office and San Diego County. Read the California Department of Forestry and Fire Protection, Office of the State Fire Marshal WILDLAND URBAN INTERFACE (WUI)PRODUCTS Report. (PDF)

IV. SOLID "WOOD" DECKING

◊Company Name: Various Manufacturers

Product Description: Solid "Wood" decking: "Redwood", "Western Red Cedar", "Incense Cedar", "Port Orford Cedar", and "Alaska Yellow Cedar".

Sizes: Minimum nominal 2" thickness (American Softwood Lumber Standard PS 20).
Lumber grades: Construction Common and better grades for Redwood, 3 Common and better grades for Cedars, and commercial decking or better grades for both Redwood and Cedars.

Special instructions: solid wood decking shall be 3x decking and installed over solid wood joists spacing 24" or less on center with 6x6 columns, 4x10 or 6x8 beams and 4x8 joists.

APPENDIX ‘E’

Ignition Resistive Construction

Appendix 'E'
Ignition Resistive and Building Construction Requirements as it Relates to the Paradise Ranch Development in Chino Hills, California

The following are the current requirements for ignition resistant construction for high fire hazard areas including requirements under Chapter 7A of the California Building Code (CBC) 2019 edition.

1. All structures will be built with a Class A Roof Assembly and shall comply with the requirements of Chapter 7A and Chapter 15 of the California Fire Code. Roofs shall have a roofing assembly installed in accordance with its listing and the manufacturer's installation instructions.

2. Roof valley flashings shall be not less than 0.019-inch (0.48 mm) No. 26 gauge galvanized sheet corrosion-resistant metal installed over not less than one layer of minimum 72 pound (32.4 kg) mineral-surfaced nonperforated cap sheet complying with ASTM D3909, at least 36-inch-wide (914 mm) running the full length of the valley.

3. Attic or foundation ventilation louvers or ventilation openings in vertical walls shall be covered with a minimum of 1/16-inch and shall not exceed 1/8-inch mesh corrosion resistant metal screening or other approved material that offers equivalent protection.

4. Where the roof profile allows a space between the roof covering and roof decking, the spaces shall be constructed to resist the intrusion of flames and embers, be fire stopped with approved materials or have one layer of a minimum 72 pound (32.4 kg) mineral surfaced nonperforated cap sheet complying with ASTM D3909 installed over the combustible decking.

5. Enclosed roof eaves and roof eave soffits with a horizontal underside, sloping rafter tails with an exterior covering applied to the under-side of the rafter tails, shall be protected by one of the following:

    - Noncombustible material
    - Ignition-resistant material
    - One layer of $^{5}/_{8}$-inch Type X gypsum sheathing applied behind an exterior covering on the underside of the rafter tails or soffit
    - The exterior portion of a 1-hour fire resistive exterior wall assembly applied to the underside of the rafter tails or soffit including assemblies using the gypsum panel and sheathing products listed in the Gypsum Association Fire Resistance Design Manual

- Boxed-in roof eave soffit assemblies with a horizontal underside that meet the performance criteria in Section 707A.10 when tested in accordance with the test procedures set forth in ASTM E2957.
- Boxed-in roof eave soffit assemblies with a horizontal underside that meet the performance criteria in accordance with the test procedures set forth in SFM Standard 12-7A-3.

6. The exposed roof deck on the underside of unenclosed roof eaves shall consist of one of the following:

    - Noncombustible material, or
    - Ignition-resistant material, or
    - One layer of 5/8-inch Type X gypsum sheathing applied behind an exterior covering on the underside exterior of the roof deck, or
    - The exterior portion of a 1-hour fire resistive exterior wall assembly applied to the underside of the roof deck designed for exterior fire exposure including assemblies using the gypsum panel and sheathing products listed in the Gypsum Association fire Resistance Design Manual.

7. Vents - ventilation openings for enclosed attics, enclosed eave soffit spaces, enclosed rafter spaces formed where ceilings are applied directly to the underside of roof rafters, and underfloor ventilation openings shall be fully covered with metal wire mesh, vents, other materials or other devices that meet one of the following requirements:

    A. Vents listed to ASTM E2886 and complying with all the following:

    i. There shall be no flaming ignition of the cotton material during the Ember Intrusion Test.

    ii. There shall be no flaming ignition during the Integrity Test portion of the Flame Intrusion Test.

    iii. The maximum temperature of the unexposed side of the vent shall not exceed 662°F (350°C).

    B. Vents shall comply with all the following:

    i. The dimensions of the openings therein shall be a minimum of $^{1}/_{16}$-inch (1.6 mm) and shall not exceed $^{1}/_{8}$-inch (3.2 mm).

    ii. The materials used shall be noncombustible.
    Exception: Vents located under the roof covering, along the ridge of roofs, with the exposed surface of the vent covered by noncombustible wire mesh, may be of combustible materials.

iii. The materials used shall be corrosion resistant.

8. Vents shall not be installed on the underside of eaves and cornices.

   Exceptions:

   1. Vents listed to ASTM E2886 and complying with all the following:

      1. There shall be no flaming ignition of the cotton material during the Ember Intrusion Test.
      2. There shall be no flaming ignition during the Integrity Test portion of the Flame Intrusion Test.

   2. The maximum temperature of the unexposed side of the vent shall not exceed 662°F (350°C).
   3. The enforcing agency shall be permitted to accept or approve special eave and cornice vents that resist the intrusion of flame and burning embers.

9. All chimney, flue or stovepipe openings that will burn solid wood will have an approved spark arrester. An approved spark arrester is defined as a device constructed of nonflammable materials, having a heat and corrosion resistance equivalent to 12-gauge wire, 19-gauge galvanized steel or 24-gauge stainless steel. or other material found satisfactory by the Fire Protection District, having ½-inch perforations for arresting burning carbon or sparks nor block spheres having a diameter less than 3/8 inch (9.55 mm). It shall be installed to be visible for the purposes of inspection and maintenance and removeable to allow for cleaning of the chimney flue.

10. All residential structures will have automatic interior fire sprinklers installed according to the National Fire Protection Association (NFPA) 13D 2019 edition - *Standard for the Installation of Sprinkler Systems in One and Two-family Dwellings and Manufactured Homes*.

11. All glass or other transparent, translucent, or opaque glazing materials including skylights shall comply with one of the following requirements:

   - be constructed of multi-layered glazed panels, one layer of which must be tempered glass,
   - or be constructed of glass block units, or
   - have a fire-resistance rating of not less than 20 minutes when tested according to NFPA 257, or
   - be tested to meet the performance requirements of the SFM Standard 12-7A-2.

12. The exterior wall covering, or wall assembly shall comply with one of the following requirements:

- Noncombustible material, or
- Ignition resistant material, or
- Heavy timber exterior wall assembly, or
- Log wall construction assembly, or
- Wall assemblies that have been tested in accordance with the test procedures for a 10minute direct flame contact expose test set forth in ASTM E2707 with the conditions of acceptance shown in Section 707A.3.1 of the California Building Code, or
- Wall assemblies that meet the performance criteria in accordance with the test procedures for a 10-minute direct flame contact exposure test set forth in SFM Standard 12-7A-1.

Exception: Any of the following shall be deemed to meet the assembly performance criteria and intent of this section including.

- One layer of 5/8-inch Type X gypsum sheathing applied behind the exterior covering or cladding on the exterior side of the framing, or
- The exterior portion of a 1-hour fire resistive exterior wall assembly designed for exterior fire exposure including assemblies using the gypsum panel and sheathing products listed in the Gypsum Association Fire Resistance Design Manual.

13. All eaves, facias and soffits will be enclosed (boxed) with non-combustible materials. This shall apply to the entire perimeter of each structure.

14. Gutters shall be provided with the means to prevent the accumulation of leaf litter and debris within the gutter that contribute to roof edge ignition.

15. No attic ventilation openings or ventilation louvers shall be permitted in soffits, in eave overhangs, between rafters at eaves, or in other overhanging areas.

16. All projections (exterior balconies, decks, patio covers, unenclosed roofs and floors, and similar architectural appendages and projections) or structures less than five feet from a building shall be of non-combustible material, one-hour fire resistive construction on the underside, heavy timber construction or pressure-treated exterior fire-retardant wood. When such appendages and projections are attached to exterior fire-resistive walls, they shall be constructed to maintain same fire-resistant standards as the exterior walls of the structure.

17. Deck Surfaces shall be constructed with one of the following materials:

    - Material that complies with the performance requirements of Section 709A.4 when tested in accordance with both ASTM E2632 and ASTM E2726, or
    - Ignition-resistant material that complies with the performance requirements of 704A.3 when tested in accordance with ASTM E84 or UL 723, or

- Material that complies with the performance requirements of both SFM Standard 127A-4 and SFM Standard 12-7A-5, or
- Exterior fire retardant treated wood, or
- Noncombustible material, or
- Any material that complies with the performance requirements of SFM Standard 127A-4A when the attached exterior wall covering is also composed of noncombustible or ignition-resistant material.

18. Exterior doors shall be approved non-combustible construction, solid core wood and shall conform to the performance requirements of standard SFM 12-7A-1 or shall be of approved noncombustible construction, or solid core wood having stiles and rails not less than 1⅜ inches thick with interior field panel thickness no less than 1¼ inches thick, or shall have a fire-resistance rating of not less than 20 minutes when tested according to NFPA 252.

19. Accessory structures attached to buildings with habitable spaces and projections shall be in accordance with the Building Code. When the attached structure is located and constructed so that the structure or any portion thereof projects over a descending slope surface greater than 10 percent, the area below the structure shall have all underfloor areas and exterior wall construction in accordance with Chapter 7A of the Building Code.

20. Window assemblies, skylights and exterior glazed door assemblies shall comply with one of the following requirements:

    - Be constructed of multiplane glazing with a minimum of one tempered pane meeting the requirements of Section 2406 Safety Glazing, or
    - Be constructed of glass block units, or
    - Have a fire-resistance rating of not less than 20 minutes when tested according to NFPA 257, or
    - Be tested to meet the performance requirements of SFM Standard 12-7A-2.

21. Combustible eaves, fascia and soffits shall be enclosed. Eaves of heavy timber construction are not required to be enclosed if attic venting is not installed in the eaves. For the purposes of this section, heavy timber construction shall consist of a minimum of 4x6 rafter ties and 2x decking.

22. Detached accessory buildings that are less than 120 square feet in floor area and are located more than 30 feet but less than 50 feet from an applicable building shall be constructed of noncombustible materials or of ignition-resistant materials as described in Section 704A.2 of the California Building Code.

    Exception: Accessory structures less than 120 square feet in floor area located at least 30 feet from a building containing a habitable space.

Below are the mandated requirements specified by the City of Chino Hills Independent Fire District:

1. Spark arrestor. All chimneys attached to any appliance or fireplace that burns solid fuel shall be equipped with an approved spark arrestor. The spark arrestor shall meet all the following requirements:

    i. Opening shall not permit the passage of spheres having a diameter larger than ½ inch and shall not block the passage of sphere having a diameter of less than 3/8 inch.
    ii. The spark arrestor shall be visible from the ground and the screen or chimney cap shall be accessible and removable to allow for cleaning of the chimney flue.
    iii. The net free area of the spark arrestor shall not be less than four times the net area of the outlet of the chimney.
    iv. The spark arrestor screen shall have heat or corrosion resistance equivalent to 12-gauge steel wire, 19-gauge galvanized wire or 24-gauge stainless steel.

2. Aerial access. Buildings exceeding three stories in height or 30 feet in height shall be provided with aerial fire apparatus access. One or more of the required access routes shall be not less than 15 feet (4572 mm) and not greater than 30 feet (9144 mm) from the building. The side of the building on which the aerial access fire apparatus road is positioned shall be approved by the fire code official.

3. Fire Service Roads shall have an unobstructed width of not less than 27 feet, exclusive of shoulders, except for approved security gates in accordance with Section 503.6, and an unobstructed vertical clearance of not less than 13 feet 6 inches (4115 mm).

4. Fire service access roads shall be designed and maintained to support the imposed loads (67,000 lbs.) of fire apparatus and shall be sourced by either asphalt or concrete except when alternate surfaces are approved by the jurisdiction.

In addition to the mandatory requirements listed above the following building features are additional mitigation measures agreed to in consultation with the City of Chino Hills:

- Install “Brandguard” or equivalent type ember resistant baffled vents on all structures, or if necessary, eliminate attic vents entirely – vents will be 1/16” diameter or smaller.
- All exterior doors that swing shall have self-closing hardware, e.g., spring loaded or pneumatic hinges (side yard doors cannot be sliding doors; rear yard doors can be sliding doors when rear yard setbacks are 15’ or greater).
- All structures shall have automatic door closers on all vehicle garage doors (standard on most new automatic garage door openers as a security feature) that can be set to close after a certain period of time with no activity.

- Fire sprinklers shall be installed per NFPA 13D and shall also be installed in all areas of the home that are not required by NFPA 13D – i.e., in all walk-in closets or rooms in excess of 55 square feet, all bathrooms regardless of size, and all garages.
- Metal mesh window bug screens shall be installed on all operable windows.
- Exterior wall construction between buildings to conform to 2-hour construction assembly as shown in Gypsum Association Fire Resistance Design Manual.
- Fences or walls installed on the lot lines between structures shall be of noncombustible materials. Upon submission of the Conceptual Fire Protection Plan, consideration may be given to alternative materials in situations where not between homes (i.e., small front yard fences depending upon materials and design components).
- All outside hinged entry doors shall have a 90-minute fire rating.
- Builder shall deliver a copy of the FPP at time of sale to each initial homeowner.

APPENDIX ‘F’

Off-Site Fuel Treatment Agreement
(Provided by Developer/Owner)