APPENDIX E
Hydrology Report

VCA ENGINEERS, INC.
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SITE HYDROLOGY AND HYDRAULICS REPORT

FOR

VALLEY MIXED USE PROJECT

205 E. VALLEY BOULEVARD,
SAN GABRIEL, CA

August 7, 2021

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City of San Gabriel
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Subject: VALLEY MIXED USE PROJECT
205 E. Valley Boulevard, San Gabriel, CA

To Whom It May Concern,

We are pleased to submit this letter report regarding the Hydrology of the Valley Mixed Use Project.

This report is comprised of three sections:

- **Narrative Report and Results**
  This includes Introduction and Scope, Project Site Hydrology, Stormwater Mitigation, and Project Conclusions and Recommendations

- **Calculations**
  This includes modeling and calculation results of the hydrology analysis.

- **Appendix**
  This includes rainfall information and utility plans.

CONTENTS

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1 INTRODUCTION

1.1 Scope

This Hydrology Report summarizes the stormwater management for the Valley Mixed Use Project.

This narrative provides calculations of the stormwater runoff generated by the site, the conveyance and discharge system of the runoff, and the stormwater mitigation system using approved Best Management Practices.

1.2 Standards

The standards below were used in the design of the site's stormwater management:

1. Los Angeles County Department of Public Works Hydrology Manual (2006)
2. City of San Gabriel Municipal Code 153.132 – Stormwater Runoff
3. Los Angeles County Department of Public Works Low Impact Development Standards Manual (2014)

2 PROJECT INFORMATION

2.1 Project Location

The Valley Mixed Use Project is located at 205 E. Valley Boulevard in San Gabriel, CA. It is bounded by private residences to its north, by Palm Ave to its east, by commercial buildings to the southeast, and by Valley Boulevard to its south. Its approximate coordinates, as obtained from Google Earth, are Latitude: 34°04’48"N and Longitude: 118°05'52"W. Figure 1 shows the aerial view of the site. The existing site is 0.69 acres. The proposed project will develop approximately 0.57 acres of the site.

Figure 1 - Site Location

2.2 Existing Site Conditions

2.2.1 Existing Site Improvements

The existing site consists of an undeveloped lot, intermodal containers, debris, and minimal landscaping areas. The existing site is 30,201.36 sf and consists of 29,597.33 sf (98.00%) impervious area and 604.03 sf (2.00%) pervious area.

2.2.2 Existing Drainage Pattern

The site drainage pattern is dictated by the topography of the existing land conditions. The site is located on a topographically, flat area, gently sloping downward in the south and east direction.

The surface runoff, from the existing on-site, appears to sheet flow, in a southeasterly direction, from the site onto S. Palm Ave and Valley Blvd. There are no existing catch basins or storm drain lines onsite or closely surrounding the site. Figure 2 shows the existing drainage of the project.

Figure 2 is the topographical survey of the site prepared by Environmental Geotechnology Laboratory 12/15/20, for reference.

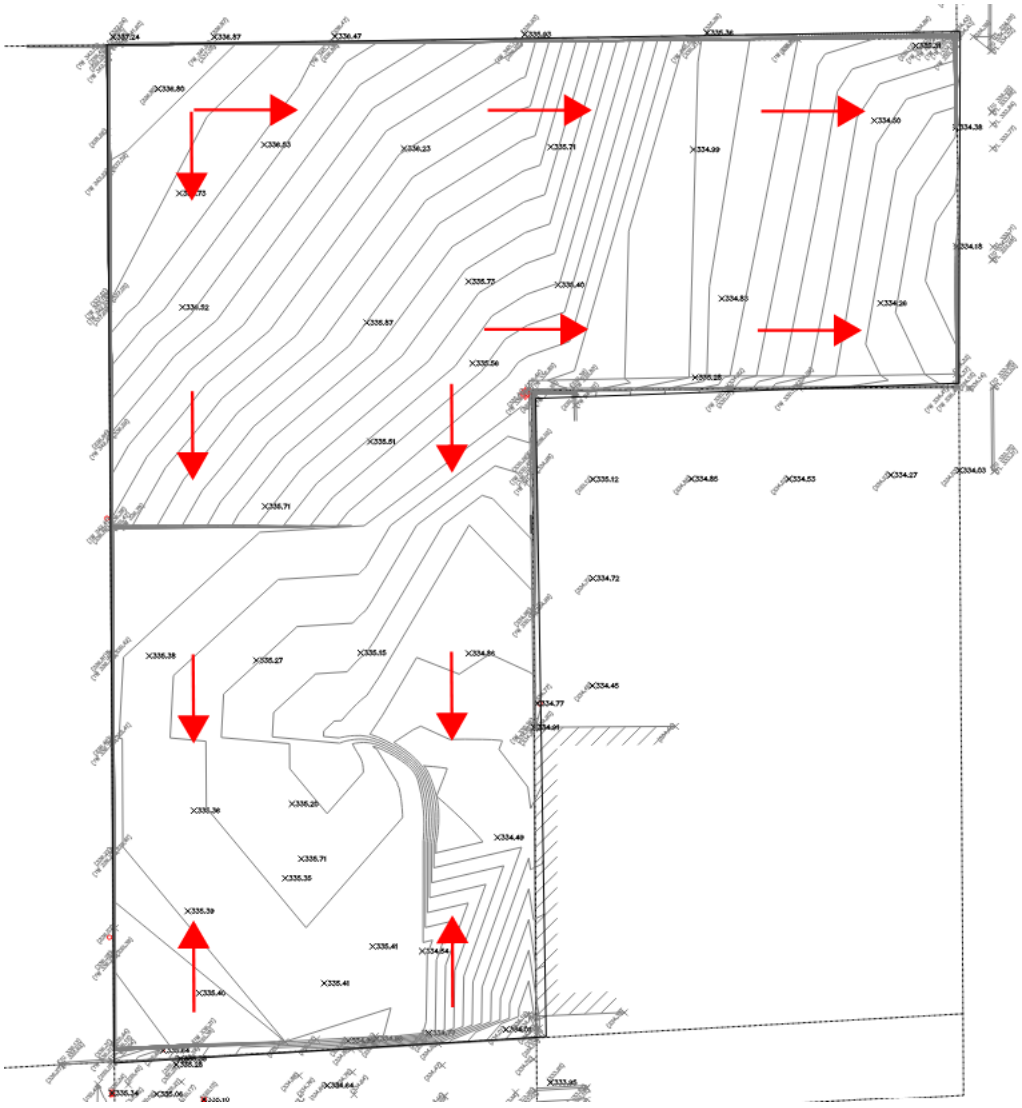


Figure 2 – Existing Drainage Pattern

2.3 Geological Conditions

2.3.1 Geotechnical Report

This section presents information and recommendations from the geotechnical reports prepared by Environmental Geotechnology Laboratory, Inc., entitled "Report of Geotechnical Investigation: Proposed Mixed-Use Apartment with Two-Level Subterranean Parking" dated December 10, 2020 that are relevant to the hydrology and hydraulics of the project site.

2.3.2 Soil Type

The subsurface exploration and testing program revealed the existence of alluvial soil to the maximum explored depth of 42 feet. "The onsite soils consist predominantly of dark brown and dark yellow/olive brown clayey sand (SC), sandy clay (CL) and silty sand (SM). In general, our boring B-2 encountered dark brown to olive brown, fine to coarse grained, slightly moist and medium dense to stiff clayey sand (SC) and sandy clay to a depth of approximately 14 feet" (Geotechnical Report, Page 3). The presence of small gravel was locally encountered within the exploration. "Based on Dibblee (1989), the site is underlain by alluvial gravel, sand and silt of valleys and floodplains" (Geotechnical Report, Page 4).

2.3.3 Groundwater Level

"Static ground water levels were not encountered during our subsurface investigation to the maximum explored depth of 42 feet below the existing ground surface." Continuing, "Groundwater is therefore not expected to be a significant constraint during the construction. However, groundwater may be a significant constraint if grading is completed during the rainy season when perched water is more likely to occur." (Geotechnical Report, Page 3)

2.4 Proposed Site Conditions

2.4.1 Development Area

The proposed project will consist of a new 51 dwelling units mixed-use apartment, with additional landscape areas. The project will be 30,201.36 sf and will consist of 27,671.31 sf (91.62%) impervious area and 2,530.05 sf (8.38%) pervious area.

The proposed development will increase the pervious area by approximately 6.38%. These pervious and impervious area delineations are shown in Figure 3. A comparison of existing conditions and proposed conditions are presented in Table 1.

Table 1 - Proposed Site Pervious and Impervious Areas

Site Condition	Pervious Area (acres)	Impervious Area (acres)	% Pervious	% Impervious
Existing	0.01	0.68	2.00	98.00
Proposed	0.06	0.63	8.38	91.62

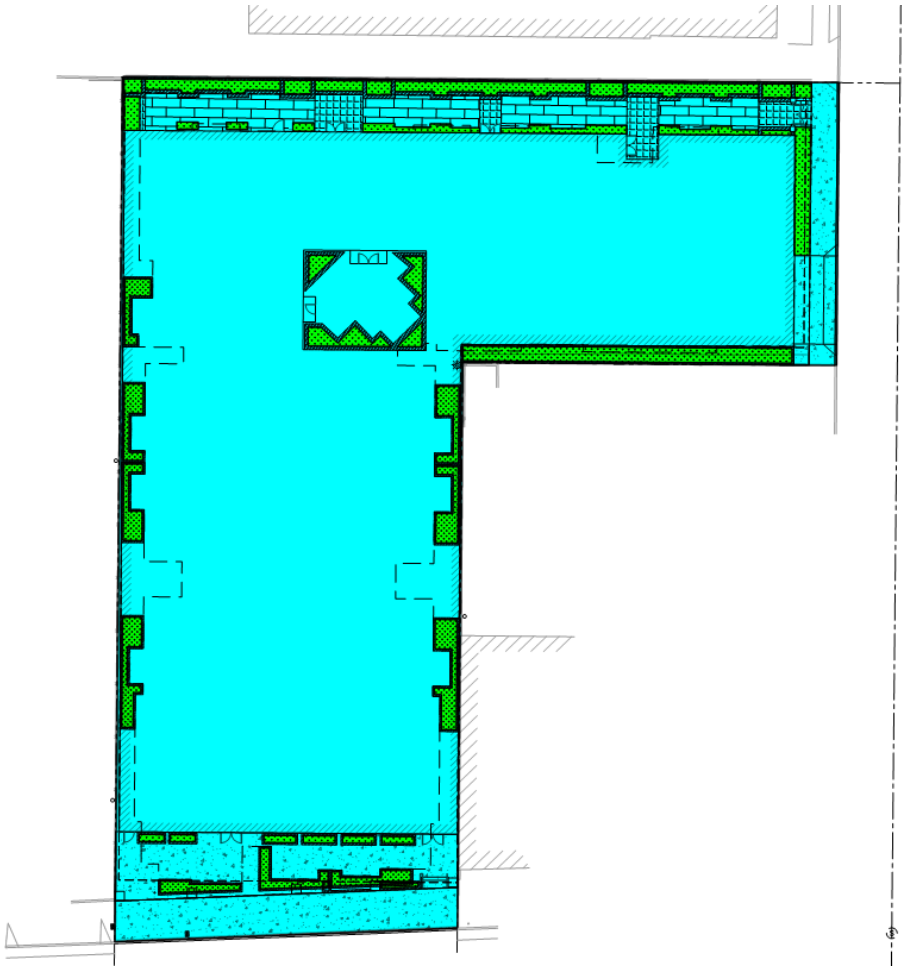


Figure 3 - Proposed Site Plan showing Pervious and Impervious Areas

2.4.2 Proposed Runoff Conveyance and Discharge System

The grading of the new site will utilize many of the existing slopes to minimize cut & fill on site. The grading of the new concrete driveways will follow the grading of existing asphalt driveways, and the finish floor elevation at proposed building will be within a foot of the existing.

Stormwater will be collected by onsite drain inlets around the ground site. All collected runoff will be conveyed to various biofiltration planter boxes. The 85th percentile design storm event will be filtered through the soil media at a rate of 12 in/hr and discharged through curb drains along the face of the sidewalks. The runoff that exceeds the 85th percentile design storm event will be collected in atrium drains and, additionally, discharged through curb drain along Palm Avenue.

3 PROJECT HYDROLOGY

3.1 Hydrology Data

The hydrology data and design criteria described in this section was obtained from the LA County Department of Public Works (LACDPW) Hydrology Manual.

3.1.1 Isohyetal Map

Based on its Google Earth coordinates, the project site was determined to be within the El Monte Isohyet Map (1-H1.20) of the LACDPW Hydrology Manual. Appendix A includes the isohyetal map related to this project.

3.1.2 Design Frequency

Drainage design calculations are based on the 25-year isohyetal as required by the Los Angeles County Department of Public Works and the San Gabriel municipal code.

3.1.3 Rainfall Depth

Based on the Isohyetal Map, the rainfall for the project site is 6.62 inches for a 50-year, 24-hour storm event and 5.81 inches for a 25-year, 24-hour storm event.

3.1.4 Soil Type

The Isohyet Map indicates a numerical soil classification of 06 (San Gabriel Valley) for the site. This approximates the soil classification provided by the Geotechnical Report, which was discussed in Section 2.3.

3.2 Storm Water Discharge For The Proposed Site

3.2.1 Tributary Areas

Runoff on the site will be collected through drain inlets throughout the site. All collected runoff will be conveyed to variuos biofiltration planters. Runoff from the first floor will be pumped to biofiltration planters on the second floor using a sump pump. There will be no unmitigated areas in the site.

3.2.2 Runoff Flow and Volume

The HydroCalc program was used to determine the runoff flow and volume of the existing and the proposed site. For the existing site, based on a 25-year, 24-hour storm event, the site will produce a total of 0.30 acre-ft (12,856.77 cu-ft) of stomwater runoff, at a peak flow rate of 2.16 cfs, with a time of concentration of 5 minutes. For the proposed site, based on a 25-year, 24-hour storm event, the site will produce an approximate total of 0.28 acre-ft (12,218.39 cu-ft) of stormwater runoff, at a peak flow rate of 2.15 cfs, with a time of concentration of 5 minutes. The proposed site will also include LID planter boxes to detain a portion of the runoff (85th percentile design storm) for treatment. The runoff and volume for the 85th percentile storm event is equal to 0.04 acre-ft (1,879.93 cu-ft) of stormwater runoff, at a peak flow rate of 0.16 cfs, with a time of concentration of 19 minutes. (see Appendix B).

3.2.3 Allowable Stormwater Discharge

The LACDPW requires that the site be designed for a 25-year, 24-hour discharge (Urban Flood) storm event. Additionally, the San Gabriel municipal code requires the drainage collected on site to be treated or controlled so that downstream drainage patterns are not overtaxed by the 25-year storm event. The proposed development increases the impervious area by almost 10% in turn decreasing the runoff produced from the 25-year storm event. Furthermore, the stormwater on site will be collected and discharged into LID planter boxes, where the runoff produced from the 85th percentile storm event will be detained and treated through the soil. Subtracting the flow rate produced from the 85th percentile reduces the total flow rate produced from the proposed development. The new flow rate is 0.18 less than the existing.

Table 1 – Existing Stormwater Runoff vs Proposed

	25-year storm Flow Rate (cfs)	**85th Percentile Flow Rate (cfs)**	**Actual Flow Rate (cfs)**
Existing	2.17	-	2.17
Proposed	2.15	0.16	1.59
	25-year Storm Runoff (cuft)	**85th Percentile Reduction (cuft)**	**Actual Runoff (cuft)**
Existing	12,857	-	12,857
Proposed	12,218	1,879	10,339

4 BEST MANAGEMENT PRACTICES

4.1 Biofiltration BMPS

The site will comply with the Los Angeles County requirements for stormwater treatment. Biofiltration planters will be used to treat the required mitigated volume for LID compliance. Per the LID requirements, the mitigated volume of water will be collected by roof drains and various onsite drain inlets and conveyed into the treatment system.

5 PROJECT CONCLUSIONS AND RECOMMENDATIONS

After reviewing the results of the hydrology study, VCA Engineers concludes and recommends that:

1. The proposed storm drain system will be adequate to reduce the peak flow rate from the proposed 25-year, 24- hour rainfall event to be less than the existing.

2. LID approval is achieved by mitigation through biofiltration BMP's.

It has been a pleasure to be of professional service to you. Please contact us if you have any questions or if we can be of further assistance.

Sincerely,

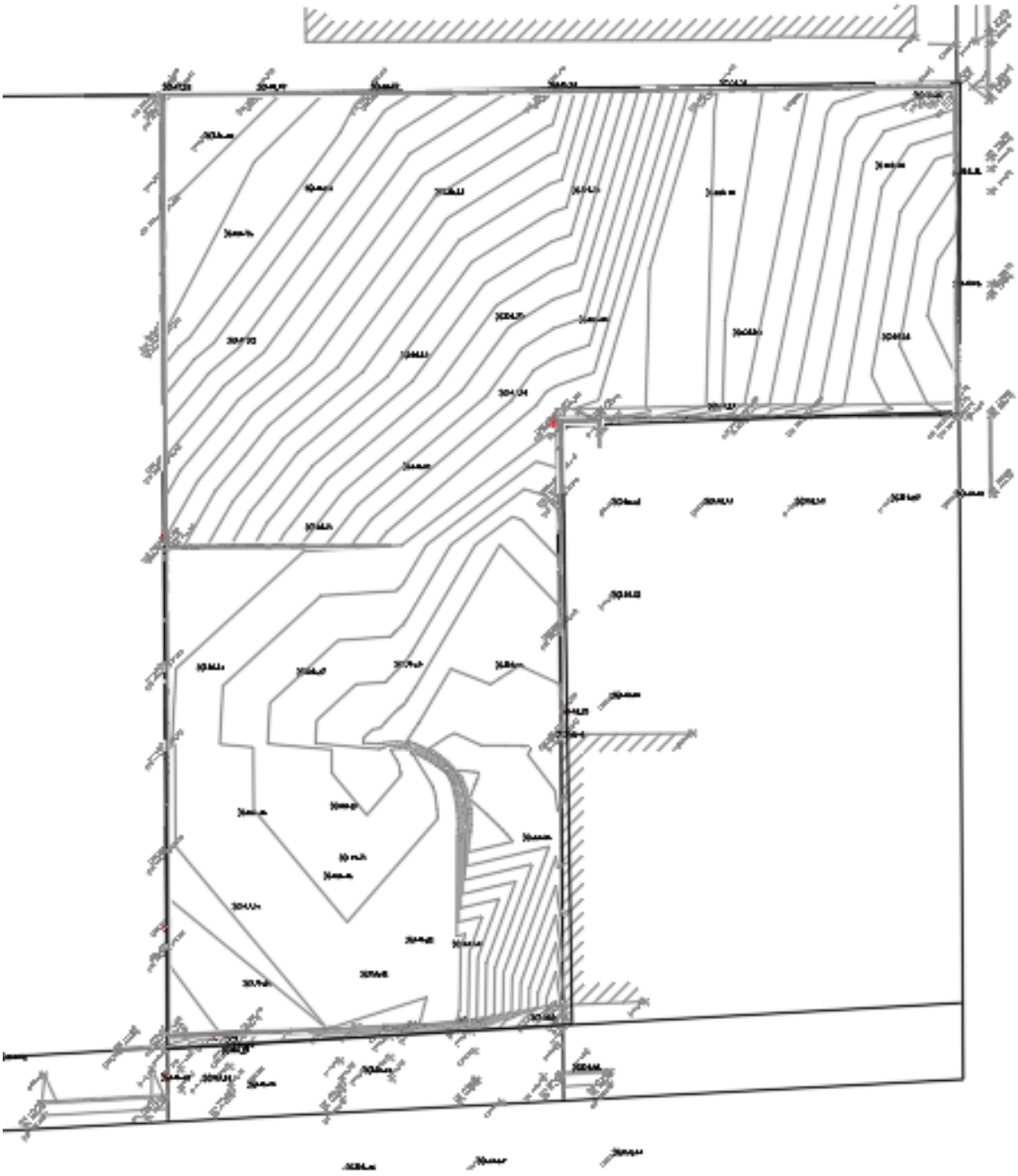
VCA ENGINEERS Inc.

VIRGIL C. AOANAN, P.E. S.E.

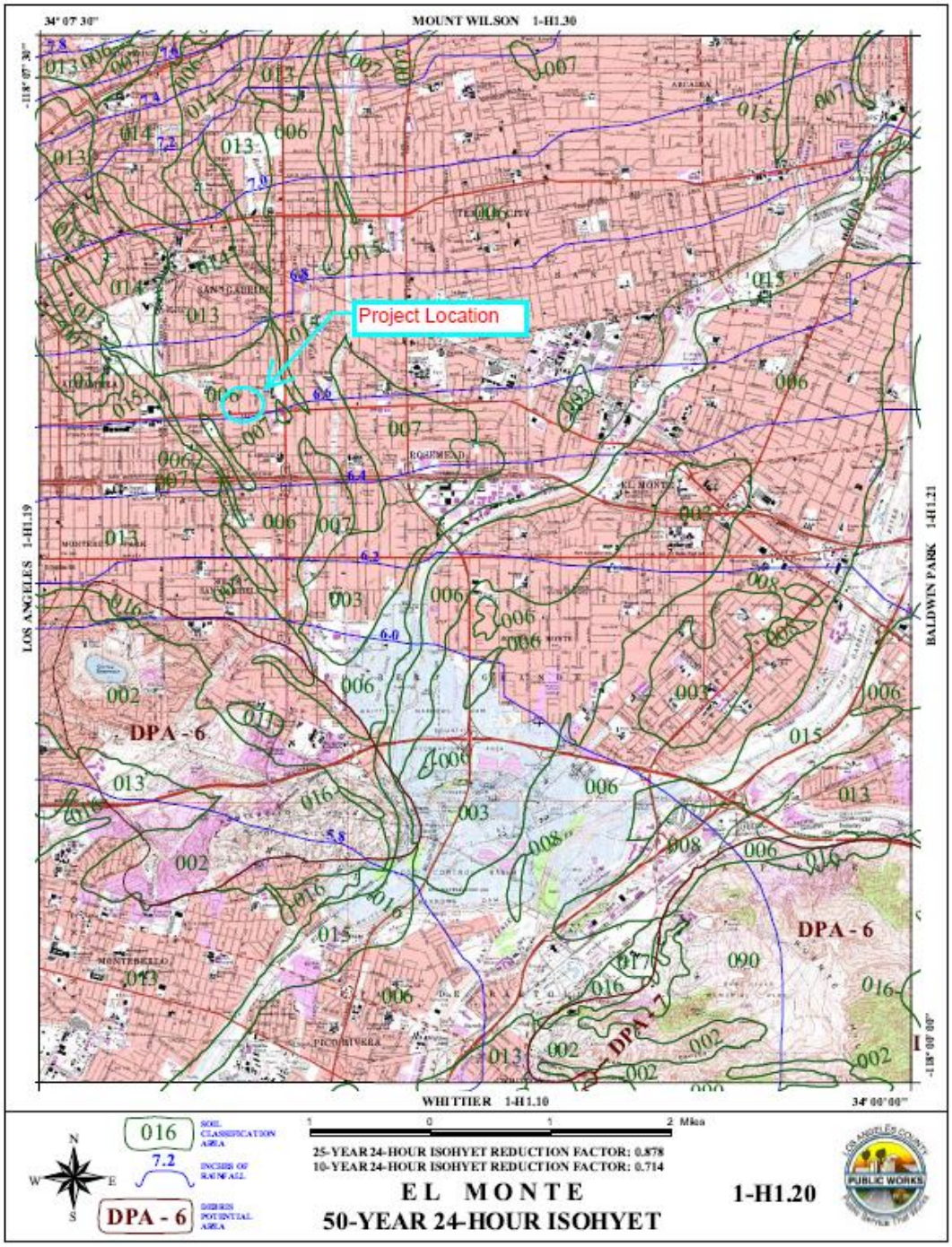
PRINCIPAL

6 APPENDIX

Appendix A: Site Topographic Map



Appendix B: Project Site Isohyet Map



Appendix C: Hydrology Calculations

25-year Storm Event Predevelopment

Peak Flow Hydrologic Analysis

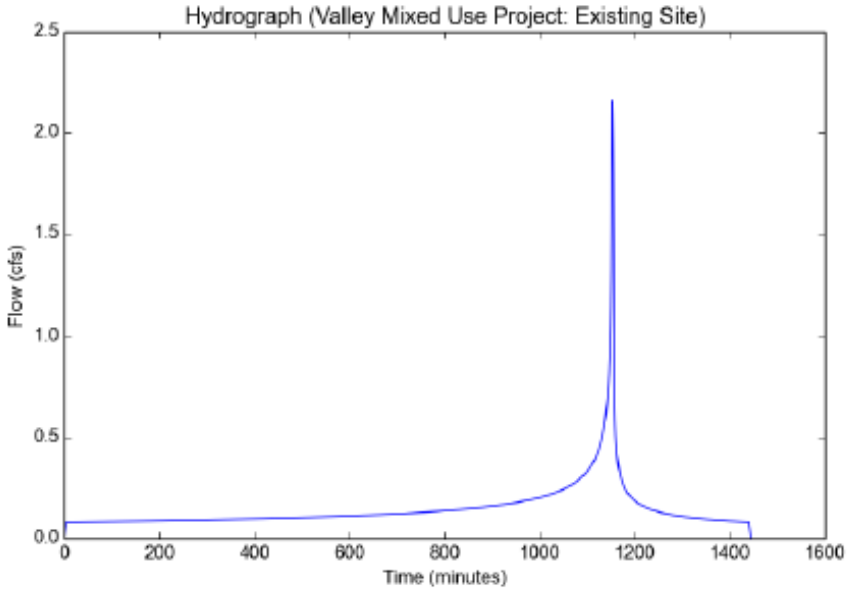
File location: Z:/VCA Projects 5/2192 to XXX/2330-420 Valley Mixed Used Development/Reports/Hydrology Report/Hydrocalcs/2021-2-04
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Valley Mixed Use Project
Subarea ID	Existing Site
Area (ac)	0.6933
Flow Path Length (ft)	304.09
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	6.62
Percent Impervious	0.98
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.8124
Peak Intensity (in/hr)	3.4678
Undeveloped Runoff Coefficient (Cu)	0.8551
Developed Runoff Coefficient (Cd)	0.8991
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	2.1617
Burned Peak Flow Rate (cfs)	2.1617
24-Hr Clear Runoff Volume (ac-ft)	0.2952
24-Hr Clear Runoff Volume (cu-ft)	12856.7695



25-year Storm Event Proposed Development

Peak Flow Hydrologic Analysis

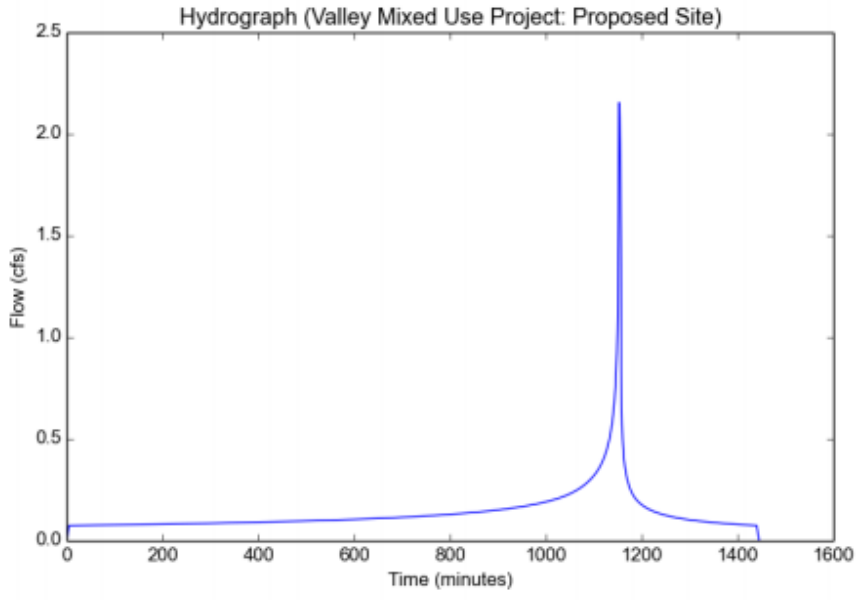
File location: Z:/VCA Projects 5/2192 to XXX/2330-420 Valley Mixed Used Development/Reports/Hydrology Report/Hydrocalcs/2021-2-24
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Valley Mixed Use Project
Subarea ID	Proposed Site
Area (ac)	0.6933
Flow Path Length (ft)	304.09
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	6.62
Percent Impervious	0.916
Soil Type	6
Design Storm Frequency	25-yr
Fire Factor	0
LID	False

Output Results

Modeled (25-yr) Rainfall Depth (in)	5.8124
Peak Intensity (in/hr)	3.4678
Undeveloped Runoff Coefficient (Cu)	0.8551
Developed Runoff Coefficient (Cd)	0.8962
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	2.1547
Burned Peak Flow Rate (cfs)	2.1547
24-Hr Clear Runoff Volume (ac-ft)	0.2805
24-Hr Clear Runoff Volume (cu-ft)	12218.3941



85th Percentile Storm Event Proposed Development

Peak Flow Hydrologic Analysis

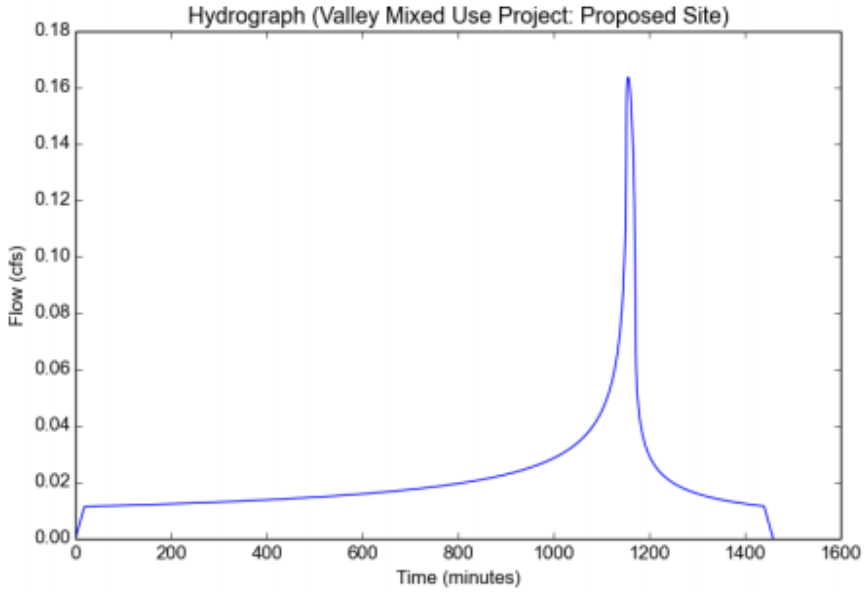
File location: Z:/VCA Projects 5/2192 to XXX/2330-420 Valley Mixed Used Development/Reports/Hydrology Report/Hydrocalcs/2021-2-24
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Valley Mixed Use Project
Subarea ID	Proposed Site
Area (ac)	0.6933
Flow Path Length (ft)	304.09
Flow Path Slope (vft/hft)	0.01
85th Percentile Rainfall Depth (in)	0.89
Percent Impervious	0.916
Soil Type	6
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.89
Peak Intensity (in/hr)	0.2835
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.8328
Time of Concentration (min)	19.0
Clear Peak Flow Rate (cfs)	0.1637
Burned Peak Flow Rate (cfs)	0.1637
24-Hr Clear Runoff Volume (ac-ft)	0.0425
24-Hr Clear Runoff Volume (cu-ft)	1849.9347



Appendix D: Utility Plans