Markham Street Extension Improvements

Water Quality Technical Memorandum

County of Riverside, Department of Transportation

November 13, 2023

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Contents

Tables

Attachments

Abbreviations

ADA	American with Disabilities Act
BMP	Best Management Practice
CEQA	California Environmental Quality Act
CDFW	California Department of Fish and Wildlife
CWA	Federal Clean Water Act
EB	Eastbound Direction
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
MSHCP	Multiple Species Habitat Conservation Plan
NPDES	National Pollution Discharge Elimination System
LOS	Level of Service
PCWQCA	Porter-Cologne Water Quality Control Act
RCTD	Riverside County Transportation Department
R/W	Right of Way
SWPPP	Stormwater Pollution Prevention Plan
RWQCB	Regional Water Quality Control Board
MS4 TPG	Santa Ana Region MS4 Permit Program Guidance and Standards for Transportation Projects
USACE	United States Army Corps of Engineers
WB	Westbound Direction

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Project Description

1.1 Introduction

The Riverside County Transportation Department (RCTD) is proposing improvements to Markham Street by extending the roadway between Roosevelt Street and Wood Road for approximately 1.3 miles in Woodcrest Community in Riverside County, California (see Attachment A). The purpose of the Markham Street Expansion Project (Project) is to improve traffic circulation within the community. The Project will be designed as a secondary highway per the Riverside General Plan (2015) and will include the construction of one travel lane in each direction, Class II bike lanes, and a sidewalk on the south side of Markham Street within the Project limits. The Project is subject to the applicable provisions of the California Environmental Quality Act (CEQA), and the Riverside County Transportation Department is the CEQA lead agency.

1.2 Purpose

This Water Quality Technical Memorandum (WQTM) was prepared to describe how the Project will affect the water quality of the region during construction and throughout operation.

1.3 Existing Conditions

The Project is located in a semi-rural area with residential, commercial, and institutional land uses and vacant properties. Properties within the Project limits include single-family homes, businesses, and utility infrastructure including a sewer-lift and water-pumping station, overhead power lines and underground water, gas, and telecommunication lines.

The Project is along Markham Street between Roosevelt Street and Wood Road and spans in an east/west direction for 1.3 miles, approximately 6,864 feet. Between the major street intersections of Markham Street with Roosevelt Street and Wood Road, there are minor street intersections with Oran Drive, Birch Street, Cedar Street, and James Kenny Road. At each of these intersections, previous partial roadway improvements have been performed. The west end of the Roosevelt Street intersection and the east end of the Wood Road Intersection are the outer segments of Markham Street that have been paved and improved to accommodate its designation as a secondary highway. Extending to the east from the Roosevelt Street intersection, Markham Street is an unpaved dirt road for 0.50 miles (approximately 2,640 feet) that connects to an existing portion of the paved roadway. The unpaved portion of Markham Street is inaccessible from the west end of the Roosevelt Street intersection, as it is blocked by existing metal beam guardrail. From the Wood Road intersection extending west is a 20-foot-wide paved road for 0.47 miles (approximately 2,500 feet).

1.4 Proposed Project

The Project includes the construction of one travel lane in each direction for 1.3 miles (approximately 6,864 feet) spanning along Markham Street from Roosevelt Street to Wood Road. Roadway and traffic signal improvements will also be implemented to facilitate efficiency in flow of traffic, see Tables 1-1 and 1-2. All existing driveways along the affected portion of Markham Street will be connected to the new paved roadway. Additionally, existing utilities will be relocated and drainage improvements (i.e., storm drain piping, culverts, and new curb and gutters) will be designed to accommodate the roadway extension. The Project requires right-of-way acquisition, temporary and permanent construction easements, and staging areas. See Attachment B.

Table 1-1. Roadway Improvements

Component	Width (ft)	Component	Width (ft)
EB Travel Lane	12	Parkway	6
EB Class II Bike Lane	6	Sidewalk	6
WB Travel Lane	12	Unpaved Shoulder [a]	8
WB Class II Bike Lane	5	Curb and Gutters [b]	N/A

Source: HDR Markham Environmental Technical Studies Preliminary Design - June 27, 2023.
[a] Located at northern edge of the roadway
[b] Located at southern edge of the roadway

Table 1-2. Intersection Improvements

Intersection	Improvements
Markham St & Wood Rd (existing signalized intersection)	EB Left-Turn Lane EB Through Lane EB Shared-Through/Right-Turn Lane
Markham St & Roosevelt St	Stop-Controlled Intersection Traffic Restriping WB Through Lane WB Shared-Through/Right Turn Lane
Markham St & Oran Dr Markham St & Birch St Markham St & Cedar St Markham St & James Kenny Rd	Stop Controlled Intersection ADA Pedestrian Ramps Curb Returns

Source: HDR Markham Environmental Technical Studies Preliminary Design - June 27, 2023.

Regulatory Setting

Table 2-1 lists the applicable regulations and permit requirements related to water quality. A discussion of applicable regulations applicable to the Project follows Table 2-1.

Table 2-1. Regulatory Permit Requirements and Applicable Regulations

Associated Permit / Regulatory Action
• CDFW, Section 1602 Streambed Agreement and 1600 Et Seq. • Santa Ana RWQCB, Section 401 Water Quality Certification • USACE, Section 404 Permit-Nationwide • NPDES Construction General Permit, Order No. 2022-0057-DWQ and NPDES No. CAS000002 • NPDES Area-Wide Urban Storm Water Runoff Management Program, Order No. R8-2010-033 and NPDES No. CAS618033 (MS4 Permit) • Santa Ana Region MS4 Permit Program Guidance and Standards for Transportation Projects Best Management Practices Report (MS4 TPG Report) • Clean Water Act, Section 303(d), 404 and 401 • Porter-Cologne Water Quality Control Act

Sources: HDR Markham Street Preliminary Roadway and Environmental Constraints Memo - Feb 2020.

2.1 Water Quality

This Project will have water quality requirements subject to two permits for the temporary and permanent phases. The temporary, or construction, phase will be addressed by the National Pollution Discharge Elimination System (NPDES) Construction General Permit (Order No. 2022-0057-DWQ and NPDES No. CAS000002) which includes the Storm Water Pollution Prevention Program report (SWPPP) and construction-related Best Management Practices report (BMPs). The SWPPP will address all construction-related activities, equipment, and materials that have the potential to impact water quality and identify sources of pollutants. The risk level determination analysis was also conducted to support the Project will not cause hinderance to local water quality, see Section 4.1 and Attachment G for more information.

The permanent, or post-construction, phase will adhere to the MS4 Permit (Order No. R8-2010-033 and NPDES No. CAS618033) related guidance document: Guidance and Standards for Transportation Projects for the Santa Ana Region Riverside County Co-Permittees. This document resulted in preparation of the Template for Low Impact Development: Guidance and Standards for Transportation Projects (will be referred to as Transportation Project Report or TPR). This will address long-term water quality impacts by filtering pollutants through low-impact development infrastructure (LIDs), sediment control, storm drain inlet protection, construction materials management and non-storm water BMPs.

Furthermore, the Project will adhere to waste discharge requirements set forth by the Riverside County Flood Control and Water Conservation District, the County of Riverside, and the Incorporated Cities of Riverside County within the Santa Ana Region.

Affected Environment

3.1 Hydrology

The Project is in the Santa Ana River hydrologic unit's Middle Santa Ana River hydrologic area and the Riverside-Arlington hydrologic sub-area (801.26) (Attachment C). The hydrologic surface area is 44,218 acres (Caltrans, 2023).

3.2 Local Drainage

The Project drainage area is comprised of three tributary areas in the Santa Ana River watershed. These tributary areas total 2,345 acres, and they primarily contribute to offsite drainage. The runoff from these areas that collects on-site occurs along Markham Street before draining westerly toward Mockingbird Canyon (Environmental Constraints Analysis, 2020). Also see Attachment D.

There is currently minimal drainage infrastructure within the Project limits. There are approximately 5 existing road drainage locations routing flow from the street to the side of the road via curb routing and corrugated metal pipe.

3.3 Surface Water

As previously mentioned, the storm water runoff from the Project site is not collected but diverted from the roadway to the road shoulder to minimize roadway flooding. The runoff that collects on-site flows along Markham Street and drains southwesterly to Mockingbird Canyon. There are currently no beneficial uses assigned to the Project location or Mockingbird Canyon (California Water Boards, 2019).

3.4 Groundwater

The Western Municipal Water District (WMWD) supplies water to the community surrounding the Project. The WMWD receives most of its water from the Sacramento-San Joaquin Bay-Delta (State Water Project) and the Colorado River Aqueduct. The district has groundwater supply in the Murrieta Division which is combined with the aforementioned imported water sources to provide water for the region's community. Groundwater from the Bunker Hill Basin is also transported into the Riverside Division (WMWD, 2023).

As previously mentioned, the Project is in the Riverside-Arlington sub-basin. This basin is replenished by several sources including the following: Santa Ana River (infiltration), Rialto-Colton fault (underflow), Chino sub-basin (intermittent underflow), irrigation (return flow), and precipitation (percolation) (WMWD, 2023). There are currently no beneficial uses assigned to the Project location or Mockingbird Canyon as this Project is not within a Santa Ana River groundwater management zone (California Water Boards, 2019).

The Project is within Riverside County Groundwater Protection Areas 33S03S04W31 and 33S04S04W06 (CPDR GWPAs, 2023). These areas have runoff concerns with respect to pesticide usage from irrigation of agricultural areas adjacent to the project location as it has the potential to cause fluctuation of local groundwater levels, see Attachment E. These fluctuations can also lead to perched groundwater (CPDR, 2023).

3.5 Floodplains

According to the Federal Emergency Management Act (FEMA) Flood Insurance Rate Map (FIRM) (Map Number 06065C1405G, effective date August 28th, 2008), the Project is within an area classified as Zone X, which is outside of the 500- and 100-year floodplain zone (Attachment F) (FEMA, 2023).

Environmental Consequences

4.1 Short-Term Impacts during Construction

Potential impacts to the surrounding area's hydrology and water quality were identified by reviewing the 2019 Santa Ana River Basin Water Quality Control Plan, the MS4 TPG Report, FEMA flood zone maps, CWA Section 303(d), and conducting a risk level determination analysis. The risk level determination analysis analyzed two site-specific risks, the sediment and receiving water risks. The sediment risk was calculated following the revised universal soil loss equation (RUSLE) and computed a watershed erosion estimate of about 6.43 tons per acre, signifying the Project has a low sediment risk. The receiving water risk assumed the Project drains to Mockingbird Canyon Reservoir and utilized the CA 2022 Waterboards Integrated Report GIS Map and 2019 Santa Ana River Basin Water Quality Control Plan. These sources support both the Project and Mockingbird Canyon Reservoir are not of nor within critically impaired environmental areas, signifying the Project has low receiving water risk. Overall, the Project does not impose adverse environmental effects as its combined risk level was determined to be low, see Attachment G.

The total disturbed soil area (DSA) for the Project includes areas designated for construction, access, and staging. Temporary impacts to water quality can be anticipated during the construction phase. These potential impacts may include increased sediment from construction equipment, excavation and grading, vegetation removal, construction waste materials, trash from workers, petroleum products from construction equipment and/or vehicles, sanitary waste from portable facilities, and chemicals used in the construction process.

The Project is subject to the requirements of the National Pollutant Discharge Elimination System (NPDES) Construction General Permit which require preparation and implementation of a SWPPP to address the quality and quantity of stormwater runoff during construction. The SWPPP will identify temporary BMPs to assist in mitigating short-term impacts to water quality during construction. These BMPs may include but are not limited to temporary slope reinforcement and stabilization, linear sediment barriers, waste management, and temporary construction entrance and drainage inlet protection (Environmental Constraints Analysis, 2020).

4.2 Long-Term Impacts during Operation

The Project would include the addition of about 4.64 acres (202,200 square feet) of impervious surface (MS4 TPG Report, 2023), new traffic signals, relocated utilities, new signage, striping, removal of existing pavement, modification or removal of existing drainage infrastructure, and installation of storm drain infrastructure improvements to maintain existing drainage patterns. The proposed drainage infrastructure improvements include installation of nine culverts, one regional channel to facilitate off-site drainage, and twelve catch basins to collect and divert on-site street flow drainage to the proposed off-site culverts and the regional channel.

These improvements are designed to maintain existing drainage patterns and mitigate impacts of the on-site stormwater leaving the site (Drainage Report, 2023). There are several long-term effects on water quality that may result from the addition of new impervious surfaces and associated runoff including but limited to increased rate and quantity of storm water runoff, increased potential for downstream erosion; dry-weather flows, which may contain pollutants and/or alter natural streams and their habitats, and increased pollutant concentration during wet weather flows (Environmental Constraints Analysis, 2020).

The Santa Ana Region Municipal Separate Storm Sewer Systems (MS4) Permit Program is applicable to the Project which includes requirements for Low Impact Development (LID) BMPs throughout operations (Environmental Constraints Analysis, 2020). Per the Santa Ana Region MS4 Permit Program Template for Low Impact Development: Guidance and Standards for Transportation Projects, the Project is classified as a Category 4 project (LID, 2023). Table 4-1 summarizes the applicable Category 4 - LID BMPs and their respective feasibility in this Project. The results from this feasibility assessment indicate implementation of a minimum road width is the only feasible LID post-construction BMP to be incorporated into the Project. This will reduce the amount of impervious surface introduced in the Project which therefore minimizes runoff and the potential effects of downstream erosion.

Table 4-1. LID BMPs and Project Implementation Feasibility

Category 4 LID BMPs	Feasibility Assessment
Minimum Road Width	This option is feasible. The proposed road lane width is 12 feet which complies with the County of Riverside General Plan (GP) for minimum road widths.
Drainage Swales	This option is not feasible. The Project does not have enough space in the proposed ROW for this BMP.
Infiltration Basins	This option is not feasible. The Project does not have enough space in the proposed right-of-way (ROW) for this BMP.
Bioretention	This option is not feasible. The Project does not have enough space in the proposed right-of-way (ROW) for this BMP.
Sidewalk Trees and Tree Boxes	This option is not feasible. The Project does not have enough space in the proposed ROW for this BMP.
Permeable Pavement	This option is not feasible. As a collector street, this portion of Markham Street is expected to generate a traffic volume increase of approximately 7,300 vehicles with expected level of service of B or better. This high traffic volume would prevent the use of permeable pavement.

Sources: HDR Markham Street Extension Improvements Santa Ana Region MS4 Permit Program Template for Low Impact Development: Guidance and Standards for Transportation Projects - June 2023.
HDR Markham Street Roadway Improvement Project Traffic Impact Assessment Memo - Feb 2022.

Conclusion and Recommendations

The Project must comply with the Clean Water Act and NPDES standards during and after construction. The contractor must prepare a SWPPP that includes identification and implementation of BMPs to mitigate potential erosion and ensure that dirt, construction materials, pollutants, and other relevant materials do not discharge to surrounding storm drains or surface waters. In addition to the standard BMPs required for compliance with NPDES as described in the Construction General Permit, the standardized measures for consideration in preparation of the SWPPP include, but are not limited, to the following:

- Excavated materials should not be deposited or stored along watercourses where materials could be washed away by high water or storm runoff.
- Precautions should be taken when handling materials to protect water quality.
- Hazardous materials, such as paint, lubricant, engine oil, carbon-fueled equipment, concrete washes, or stockpiles, to be stored or used during construction shall be stored in a manner to minimize potential impacts to surface and groundwater. Appropriate techniques include storing materials inside or under cover on paved surfaces, secondary containment, regular inspections, and training of subcontractors and construction workers. The period of time that such materials are stored on the site should be kept to a minimum.
- After construction is complete, the contractor should dispose of remaining hazardous or toxic materials appropriately, according to local, state, and federal regulations.
- No maintenance of construction equipment or storage of construction vehicles should occur within 50 feet of a drainage channel.
- Where a potential exists for grease and oil contamination to flow into storm drains, ditch structures, including grease traps, sediment traps, detention basins, and/or temporary dikes will be used to control possible pollutants.
- Facilities shall be constructed pursuant to guidance published in Section 402 of the Clean Water Act.

Throughout operation, the proposed drainage infrastructure improvements including the nine culverts, one regional channel, and twelve catch basins are designed to maintain existing drainage patterns and mitigate impacts of the on-site stormwater leaving the site. Implementing the minimum road width LID post-construction BMP will also minimize the amount of impervious surface area introduced in the Project.

References

California Water Boards, Santa Ana – R8. Santa Ana River Basin Plan. June 2019. Available online at: https://www.waterboards.ca.gov/santaana/water_issues/programs/basin_plan/. Accessed on September 13, 2023. (California Water Boards, 2019)

California Department of Pesticide Regulation, CA DPR – California Code of Regulations (Title 3. Food and Agriculture) Division 6 Pesticides and Pest Control Operations, Section 6487.4 Runoff Groundwater Protection Areas. 2023. Available online at: https://www.cdpr.ca.gov/docs/legbills/calcode/020404.htm#a64874. (CPDR, 2023)

California Department of Pesticide Regulation, CA DPR – Riverside County Groundwater Protection Areas. 2023. Available online at: https://www.cdpr.ca.gov/docs/emon/grndwtr/gwpa_lists/riverside_county_gwpas.htm. (CPDR GWPAs, 2023).

Federal Emergency Management Agency (FEMA). 2023. Flood Insurance Rate Map Panel 06065C1405G. (FEMA, 2023)

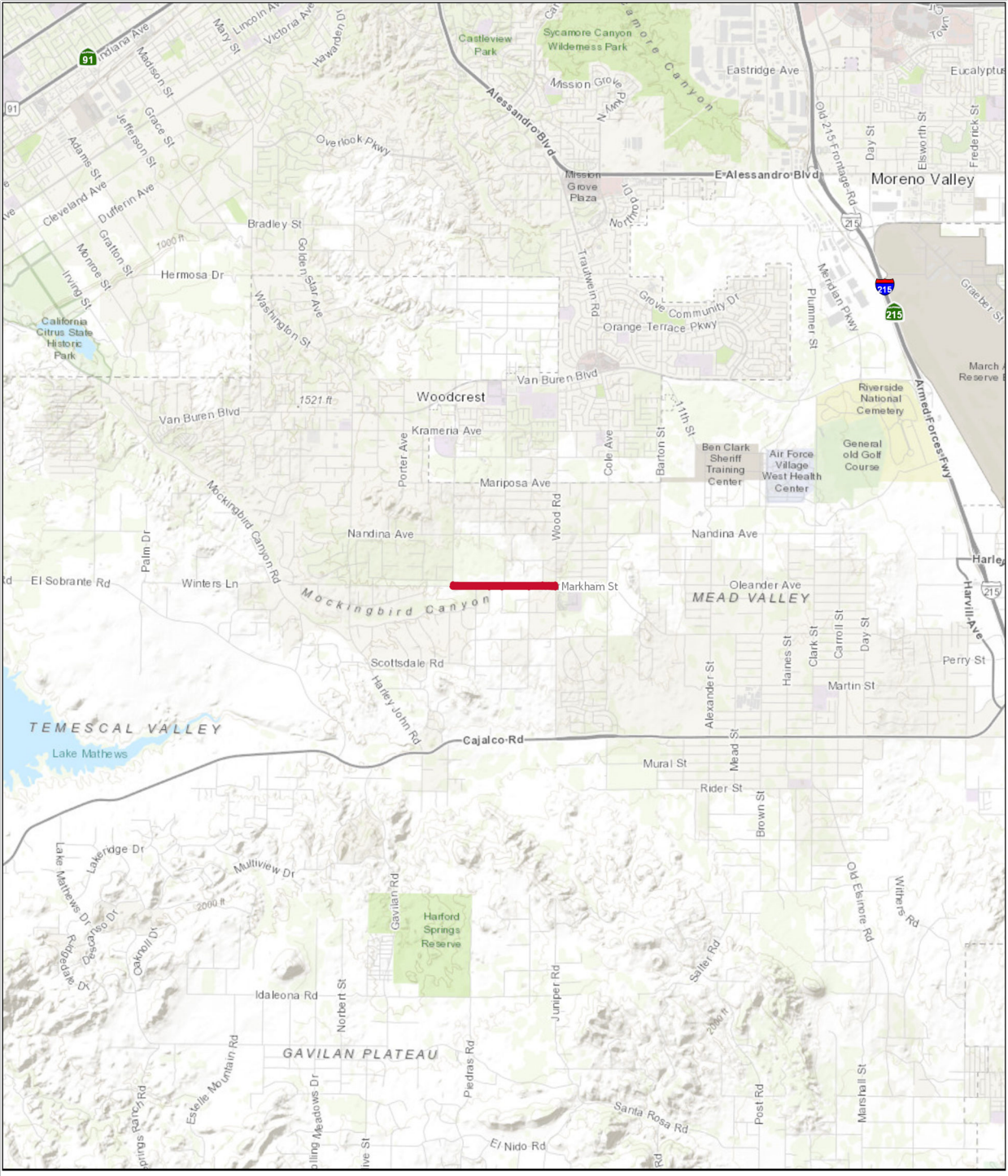
HDR, Inc. Drainage Report (PA&ED Design): Markham Street Extension Project. February 27, 2023. (Drainage Report, 2023)

HDR, Inc. Markham Street Roadway Alignment and Preliminary Environmental Constraints Analysis Technical Memorandum. February 10, 2020. (Environmental Constraints Analysis, 2020)

HDR, Inc. Markham Street Extension Improvements Santa Ana Region MS4 Permit Program Template for Low Impact Development: Guidance and Standards for Transportation Projects. June 15, 2023. (MS4 TPG Report, 2023)

Western Municipal Water District (WMWD). 2023. Sources of Water Supply. Available online at: https://wmwd.maps.arcgis.com/apps/MapSeries/index.html?appid=8ecd94acacf644cf9b65d75d67992dbf. Accessed on September 14, 2023. (WMWD, 2023)

Attachment A: Project Location Map

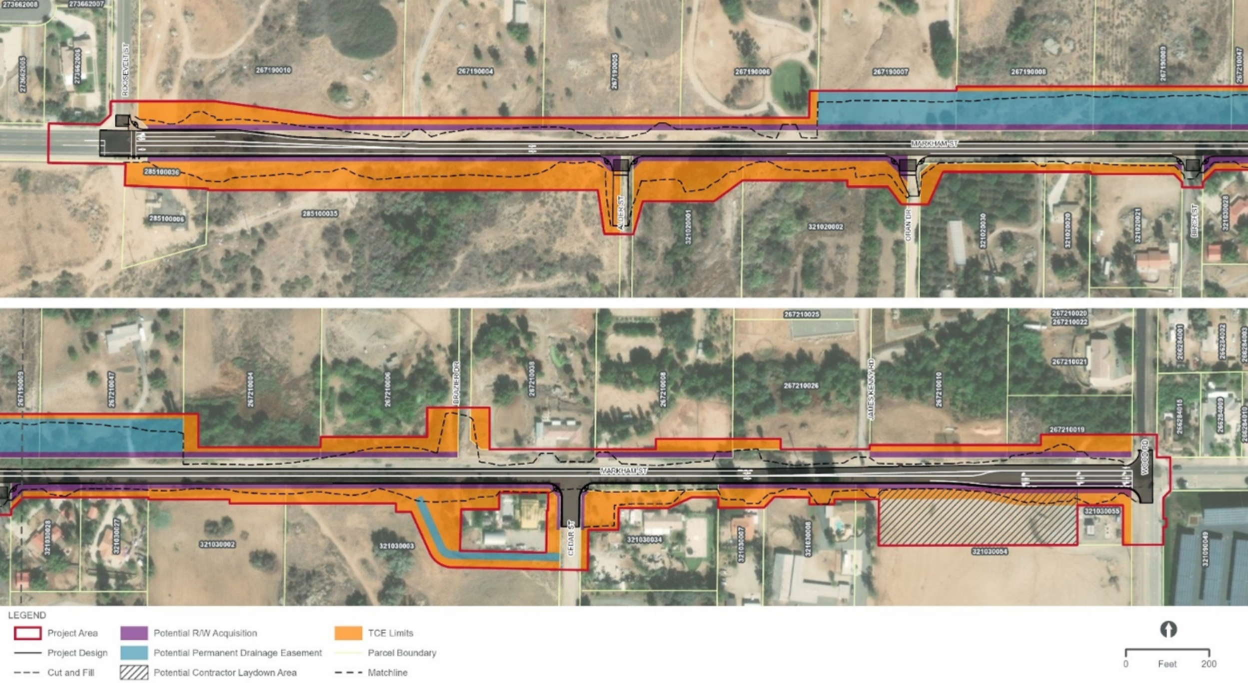


LEGEND

Proposed Improvements

0 Miles 1.5

Attachment B: Project Study Area Map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267190009
267210047
MARKHAM ST
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285100006
285100035
ALDER ST
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321020002
ORAN DR
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321020020
321020021
BIRCH ST
321030028
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267210020
267210022
267210021
267190009
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267210006
BRAZIER DR
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267210008
267210026
JAMES KENNY RD
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267210019
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266284002
266284003
266284015
266284009
266284010
MARKHAM ST
WOOD RD
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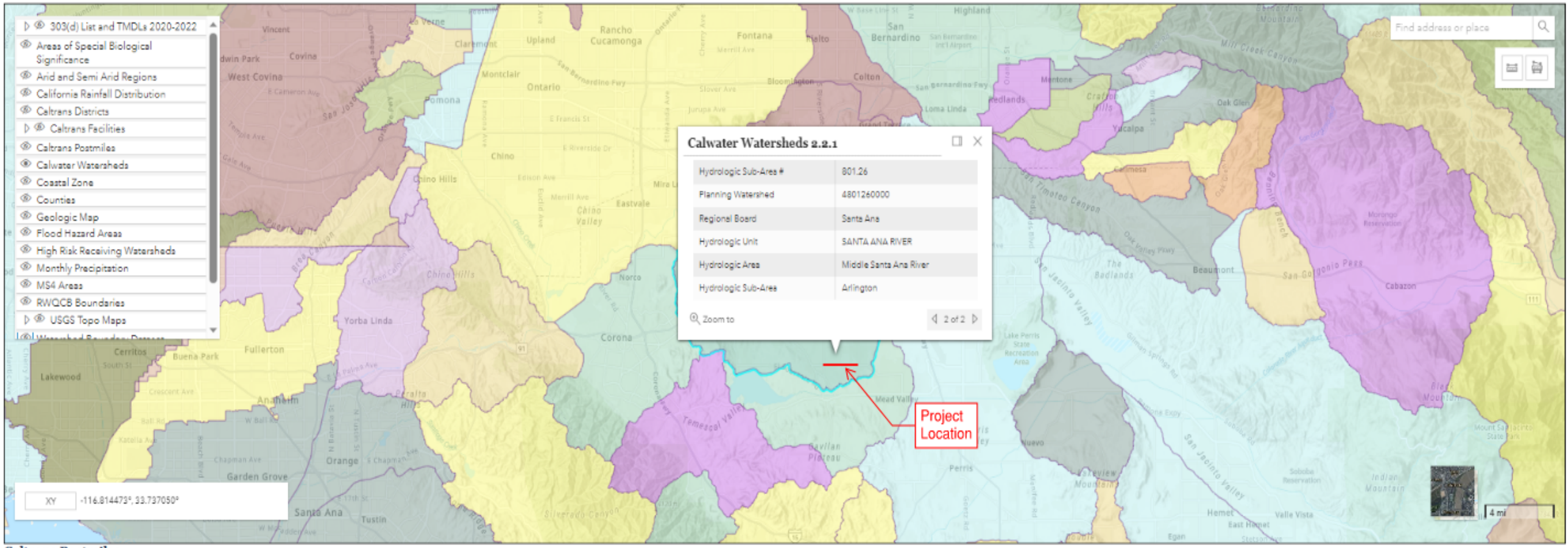
321030027
321030002
321030003
CEDAR ST
321030034
321030007
321030008
321030055
321030054
321090049
LEGEND
Project Area
Project Design
Cut and Fill
Potential R/W Acquisition
Potential Permanent Drainage Easement
Potential Contractor Laydown Area
TCE Limits
Parcel Boundary
Matchline
0
Feet
200

Attachment C: Watershed Data per the CalTrans Water Quality Planning Tool

Caltrans Water Quality Planning Tool

The Water Quality Planning Tool was created to help planners and designers comply with environmental permits. It uses a map interface to find information based on a project's location. **This application is being updated for digital accessibility and will continue to function while updates are in progress.**



Caltrans Postmiles

County:

Watershed Information

CALWATER WATERSHED

Hydrologic Unit	SANTA ANA RIVER	Hydrologic Area	Middle Santa Ana River	Hydrologic Sub-Area #	801.26
Hydrologic Sub-Area Name	Arlington	Planning Watershed	4801260000	HSA Area (acres)	44218
Latitude, Longitude	33.82837, -117.40569				

WATERSHED BOUNDARY DATASET

Watershed	Middle Santa Ana River	Subwatershed	Hole Lake	Hydrologic Unit Code	180702030803
Average Annual Precipitation (inches)	9.72				

Attachment D: Environmental Constraints Memo

Technical Memorandum

Date:	Monday, February 10, 2020
Project:	Markham Street Improvements
To:	Alfredo Martinez, RCTD
From:	Charles Christoplis, HDR
Subject:	**Markham Street Roadway Alignment and Preliminary Environmental Constraints Analysis**

Background

The Riverside County Transportation Department (RCTD) is considering implementing improvements to extend portions of Markham Street in unincorporated Riverside County (Figure 1 and Figure 2). The purpose of the project is to accommodate existing and planned growth and traffic circulation systems improvement within unincorporated Riverside County. The improvements would occur along an approximately 1.3-mile segment between Roosevelt Street and Wood Road. The intent of the project is to develop Markham Street to its ultimate roadway classification, which is a Secondary Highway per Riverside County standards. This would result in Markham Street functioning as a four-lane secondary roadway (two lanes in either direction) and would include a median lane, as well as the construction of sidewalks and curbs along the entire length of the roadway segment.

Existing Site Conditions

The proposed roadway improvements will begin at the existing intersection of Markham Street and Roosevelt Street and extend to the intersection of Wood Road and Markham Street. Each of these intersections has been partially developed as part of previous roadway work. Markham Street west of Roosevelt Street and east of Wood Street have been improved to meet the Secondary street classification standards. From the intersection of Wood Road, Markham Street has been paved with a 20 foot wide asphalt surface to provide access the existing properties for a distance of 2,500 feet. Along this paved section driveway to the existing properties have been set back to allow for roadway widening. Additionally, smaller street intersections including Oran Drive, Birch Street, Cedar Street and Kenny Road connect to Markham Street within the improvement limits.

The project area is located in a semi-rural area with residential, commercial, and institutional land uses located throughout the area. Adjacent properties along this roadway segment consist of vacant land, single family homes, business properties and Water District properties utilized for a sewer lift station and water pumping station.

Existing utilities consist of an overhead power line along the north side of Markham Street, water lines, and communication lines as identified by field observation. Facility Maps were not available at the time the report was written and further research will be required prior to final design.

Figure 1. Regional Project Location

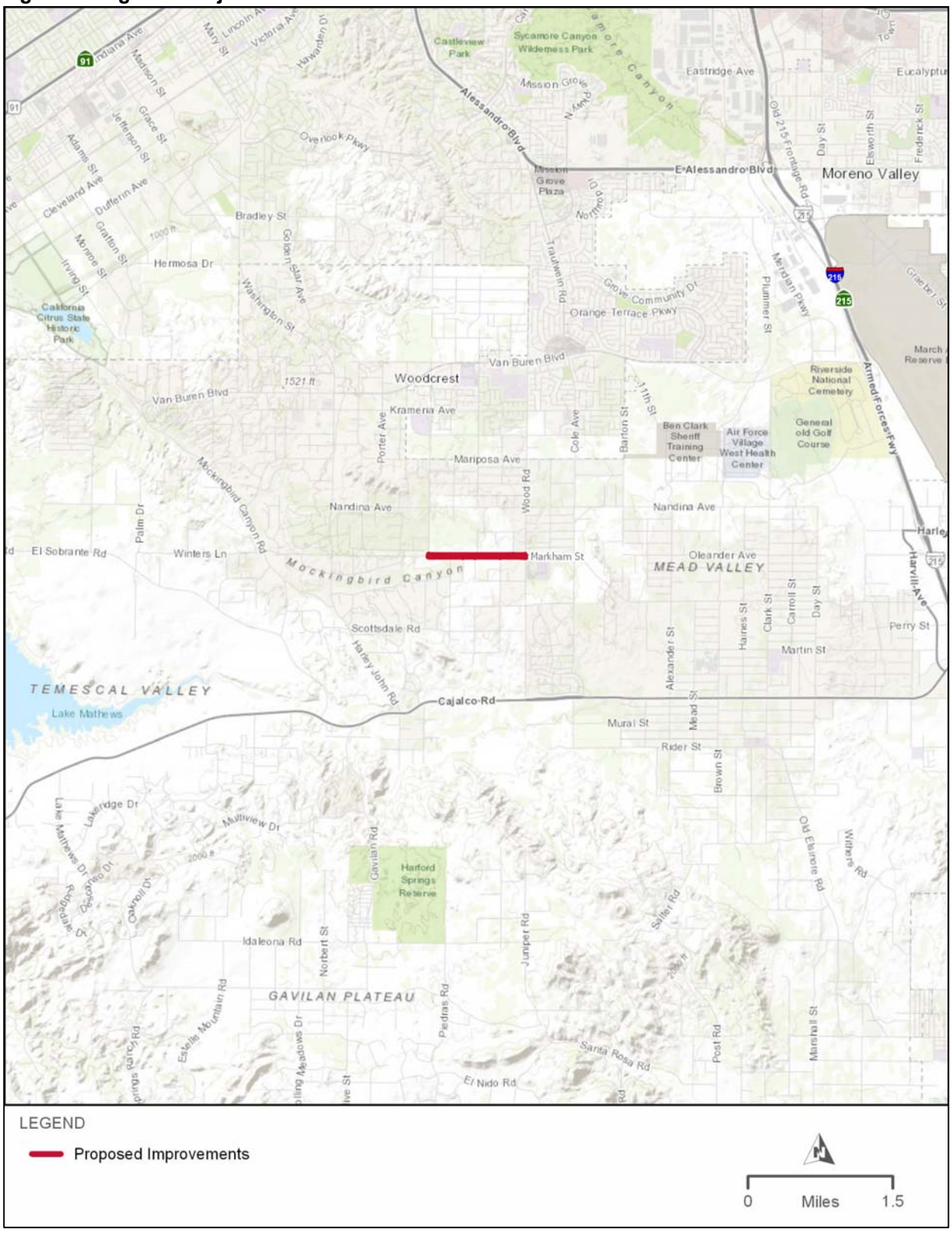
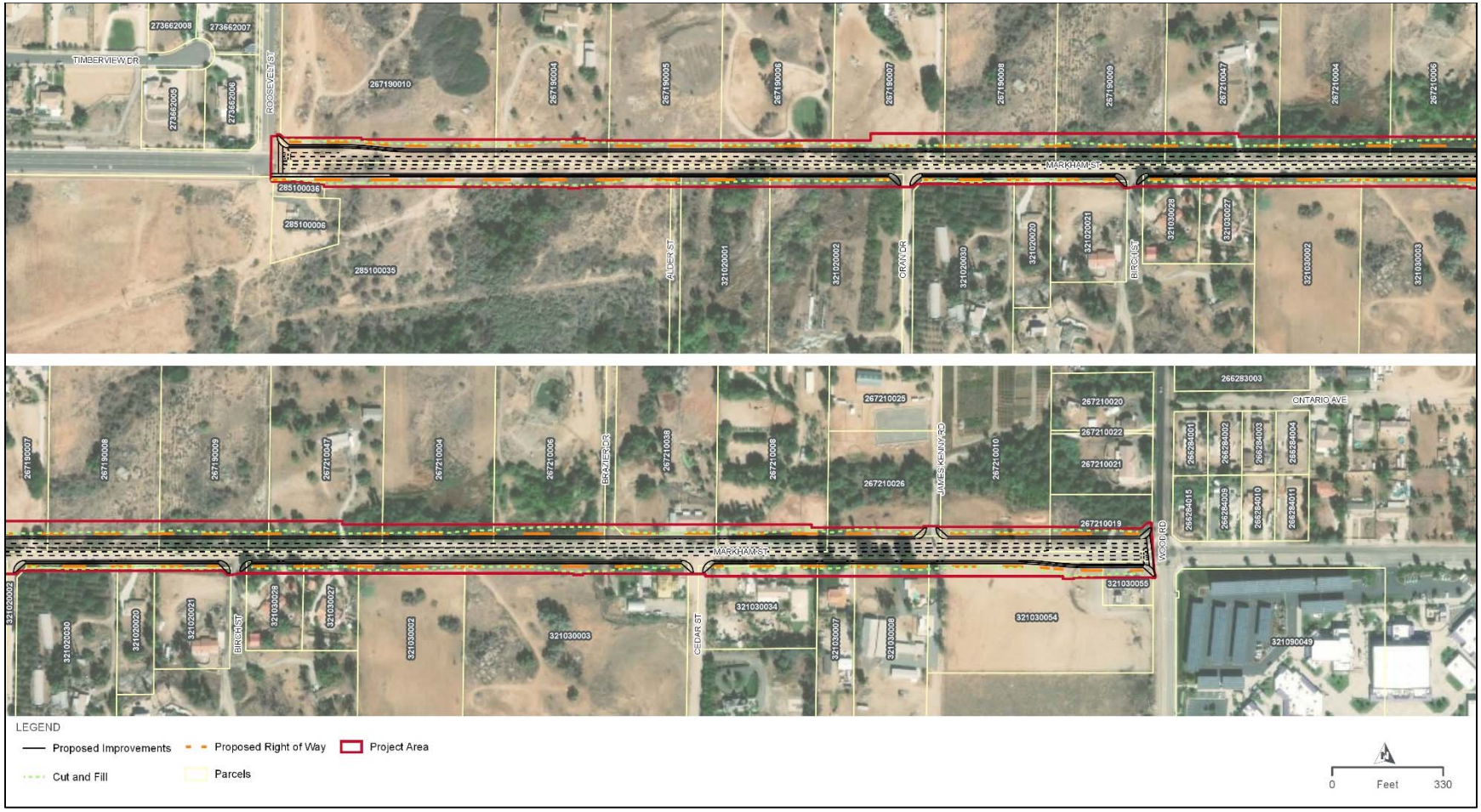


Figure 2. Project Location



Existing drainage in this area primary flows from northeast direction to southwest following an existing unimproved water course with additional flows added from the south side of Markham along the easterly half of the alignment. Along a portion of the existing roadway alignment the water has been channeled to remain on the north side of the roadway in a roadside ditch to control flooding until it ultimately crosses the existing dirt roadway and flows continue in the south westerly direction just west of Oran Drive. Along the easterly portion of the roadway that has been partially paved, minor corrugated pipes have been installed to allow water to cross the roadway.

Design Criteria

This study was based on developing Markham Street to a Secondary Highway per Riverside County standard 94 (Secondary Highway). Based on the standard, the roadway with will be 64 feet with an overall right of way of 100 feet. Additionally, the right of way will increase to 112 feet at the intersections with Roosevelt Street and Wood Road. The roadway design speed was set at 50 mph as required per Riverside County Standard 114. The current posted speed limit on Markham in the area is 45mph. The maximum design grade used is 4% to meet the County Standard for rolling terrain.

Proposed Markham Street Alignment and Improvements

The Markham Street section will follow Riverside County Standard 94 for a Secondary Highway. As shown on Figure 3 and Figure 4, the roadway section will be modified to consist of two lines in each direction with a double left hand turn lane in the middle. The section will have sidewalks on both side of the street and will have right of way fencing to remain consistent with the adjoining roadway sections.

The alignment will generally follow the existing right of way and property lines in the area to create a straight alignment.

Intersection improvements including roadway and traffic signals will be required at the major Roosevelt Street and Wood Road intersections. The four smaller intersections will require roadway modifications to develop curb returns and pedestrian accessible ramps.

The roadway profile has been developed to generally follow the existing grades to limit the earthwork requirements and allow for the tie in of existing driveways.

Proposed Markham Street Drainage Improvements

As describe above, the drainage in this area primary flows from northeast direction to southwest following an existing unimproved water course with additional flows added from the south side of Markham along the easterly half of the alignment. The drainage course will be allowed to remain with the minor corrugated metal culverts being replaced with reinforced concrete culvert for the minor flow crossing. Where the major flows on the north side intersect the new roadway improvements a new 40 foot wide graded earthen channel will be constructed to direct the flow westerly until the flows can be directed under Markham Street and released into the original water course. The earthen channel will extend from approximately station 28+00 to 45+00. The major flows at station 28+00 will cross under Markham Street in 4 – 4 foot by 8 foot concrete box culverts.

Figure 3. Conceptual Plan and Profile (Sheet 1)

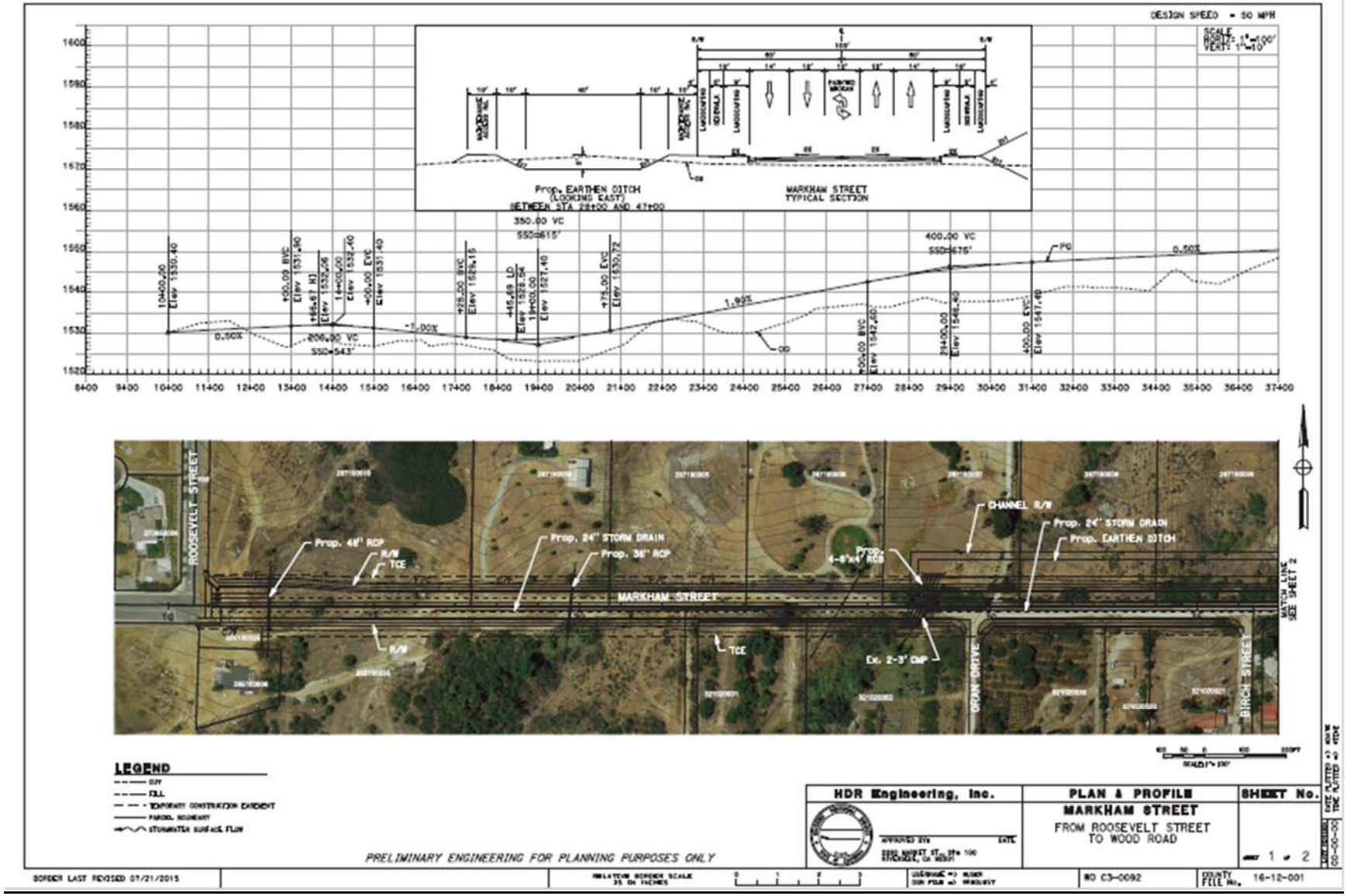
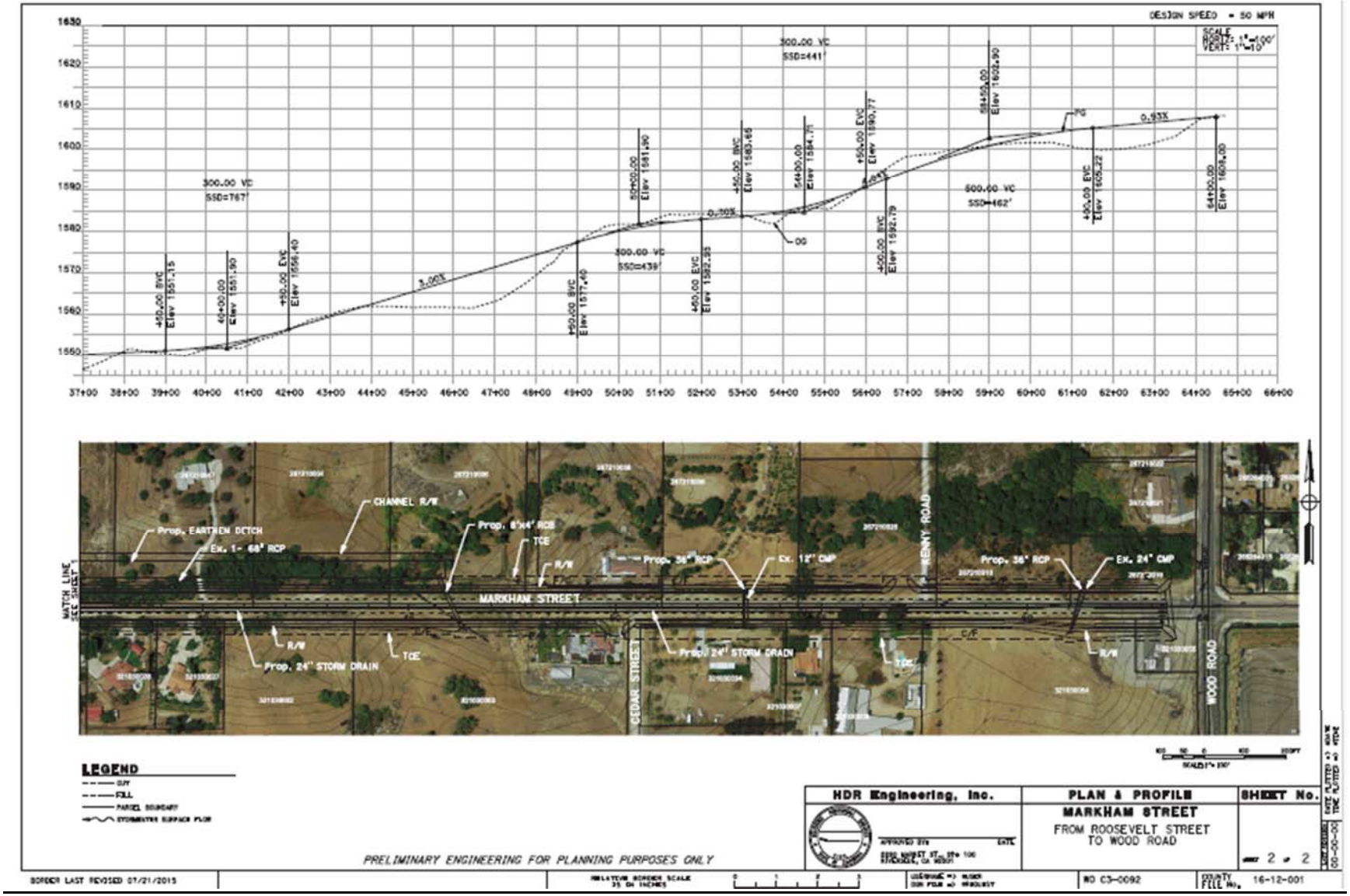


Figure 4. Conceptual Plan and Profile (Sheet 2)



The earthen culvert will cross through five existing parcels. These parcels will need further review for required driveway improvements over the earthen ditch.

See attached Technical Memorandum – Preliminary Drainage Analysis (Attachment 1) for drainage design values.

Right of Way

The right of way needs for the project have been review at a conceptual level to determine an allowance for temporary and permanent right of way needs. Property appraisals will need to be performed during final design to evaluate actual right of way cost.

The estimate total right of way required for roadway purposed is 403,000 square feet with a value of $1,209,000, based on $3 per square foot.

The estimate total permanent drainage easement for the proposed channel is 144,500 square feet with a value of $433,500, based on $3 per square foot.

The estimate total temporary construction easement is 177,500 square feet with a value of $177,500, based on $1 per square foot.

Total estimate right of way cost = $1,820,000

Cost Estimate

The estimated total cost for the Markham Street Roadway Extension is summarized in Table 1. This cost estimate includes the total anticipated construction cost, 25% contingency, right of way based on preliminary square foot requirements, preliminary engineering based on 25% of construction cost and construction engineering based on 12% of construction cost.

Table 1. Conceptual Cost Estimate

Item	Cost
Roadway with 10% Mobilization	$7,504,000
Contingency at 25%	$1,876,000
Right-of-Way Costs	$1,820,000
Environmental Clearance and Mitigation	$700,000
Preliminary Engineering 25%	$1,876,000
Construction Engineering 12%	$900,480
Total Project Costs	**$14,676,480**

Environmental Methodology Used in Existing Conditions Analysis

Environmental Analysis Methodology

This Environmental Constraints Analysis provides a basic summary detailing the environmental constraints associated with the proposed roadway improvement site/study area. The analysis of existing conditions and environmental constraints focuses on the following land use-based issues that would require analysis under the California Environmental Quality Act (CEQA):

- Aesthetics/Visual
- Air quality/greenhouse gases
- Biological resources
- Cultural resources
- Hazards and hazardous materials
- Hydrology/water quality
- Noise and vibration
- Traffic

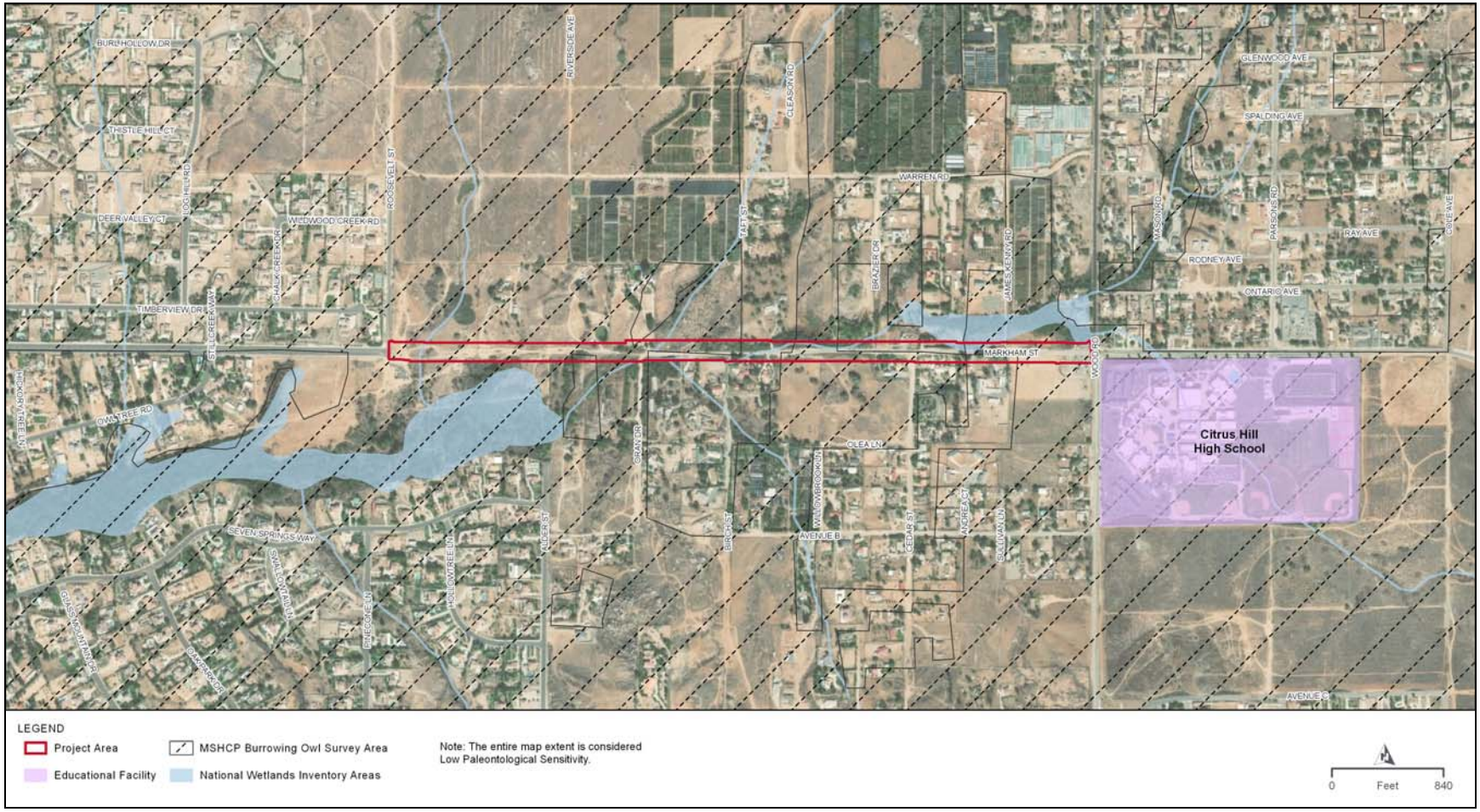
This analysis is based primarily on information and data sources contained in the References section, combined with local observations made on a visit to the project area on December 8, 2019. Figure 5 provides an overview of potential environmental constraints identified by this desktop summary review.

If the project is implemented as planned and with standard construction methods, there are several types of environmental constraints that will require additional evaluation, agency coordination, and possible mitigation. However, as discussed below, these constraints would not preclude implementation of the project.

STUDY AREA

For the purposes of this constraints analysis, based on the preliminary engineering design, the study area includes the furthest extent of proposed roadway improvements and cut and fill, as shown on Figure 2. The study area is located within unincorporated Riverside County in the United States Geologic Survey (USGS) *Steele Peak, California* 7.5' topographic quadrangle. The study area is also located within the Riverside County Lake Mathews/Woodcrest Area Plan. Where appropriate, resources located outside of the project area were identified for each of the resource topics. The following sections provide an evaluation of potential environmental constraints and/or impacts of the identified project improvements.

Figure 5. Environmental Constraints Map



Existing Conditions Analysis

Aesthetics/Visual Resources

DATA SOURCES/METHODS

The project area is located in a semi-rural area with residential, commercial, and institutional land uses located throughout the area. Informational sources used for this constraints analysis included the Caltrans – California Scenic Highway Mapping System and the Lake Mathews/Woodcrest Area Plan.

EVALUATION

As shown on Figure 6, existing views along the project area include existing Markham Street, residential uses, vegetation, and associated utility infrastructure (e.g., above ground electrical lines and poles).

Based on a review of the California Scenic Highway Mapping System, the project is not located near any designated State Scenic Highways. The Lake Mathews/Woodcrest Area Plan does not identify General Plan designated scenic views or vistas within the project area. The Lake Mathews/Woodcrest area contains a number of County-Eligible Scenic Highways, including Mockingbird Canyon Road, La Sierra Avenue, El Sobrante Road, and Cajalco Road. However, Markham Street is not identified or classified as a County-Eligible Scenic Highway.

The project improvements are not likely to result in a substantial change to the visual character because the project study area already contains the existing Markham Street and does not propose structures that would obstruct views in the project study area.

RECOMMENDATIONS

It is anticipated that the development of the proposed roadway improvements would be required to adhere to the County's development guidelines and zoning standards and RCTD roadway design requirements. Adherence to these development guidelines and requirements would ensure that the proposed improvements would be consistent with visual character in the area. In addition, much of the infrastructure associated with the proposed improvements would be placed at the ground surface and generally would not represent a prominent visual feature in the existing visual landscape.

The exception to this would occur in the case of any new ancillary or supporting facilities (e.g., bridge structures) proposed that deviate from the preliminary design concept. These type of facilities would require further evaluation as engineering details become available and, if necessary, visual simulations generated. Changes to existing visual landscapes are anticipated to be of particular importance to the Lake Mathews/Woodcrest area.

Overall, visual/aesthetic concerns are not likely to represent significant constraints on the development of the proposed roadway improvements, since site design would be governed by the County's and RCTD's roadway guidelines and standards.

Figure 6. Representative Photos of Markham Street

Existing paved portion of Markham Street looking east towards Wood Road.

Existing unpaved portion of Markham Street looking west towards Roosevelt Street.

Air Quality and Greenhouse Gases

DATA SOURCES/METHODS

Air quality is defined by ambient air concentrations of specified pollutants identified by the U.S. Environmental Protection Agency (EPA) to be of concern with respect to the health and welfare of the general public. The U.S. EPA is responsible for enforcing the federal Clean Air Act (CAA) of 1970, as amended. The CAA required the U.S. EPA to establish National Ambient Air Quality Standards (NAAQS), which identify concentrations of pollutants in the ambient air below which no adverse effects on the public health and welfare are anticipated. In response, the U.S. EPA established both primary and secondary standards for several pollutants (called "criteria pollutants").

The California Air Resources Board (CARB) is the state regulatory agency with authority to enforce regulations to both achieve and maintain the NAAQS and California Ambient Air Quality Standards (CAAQS). The project area is located within the South Coast Air Basin (SCAB) in unincorporated Riverside County. Therefore, the South Coast Air Quality Management District (SCAQMD) is the local agency responsible for administration and enforcement of air quality regulations and standards in the SCAB. SCAQMD is responsible for developing and implementing the Air Quality Management Plan (AQMP) for attainment and maintenance of the ambient air quality standards in the SCAB. Source materials reviewed as part of this evaluation include the SCAQMD's Air Quality Handbook, SCAQMD's AQMP and air quality data summaries provided by (CARB).

EVALUATION

The SCAB is a 6,600 square mile area bounded by the Pacific Ocean to the west and the San Gabriel, the San Bernardino, and the San Jacinto Mountains to the north and east, with the southern boundary coinciding with the southernmost county lines of Orange County and the non-desert portions of Riverside and San Bernardino Counties.

The extent and severity of the air pollution problem in the SCAB is a function of the area's natural physical characteristics (weather and topography), as well as man-made influences (development patterns and lifestyle). The SCAB suffers from periods of poor air quality and exceeds NAAQS and CAAQS for multiple criteria air pollutants. Specifically, the SCAB is designated as "nonattainment" for ozone, particulate matter (less than 10 microns; PM_{10}), and particulate matter (less than 2.5 microns; $PM_{2.5}$) (Table 2).

Sensitive receptors are defined as populations that are more susceptible to the effects of pollution than the population at large. The SCAQMD identifies the following as sensitive receptors: long-term health care facilities, rehabilitation centers, convalescent centers, retirement homes, residences, schools, playgrounds, child care centers, and athletic facilities. There are existing residential uses adjacent to the project area.

Construction of the project would have the potential to create air quality impacts through the use of heavy-duty construction equipment, construction worker vehicle trips, material delivery trips, and heavy-duty haul truck trips generated from construction activities. Similarly, operation of the project may have the potential to create operational air quality impacts. If the project is anticipated to generate additional vehicular traffic (increasing mobile source air emissions) or involve the use of diesel equipment during construction activities.

Table 2. Federal and State Attainment Status for South Coast Air Basin

Pollutant	Federal Classification	State Classification
Ozone (1-hour standard)	Nonattainment	Nonattainment
Ozone (8-hour standard)	Nonattainment	Nonattainment
Particulate matter 10 micrometers or less in diameters	Attainment	Nonattainment
Particulate matter 2.5 micrometers or less in diameters	Nonattainment	Nonattainment
Carbon monoxide	Attainment	Attainment
Nitrogen dioxide	Attainment	Attainment
Sulfur dioxide	Attainment	Attainment
Lead	Attainment	Attainment

Source: California Air Resources Board 2019

RECOMMENDATIONS

An air quality analysis (which includes air emission calculations) is recommended to evaluate potential air quality impacts associated with the development of the project. If impacts are significant, mitigation is likely to include construction best management practices (BMP), such as dust suppression techniques and controls on diesel equipment operation. Overall, air quality concerns are not likely to represent significant constraints on the development of the project, since the duration of construction can be modified and BMPs implemented. In addition, operation of the project may yield air quality benefits (through quantification and reduction of vehicle miles traveled) when compared with the no project and future without project conditions.

Biological Resources

DATA SOURCES/METHODS

HDR evaluated the project study area for the potential to support special-status species based upon publicly available data. The evaluation included a search of the California Natural Diversity Database (CNDDB) and California Native Plant Society's (CNPS) Inventory of Rare and Endangered Vascular Plants for records occurring in the quadrangle, including and surrounding the project areas, U.S. Fish and Wildlife Service (USFWS) critical habitat mapper, Western Riverside County Regional Conservation Authority (RCA) Multiple Species Habitat Conservation Plan (MSHCP) Information Map, and National Wetland Inventory mapping. Aerial photography, Natural Resource Conservation Service (NRCS) soil mapping, and (USGS) topographic maps were reviewed to determine site characteristics. This information was then used to identify potential biological resources survey activities and regulatory approvals that may be required for project development. Biological resource database queries have been included as Attachment 2.

EVALUATION

Vegetation mapping provided in the RCA's MSHCP Information Map identifies three land covers/vegetation communities within the project area: agricultural land, developed/disturbed land, and riparian scrub/woodland/forest. Reviews of aerial photographs confirm this mapping; however, areas mapped as

developed/disturbed land consist of unpaved open space that supports some vegetation and could support habitat for wildlife. Areas identified as freshwater forested/shrub wetland and riverine were identified on the National Wetlands Inventory within the project area.

Special-Status Plants

Based on the results of the database searches, the project area is not expected to support any special-status plant species. Any plant species that could potentially occur within the project area are MSHCP Covered Species. Project impacts to these species would be covered through compliance with the MSHCP and analyzed as part of the CEQA document prepared for the proposed roadway improvements.

Special Status Wildlife

Based on the results of the database searches, the project area has suitable habitat to support some special-status species, including the California legless lizard (*Anniella pulchra*), Red diamond rattlesnake (*Crotalus ruber*), Coast horned lizard (*Phyrnosoma blainvillii coronatum*), Burrowing owl (*Athene cunicularia*), Least Bell's vireo (*Vireo bellii pusillus*), Western yellow bat (*Lasiurus xanthinus*), Northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*), Stephens' kangaroo rat (*Dipodomys stephensi*), and Southern grasshopper mouse (*Onychomys torridus ramona*).

Any wildlife species that could potentially occur within the project area are MSHCP Covered Species. Project impacts to these species would be covered through compliance with the MSHCP and analyzed as part of the CEQA document prepared for the proposed roadway improvements. However, two of these species, burrowing owl (*Athene cunicularia*) and least Bell's vireo (*Vireo bellii pusillus*) require additional surveys and reporting in order to demonstrate compliance with species protection requirements of the MSHCP. These requirements are discussed below.

Jurisdictional Resources

Features identified on the National Wetlands Inventory and on aerial photographs could be considered waters of the U.S. and waters of the state under jurisdiction of the United States Army Corps of Engineers (USACE), the Santa Ana Regional Water Quality Control Board (RWQCB), and California Department of Fish and Wildlife (CDFW), pursuant to Sections 404 and 401 of the Clean Water Act and Section 1602 of the California Fish and Game Code, respectively. These features are also protected under the MSHCP, as discussed below.

A jurisdictional delineation would be required to determine the extent of jurisdictional features within the study area. If the project impacts waters of the U.S. or waters of the state, the following permits would be required:

- CDFW 1602 Streambed Agreement
- RWQCB Section 401 Water Quality Certification
- USACE Section 404 Permit – Nationwide

Multiple Species Habitat Conservation Plan Compliance

The MSHCP is a comprehensive habitat conservation-planning program for western Riverside County that was developed to preserve native vegetation and meet the habitat needs of multiple species rather than focusing preservation efforts on one species at a time. The MSHCP requires assessment of potential project impacts to special-status plant and animal species and riparian/riverine areas, according to the project's

location within the MSHCP Planning Area, to assess the project's consistency with the MSHCP. Table 3 is a checklist of biological resources that must be assessed for the project:

Table 3. Multiple Species Habitat Conservation Plan Project Review Checklist

	Yes	No
Is the project located in a Criteria Area or Public/Quasi-Public Land?		✓
Is the project located in Criteria Area Plant Survey Area?		✓
Is the project located in Criteria Area Amphibian Survey Area?		✓
Is the project located in Criteria Area Mammal Survey Area?		✓
Is the project located adjacent to MSHCP Conservation Areas?		✓
Is the project located in Narrow Endemic Plant Species Survey Area?		✓
Are riverine/riparian/wetland habitats or vernal pools present?	✓	
Is the project located in Burrowing Owl Survey Area?	✓	

Notes:
MSHCP=Multiple Species Habitat Conservation Plan

Burrowing Owl Survey Area

The project is located within the MSHCP burrowing owl survey area and will require a habitat assessment to determine the presences of suitable burrowing owl habitat within the project area and a 500-foot buffer. Based on aerial photography, there is potential that the project area supports suitable burrowing owl habitat and that burrowing owl focused surveys and/or burrowing owl pre-construction surveys would be required. Focused burrowing owl surveys must be conducted according to the MSHCP's Burrowing Owl Survey Instructions.

Riverine/Riparian/Wetlands or Vernal Pools

Riparian/riverine areas are lands that contain habitat dominated by trees, shrubs, and persistent emergents that occur close to, or depend upon, soil moisture from a nearby water source or areas with fresh water flowing during all of a portion of the year. Unvegetated drainages (ephemeral) streams may be included if alterations to drainages within the project area have the potential to affect MSHCP Covered Species and Conservation Areas.

The project area supports areas included on the RCA's MSHCP Information Map as riverine/riparian. The jurisdictional delineation (discussed above) would identify these resources; MSHCP Riverine/Riparian areas general align with CDFW jurisdictional areas. If riverine/riparian areas or vernal pools are present on the site and will be impacted by the proposed roadway improvements, a Determination of Biologically Equivalent of Superior Preservation (DBESP), including an analysis of functions and values of such areas, will be required.

Other Multiple Species Habitat Conservation Plan Survey Requirements

As noted in Table 3, the project is not located within any other designated MSHCP survey areas. However, since it may support riparian vegetation, the project would require surveys for riparian/riverine birds (least

Bell's vireo and southwestern willow flycatcher (*Empidonax traillii extimus*). Surveys for these species consist of a minimum of eight site visits conducted according to USFWS protocol and must occur between April 10 and July 31.

If the proposed roadway improvements would directly or indirectly impact habitat occupied by these species, a DBESP report would be required in order to demonstrate to RCA that appropriate avoidance, minimization, and/or mitigation measures have been implemented to address these impacts.

As noted in Table 3, the study area is not identified as a MSHCP criteria cell and there are no existing or proposed wildlife linkages. Since the study area is not identified as a MSHCP criteria cell or proposed wildlife linkage area, there are no MSHCP requirements to include wildlife crossings as part of the roadway improvements.

RECOMMENDATIONS

Based on the preliminary research conducted, the following recommendations are provided for biological resources that may occur within or adjacent to the project area:

- Conduct a general biological resources survey, including a general field survey as well as the following focused surveys:
    - Jurisdictional delineation to identify and map features subject to USACE, RWQCB, CDFW, and MSHCP jurisdiction
    - Burrowing Owl Habitat Assessment and focused Burrowing Owl survey, if deemed necessary following habitat assessment
    - Focused Least Bell's vireo survey, if deemed necessary following habitat assessment
- Prepare a Biological Resources Report with MSHCP Compliance section
    - The report should address potential biological resources issues as required for the project review process under the MSHCP and CEQA
- Analyze project impacts to determine the need to prepare jurisdictional permits and DBESP
- Prepare and submit permit applications to USACE, RWQCB, and CDFW
- If needed, prepare DBESP; the DBESP will be reviewed by RCA, CDFW, and USFWS and should include:
    - Definition of the project area
    - A project description demonstrating why the avoidance alternative is not possible
    - Biological information, including biological resources map
    - Quantification of unavoidable impacts to riparian/riverine areas, including direct and indirect impacts
    - Project design features and mitigation measures that reduce indirect impacts, such as edge treatments, landscaping, elevation differences, minimization, and compensation through restoration or enhancement
- Once RCA has received the DBESP and has completed checks for criteria consistency, a letter of determination will be issued after a 45-day review period. RCA may determine that a Joint Project Review (JPR) is necessary even if a conservation area is not designated for the property. RCA reviews the determination to ensure compliance with the MSHCP requirements and conservation

objectives and other MSHCP requirements. Based on the extent of riverine/riparian resources within the project area, it is not anticipated that a formal JPR would be required; however, this cannot be determined until after RCA has received the DBESP.

Cultural and Historic Resources

DATA SOURCES/METHODS

Historic and cultural (or archaeological) resources are known to occur within the study area. To determine if one or more of these resources occur with the study area, HDR completed a review of the Lake Mathews/Woodcrest Area Plan and Riverside County General Plan. In addition, the National Park Service's National Register of Historic Places (NRHP) Program Spatial Data and California Office of Historical Preservation Historical Resources Database was reviewed to determine if any NRHP or California Register of Historic Places (CRHP) listed sites occurred within or in close proximity of the study area.

EVALUATION

Historical Resources

Based on the data sources reviewed, no historical resources listed on the NRHP or CRHP are located within or adjacent to the project area under consideration. In addition, no historical resources were identified for the project area in the Lake Mathews/Woodcrest Area Plan or Riverside County General Plan.

Archaeological Resources

Based on the data sources reviewed, no archaeological resources were identified for the project area in the Lake Mathews/Woodcrest Area Plan or Riverside County General Plan.

Typically, in areas where sites are underlain by artificial fill (like existing roadways), the likelihood of archaeological resources existing on site is minimized by the area having been previously disturbed. Artificial fill is not a naturally occurring formation, but is young geologic material used in the construction of building facilities that is considered to have limited archaeological resource potential. Thus, any construction activities involving grading or excavation of artificial fills would have limited potential to expose previously undiscovered archaeological resources. However, no information is available on the depth or age of the artificial fill on the existing portion of Markham Street at this time. Depending on the conditions of the underlying fill or soil, there could be a high potential for discovery of historical archaeology resources.

For the portion of Markham Street that would be extended, there is a potential for construction activities to impact previously undocumented archaeological resources. This is due to the undisturbed nature of the soil in this part of project area.

Paleontological Resources

Under CEQA Guidelines, potential impacts to paleontological resources resulting from project implementation must be evaluated and, if found to be significant, mitigated to below a level of significance. Paleontological resources include fossils (i.e., the remains and/or traces of prehistoric plant and animal life), as well as the collecting localities and the geologic formations containing those localities. Estimates of the likelihood of the presence of paleontological resources at a given site are based on the identification of underlying geologic formations and the paleontological sensitivity of these formations. The project area is identified as being in an area of low paleontological resource sensitivity.

Typically, in areas where sites are underlain by artificial fill (like existing roadways), the likelihood of paleontological resources existing on site is minimized by the area having been previously disturbed.

Artificial fill is not a naturally occurring formation, but is young geologic material used in the construction of building facilities that is considered to have limited paleontological resource potential. Thus, any construction activities involving grading or excavation of artificial fills would have limited potential to expose fossil bearing geologic formations or adversely impact paleontological resources. However, no information is available on the depth of the artificial fill on the existing portion of Markham Street at this time.

For the portion of Markham Street that would be extended, there is a potential for construction activities to impact previously undocumented paleontological resources. This is due to the undisturbed nature of the soil in this part of project area.

RECOMMENDATIONS

Historical/Archaeological Resources

Publically available data on identified cultural resources is generally limited due to the sensitivity of the location and condition of the resource. This constraints analysis relies on publicly available data and is not based on a formal records search. A formal records search request will require the development of a cultural resources study area that captures both the directly and indirectly affected area for a project. Once a cultural resource study area is defined, it is recommended to conduct a formal records search request through the Southern Central Coastal Information Center (SCCIC). If federal funding or approvals are involved, the development of the APE would require consultation with and approval from the California State Historic Preservation Officer (SHPO).

Additionally, coordination with local tribes would also be necessary. After a cultural resource study area is established for the project, a detailed field archaeological survey would be required to determine if any undocumented resources exist on the project area. Based on the results of this preliminary evaluation, the proposed improvements carry a potential to directly or indirectly affect undocumented historical and archaeological resources. For this reason, the following recommendations are proposed for further consideration:

- The area of direct impacts would be established and finalized.
- Complete an archival records search, to include the cultural resource databases housed with the SCCIC, the Sacred Lands File (SLF) kept with the Native American Heritage Commission (NAHC), the Bureau of Land Management (BLM)'s General Land Office (GLO) records, and any available historic aerial imagery and documents.
- A Phase 1 archaeological survey for the cultural resource study area following the Secretary of the Interior's (SOI)Standards and Guidelines for Archaeology and Historic Preservation (48 *Federal Register* 44716, September 29, 1983) would be completed.
- If warranted based on the findings of the Phase 1 survey, complete archaeological testing, including an extended Phase I and Phase II significance evaluation.
- If federal agency approvals or funding are contemplated, seek concurrence from SHPO.
- When completing any required resource evaluations, comply with local regulations.
- Based on the findings of the cultural resources records search and field survey, additional avoidance, minimization, or mitigation measures would be identified.
- The CEQA lead agency will need to consult with Native American groups that have requested notification under Assembly Bill (AB) 52.

Paleontological Resources

As noted above, no information is currently available on the depth of artificial fill present at the project area. Therefore, it is not known at this time whether there is the potential to expose fossil-bearing geologic formations with the development of proposed roadway improvements. A geotechnical study would be necessary to evaluate this possibility. In addition, although not required, it is recommended that a certified paleontologist conduct a museum record and literature search for the area. In the case of potential paleontological impacts associated with development at the project area, mitigation could require preparation and implementation of a paleontological monitoring program.

Hazards and Hazardous Materials

DATA SOURCES/METHODS

The study area was assessed for their potential to encounter documented hazardous materials sites. A high level assessment was completed by reviewing the California Department of Toxic Substances Control (DTSC) EnviroStor online database (2020) to identify sites of concern located in the vicinity of the project area. A review of the data available on the Riverside County Mapping Portal was also conducted for potential geologic hazards that may occur within the project area.

EVALUATION

Review of the data available on the DTSC EnviroStor database did not identify hazardous material sites of concern within the vicinity of the study area. The project area contains a mixture of undeveloped and residential land uses. The project area is located in the seismically active southern California region, and fault zones in the area include the San Andreas, San Jacinto, and Elsinore Zones. Review of data available on the Riverside County Mapping Portal determined that the project area is not located within a known Alquist-Priolo Earthquake Fault Zone, and there are no known faults located beneath the project area. The project area is also not within an identified liquefaction zone. However, details associated with the type and characterization of soil conditions within the project area are currently not known.

RECOMMENDATIONS

According to the EnviroStor database, there are no sites of concern documented within the project area. Although no sites of concern were documented on the EnviroStor database, further database research and field investigation may be required to assess the potential for previously undocumented sources of hazardous materials. Although not required, a Phase I Environmental Site Assessment (ESA) following American Society of Testing and Materials (ASTM) procedures should be conducted for the project and to document actual conditions on the ground. The results of the Phase I ESA will determine whether a Phase II site investigation (e.g., drilling and sampling) would be required. Based on the preliminary research conducted, the following recommendations are provided for hazards that may occur within or adjacent to the project area:

- Preparation of a site-specific geotechnical investigation for the project area, and inclusion of associated applicable findings and recommendations
- Conformance with appropriate regulatory guidelines and standard engineering practices
- Use of remedial grading and standard engineering/design techniques to address potential issues related to liquefaction and soil-related hazards such as expansion and compression
- Evaluation of static and pseudo-static slope stability analyses for proposed cut and fill slopes and retaining structures – if applicable

With the implementation of such measures, geology/seismicity issues and hazards are unlikely to represent significant site constraints.

Hydrology/Water Quality

DATA SOURCES/METHODS

The analysis for determining potential impacts to hydrology and water quality was conducted by reviewing the Santa Ana River Basin Water Quality Control Plan, the Santa Ana Region MS_4 Permit Program Guidance and Standards for Transportation Projects (TPG), the Federal Emergency Management Agency's (FEMA) flood zone maps, Clean Water Act (CWA) Section 303(d) list, geographic information system data, and other mapping. The project area is located within the Santa Ana RWQCB Cajalco Hydrologic Basin Planning Area. Flood zone maps were reviewed to determine if any of portions of the project area are located within a FEMA Special Flood Hazard Area (SFHA). The SFHA is the area where the National Flood Insurance Program's floodplain management regulations must be enforced.

EVALUATION

Water Quality

Urban developments are often significant sources of storm water pollution. Development and redevelopment activities have two primary effects on water quality; they are sources of erosion and sedimentation during the construction phase and they have long-term effects on runoff once the development is complete. Urban development can affect water quality in three ways:

- Impervious surfaces associated with development increase the rate and volume of storm water runoff, which increase downstream erosion potential.
- Urban activities generate dry-weather ("nuisance") flows, which may contain pollutants and/or may change the ephemeral nature of streams and the degradation of certain habitats.
- Impervious surfaces increase the concentration of pollutants during wet weather flows.

The potential for negative water quality impacts is generally correlated with the density of development and the amount of impervious area associated with the development.

The project improvements would be subject to the requirements of the National Pollutant Discharge Elimination System (NPDES) Construction General Permit, which would require the preparation of a Stormwater Pollution Prevention Plan (SWPPP) and implementation of construction BMPs to minimize impacts on water quality. In addition, new roadway projects are required to adhere to requirements identified as part of the Santa Ana Region Municipal Separate Storm Sewer Systems (MS_4) Permit Program.

The Santa Ana Region MS_4 Permit Program requires development of a standard design and post-development BMP guidance to guide application of Low Impact Development (LID) BMPs to the maximum extent practicable on streets, roads, or highways under the jurisdiction of RCTD. Table 4 provides a summary of the types of projects that would be required to follow TPG requirements.

Based on the type of roadway improvements contemplated for Markham Street (e.g. construction of new transportation surfaces and the improvement of existing transportation surfaces), adherence to TPG guidance and standards would be required.

Table 4. Transportation Project Guidance Applicability

The Transportation Project Guidance applies to the following projects: • Public Transportation Projects in the area covered by the Santa Ana Region MS_4 Permit, which involve the construction of new transportation surfaces or the improvement of existing transportation surfaces (including Class I Bikeways and sidewalks)
The Transportation Project Guidance does not apply to the following projects that are either exempt or covered by other MS_4 Permit requirements: • Transportation Projects that have received CEQA approval by the effective date of the TPG • Emergency Projects, as defined by TPG Section 2 • Maintenance Projects, as defined by TPG Section 2 • Dirt or gravel roads • Transportation Projects that are part of a private new development or significant redevelopment project and required to prepare a Water Quality Management Plan (WQMP) • Transportation Project subject to other MS_4 Permit requirements, e.g., California Transportation Department (Caltrans) oversight projects, cooperative projects with an adjoining County or an agency outside the jurisdiction covered by the Santa Ana Region MS_4 Permit

Source: Santa Ana Region MS4 Permit Program Guidance and Standards for Transportation Projects

Hydrology/Hydraulics

The construction and operation of the proposed roadway improvements could result in additional stormwater being generated. It is anticipated that hydrological conditions within the project area would not likely be substantially altered. However, additional design and hydrological analysis would be required to verify that stormwater generated on site is treated through BMPs before leaving the project area, and changes to stormwater flow conditions are analyzed and mitigated accordingly.

Flood Hazard

Based on Flood Insurance Rate Map (FIRM) Panel 06065C1405G, the project area and surrounding areas are not located within a FEMA SFHA and are classified as Zone X. Zone X are areas determined to be outside of the 500-year and 100-year floodplains by FEMA.

RECOMMENDATIONS

The project would be subject to the requirements of the NPDES Construction General Permit, which would require the preparation of a SWPPP. As identified in Table 4, the development of the project would also require the preparation of a TPG BMP Report per the Santa Ana Region MS_4 Permit Program Guidance and Standards for Transportation Projects.

The project areas are generally located in Zone X and would not require a physical map revision or a letter of map revision associated with FEMA's flood map revision process. It is anticipated that the implementation of the project would not affect any flood control facilities. Water quality concerns are not likely to represent significant constraints on the development of the project area, since site design can be modified and BMPs implemented for the roadway improvements.

Noise and Vibration

DATA SOURCES/METHODS

Data used to prepare this analysis were obtained from the Lake Mathews/Woodcrest Area Plan, Riverside County General Plan, and Riverside County Ordinance No. 847 Regulating Noise.

EVALUATION

The primary noise sources in the vicinity of the project area include vehicular traffic, noise from adjacent education facilities (e.g., Citrus Hill High School), and intermittent noise from operating plant nurseries and residential uses. Both mobile and stationary noise sources contribute to the existing noise levels within the project area.

Land uses that are considered sensitive receptors to noise include residential areas, schools, hospitals, churches, recreational areas, office buildings, and transient lodging. Residential areas are also considered particularly sensitive to noise during the nighttime hours. Land uses surrounding the project area consist of a mixture of suburban residential, semi-rural residential, commercial, institutional, and vacant land uses. Homes in the vicinity of the project areas are generally single-family residences.

Under CEQA, the baseline noise level is compared to the build condition noise level. The assessment entails looking at the setting of the noise impact and then at how large or perceptible any noise increase would be in the given area. Key considerations include the uniqueness of the setting, the sensitive nature of the noise receptors, the magnitude of the noise increase, the number of residences affected, and the absolute noise level.

Construction of the proposed roadway improvements would require the use of heavy-duty construction equipment used for clearing and grading, trenching and installing underground utilities, spreading and compacting materials, and paving. As a result, construction activities would result in the generation of construction noise and vibration within the project area. The project is not anticipated to result in a new noise-generating source as there is vehicular traffic that currently travels along the existing segment of Markham Street to access residential uses. However, with the extension of Markham Street, the volume of traffic along Markham Street is anticipated to change and may result in changes associated with existing traffic noise levels.

RECOMMENDATIONS

A project-specific noise and vibration study is recommended to quantify potential noise and vibration impacts. This study would include the collection of ambient noise data for multiple receptor locations to better characterize the severity of potential noise impacts during construction and operation. Depending on the results of the noise and vibration study conducted, mitigation measures and project design features may need to be incorporated into the project.

Traffic

DATA SOURCES/METHODS

Data used to prepare this analysis were obtained from the Lake Mathews/Woodcrest Area Plan and Riverside County General Plan.

EVALUATION

The proposed improvements would build out Markham Street from the existing two lane configuration to a four lane configuration to meet Secondary Highway classification standards. The extension of Markham

Street would also remove the existing roadway gap at the Markham Street/Roosevelt Street intersection, resulting the connection of Markham Street from Roosevelt Street and Wood Street. It is anticipated these improvements would change traffic volumes and patterns within the project area.

RECOMMENDATIONS

A project-specific traffic study is recommended to quantify potential traffic impacts. This study would include the collection of existing traffic data for selected intersections and roadway segments within the project study area and traffic modeling to better characterize potential traffic impacts. Depending on the results of the traffic study, mitigation measures and project design features may need to be incorporated into the project.

Summary of Environmental Constraints

This environmental constraints analysis provides a high level, desktop constraints evaluation of the project currently under consideration by RCTD for future improvements along Markham Street. The main objective of this evaluation was to identify potential environmental constraints for the project concept, with particular focus on biological and cultural resources.

Based on the findings of this analysis, no environmental constraints were identified for project improvements that would otherwise preclude them from further consideration. However, this evaluation will need to be supplemented at a later date, once preliminary engineering becomes available, in order to develop a project study area to allow for the completion of a more detailed environmental analysis.

It is anticipated that improvements associated with Markham Street (e.g., roadway segment extension, curb and gutter improvements) would require further assessment and clearance under CEQA. The level of CEQA documentation (e.g., Initial Study (Mitigated) Negative Declaration or Environmental Impact Report) needed for the implementation of the project would be determined after a more defined project footprint and recommended technical studies are available, based on advanced preliminary project design concepts.

References

California Air Resources Board. 2019.

California Department of Fish and Wildlife. 2020. California Natural Diversity Database.

California Department of Transportation. 2020. California Scenic Highway Mapping System.

California Department of Toxic Substances Control. 2020. EnviroStor Database.

California Native Plant Society. 2020. Inventory of Rare and Endangered Vascular Plants.

California Office of Historical Preservation. 2020. Historical Resources Database.

County of Riverside. 2016. Lake Mathews/Woodcrest Area Plan.

Federal Emergency Management Agency. 2020. Flood Insurance Rate Map Panel 06065C1405G.

National Park Service. 2020. National Register of Historic Places Program Spatial Data.

Natural Resource Conservation Service. 2020. Soil Mapper Database.

South Coast Air Quality Management District. 1993. CEQA Air Quality Handbook.

South Coast Air Quality Management District. 2016. Air Quality Management Plan.

United States Fish and Wildlife Service. 2020. Critical Habitat Mapper.

United States Fish and Wildlife Service. 2020. National Wetlands Inventory.

United States Geologic Survey. 2020. Steele Peak, California 7.5’ topographic quadrangle.

Western Riverside County Regional Conservation Authority. 2020. Multiple Species Habitat Conservation Plan Information Map.

Attachment 1. Preliminary Drainage Constraints Analysis

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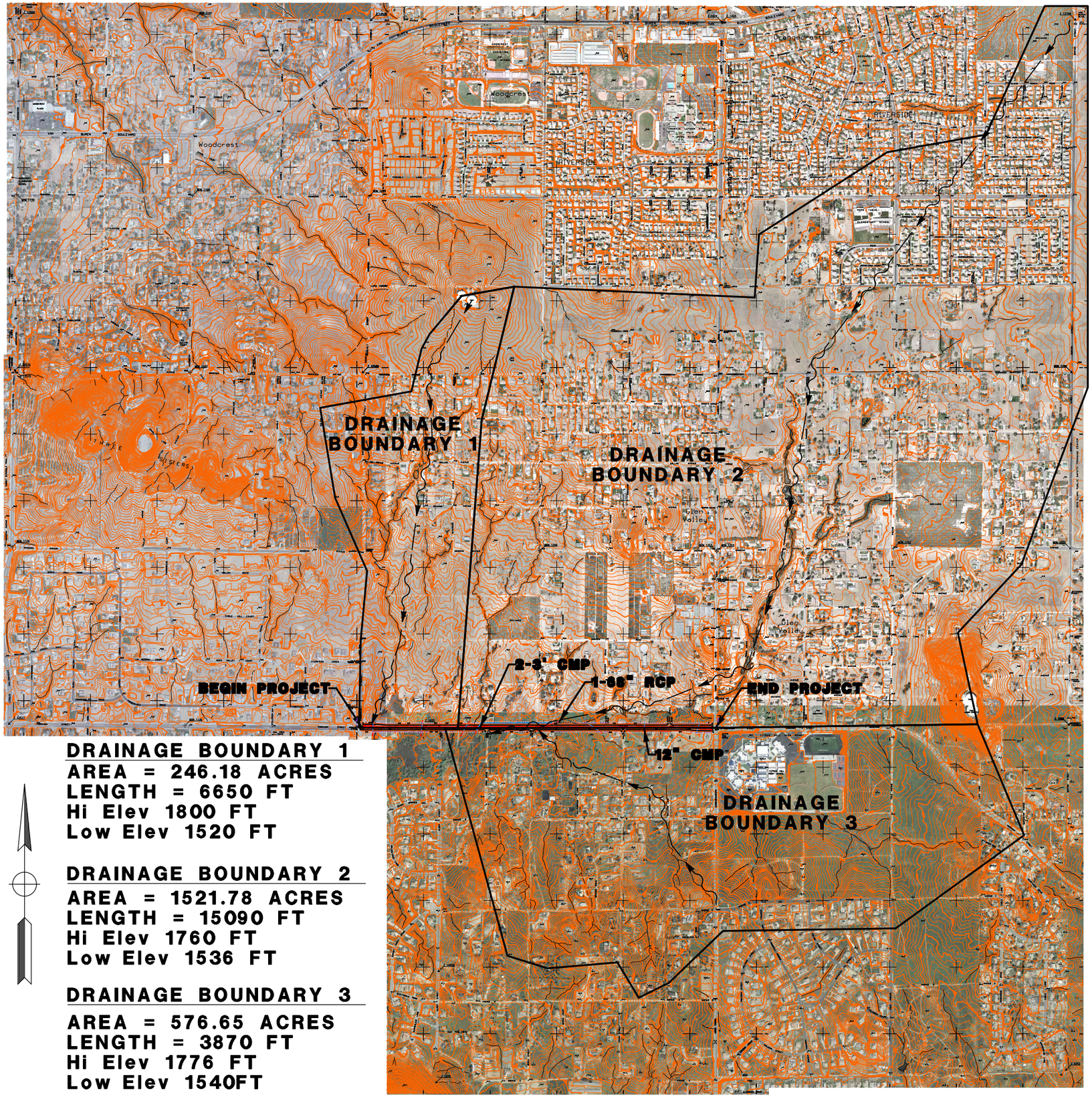
Technical Memorandum

Date:	Friday, January 24, 2020
Project:	Markham Street Improvements
To:	Charles Christoplis, HDR
From:	Bill Flores, HDR
Subject:	**Markham Street Roadway Alignment and Preliminary Environmental Constraints Analysis – Drainage Analysis**

Analysis Approach

The purpose of this document is to summarize, at a high level, the drainage characteristics of the project drainage area. Markham Street project is located in Riverside County, CA. The tributary drainage areas to the project are located on the north (drainage areas 1 and 2) and south (drainage area 3) side of the project. Drainage areas (and Q100 discharges) for areas 1, 2, and 3 are 246 acres (311 cfs), 1522 acres (1,923 cfs), and 577 acres (729 cfs), respectively. The road basically acts as a flow line to convey the drainage areas from east to west. Hydrology calculations are consistent with Riverside County Hydrology Manual and implemented AES software. For flood control, a 8ft x 4ft RCB is proposed as a road culvert (approx. station 46+00) to convey drainage from drainage area 3 (from the south of road) to the north side to confluence with area 2. This combined flow (2,652 cfs) is conveyed along a proposed earthen ditch (trap channel with 40 foot bottom, 5 foot high, 2:1 side slopes) and outlets back to the south side of the road (station 28+00) via 4 - 8ft x 4ft RCBs. Also, a 36” RCP (station 20+00) and 48” RCP (station 14+00) are proposed on the westerly end of the road to convey drainage from area 1 to the south side of the road. Local drainage along the proposed road is accommodated by incorporating longitudinal and culverts ranging from 24” to 36” RCP. The local drainage systems will connect to the large flood control culverts at application areas. Refer to the attachments for the additional information such as calculations and hydrology map. The drainage concept plan also has more information.



DRAINAGE BOUNDARY 1
AREA = 246.18 ACRES
LENGTH = 6650 FT
Hi Elev 1800 FT
Low Elev 1520 FT

DRAINAGE BOUNDARY 2
AREA = 1521.78 ACRES
LENGTH = 15090 FT
Hi Elev 1760 FT
Low Elev 1536 FT

DRAINAGE BOUNDARY 3
AREA = 576.65 ACRES
LENGTH = 3870 FT
Hi Elev 1776 FT
Low Elev 1540FT

Project: RLTD MARKHAM STREET PSR	Computed: RICHENNY BOVANNAK	Date: 1/20/2020
Subject: HYDROLOGY CALCULATIONS	Checked:	Date:
Task:	Page: 1	of: 1
Job #:	No:	

DRAINAGE BOUNDARY 1

TOTAL AREA (ACRES) = 246.18 AC

PEAK FLOW RATE (CFS) = 311.14 CFS

DRAINAGE BOUNDARY 2

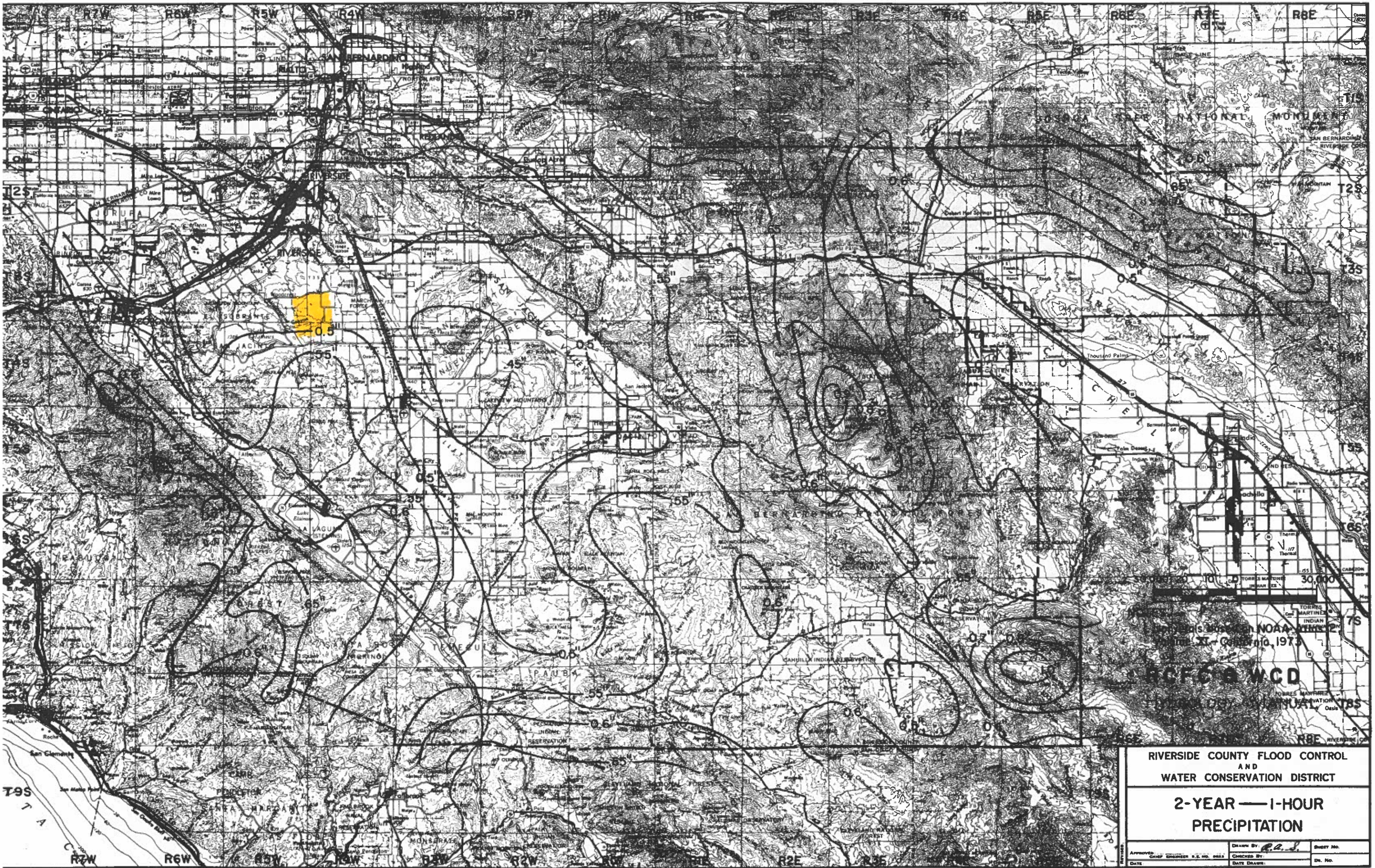
TOTAL AREA (ACRES) = 1521.78 AC

$$\text{PEAK FLOW RATE (CFS)} = \frac{311.14 \text{ CFS}}{246.18 \text{ AC}} \times 1521.78 \text{ AC} = 1923.33 \text{ CFS}$$

DRAINAGE BOUNDARY 3

TOTAL AREA (ACRES) = 576.65 AC

$$\text{PEAK FLOW RATE (CFS)} = \frac{311.14 \text{ CFS}}{246.18 \text{ AC}} \times 576.65 \text{ AC} = 728.81 \text{ CFS}$$



Based on NOAA Atlas 2, Vol. XI - California, 1973

RCFC & WCD

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

2-YEAR — 1-HOUR PRECIPITATION

APPROVED CHIEF ENGINEER R.E. NO. 0883 DATE	DRAWN BY: R.A.S. CHECKED BY: DATE DRAWN:	SHEET NO. DR. NO.

PLATE D-4.3

RIVERSIDE COUNTY FLOOD CONTROL
AND
WATER CONSERVATION DISTRICT

100-YEAR —— 1-HOUR
PRECIPITATION

APPROVED: CHIEF ENGINEER	DRAWN BY: a.a.s.	SHEET NO.	
DATE	CHECKED BY:	DR. NO.	
	DATE DRAWN:		

PLATE D-4.4

RAINFALL INTENSITY—INCHES PER HOUR

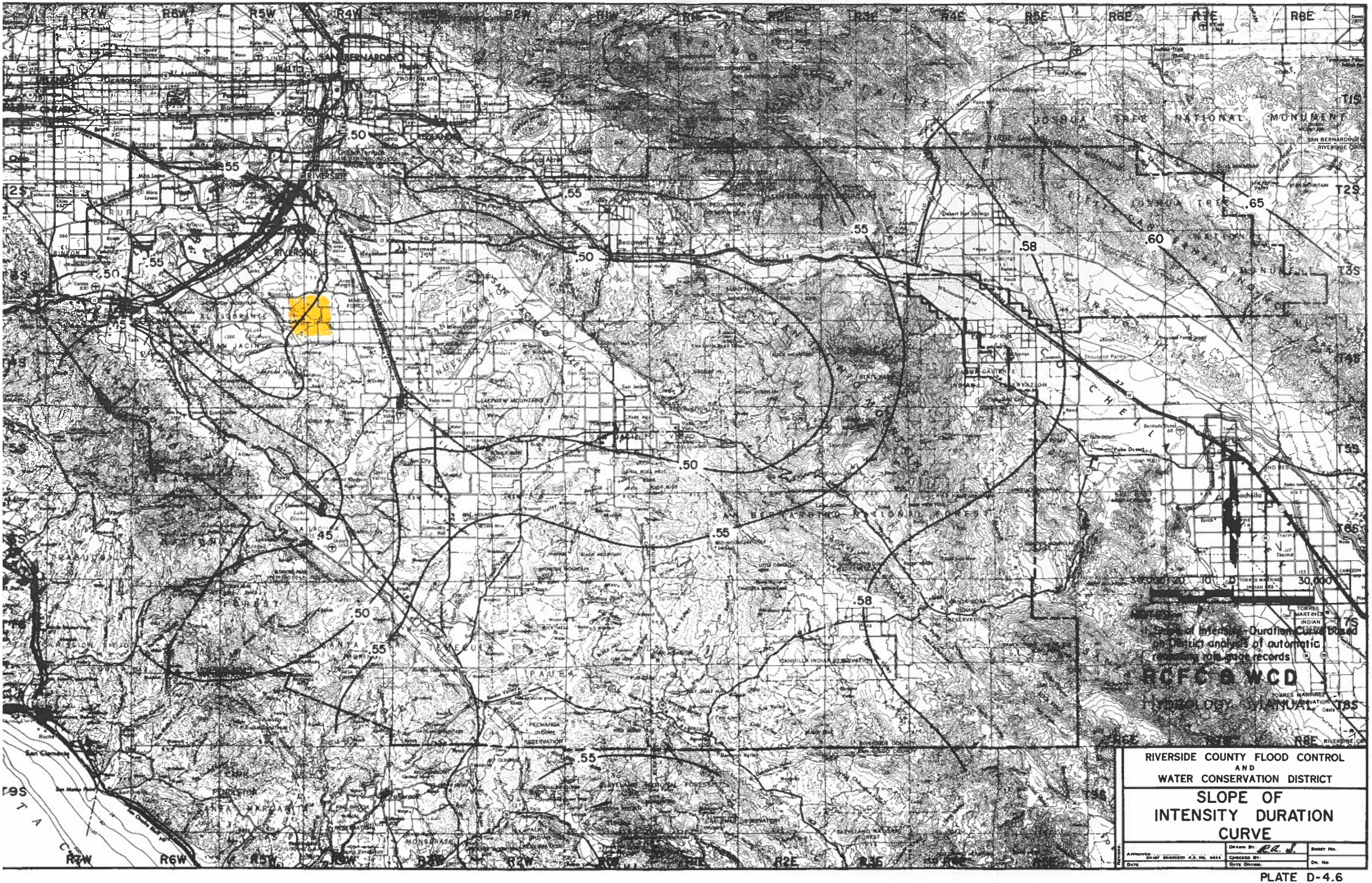
RIVERSIDE			RIVERSIDE (FOOTHILL AREAS)			RUBIDOUX			SAN JACINTO			SUN CITY		
DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	100 YEAR
5	2.75	3.92	5	3.14	4.71	5	3.18	4.71	5	2.81	4.16	5	3.25	4.85
6	2.48	3.55	6	2.84	4.26	6	2.87	4.26	6	2.56	3.79	6	2.95	4.40
7	2.28	3.26	7	2.61	3.91	7	2.64	3.91	7	2.37	3.51	7	2.72	4.06
8	2.12	3.03	8	2.42	3.63	8	2.45	3.63	8	2.22	3.29	8	2.53	3.78
9	1.99	2.84	9	2.27	3.41	9	2.30	3.41	9	2.09	3.10	9	2.38	3.55
10	1.88	2.68	10	2.14	3.21	10	2.17	3.21	10	1.98	2.94	10	2.25	3.36
11	1.78	2.54	11	2.03	3.05	11	2.06	3.05	11	1.89	2.80	11	2.14	3.19
12	1.70	2.42	12	1.94	2.91	12	1.96	2.91	12	1.81	2.68	12	2.04	3.05
13	1.62	2.32	13	1.86	2.78	13	1.88	2.78	13	1.74	2.58	13	1.96	2.92
14	1.56	2.23	14	1.78	2.67	14	1.80	2.67	14	1.68	2.48	14	1.88	2.81
15	1.50	2.14	15	1.71	2.57	15	1.74	2.57	15	1.62	2.40	15	1.81	2.71
16	1.45	2.07	16	1.66	2.48	16	1.68	2.48	16	1.57	2.32	16	1.75	2.62
17	1.40	2.00	17	1.60	2.40	17	1.62	2.40	17	1.52	2.25	17	1.70	2.54
18	1.36	1.94	18	1.55	2.33	18	1.57	2.33	18	1.48	2.19	18	1.65	2.46
19	1.32	1.88	19	1.51	2.26	19	1.52	2.26	19	1.44	2.13	19	1.60	2.39
20	1.28	1.83	20	1.46	2.20	20	1.48	2.20	20	1.40	2.08	20	1.56	2.33
22	1.22	1.74	22	1.39	2.08	22	1.41	2.08	22	1.34	1.98	22	1.48	2.21
24	1.16	1.66	24	1.32	1.99	24	1.34	1.99	24	1.28	1.90	24	1.41	2.11
26	1.11	1.58	26	1.27	1.90	26	1.28	1.90	26	1.23	1.82	26	1.36	2.03
28	1.06	1.52	28	1.22	1.82	28	1.23	1.82	28	1.19	1.76	28	1.30	1.95
30	1.02	1.46	30	1.17	1.76	30	1.19	1.76	30	1.15	1.70	30	1.26	1.88
32	.99	1.41	32	1.13	1.70	32	1.14	1.70	32	1.11	1.64	32	1.21	1.81
34	.96	1.37	34	1.09	1.64	34	1.11	1.64	34	1.08	1.59	34	1.18	1.76
36	.93	1.32	36	1.06	1.59	36	1.07	1.59	36	1.05	1.55	36	1.14	1.70
38	.90	1.29	38	1.03	1.54	38	1.04	1.54	38	1.02	1.51	38	1.11	1.66
40	.87	1.25	40	1.00	1.50	40	1.01	1.50	40	.99	1.47	40	1.08	1.61
45	.82	1.17	45	.94	1.41	45	.95	1.41	45	.94	1.39	45	1.01	1.51
50	.77	1.11	50	.88	1.33	50	.90	1.33	50	.89	1.31	50	.96	1.43
55	.73	1.05	55	.84	1.26	55	.85	1.26	55	.85	1.25	55	.91	1.36
60	.70	1.00	60	.80	1.20	60	.81	1.20	60	.81	1.20	60	.87	1.30
65	.67	.96	65	.77	1.15	65	.78	1.15	65	.78	1.15	65	.83	1.25
70	.64	.92	70	.73	1.10	70	.74	1.10	70	.75	1.11	70	.80	1.20
75	.62	.88	75	.71	1.06	75	.72	1.06	75	.72	1.07	75	.77	1.15
80	.60	.85	80	.68	1.02	80	.69	1.02	80	.70	1.04	80	.75	1.12
85	.58	.83	85	.66	.99	85	.67	.99	85	.68	1.01	85	.72	1.08
SLOPE = .550			SLOPE = .550			SLOPE = .550			SLOPE = .500			SLOPE = .530		

RCFC & WCD

HYDROLOGY MANUAL

STANDARD INTENSITY-DURATION CURVES DATA

PLATE D-4.1 (5 of 6)



Depth-Duration-Frequency Curve Based on Statistical analysis of automatic recording rain gauge records

RCFC & WCD

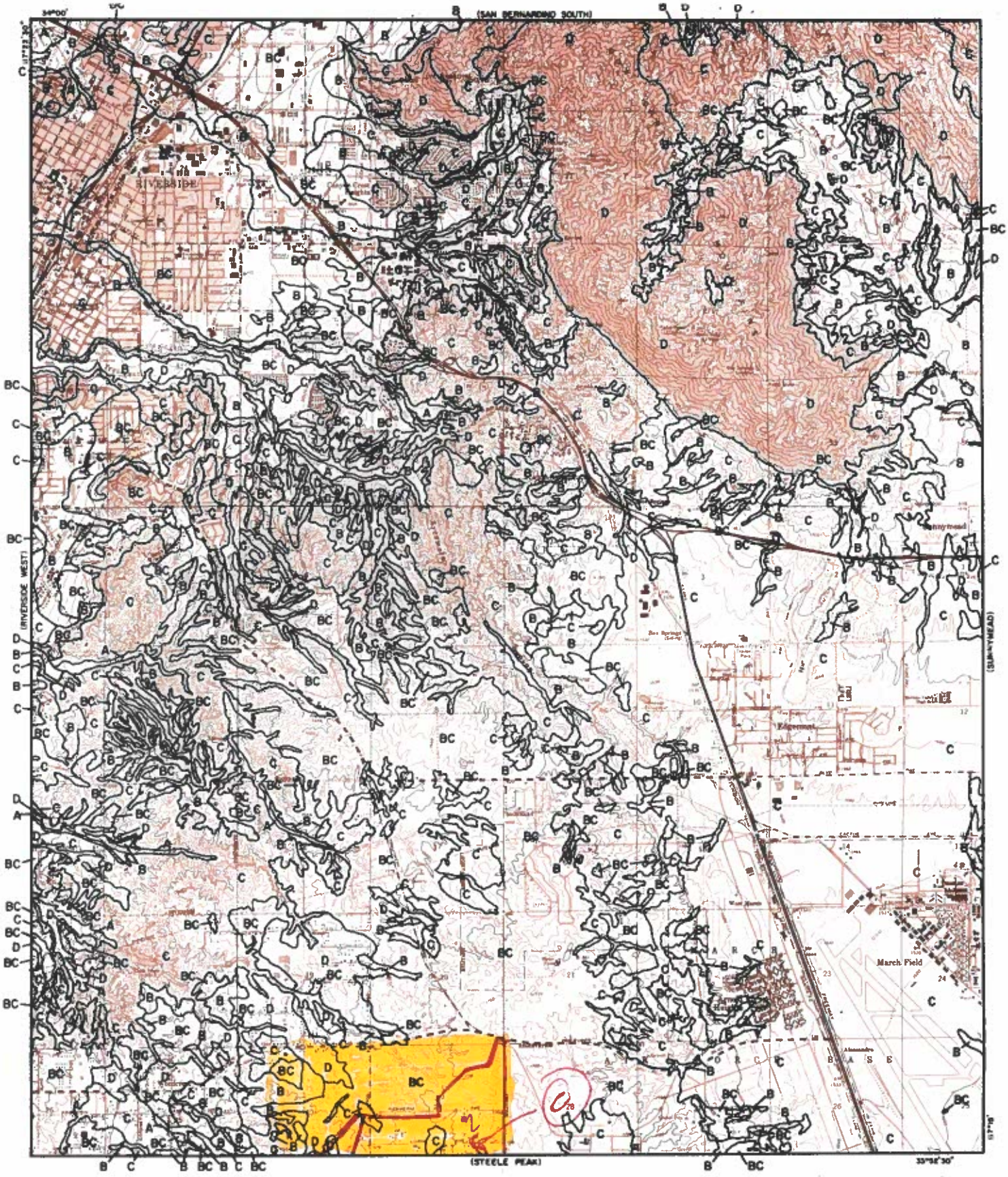
Hydrology Manual

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

SLOPE OF INTENSITY DURATION CURVE

APPROVED CHIEF ENGINEER R.C. NO. 6855	DRAWN BY:	SHEET NO.
DATE	CHECKED BY:	DR. NO.
REVISED	DATE DRAWN:	

PLATE D-4.6



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

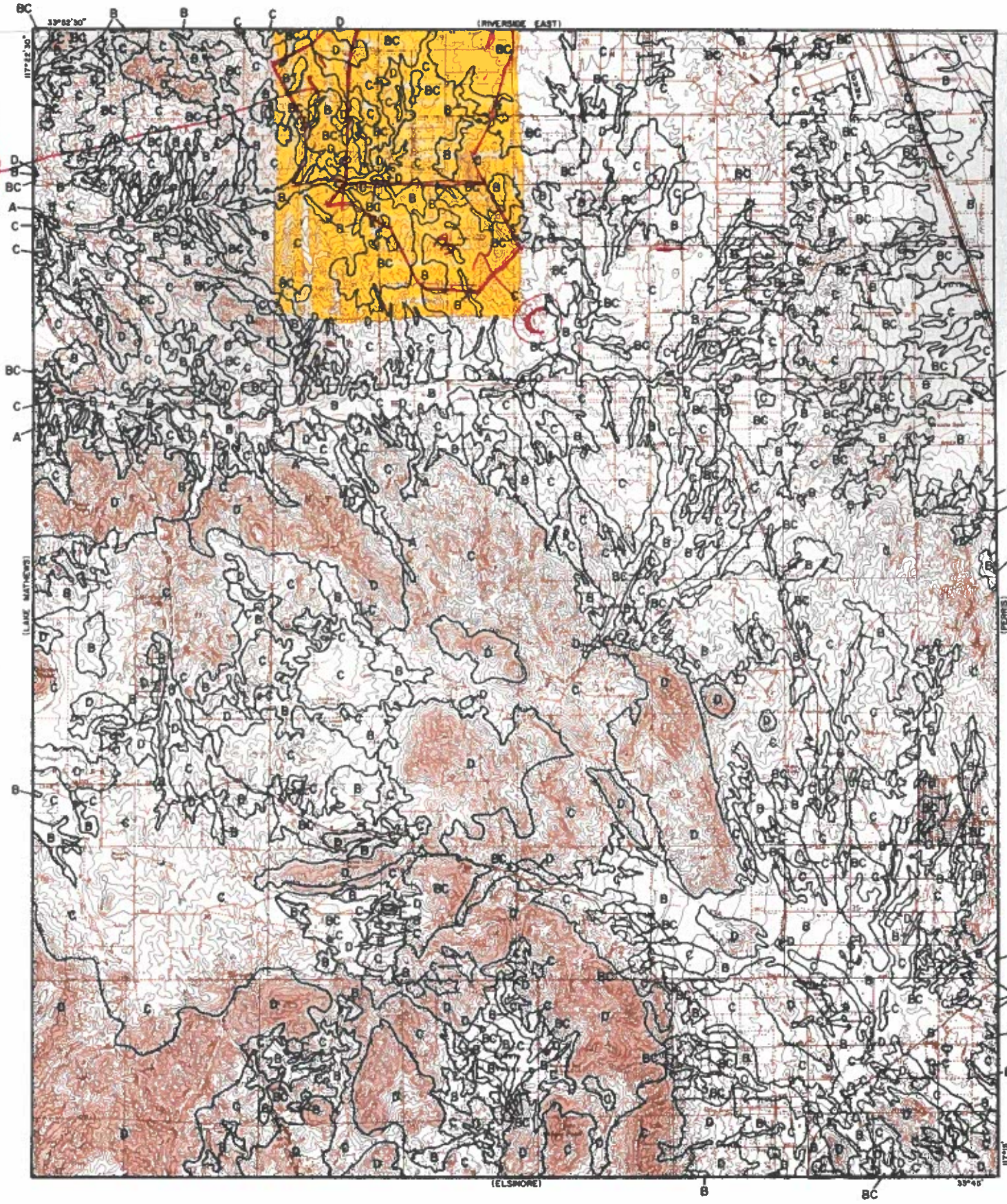
RCFC & WCD

HYDROLOGY MANUAL

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR RIVERSIDE–EAST

PLATE C-1.16



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC&WCD

HYDROLOGY MANUAL

N

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR STEELE PEAK

_____

****

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON

RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT

(RCFC&WCD) 1978 HYDROLOGY MANUAL

(Rational Tabling Version 15.0)

Release Date: 04/01/2008 License ID 1555

Analysis prepared by: Richenny Bovannak

********** DESCRIPTION OF STUDY **********

* MARKHAM STREET IMPROVEMENT PROJECT *

* Q100 *

* RICHENNY BOVANNAK *

****

FILE NAME: DA1-DEV.DAT

TIME/DATE OF STUDY: 11:05 01/13/2020

USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:

USER SPECIFIED STORM EVENT(YEAR) = 100.00

SPECIFIED MINIMUM PIPE SIZE(INCH) = 18.00

SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95

10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) = 1.880

10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 0.700

100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) = 2.680

100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) = 1.000

SLOPE OF 10-YEAR INTENSITY-DURATION CURVE = 0.5513834

SLOPE OF 100-YEAR INTENSITY-DURATION CURVE = 0.5501947

COMPUTED RAINFALL INTENSITY DATA:

STORM EVENT = 100.00 1-HOUR INTENSITY(INCH/HOUR) = 1.000

SLOPE OF INTENSITY DURATION CURVE = 0.5502

RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD

NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES

USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL

NO.	HALF-WIDTH (FT)	CROWN TO STREET-CROSSFALL: IN- / OUT-/PARK- (FT)	CURB GUTTER-GEOMETRIES: HEIGHT (FT)	WIDTH (FT)	LIP (FT)	HIKE (FT)	MANNING FACTOR (n)
1	30.0	20.0	0.018/0.018/0.020	0.67	2.00	0.0312	0.167	0.0150

GLOBAL STREET FLOW-DEPTH CONSTRAINTS:

1. Relative Flow-Depth = 0.00 FEET

as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)

2. (Depth)*(Velocity) Constraint = 6.0 (FT*FT/S)

*SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

****

FLOW PROCESS FROM NODE 1.00 TO NODE 2.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

==========

ASSUMED INITIAL SUBAREA UNIFORM

```
      DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   430.31
 UPSTREAM ELEVATION(FEET) =   1800.00
 DOWNSTREAM ELEVATION(FEET) =   1772.00
 ELEVATION DIFFERENCE(FEET) =     28.00
 TC = 0.393*[(  430.31**3)/(    28.00)]**.2 =    7.670
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.101
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .8271
 SOIL CLASSIFICATION IS "C"
 SUBAREA RUNOFF(CFS) =     25.32
 TOTAL AREA(ACRES) =      9.87   TOTAL RUNOFF(CFS) =     25.32

****************************************************************************
 FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1742.00  DOWNSTREAM(FEET) =   1524.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  6626.90   CHANNEL SLOPE =  0.0329
 CHANNEL FLOW THRU SUBAREA(CFS) =      25.32
 FLOW VELOCITY(FEET/SEC) =   5.80 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =  19.06   Tc(MIN.) =   26.73
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =    7057.21 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  81
----------------------------------------------------------------------------
```

>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<

==========

100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 1.560

SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7752

SOIL CLASSIFICATION IS "C"

SUBAREA AREA(ACRES) = 236.31 SUBAREA RUNOFF(CFS) = 285.82

TOTAL AREA(ACRES) = 246.2 TOTAL RUNOFF(CFS) = 311.14

TC(MIN.) = 26.73

==========

END OF STUDY SUMMARY:

TOTAL AREA(ACRES) = 246.2 TC(MIN.) = 26.73

PEAK FLOW RATE(CFS) = 311.14

==========

==========

END OF RATIONAL METHOD ANALYSIS

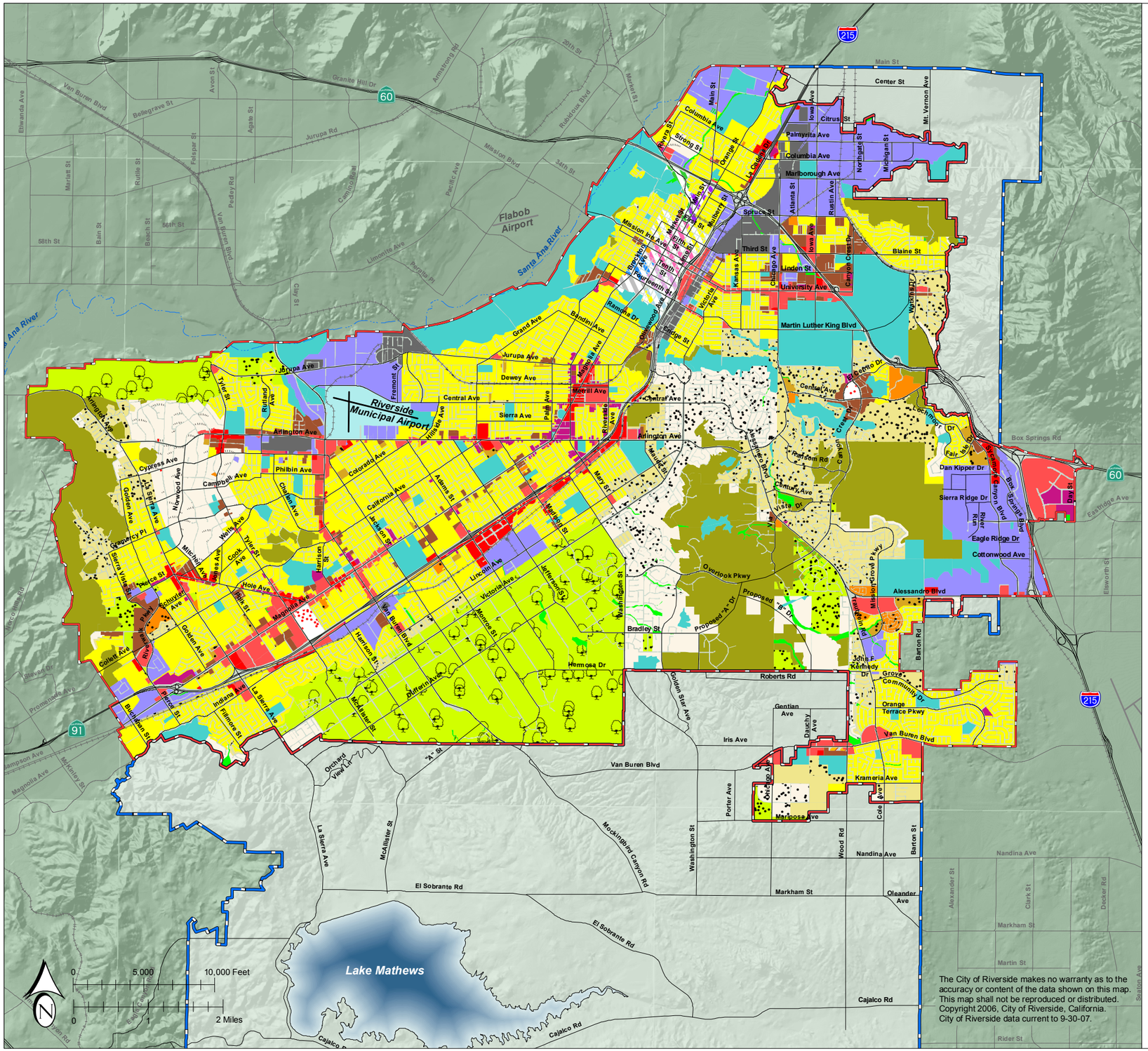
COMMUNITY DEVELOPMENT DEPARTMENT - PLANNING DIVISION

For Questions, contact the Planner on Duty at
Telephone: (951) 826-5371 / Fax: (951) 826-5981
Visit our website, www.riversideca.gov/planning

GENERALIZED REQUIREMENTS FOR *RESIDENTIAL ZONES*

ZONE		PRIMARY USES PERMITTED	SITE DEVELOPMENT STANDARDS									
			MINIMUM LOT			MINIMUM BLDG SETBACKS[8]				MAX HEIGHT[10] (Feet)	DENSITY – MAXIMUM[1,11]	MAX LOT COVERAGE
			AREA (Sq. Ft.) - per dwelling	WIDTH (Feet)	DEPTH (Feet)	FRONT[7,14,16] (Feet)	SIDES[5,14] (Feet)	STREET SIDE[5,14] (Feet)	REAR[5,14] (Feet)			
RA-5	Residential Agricultural	One Family dwelling, Agricultural Area	5 Acres[2,9]	300[2]	500[2]	40[1,2]	20[1,2]	20[1,2]	25[2]	35[1]	0.2	30%
RC[12]	Residential Conservation	One Family dwelling, Environmentally Sensitive Areas	Varies[2]	130[2,12]	100[2,12]	30[2,6]	25[2]	25[2]	25[2]	20	0.5	N/A
RR	Rural Residential	One Family Dwelling, Livestock	20,000	100[13]	150	30	20	20	100	35	2.1	30%
RE	Residential Estate	General Agriculture, One Family Dwelling Per Lot	1 Acre	130[13]	150	30	25	25	30	35	1	30%
R-1-1/2 acre	Single Family Residential	One Family Dwelling	21,780	125[13]	150	30[4]	20[3]	-	35	35	2	30%
R-1-13000	Single Family Residential	One Family Dwelling	13,000	100[13]	110	25[4]	15[3]	-	30	35	3.4	30%
R-1-10500	Single Family Residential	One Family Dwelling	10,500	90[13]	110	25[4]	10/15[3]	-	25	35	4.1	35%
R-1-8500	Single Family Residential	One Family Dwelling	8,500	80[13]	100	25[4]	12.5/7.5[3]	-	25	35	5.1	35%
R-1-7000	Single Family Residential	One Family Dwelling	7,000	60[13]	100	20[4]	10/7.5[3]	-	25	35	6.2	40%
R-3-4000	Multi-Family Residential	Multiple Family Dwelling (Minimum Lot Area per Parent Parcel - 1 acre)	4,000	80	150	25	10	-	20	30[2]	10.9	-
R-3-3000	Multi-Family Residential	Multiple Family Dwelling (Minimum Lot Area per Parent Parcel - 1 acre)	3,000	80	150	25	10	-	20	30[2]	14.5	-
R-3-2500	Multi-Family Residential	Multiple Family Dwelling (Minimum Lot Area per Parent Parcel - 1 acre)	2,500	80	100	20	10	-	20	30[2]	17.4	-
R-3-2000	Multi-Family Residential	Multiple Family Dwelling (Minimum Lot Area per Parent Parcel - 1 acre)	2,000	80	100	15	7.5/10	-	15	30[2]	21.8	-
R-3-1500	Multi-Family Residential	Multiple Family Dwelling (Minimum Lot Area per Parent Parcel - 1 acre)	1,500	80	100	15	7.5/10	-	15	30[2]	29	-
R-4	Multi-Family Residential	Multiple Family Dwelling (Minimum Lot Area per Parent Parcel - 1 acre)	1,000	100	150	15	7.5/10	-	10	50	40	-

1. See Section 19.100.060 A (Additional Density). Gross Acreage means streets are included for density purposes. Notwithstanding allowable density in a gross acreage basis, individual lots must meet the minimum lot size requirements exclusive of streets, except in the RA-5 Zone as described in Note 9.
2. Lot width, depth, and area; building area; and setback requirements shall be as required as set forth in the Table. However, the zoning standards and requirements of the RC and RA-5 Zones shall not apply to any buildings existing prior to or under construction on November 13, 1979, or to the restoration of rehabilitation of or to any additions to such buildings, provided that the use, restoration, rehabilitation, or addition shall conform to the current standards and requirements of the zoning in existence immediately prior to November 13, 1979. Also see Section 19.100.050 A (Lot Area).
3. Where a lot is less than 65 feet in width and was of record prior to November 23, 1956, or was of record prior to the date on which such lot was annexed to the City, the required side yards adjacent to interior side lot lines shall be reduced to 5 feet.
4. Front Setback Exceptions: See Section 19.100.060 C (Exceptions to Setback Requirements).
5. Side and Rear Setback Exceptions: See Section 19.100.060 C (Exceptions to Setback Requirements).
6. No lot that fronts into Hawarden Drive within the Hawarden Drive Special Design Area, generally between Anna Street and the Alessandro Arroyo, shall have a front yard depth of less than fifty feet.
7. Where a lot or parcel of land at the junction of two intersecting streets in any residential zone has frontage on each street over 130 feet in length, front yards of the depth required in the appropriate zone shall be required on both frontages. Also see Chapter 19.630 (Yard Requirements and Exceptions).
8. No dwelling shall be located closer than 5 feet to any retaining wall exceeding 2 feet in height, unless such retaining wall is an integral part of an approved dwelling.
9. Lot area in the RA-5 Zone is measured to the centerline of the adjoining street or streets; provided, however, individuals may construct one single-family dwelling on a lot of less than 5 acres existing as of May 15, 1979 and the residence is owner occupied after construction.
10. Refer to Chapter 19.560 (Building Height Measurement) for height measurement and exceptions to height limits.
11. Also see 19.100.060 A (Additional Density). Project density may be greater in a Planned Residential Development.
12. See section 19.100.050 (Additional Regulations for the RC Zone).
13. See Section 18.210.080 (Lots) and Article X (Definitions) for exceptions for cul-de-sac lots, knuckle lots, lots on curves, and corridor lots.
14. For Multi-Family Residential Zones: Whenever a Height Overlay Zone has been applied to allow a structure to exceed two stories in height, the front, side, and rear yards shall be increased by 2.5 feet for each story in excess of two stories, except as otherwise stated in this footnote. No building or building portion of two stories or higher may be located within 50 feet of any side or rear property line that abuts property in an RA, RC, RR, RE, or R-1 Zone; in such instance for each story in excess of two, the setback shall increase by 10 feet.
15. For a development of three acres or greater, up to 60 percent of the units may be in buildings up to three stories, 40 feet maximum height subject to Planning Commission approval. Applicable to R-3-4000, R-3-3000, R-3-2500, R-3-2000, R-3-1500 (all 2 stories maximum).
16. 35 foot full landscaped front yards are required along all arterial streets, 88 feet wide or greater as shown on the Circulation Map of the City's General Plan. This setback may be reduced to 25 feet for single-story multiple-family development along arterial streets.



CITY OF RIVERSIDE
GENERAL PLAN 2025

LEGEND

- RIVERSIDE CITY BOUNDARIES
- RIVERSIDE PROPOSED SPHERE OF INFLUENCE

ZONING

RESIDENTIAL ZONES

- RE
- RA-5
- RR
- RC
- R-1-1/2 acre
- R-1-13000
- R-1-10500
- R-1-8500
- R-1-7000
- R-3-4000
- R-3-3000
- R-3-2500
- R-3-2000
- R-3-1500

COMMERCIAL/INDUSTRIAL ZONES

- O
- CR
- CRC
- CG
- BMP
- I

DOWNTOWN SPECIFIC PLANS

- DSP-AS
- DSP-HC
- DSP-JC
- DSP-MSG
- DSP-NC
- DSP-NMS
- DSP-PPO
- DSP-RC
- DSP-RES

OTHER ZONES

- AIR
- RWY
- OSP-CID
- PF

OVERLAY ZONES

- WC

*AMENDMENTS TO THE MAP AFTER ZONING CODE ADOPTION WILL BE MAINTAINED ON FILE IN THE PLANNING DIVISION

SOURCE: CITY OF RIVERSIDE

ZONING MAP OF THE CITY OF RIVERSIDE

0 5,000 10,000 Feet

Worksheet for North Ditch 2-1

Project Description

Friction Method	Manning Formula
Solve For	Bottom Width

Input Data

Roughness Coefficient	0.030	
Channel Slope	0.01625	ft/ft
Normal Depth	4.00	ft
Left Side Slope	2.00	ft/ft (H:V)
Right Side Slope	2.00	ft/ft (H:V)
Discharge	2652.14	ft^3/s

Results

Bottom Width	39.29	ft
Flow Area	189.18	ft^2
Wetted Perimeter	57.18	ft
Hydraulic Radius	3.31	ft
Top Width	55.29	ft
Critical Depth	4.78	ft
Critical Slope	0.00869	ft/ft
Velocity	14.02	ft/s
Velocity Head	3.05	ft
Specific Energy	7.05	ft
Froude Number	1.34	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.00	ft
Critical Depth	4.78	ft
Channel Slope	0.01625	ft/ft

Worksheet for North Ditch 2-1

GVF Output Data

Critical Slope	0.00869	ft/ft

Worksheet for Box Pipe Markham Street

Project Description

Friction Method	Manning Formula
Solve For	Full Flow Capacity

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.03000	ft/ft
Normal Depth	4.00	ft
Height	4.00	ft
Bottom Width	8.00	ft
Discharge	767.46	ft³/s

Results

Flow Area	32.00	ft²
Wetted Perimeter	24.00	ft
Hydraulic Radius	1.33	ft
Top Width	8.00	ft
Critical Depth	6.59	ft
Percent Full	100.0	%
Critical Slope	0.00481	ft/ft
Velocity	23.98	ft/s
Velocity Head	8.94	ft
Specific Energy	12.94	ft
Froude Number	2.11	
Discharge Full	767.46	ft³/s
Slope Full	0.03000	ft/ft
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

Worksheet for Box Pipe Markham Street

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	4.00	ft
Critical Depth	6.59	ft
Channel Slope	0.03000	ft/ft
Critical Slope	0.00481	ft/ft

Worksheet for 30% DA1 Pipe

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02000	ft/ft
Normal Depth	3.00	ft
Diameter	3.00	ft

Results

Discharge	94.32	ft^3/s
Flow Area	7.07	ft^2
Wetted Perimeter	9.42	ft
Hydraulic Radius	0.75	ft
Top Width	0.00	ft
Critical Depth	2.87	ft
Percent Full	100.0	%
Critical Slope	0.01738	ft/ft
Velocity	13.34	ft/s
Velocity Head	2.77	ft
Specific Energy	5.77	ft
Froude Number	0.00	
Maximum Discharge	101.46	ft^3/s
Discharge Full	94.32	ft^3/s
Slope Full	0.02000	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	100.00	%
Downstream Velocity	Infinity	ft/s

Worksheet for 30% DA1 Pipe

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	3.00	ft
Critical Depth	2.87	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.01738	ft/ft

Worksheet for 70% DA1 Pipe

Project Description

Friction Method	Manning Formula
Solve For	Channel Diameter

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02000	ft/ft
Normal Depth	4.00	ft
Discharge	217.80	ft³/s

Results

Diameter	4.04	ft
Flow Area	12.81	ft²
Wetted Perimeter	11.87	ft
Hydraulic Radius	1.08	ft
Top Width	0.82	ft
Critical Depth	3.92	ft
Percent Full	99.0	%
Critical Slope	0.01913	ft/ft
Velocity	17.00	ft/s
Velocity Head	4.49	ft
Specific Energy	8.49	ft
Froude Number	0.76	
Maximum Discharge	224.69	ft³/s
Discharge Full	208.88	ft³/s
Slope Full	0.02175	ft/ft
Flow Type	SubCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	98.96	%
Downstream Velocity	Infinity	ft/s

Worksheet for 70% DA1 Pipe

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	4.00	ft
Critical Depth	3.92	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.01913	ft/ft

Attachment 2. Biological Database Results

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Summary Table Report

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad IS (Riverside East (3311783) OR Riverside West (3311784) OR Lake Mathews (3311774) OR Steele Peak (3311773))
 AND Elevation IS greater than OR equal to "1400"
 AND Elevation IS less than OR equal to "1650"

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks						Population Status		Presence		
						A	B	C	D	X	U	Historic > 20 yr	Recent <= 20 yr	Extant	Poss. Extirp.	Extirp.
Agelaius tricolor tricolored blackbird	G2G3 S1S2	None Threatened	BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_EN-Endangered NABCI_RWL-Red Watch List USFWS_BCC-Birds of Conservation Concern	1,586 1,586	955 S:1	0	0	0	0	0	1	1	0	1	0	0
Aimophila ruficeps canescens southern California rufous-crowned sparrow	G5T3 S3	None None	CDFW_WL-Watch List	1,400 1,490	235 S:3	0	1	1	0	0	1	0	3	3	0	0
Anniella stebbinsi southern California legless lizard	G3 S3	None None	CDFW_SSC-Species of Special Concern USFS_S-Sensitive	1,500 1,602	417 S:3	0	2	0	0	0	1	1	2	3	0	0
Arizona elegans occidentalis California glossy snake	G5T2 S2	None None	CDFW_SSC-Species of Special Concern	1,539 1,591	260 S:2	0	0	0	0	0	2	1	1	2	0	0
Aspidoscelis hyperythra orange-throated whiptail	G5 S2S3	None None	CDFW_WL-Watch List IUCN_LC-Least Concern USFS_S-Sensitive	1,400 1,600	369 S:5	0	0	0	0	0	5	5	0	5	0	0
Athene cunicularia burrowing owl	G4 S3	None None	BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern USFWS_BCC-Birds of Conservation Concern	1,400 1,640	1989 S:5	0	2	0	1	1	1	1	4	4	0	1
Centromadia pungens ssp. laevis smooth tarplant	G3G4T2 S2	None None	Rare Plant Rank - 1B.1 SB_RSABG-Rancho Santa Ana Botanic Garden	1,450 1,620	126 S:4	1	1	0	0	0	2	3	1	4	0	0
Chaetodipus fallax fallax northwestern San Diego pocket mouse	G5T3T4 S3S4	None None	CDFW_SSC-Species of Special Concern	1,400 1,600	101 S:8	0	2	0	0	0	6	8	0	8	0	0

Summary Table Report

California Department of Fish and Wildlife

California Natural Diversity Database

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks						Population Status		Presence		
						A	B	C	D	X	U	Historic > 20 yr	Recent <= 20 yr	Extant	Poss. Extirp.	Extirp.
Chorizanthe parryi var. parryi Parry's spineflower	G3T2 S2	None None	Rare Plant Rank - 1B.1 BLM_S-Sensitive SB_RSABG-Rancho Santa Ana Botanic Garden USFS_S-Sensitive	1,400 1,440	150 S:2	0	1	0	0	1	0	1	1	1	1	0
Chorizanthe polygonoides var. longispina long-spined spineflower	G5T3 S3	None None	Rare Plant Rank - 1B.2 BLM_S-Sensitive SB_RSABG-Rancho Santa Ana Botanic Garden	1,400 1,555	166 S:12	0	8	0	0	0	4	8	4	12	0	0
Crotalus ruber red-diamond rattlesnake	G4 S3	None None	CDFW_SSC-Species of Special Concern USFS_S-Sensitive	1,410 1,630	192 S:13	0	2	0	0	0	11	4	9	13	0	0
Diadophis punctatus modestus San Bernardino ringneck snake	G5T2T3 S2?	None None	USFS_S-Sensitive	1,600 1,600	14 S:1	0	0	0	0	0	1	0	1	1	0	0
Dipodomys stephensi Stephens' kangaroo rat	G2 S2	Endangered Threatened	IUCN_EN-Endangered	1,400 1,650	220 S:23	3	5	6	3	3	3	17	6	20	1	2
Eremophila alpestris actia California horned lark	G5T4Q S4	None None	CDFW_WL-Watch List IUCN_LC-Least Concern	1,640 1,640	94 S:1	0	0	0	0	0	1	1	0	1	0	0
Euphydryas editha quino quino checkerspot butterfly	G5T1T2 S1S2	Endangered None	XERCES_CI-Critically Imperiled	1,451 1,458	127 S:2	0	0	0	0	2	0	2	0	0	2	0
Haliaeetus leucocephalus bald eagle	G5 S3	Delisted Endangered	BLM_S-Sensitive CDF_S-Sensitive CDFW_FP-Fully Protected IUCN_LC-Least Concern USFS_S-Sensitive USFWS_BCC-Birds of Conservation Concern	1,400 1,440	327 S:5	0	0	0	0	0	5	5	0	5	0	0
Lasiurus xanthinus western yellow bat	G5 S3	None None	CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern WBWG_H-High Priority	1,650 1,650	58 S:1	0	0	0	0	0	1	1	0	1	0	0
Lepidium virginicum var. robinsonii Robinson's pepper-grass	G5T3 S3	None None	Rare Plant Rank - 4.3	1,400 1,600	142 S:3	0	0	0	0	0	3	3	0	3	0	0

Summary Table Report

California Department of Fish and Wildlife

California Natural Diversity Database

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks						Population Status		Presence		
						A	B	C	D	X	U	Historic > 20 yr	Recent <= 20 yr	Extant	Poss. Extirp.	Extirp.
Neotoma lepida intermedia San Diego desert woodrat	G5T3T4 S3S4	None None	CDFW_SSC-Species of Special Concern	1,500 1,500	132 S:1	0	1	0	0	0	0	1	0	1	0	0
Nyctinomops femorosaccus pocketed free-tailed bat	G4 S3	None None	CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern WBWG_M-Medium Priority	1,600 1,600	90 S:1	0	0	0	0	0	1	1	0	1	0	0
Onychomys torridus ramona southern grasshopper mouse	G5T3 S3	None None	CDFW_SSC-Species of Special Concern	1,580 1,580	28 S:1	0	0	0	0	0	1	1	0	1	0	0
Perognathus longimembris brevinasus Los Angeles pocket mouse	G5T1T2 S1S2	None None	CDFW_SSC-Species of Special Concern	1,600 1,640	70 S:2	0	1	0	0	0	1	2	0	2	0	0
Phrynosoma blainvillii coast horned lizard	G3G4 S3S4	None None	BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern	1,400 1,600	784 S:4	0	1	1	0	0	2	3	1	4	0	0
Polioptila californica californica coastal California gnatcatcher	G4G5T2Q S2	Threatened None	CDFW_SSC-Species of Special Concern NABCI_YWL-Yellow Watch List	1,400 1,630	846 S:14	0	1	2	0	0	11	13	1	14	0	0
Southern Cottonwood Willow Riparian Forest Southern Cottonwood Willow Riparian Forest	G3 S3.2	None None		1,460 1,460	111 S:1	0	0	0	0	0	1	1	0	1	0	0
Southern Sycamore Alder Riparian Woodland Southern Sycamore Alder Riparian Woodland	G4 S4	None None		1,400 1,600	230 S:5	0	0	0	0	0	5	5	0	5	0	0
Spea hammondii western spadefoot	G3 S3	None None	BLM_S-Sensitive CDFW_SSC-Species of Special Concern IUCN_NT-Near Threatened	1,403 1,623	1213 S:9	0	1	0	0	0	8	1	8	9	0	0
Streptocephalus woottoni Riverside fairy shrimp	G1G2 S1S2	Endangered None	IUCN_EN-Endangered	1,520 1,540	83 S:2	0	0	0	0	2	0	2	0	0	1	1
Taxidea taxus American badger	G5 S3	None None	CDFW_SSC-Species of Special Concern IUCN_LC-Least Concern	1,600 1,600	592 S:1	0	0	0	0	0	1	1	0	1	0	0

Summary Table Report

California Department of Fish and Wildlife

California Natural Diversity Database

Name (Scientific/Common)	CNDDB Ranks	Listing Status (Fed/State)	Other Lists	Elev. Range (ft.)	Total EO's	Element Occ. Ranks						Population Status		Presence		
						A	B	C	D	X	U	Historic > 20 yr	Recent <= 20 yr	Extant	Poss. Extirp.	Extirp.
Vireo bellii pusillus	G5T2	Endangered	IUCN_NT-Near Threatened NABCI_YWL-Yellow Watch List	1,422 1,642	503 S:10	0	1	2	0	0	7	0	10	10	0	0
least Bell's vireo	S2	Endangered														

CNPS California Native Plant Society

*The database used to provide updates to the Online Inventory is under construction. View updates and changes made since May 2019 here.

Plant List

23 matches found. *Click on scientific name for details*

Search Criteria

Found in Quads 3311773, 3311774, 3311784 and 3311783; Elevation is above 1400 or below 1650 feet

Modify Search Criteria | Export to Excel | Modify Columns | Modify Sort | Display Photos

Scientific Name	Common Name	Family	Lifeform	Blooming Period	CA Rare Plant Rank	State Rank	Global Rank
Abronia villosa var. aurita	chaparral sand-verbena	Nyctaginaceae	annual herb	(Jan)Mar-Sep	1B.1	S2	G5T2?
Allium munzii	Munz's onion	Alliaceae	perennial bulbiferous herb	Mar-May	1B.1	S1	G1
Berberis nevinii	Nevin's barberry	Berberidaceae	perennial evergreen shrub	(Feb)Mar-Jun	1B.1	S1	G1
Calochortus plummerae	Plummer's mariposa lily	Liliaceae	perennial bulbiferous herb	May-Jul	4.2	S4	G4
Caulanthus simulans	Payson's jewelflower	Brassicaceae	annual herb	(Feb)Mar-May(Jun)	4.2	S4	G4
Centromadia pungens ssp. laevis	smooth tarplant	Asteraceae	annual herb	Apr-Sep	1B.1	S2	G3G4T2
Chorizanthe leptotheca	Peninsular spineflower	Polygonaceae	annual herb	May-Aug	4.2	S3	G3
Chorizanthe parryi var. parryi	Parry's spineflower	Polygonaceae	annual herb	Apr-Jun	1B.1	S2	G3T2
Chorizanthe polygonoides var. longispina	long-spined spineflower	Polygonaceae	annual herb	Apr-Jul	1B.2	S3	G5T3
Convolvulus simulans	small-flowered morning-glory	Convolvulaceae	annual herb	Mar-Jul	4.2	S4	G4
Deinandra paniculata	paniculate tarplant	Asteraceae	annual herb	(Mar)Apr-Nov(Dec)	4.2	S4	G4
Dudleya multicaulis	many-stemmed dudleya	Crassulaceae	perennial herb	Apr-Jul	1B.2	S2	G2
Eriastrum densifolium ssp. sanctorum	Santa Ana River woollystar	Polemoniaceae	perennial herb	Apr-Sep	1B.1	S1	G4T1
Harpagonella palmeri	Palmer's grapplinghook	Boraginaceae	annual herb	Mar-May	4.2	S3	G4
Lasthenia glabrata ssp. coulteri	Coulter's goldfields	Asteraceae	annual herb	Feb-Jun	1B.1	S2	G4T2
	Robinson's pepper-	Brassicaceae	annual herb	Jan-Jul	4.3	S3	G5T3

Lepidium virginicum var. robinsonii	grass						
Microseris douglasii ssp. platycarpha	small-flowered microseris	Asteraceae	annual herb	Mar-May	4.2	S4	G4T4
Myosurus minimus ssp. apus	little mousetail	Ranunculaceae	annual herb	Mar-Jun	3.1	S2	G5T2Q
Pseudognaphalium leucocephalum	white rabbit-tobacco	Asteraceae	perennial herb	(Jul)Aug-Nov(Dec)	2B.2	S2	G4
Romneya coulteri	Coulter's matilija poppy	Papaveraceae	perennial rhizomatous herb	Mar-Jul(Aug)	4.2	S4	G4
Senecio aphanactis	chaparral ragwort	Asteraceae	annual herb	Jan-Apr(May)	2B.2	S2	G3
Symphyotrichum defoliatum	San Bernardino aster	Asteraceae	perennial rhizomatous herb	Jul-Nov(Dec)	1B.2	S2	G2
Texosporium sancti-jacobi	woven-spored lichen	Caliciaceae	crustose lichen (terricolous)		3	S1	G3

Suggested Citation

California Native Plant Society, Rare Plant Program. 2020. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Website http://www.rareplants.cnps.org [accessed 21 January 2020].

Search the Inventory
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Advanced Search
Glossary

Information
About the Inventory
About the Rare Plant Program
CNPS Home Page
About CNPS
Join CNPS

Contributors
The Calflora Database
The California Lichen Society
California Natural Diversity Database
The Jepson Flora Project
The Consortium of California Herbaria
CalPhotos

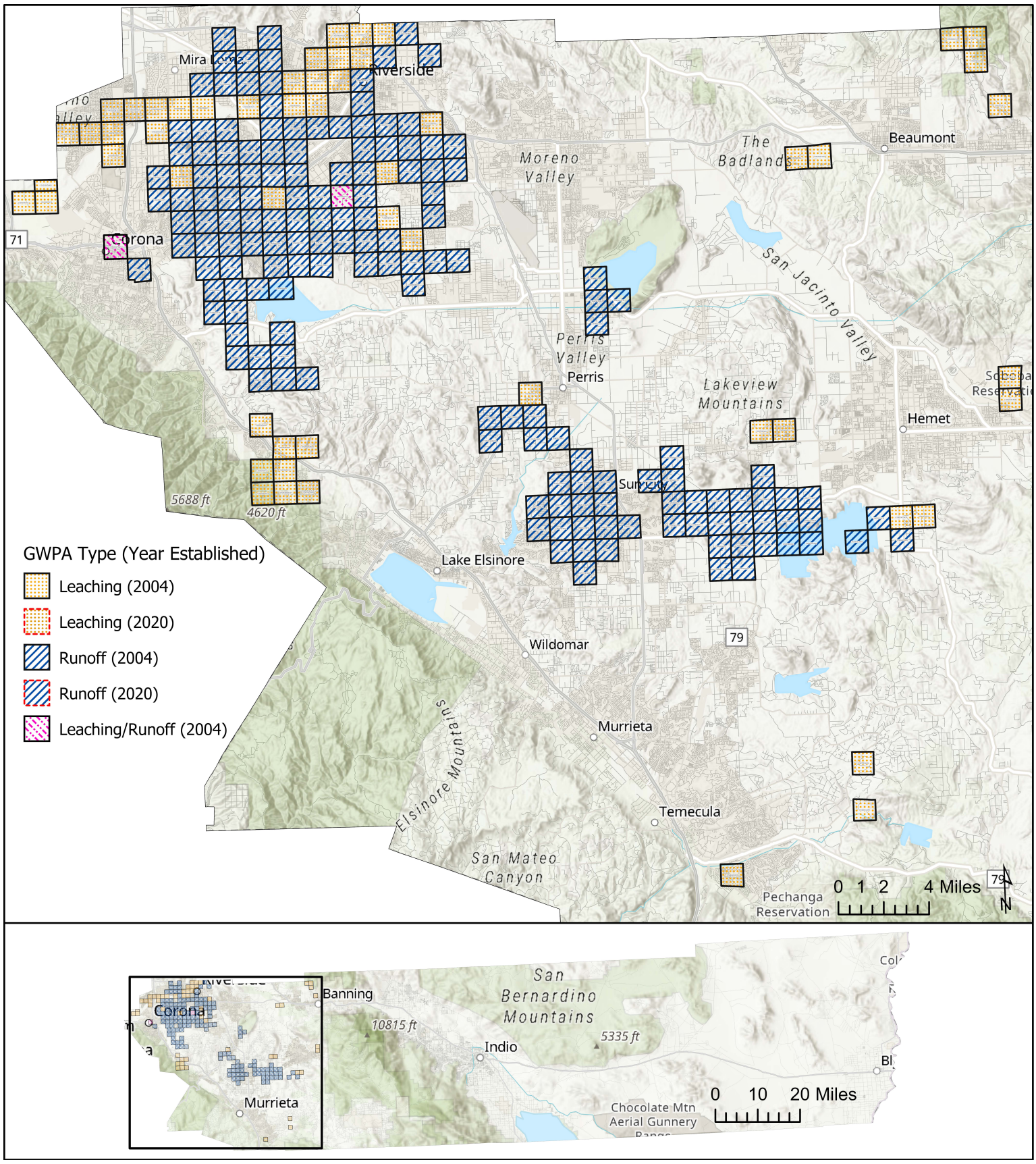
Questions and Comments
rareplants@cnps.org

Attachment E: Riverside Groundwater Protection Areas

Riverside County

Ground Water Protection Areas

January 2020



This map is for reference only. To confirm whether or not the property you are treating is located within a Ground Water Protection Area, please check with the County Agricultural Commissioner's office.

Attachment F: FEMA FIRM Map

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 1994 or later.

This map may reflect more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

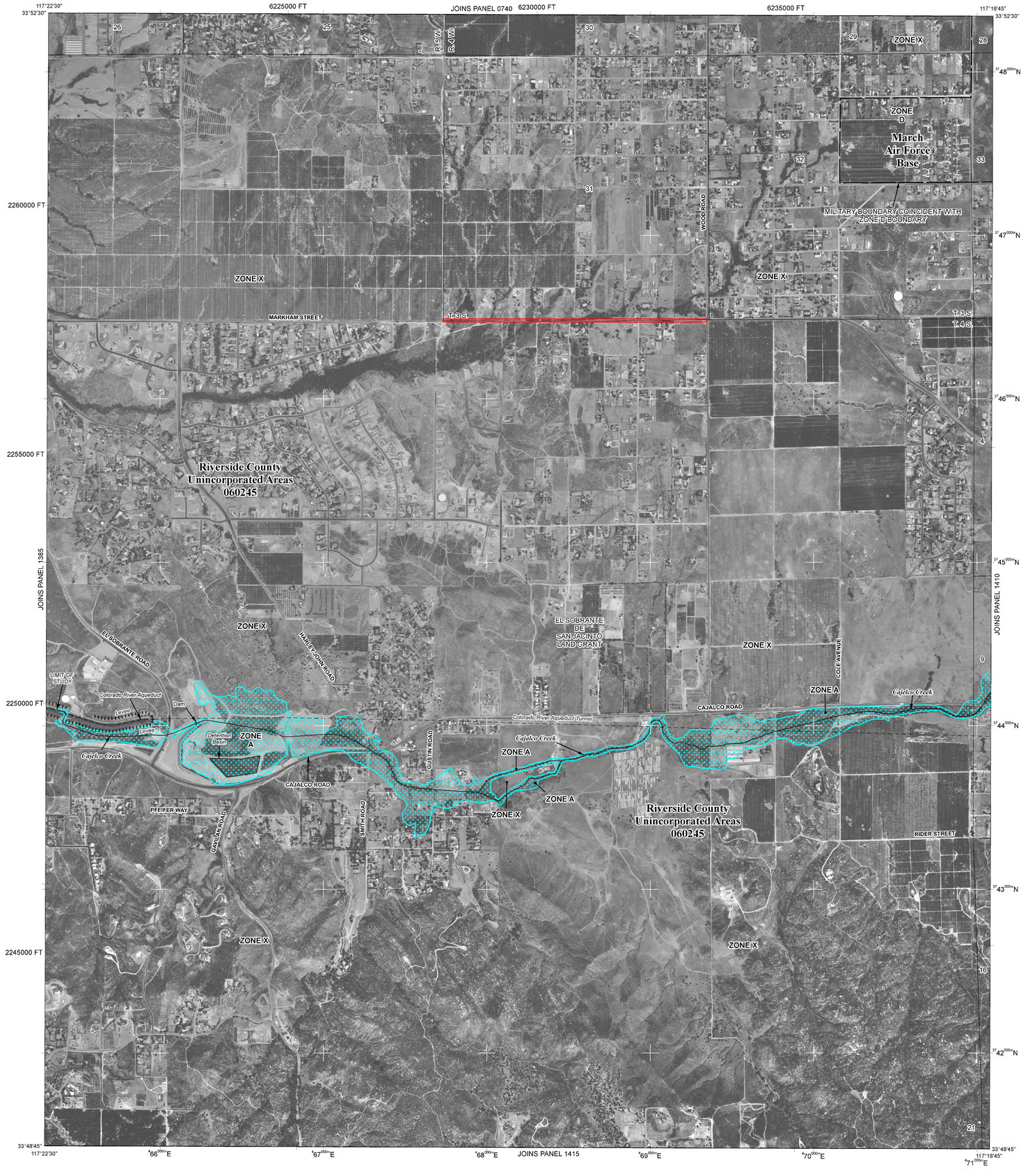
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.

Markham St. Project Location



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 — 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
2576000mN	1000-meter Universal Transverse Mercator grid values, zone 11N
600000 FT	5000-foot grid ticks: California State Plane coordinate system, zone VI (FIPSZONE 0406), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
●M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
August 28, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1405G

FIRM

FLOOD INSURANCE RATE MAP

RIVERSIDE COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 1405 OF 3805
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
RIVERSIDE COUNTY	060245	1405	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06065C1405G

EFFECTIVE DATE
AUGUST 28, 2008

Federal Emergency Management Agency

Attachment G: Risk Level Determination Analysis

Markham Street Extension PA & ED Project

Risk Level Determination Analysis

To comply with the Construction General Permit (CGP) for a Project site, a risk determination analysis was conducted and determined two site-specific risks, the Sediment Risk and Receiving Water Risk. The Sediment Risk includes the following three factors: an R-factor (rainfall erosivity), K-factor (soil erodibility), and LS-factor (topographic). The Receiving Water Risk focuses on how runoff will impact the body of water it will flow into. This Project will drain to Mockingbird Canyon Reservoir in Riverside, California. The methodology determining the site-specific risks in calculating this Project's Risk Level is discussed below.

Sediment Risk

According to the CGP, using GIS maps or site-specific information are the appropriate methods in determining the sediment risk level. This analysis was based on the GIS map method. The sediment risk level is also determined from the RUSLE equation alongside the three aforementioned factors and categorized into the following three sediment risk levels in Table 1.0:

Table 1.0: Sediment Risk Level Criteria

Sediment Risk Level	Watershed Erosion Estimate (tons/acre)
Low	$x < 15$
Medium	$15 \leq x < 75$
High	$x \geq 75$

*Note: The variable x represents the watershed erosion estimate in units of tons/acre.

R-Factor

The R-Factor is dependent on the duration and location of construction. The duration of the tentative construction schedule is from 02/02/26 to 07/31/2026. The center of the Project will be used for the location, its coordinates are 33°51'28.81" N and 117°20'25.27" W (33.8580, -117.3404). All these values were inputted into US EPA's Rainfall Erosivity Factor Calculator (https://lew.epa.gov/), which resulted in an R-Factor of 14.74. See Attachment A.

K-Factor

The K-factor is dependent on the Project location, the coordinates were inputted into the 2022 CA Waterboards K-Factor GIS Map Tool (https://gispublic.waterboards.ca.gov/portal/apps/webappviewer/index.html?id=59bb6ae7996d415bb43d13420212a823), resulting in a K-Factor of 0.2. See Attachment B.

LS-Factor
The LS-Factor is also dependent on the Project location, the coordinates were inputted into the 2022 CA Waterboards LS-Factor GIS Map Tool (https://gispublic.waterboards.ca.gov/portal/apps/webappviewer/index.html?id=d71546a521ed4829aaa0e6c7b245fd56), resulting in a LS-Factor of 2.18. See Attachment C.

The R-, K-, and LS-Factor values of 14.74, 0.2, and 2.18 computed a watershed erosion estimate of about 6.43 tons/acre, resulting in the Project's Sediment Risk being categorized as *Low*. See Attachment D.

Receiving Water Risk
The Project is assumed to drain to Mockingbird Canyon Reservoir in the upper Santa Ana River Basin. According to the 2020/2022 California Integrated Report GIS map (https://gispublic.waterboards.ca.gov/portal/apps/webappviewer/index.html?id=6cca2a3a18154655992012663 73cbb7b), Mockingbird Canyon Reservoir is not considered an impaired water body by sediment or turbidity. See Attachment E.

Furthermore, the CGP states the receiving water risk level is deemed high if the impaired water body's assigned beneficial uses include either of the following: spawn (SPWN), cold (COLD), and migratory (MIGRATORY). Based on Table 3-1 from Chapter 3 of the 2019 Santa Ana River Basin Plan, beneficial uses do not include neither of those deemed as high risk. Rather, Mockingbird Canyon Reservoir has beneficial uses of agricultural supply (AGR), recreational purposes (REC1 and REC2), warm (WARM), and wild (WILD). See Attachment F.

Moreover, the Project is not located in the red area of the GIS Water Receiving Risk Map, indicating it is of low risk. See Attachment G.

Since none of these project aspects meet the high-risk criteria, the Receiving Water Risk is *Low*. See Attachment H.

Conclusion of Analysis
Overall, both the Sediment Risk and Receiving Water Risk were found to be categorized as *Low*, resulting in the entire Project to be of combined *Risk Level 1*. See Attachment I.

Sincerely,

Alexander Ov
HDR, Inc

Attachment A

R-Factor US EPA Calculator

Rainfall Erosivity Factor Calculator for Small Construction Sites

EPA's stormwater regulations allow NPDES permitting authorities to waive NPDES permitting requirements for stormwater discharges from small construction sites if:

- the construction site disturbs less than five acres, and
- the rainfall erosivity factor ("R" in the revised universal soil loss equation, or RUSLE) value is less than five during the period of construction activity.

If your small construction project is located in an area where EPA is the permitting authority and your R factor is less than five, you qualify for a low erosivity waiver (LEW) from NPDES stormwater permitting. If your small construction project does not qualify for a waiver, then NPDES stormwater permit coverage is required. Follow the steps below to calculate your R-Factor.

LEW certifications are submitted through the NPDES eReporting Tool or "CGP-NeT". Several states that are authorized to implement the NPDES permitting program also accept LEWs. Check with your state NPDES permitting authority for more information.

- Submit your LEW through EPA's eReporting Tool
- List of states, Indian country, and territories where EPA is the permitting authority (pdf)
- Construction Rainfall Erosivity Waiver Fact Sheet
- Small Construction Waivers and Instructions (pdf)

The R-factor calculation can also be integrated directly into custom applications using the R-Factor web service.

For questions or comments, email EPA's CGP staff at cgp@epa.gov.

● Select the estimated start and end dates of construction by clicking the boxes and using the dropdown calendar.

The period of construction activity begins at initial earth disturbance and ends with final stabilization.

Start Date: 02/02/2026

End Date: 07/31/2026

● Locate your small construction project using the search box below or by clicking on the map.

Location: -117.34035248120827 , 33.85800439933419 **Search**

Click the "Calculate R Factor" button below to calculate an R Factor for your small construction project.

Calculate R Factor

Facility Information

Start Date: 02/02/2026	**Latitude:** 33.8580
End Date: 07/31/2026	**Longitude:** -117.3404

Calculation Results

Rainfall erosivity factor (R Factor) = **14.74**

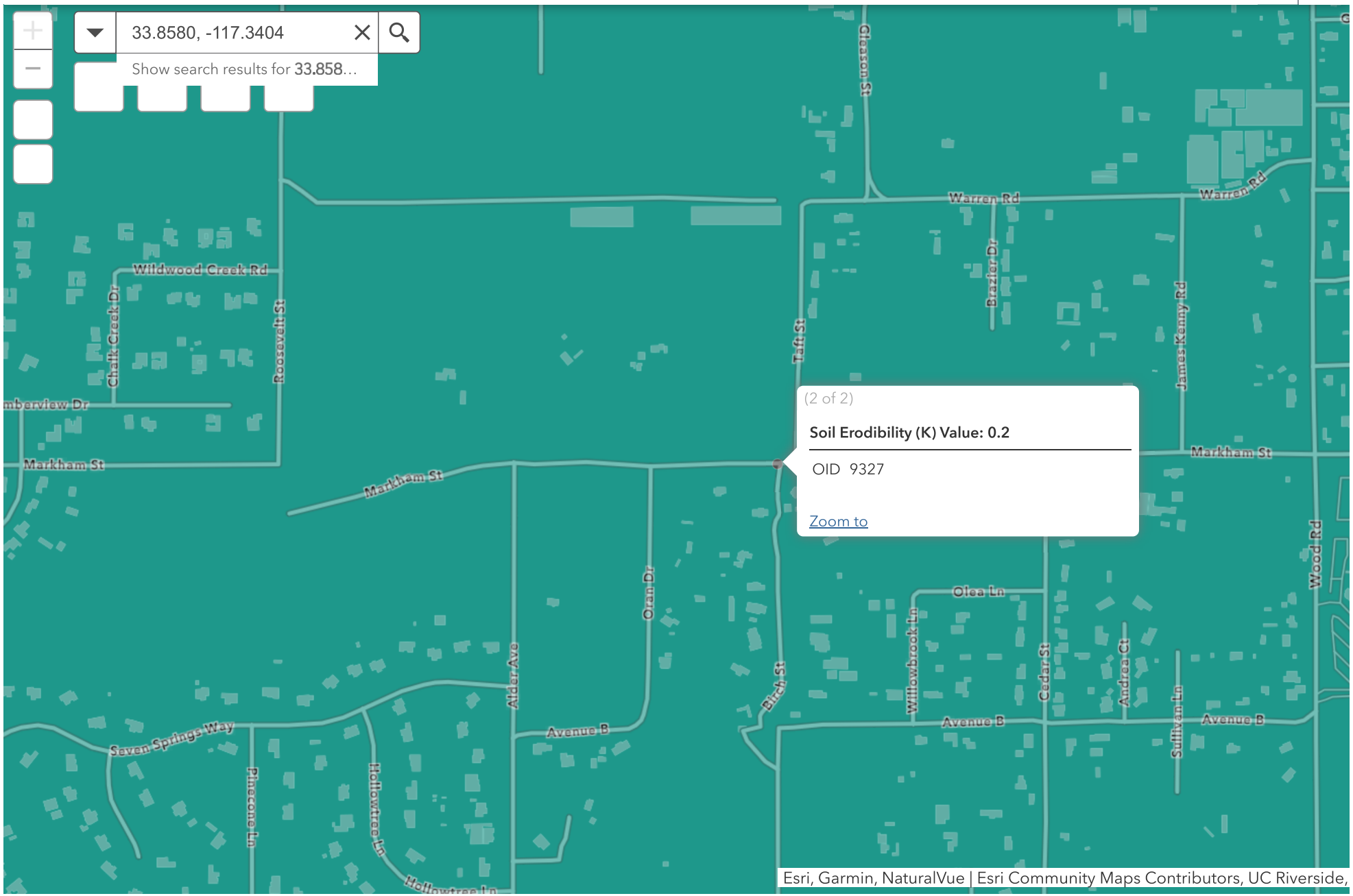
A rainfall erosivity factor of 5.0 or greater has been calculated for your site's period of construction.

You do NOT qualify for a waiver from NPDES permitting requirements and must seek Construction General Permit (CGP) coverage. If you are located in an area where EPA is the permitting authority (pdf), you must submit a Notice of Intent (NOI) through the NPDES eReporting Tool (NeT).Otherwise, you must seek coverage under your state's CGP.

Attachment B

K-Factor GIS Map Tool

2022 Construction Stormwater General Permit Soil Erodibility (K) Factor Map Tool



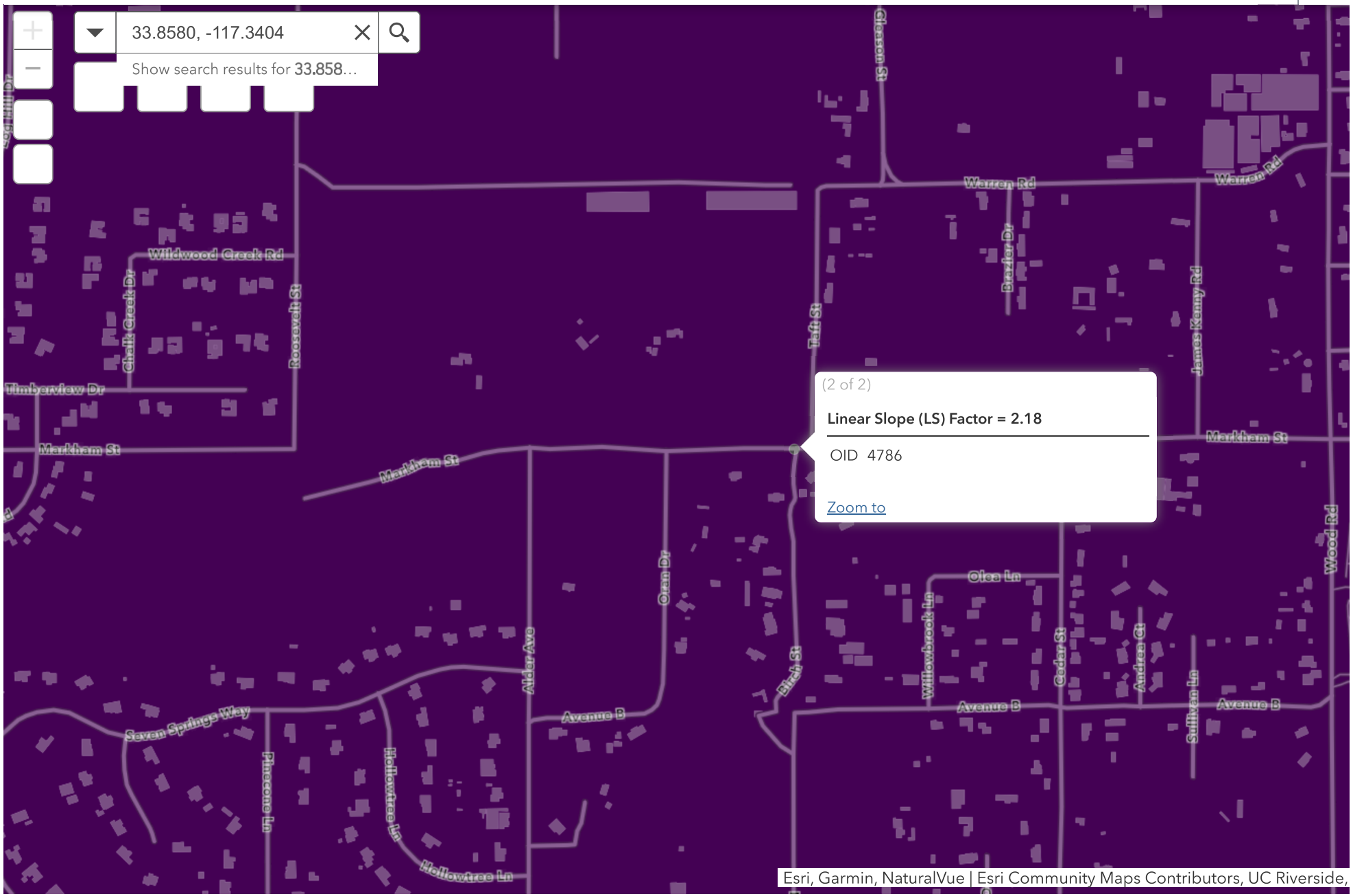
600ft

-117.336 33.864 Degrees

Attachment C

LS-Factor GIS Map Tool

2022 Construction Stormwater General Permit Length-Slope (LS) Factor Map Tool



600ft

-117.340 33.858 Degrees

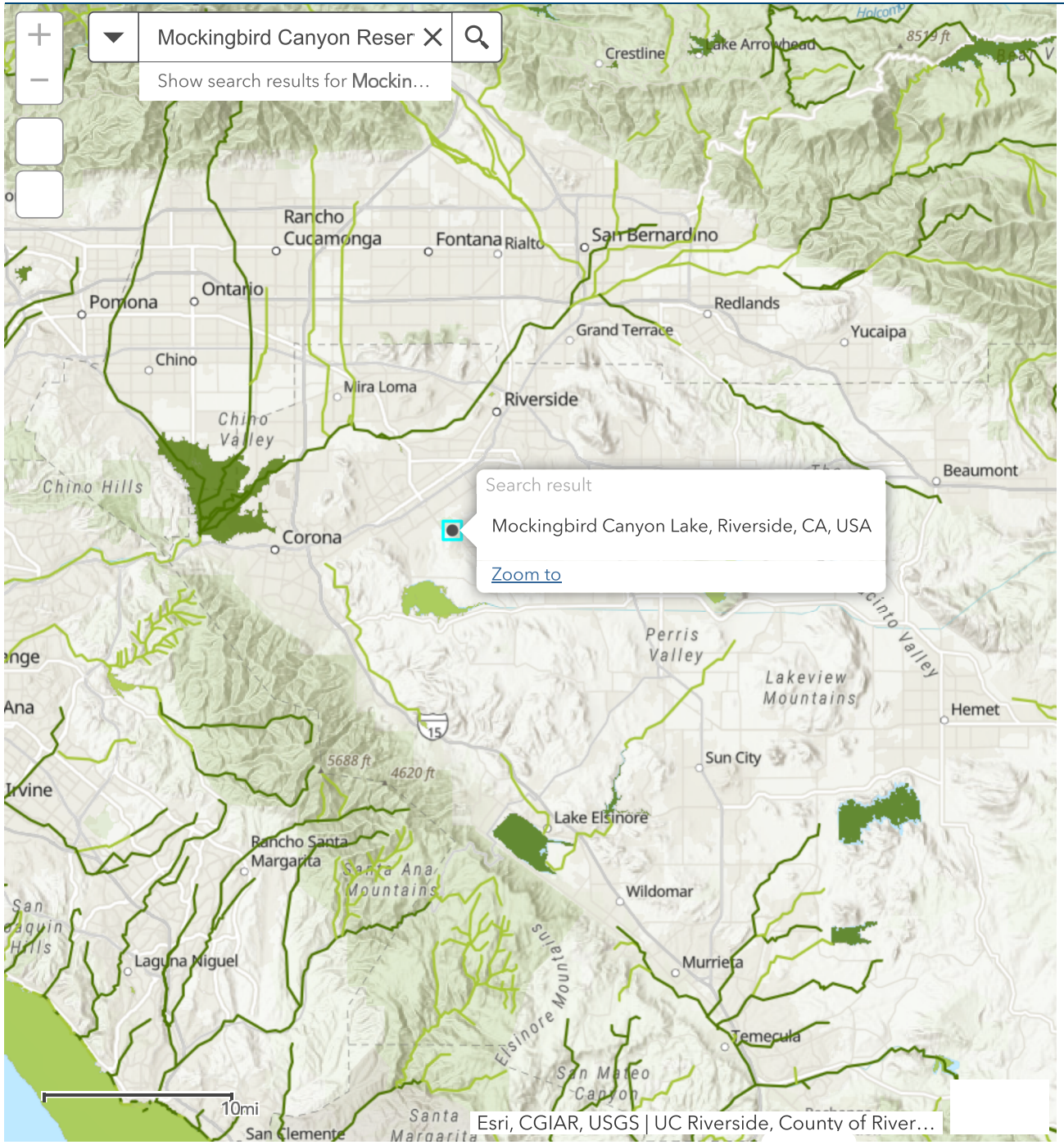
Attachment D

Sediment Risk Factor Worksheet

	A	B	C
1	**Sediment Risk Factor Worksheet**		**Entry**
2	**A) R Factor**		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	https://lew.epa.gov/		
5	**R Factor Value**		14.74
6	**B) K Factor (weighted average, by area, for all site soils)**		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	**K Factor Value**		0.2
10	**C) LS Factor (weighted average, by area, for all slopes)**		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	**LS Factor Value**		2.18
14			
15	**Watershed Erosion Estimate (=RxKxLS) in tons/acre**		6.42664
16	**Site Sediment Risk Factor**		**Low**
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		
19	High Sediment Risk: >= 75 tons/acre		
20			

Attachment E

Impaired Water Body GIS Map Tool



Legend

2020-22 Integrated Report Lines

- Not Listed
- Listed

2020-22 Integrated Report Polygons

- Listed
- Not Listed

Attachment F

Table 3-1 Beneficial Uses

Table 3-1 BENEFICIAL USES - Continued

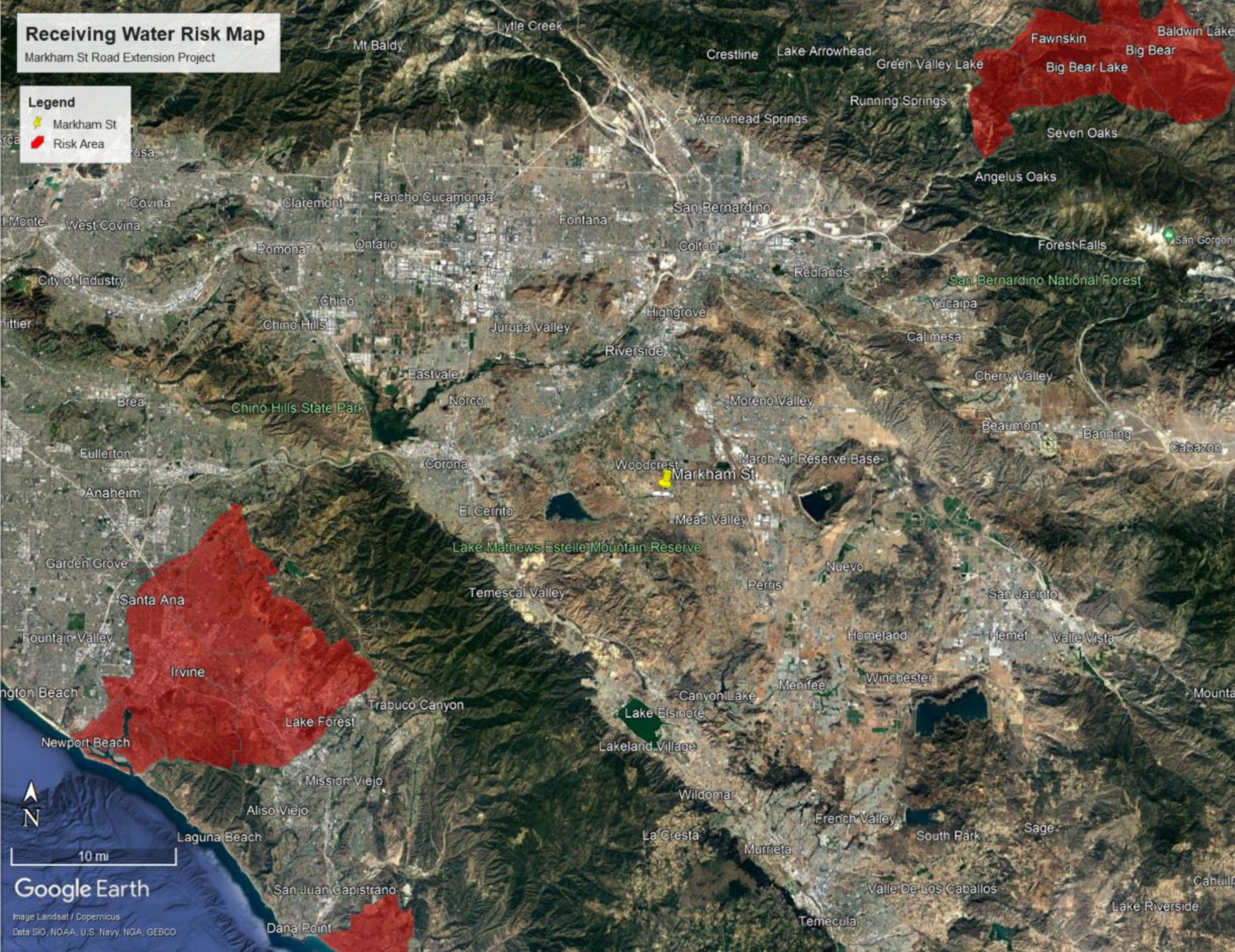
LAKES AND RESERVOIRS	BENEFICIAL USE																	Hydrologic Unit	
	MUN	AGR	IND	PROC	GWR	NAV	POW	REC1	REC2	COMM	WARM	LWRM	COLD	BIOL	WILD	RARE	SPWN	EST	Primary	Secondary
Goodhart Canyon, St. John's Canyon, and Cactus Valley Creeks	I	I						I	I		I				X				802.15	
Perris Valley Channel	+							I	X		I				X	X			802.11	
UPPER SANTA ANA RIVER BASIN																				
Baldwin Lake	+							I	I		I		I	I	I	I			801.73	
Big Bear Lake	X	X			X			X	X	X	X		X		X	X			801.71	
Erwin Lake	X							X	X				X	X	X	X			801.73	
Evans, Lake	+							X	X	X	X		X		X				801.27	
Jenks Lake	X	X			X			X	X	X			X		X				801.72	
Lee Lake	+	X	X		X			X	X	X	X				X				802.34	
Mathews, Lake	X	X	X	X	X			X[4]	X		X				X	X			802.33	
Mockingbird Reservoir	+	X						X[4]	X		X				X				802.26	
Norconian, Lake	+							X	X		X				X				802.25	
Prado Park Lake	+							X	X	X	X				X				801.21	
LOWER SANTA ANA RIVER BASIN																				
Anaheim Lake	+				X			X	X		X				X				801.11	
Irvine Lake (Santiago Reservoir)	X	X						X	X		X		X		X	X			801.12	

X Existing or Potential Beneficial Use
I Intermittent Beneficial Use
+ Excepted from MUN (see text)

[4] Access prohibited per agency/company with jurisdiction

Attachment G

Receiving Water Risk Google Earth Map Tool


Receiving Water Risk Map
Markham St Road Extension Project
Legend
Markham St
Risk Area
Lytle Creek
Mt Baldy
Crestline
Lake Arrowhead
Green Valley Lake
Fawnskin
Baldwin Lake
Big Bear
Big Bear Lake
Running Springs
Arrowhead Springs
Seven Oaks
Angelus Oaks
Covina
Claremont
Rancho Cucamonga
San Bernardino
West Covina
Fontana
Pomona
Ontario
Colton
Forest Falls
San Gorgonio
City of Industry
Redlands
San Bernardino National Forest
Chino
Yucaipa
Chino Hills
Highgrove
Jurupa Valley
Calimesa
Riverside
Eastvale
Cherry Valley
Brea
Chino Hills State Park
Norco
Moreno Valley
Beaumont
Banning
Cabazon
Fullerton
Corona
Woodcrest
March Air Reserve Base
Markham St
Anaheim
El Cerrito
Mead Valley
Lake Mathews Estelle Mountain Reserve
Garden Grove
Nuevo
Perris
Santa Ana
Temescal Valley
San Jacinto
Fountain Valley
Homeland
Hemet
Valle Vista
Irvine
Menifee
Winchester
Canyon Lake
Trabuco Canyon
Lake Elsinore
Lake Forest
Newport Beach
Lakeland Village
Mission Viejo
Wildomar
Aliso Viejo
French Valley
La Cresta
South Park
Sage
Laguna Beach
Murrieta
10 mi
Valle De Los Caballos
San Juan Capistrano
Lake Riverside
Temecula
Dana Point
Google Earth
Image Landsat / Copernicus
Data SIO, NOAA, U.S. Navy, NGA, GEBCO

Attachment H

Receiving Water Risk Factor Worksheet

Receiving Water (RW) Risk Factor Worksheet	Entry	Score
A. Watershed Characteristics	**yes/no**	
A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment** (For help with impaired waterbodies please visit the link below) or has a **USEPA approved TMDL implementation plan for sediment**?:	**no**	**Low**
http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml		
OR		
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? (For help please review the appropriate Regional Board Basin Plan)		
http://www.waterboards.ca.gov/waterboards_map.shtml		
Region 1 Basin Plan		
Region 2 Basin Plan		
Region 3 Basin Plan		
Region 4 Basin Plan		
Region 5 Basin Plan		
Region 6 Basin Plan		
Region 7 Basin Plan		
Region 8 Basin Plan		
Region 9 Basin Plan		

Attachment I

Combined Risk Level Matrix

Combined Risk Level Matrix

Receiving Water Risk	Sediment Risk: Low	Sediment Risk: Medium	Sediment Risk: High
Low	Level 1	Level 2	
High	Level 2		Level 3

Project Sediment Risk: Low

Project RW Risk: Low

Project Combined Risk: Level 1