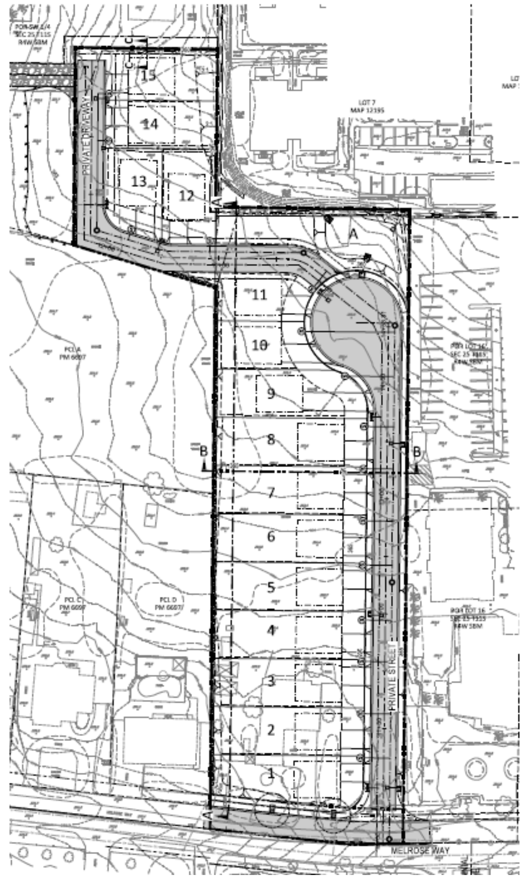
CEQA Technical Reports for 1205 Melrose Way

- Air Quality Analysis Report
- Biological Resources Report
- Cultural Resources Report
- Greenhouse Gas Analysis Report
- Noise Analysis Report
- Geotechnical Report
- Hydrology Report
- SWQMP

1205 Melrose Way Project, City of Vista
Air Quality Technical Report



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AIR QUALITY TECHNICAL REPORT

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1205 MELROSE WAY PROJECT, CITY OF VISTA

1.1 INTRODUCTION

This report presents an analysis of potential air quality impacts associated with the 1205 Melrose Way Project (the "Project") in the City of Vista, CA. The Project consists of the development of 15 new single-family homes on 2.55 acres. The Project would change the existing E-1 (Estates Residential) zoning to R-1 zoning (Single Family Residential). The Project would also require a General Plan Amendment to change the existing Low Density Residential (LD) designation to Medium Density Residential (MD), as well as a Density Bonus.

The 15 new single-family homes are estimated to be approximately 2,800 to 3,000 square feet each. Project construction would commence in January 2023 and would be completed in June 2024 (approximately 18 months). Demolition would be required to remove the existing structures onsite. Site preparation and grading activities would follow and would require approximately 4,034 cubic yards of soil import, requiring approximately 252 haul truck round trips. Building construction, paving, and architectural coating phases would follow.

There are residences immediately north (multifamily apartments) and west (single-family homes) of the Project site. An existing church (Vista Samoan Seventh-Day Adventist Temple) is immediately east of the Project site. Breeze Hill Elementary School is approximately 350 feet east of eastern boundary of the Project site. Residences are also located to the south opposite of Melrose Way.

This report presents an overview of the existing air quality conditions at the Project site, an overview of regulations applicable to the Project, and an analysis of potential air quality impacts that would result from implementation of the Project. All air quality impacts were found to be **less than significant**.

1.2 EXISTING CONDITIONS

1.2.1 CLIMATE AND METEOROLOGY

The Project site is within the San Diego Air Basin (SDAB). The climate of the SDAB is dominated by a semi-permanent high-pressure cell located over the Pacific Ocean. This cell influences the direction of prevailing winds (westerly to northwesterly) and maintains clear skies for much of the year. The high-pressure cell also creates two types of temperature inversions that may act to degrade local air quality.

The climate of the Vista area is characterized by a repetitive pattern of frequent early morning cloudiness, hazy afternoon sunshine, clean daytime onshore breezes and little temperature change throughout the year. Most of the annual rainfall occurs in the winter while summers are often completely dry. An average of 13.09 inches of rain falls each year, mainly occurring from mid-November to early April. The average maximum temperature is 74 degrees F, while the average minimum temperature is 51.9 degrees F.

Unfortunately, the same atmospheric conditions that create a desirable living climate combine to limit the ability of the atmosphere to disperse the air pollution generated by the large population attracted by the climate. The onshore winds across the coastline diminish quickly when they reach the foothill communities east of San Diego, and the sinking air within the offshore high-pressure system forms a massive temperature inversion that traps all air pollutants near the ground. The resulting horizontal and vertical stagnation, in conjunction with ample sunshine, cause several reactive pollutants to undergo photochemical reactions and form smog that degrades visibility and irritates tear ducts and nasal membranes. High smog levels in coastal communities occasionally occur when polluted air from the South Coast Air Basin drifts seaward and southward at night, and then blows onshore the next day. Such weather patterns are particularly frustrating because no matter what San Diego County does to achieve clean air, interbasin transport will cause occasionally unhealthy air over much of the County despite its best air pollution control efforts.

1.2.2 REGULATORY SETTING

Ambient Air Quality Standards

Pollutants of concern include criteria pollutants[1] and precursors such as carbon monoxide (CO)[2], nitrogen oxides (NOx)[3], sulfur dioxide (SO_2)[4], volatile organic compounds (VOC)[5], particulate matter less than 10 micrometers (PM10), and particulate matter less than 2.5 micrometers (PM2.5).[6]

Regulation of air pollutants is achieved through both national ambient air quality standards (NAAQS) and California ambient air quality standards (CAAQS) and emissions limits for individual sources. Regulations implementing the federal Clean Air Act (CAA) and its

1 Criteria air pollutants refer to those air pollutants for which the USEPA and CARB has established National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) under the Federal Clean Air Act (CAA).

2 CO is a non–reactive pollutant that is a product of incomplete combustion of organic material, and is mostly associated with motor vehicle traffic, and in wintertime, with wood–burning stoves and fireplaces.

3 When combustion temperatures are extremely high, as in aircraft, truck and automobile engines, atmospheric nitrogen combines with oxygen to form various oxides of nitrogen (NOx). Nitric oxide (NO) and NO_2 are the most significant air pollutants generally referred to as NOx. Nitric oxide is a colorless and odorless gas that is relatively harmless to humans, quickly converts to NO_2 and can be measured. Nitrogen dioxide has been found to be a lung irritant capable of producing pulmonary edema.

4 SO_2 is a combustion product of sulfur or sulfur–containing fuels such as coal and diesel. SO_2 is also a precursor to the formation of atmospheric sulfate and particulate matter, and contributes to potential atmospheric sulfuric acid formation that could precipitate downwind as acid rain.

5 VOC means any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions and thus, a precursor of ozone formation.

6 PM10 and PM2.5 consists of airborne particles that measure 10 micrometers or less in diameter and 2.5 micrometers or less in diameter, respectively. PM10 and PM2.5 represent fractions of particulate matter that can be inhaled into the air passages and the lungs, causing adverse health effects.

subsequent amendments established NAAQS for the six criteria pollutants. California has adopted more stringent CAAQS for most of the criteria air pollutants. In addition, California has established CAAQS for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles. Because of the meteorological conditions in the state, there is considerable difference between state and federal standards in California.

The NAAQS and CAAQS are intended to protect the public health and welfare, and they incorporate an adequate margin of safety. They are designed to protect those segments of the public most susceptible to respiratory distress, known as sensitive receptors, including asthmatics, the very young, elderly, people weak from other illness or disease, or persons engaged in strenuous work or exercise. Healthy adults can tolerate occasional exposure to air pollution levels somewhat above the ambient air quality standards before adverse health effects are observed.

Under amendments to the federal CAA, United States Environmental Protection Agency (USEPA) has classified air basins or portions thereof, as either “attainment” or “non-attainment” for each criteria air pollutant, based on whether the NAAQS have been achieved. The California CAA, which is patterned after the federal CAA, also requires areas to be designated as “attainment” or “non-attainment” for the state standards. Thus, areas in California have two sets of attainment / non-attainment designations: one set with respect to the NAAQS and one set with respect to the CAAQS.

The California Air Resources Board (CARB) is the state regulatory agency with authority to enforce regulations to both achieve and maintain the NAAQS and CAAQS. The CARB is responsible for the development, adoption, and enforcement of the state’s motor vehicle emissions program, as well as the adoption of the CAAQS. The CARB also reviews operations and programs of the local air districts and requires each air district with jurisdiction over a nonattainment area to develop its own strategy for achieving the NAAQS and CAAQS. The local air district has the primary responsibility for the development and implementation of rules and regulations designed to attain the NAAQS and CAAQS, as well as the permitting of new or modified sources, development of air quality management plans, and adoption and enforcement of air pollution regulations. The San Diego Air Pollution Control District (SDAPCD) is the local agency responsible for the administration and enforcement of air quality regulations for San Diego County.

Regional Air Quality Strategy

The SDAPCD and the San Diego Association of Governments (SANDAG) are responsible for developing and implementing the clean air plan for attainment and maintenance of the ambient air quality standards in the SDAB. The San Diego County Regional Air Quality Strategy (RAQS) was initially adopted in 1991 and is updated on a triennial basis. The RAQS was updated in 1995, 1998, 2001, 2004, 2009, and most recently in 2016 (SDAPCD, 2016). The SDAPCD is in the process of preparing an update to the RAQS. The RAQS outlines SDAPCD’s plans and control measures designed to attain the CAAQS for ozone. The RAQS does not address the CAAQS for PM10 or PM2.5.

State Implementation Plan

The SDAPCD has also developed the air basin's input to the State Implementation Plan (SIP), which is required under the Federal CAA for areas that are out of attainment of air quality standards. The SIP includes the SDAPCD's plans and control measures for attaining the ozone NAAQS. The SIP is also updated on a triennial basis. The Attainment Plan forms the basis for the SIP update, as it contains documentation on emission inventories and trends, the SDAPCD's emission control strategy, and an attainment demonstration that shows that the SDAB will meet the NAAQS for ozone. Emission inventories, projections, and trends in the Attainment Plan are based on the latest ozone SIP planning emission projections compiled and maintained by CARB. Supporting data were developed jointly by stakeholder agencies, including CARB, the SDAPCD, the South Coast Air Quality Management District (SCAQMD), the Southern California Association of Governments (SCAG), and SANDAG. Each agency plays a role in collecting and reviewing data as necessary to generate comprehensive emission inventories. The supporting data include socio-economic projections, industrial and travel activity levels, emission factors, and emission speciation profiles. These projections are based on data submitted by stakeholder agencies including projections in municipal General Plans.

City of Vista General Plan 2030

The City of Vista has adopted a Resource Conservation and Sustainability Element in its updated General Plan (City of Vista, 2011). The following policy from the Element applies to the Project:

RCS Policy 1.4 Amend the Grading Ordinance as needed to reduce fugitive dust generated as a result of construction projects. Require implementation of best management practices (BMPs) to stabilize disturbed land, including but not limited to short-term methods during construction (e.g., watering active construction areas, covering open stockpiles, and applying non-toxic soil stabilizers on unpaved access roads and temporary parking areas) and permanent methods post-construction (e.g., vegetation or revegetation, installation of landscape, etc.).

1.2.3 LOCAL AIR QUALITY

The SDAB is designated as a state standard nonattainment area for PM10, PM2.5, 1-hour and 8-hour ozone, and as a federal standard nonattainment area for 8-hour ozone. The SDAB is designated as attainment or unclassified for all other state and federal pollutant standards. The SDAPCD operates a regional monitoring network for ambient concentrations of air pollutants.

The closest air quality monitoring station to the Project that monitors 8-hour and 1-hour ozone, PM2.5 and NO_2 is the Camp Pendleton station at 21441 W. B Street (approximately 11 miles northwest of the Project). Measurements at the Camp Pendleton station show three exceedances of the federal standard and three exceedances of the state standard for 8-hour ozone in 2020. No other air quality standards were exceeded at the Camp Pendleton station between 2018 and 2020.

1.2.4 PROJECT SITE

The Project site is at 1205 Melrose Way (APN 166-184-10-00, 166-183-17-00, and 166-184-09-00) in Vista, CA. The Project consists of the development of 15 new single-family homes on 2.55

acres. The Project would change the existing E-1 (Estates Residential) zoning to R-1 zoning (Single Family Residential). The Project would also require a General Plan Amendment to change the existing Low Density Residential (LD) designation to Medium Density Residential (MD), as well as a Density Bonus. The Project would demolish the existing structures onsite.

There are residences immediately north (multifamily apartments) and west (single-family homes) of the Project site. An existing church (Vista Samoan Seventh-Day Adventist Temple) is immediately east of the Project site. Breeze Hill Elementary School is approximately 350 feet east of eastern boundary of the Project site. Residences are also to the south of Melrose Way.

1.2.5 SENSITIVE RECEPTORS

Land uses such as schools, children's daycare centers, hospitals, and convalescent homes are more sensitive than the general public to poor air quality because the population groups associated with these uses have increased susceptibility to respiratory distress. Persons engaged in strenuous work or exercise also have increased sensitivity to poor air quality. The CARB has identified the following people as most likely to be affected by air pollution: children less than 14 years of age, the elderly over 65 years of age, athletes, and those with cardiovascular and chronic respiratory diseases. These groups are classified as sensitive population groups.

Residential areas are considered more sensitive to air quality conditions than commercial and industrial areas because people generally spend longer periods of time at their residences, resulting in greater exposure to ambient air quality conditions. Recreational uses are also considered sensitive, due to the greater exposure to ambient air quality conditions and because the presence of pollution detracts from the recreational experience. Workers are not considered sensitive receptors because all employers must follow regulations set forth by the Occupation Safety and Health Administration to ensure the health and well-being of their employees.

There are several sensitive receptors within 1,000 feet of the Project site. There are residences immediately north (multifamily apartments) and west (single-family homes) of the Project site. Breeze Hill Elementary School is approximately 350 feet east of eastern boundary of the Project site. Residences are also to the south of Melrose Way.

1.3 THRESHOLDS OF SIGNIFICANCE

The significance of potential impacts was determined based on State CEQA Guidelines, Appendix G. Using Appendix G evaluation thresholds, the Project would be considered to have significant air quality impacts if it were to:

A. Conflict with or obstruct implementation of the applicable air quality plan;

B. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard;

C. Expose sensitive receptors to substantial pollutant concentrations; or

D. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.

The SDAPCD has not adopted any CEQA guidelines for projects in the SDAB. The SDAPCD has established screening-level criteria for non-major stationary sources under SDAPCD Rule 20.2. For CEQA purposes, these screening-level criteria can be used as thresholds to demonstrate if a project's total emissions would result in a significant air quality impact. Therefore, screening-level criteria under Rule 20.2 are used to determine the significance of emissions from the Project. Because the SDAPCD has not established screening-level criteria under Rule 20.2 for ROG or PM2.5 emissions, the SCAQMD significance threshold for PM2.5 emissions and the City of San Diego's Significance Determination Thresholds for VOC emissions are used in this analysis. The screening criteria are presented in **Table AQ-1** below.

TABLE AQ-1 SCREENING-LEVEL CRITERIA FOR AIR QUALITY IMPACTS

Pollutant	Total Emissions		
Construction Emissions			
	Pounds Per Day (lbs/day)		
Coarse Particulate Matter (PM10)	100		
Fine Particulate Matter (PM2.5)[1]	55		
Oxides of Nitrogen (NOx)	250		
Oxides of Sulfur (SOx)	250		
Carbon Monoxide (CO)	550		
Volatile Organic Compounds (VOC)[2]	137		
Operational Emissions			
	lbs/hour	lbs/day	tons/year
Coarse Particulate Matter (PM_{10})	---	100	15
Fine Particulate Matter ($PM_{2.5}$)[1]	---	55	10
Oxides of Nitrogen (NOx)	25	250	40
Oxides of Sulfur (SOx)	25		
Carbon Monoxide (CO)	100	550	100
Lead and Lead Compounds	---	3.2	0.6
Volatile Organic Compounds (VOC)[2]	---	137	15

Source: SDAPCD Rule 20.2

1 PM2.5 is not currently regulated under SDAPCD Rule 20.2. PM2.5 thresholds are based on SCAQMD significance thresholds of 55 lbs./day for construction and operation and 10 tons/year for operation.

2 VOC's are not regulated under SDAPCD Rule 20.2. VOC thresholds are based on City of San Diego's Significance Determination Thresholds.

SDAPCD Rule 51 (Public Nuisance) also prohibits emission of any material which causes nuisance to a considerable number of persons or endangers the comfort, health, or safety of any person. A project that proposes a use which would produce objectionable odors would be deemed to have a significant odor impact if it would affect a considerable number of offsite receptors.

1.4 IMPACT ANALYSIS

1.4.1 CONFLICT WITH APPLICABLE AIR QUALITY PLANS

The SDAB's air quality plans include the Regional Air Quality Strategy (RAQS) and the State Implementation Plan (SIP). Both air quality plans contain strategies for the region to attain and maintain the ambient air quality standards. The Project would require a Zone Change, General Plan Amendment, and Density Bonus. While the Project is not consistent with the existing zoning or land use designation, the addition of 15 dwelling units (14 net dwelling units) and the associated minor generation of criteria pollutants would not conflict with or obstruct implementation of the SDAB's air quality plans. As noted in Impact 1.4.2 below, construction and operational associated with the Project would be below all SDAPCD significance thresholds. Furthermore, the Project would be required to comply with applicable SDAPCD Rules and Regulations. Therefore, the Project would result in a **less-than-significant impact**.

1.4.2 COMPLIANCE WITH AIR QUALITY STANDARDS

Construction Impacts

Construction-related activities are temporary, finite sources of air emissions. Typical sources of construction-related air emissions include:

- Exhaust from construction equipment and worker automobiles, delivery trucks, and material-hauling trucks.
- Fugitive dust from earthmoving activities and equipment travel on unpaved surfaces.
- Fugitive VOC emissions from architectural coating.

Fugitive dust emissions vary greatly during construction and are dependent on the amount and type of activity, silt content of the soil, and the weather. Vehicles moving over unpaved surfaces, excavation, earth movement, grading, and wind erosion from exposed surfaces are all sources of fugitive dust.

Heavy-duty construction equipment is usually diesel powered. In general, emissions from diesel-powered equipment contain more NOx, SOx, and PM than gasoline-powered engines. However, diesel-powered engines generally produce less CO and less VOC than gasoline-powered engines. Standard construction equipment includes dozers, rollers, scrapers, backhoes, loaders, paving equipment, and heavy trucks.

Project construction would commence in January 2023 and would be completed in June 2024 (approximately 18 months). Demolition would be required to remove the existing structures onsite. Site preparation and grading activities would follow and would require approximately 4,034 cubic yards of soil import, requiring approximately 252 haul truck round trips. Building construction, paving, and architectural coating phases would follow. Emissions from construction of the Project were estimated using the California Emissions Estimator Model (CalEEMod) Version 2020.4.0.

Table AQ-2 provides a summary of the emission estimates for construction of the Project, as calculated with the CalEEMod (refer to **Appendix A** for detailed emissions outputs). As shown in **Table AQ-2**, emissions associated with construction would be below the significance thresholds for all construction phases and pollutants. Construction of the Project would be short-term and temporary. Thus, Project construction would result in a **less-than-significant impact**.

TABLE AQ-2 ESTIMATED DAILY CONSTRUCTION EMISSIONS

Emission Source	ROG[1]	NO_X	CO	SO_X	PM10	PM2.5
lbs/day						
Demolition						
Fugitive Dust	-	-	-	-	0.96	0.15
Off-road Diesel	1.47	14.32	13.46	0.02	0.68	0.63
Haul Trucks	0.01	0.58	0.16	0.00	0.08	0.02
Worker Travel	0.04	0.02	0.31	0.00	0.11	0.03
TOTAL	**1.52**	**14.92**	**13.93**	**0.03**	**1.83**	**0.83**
Significance Criteria	137	250	550	250	100	55
Significant?	No	No	No	No	No	No
Site Preparation						
Fugitive Dust	-	-	-	-	0.90	0.10
Off-road Diesel	1.30	14.28	9.78	0.02	0.54	0.50
Worker Travel	0.02	0.01	0.19	0.00	0.07	0.02
TOTAL	**1.32**	**14.29**	**9.97**	**0.03**	**1.51**	**0.61**
Significance Criteria	137	250	550	250	100	55
Significant?	No	No	No	No	No	No
Grading						
Fugitive Dust	-	-	-	-	6.57	3.37
Off-road Diesel	1.33	14.47	8.70	0.02	0.60	0.56
Haul Trucks	0.19	10.99	3.02	0.05	1.56	0.49
Worker Travel	0.03	0.02	0.24	0.00	0.08	0.02

Emission Source	ROG[1]	NO_X	CO	SO_X	PM10	PM2.5
lbs/day						
TOTAL	**1.55**	**25.47**	**11.96**	**0.07**	**8.82**	**4.44**
Significance Criteria	137	250	550	250	100	55
Significant?	No	No	No	No	No	No
Building Construction						
Off-road Diesel	1.71	13.62	14.21	0.03	0.61	0.59
Vendor Trucks	0.00	0.09	0.03	0.00	0.01	0.00
Worker Travel	0.01	0.01	0.12	0.00	0.04	0.01
TOTAL	**1.73**	**13.72**	**14.37**	**0.03**	**0.67**	**0.60**
Significance Criteria	137	250	550	250	100	55
Significant?	No	No	No	No	No	No
Paving						
Off-road Diesel	0.84	8.10	11.71	0.02	0.40	0.37
Worker Trips	0.04	0.02	0.34	0.00	0.12	0.03
TOTAL	**0.88**	**8.13**	**12.04**	**0.02**	**0.52**	**0.40**
Significance Criteria	137	250	550	250	100	55
Significant?	No	No	No	No	No	No
Architectural Coating[3]						
Fugitive VOC	136.10	-	-	-	-	-
Off-road Diesel	0.18	1.22	1.81	0.00	0.06	0.06
Worker Trips	0.00	0.00	0.02	0.00	0.01	0.00
TOTAL	**136.28**	**1.22**	**1.83**	**0.00**	**0.07**	**0.06**
Significance Criteria	137	250	550	250	100	55
Significant?	No	No	No	No	No	No
Maximum Daily Emissions	**136.28**	**25.47**	**14.37**	**0.07**	**8.82**	**4.44**
Significance Criteria	137	250	550	250	100	55
Significant?	No	No	No	No	No	No

Source: SCAQMD, 2021.

1 CARB uses the term "reactive organic gases" (ROG) to measure organic gases, which is also contained in the CalEEMod results. The City of San Diego uses the term VOC ('volatile organic compounds") to describe organic gases in its Significance Determination Thresholds.

2 Values may differ slightly from estimates shown in **Appendix A** due to rounding. Values are from summer daily emissions. Winter daily emissions are approximately the same and are less than all significance thresholds (**See Appendix A**).

3 Note, ROG emissions associated with architectural coating would likely be much lower as it is unlikely it could all be completed in 10 days (CalEEMod default phase length).

Operational Impacts

The main source of Project operational emissions would be vehicle trips, as well as other minor emissions from energy use, landscaping equipment, and areas sources (i.e., application of paints, cleaning chemicals, etc.). The Project would generate approximately 150 vehicle trips per day. Emissions from operation of the Project were estimated using the CalEEMod. **Table AQ-3** provides a summary of the emission estimates for operation of the Project, as calculated with the CalEEMod (refer to **Appendix A** for detailed emissions outputs).

TABLE AQ-3 ESTIMATED OPERATIONAL EMISSIONS

Emission Source	ROG[1]	NO_X	CO	SO_X	PM10	PM2.5
Summer (lbs/day)						
Area Sources	1.34	0.01	1.24	<0.01	<0.01	<0.01
Energy Use	<0.01	0.08	0.03	<0.01	<0.01	<0.01
Mobile Sources	0.42	0.41	3.73	<0.01	0.91	0.25
Total	**1.77**	**0.51**	**5.00**	**0.01**	**0.92**	**0.26**
Significance Criteria	137	250	550	250	100	55
Significant?	No	No	No	No	No	No
Winter (lbs/day)						
Area Sources	1.34	0.01	1.24	<0.01	<0.01	<0.01
Energy Use	<0.01	0.08	0.03	<0.01	<0.01	<0.01
Mobile Sources	0.41	0.45	3.83	<0.01	0.91	0.25
Total	**1.76**	**0.54**	**5.10**	**0.01**	**0.92**	**0.26**
Significance Criteria	137	250	550	250	100	55
Significant	No	No	No	No	No	No
Annual (tons/year)						
Area Sources	0.24	<0.01	0.11	<0.01	<0.01	<0.01
Energy Use	<0.01	0.01	<0.01	<0.01	<0.01	<0.01
Mobile Sources	0.07	0.08	0.69	<0.01	0.16	0.04
Total	**0.32**	**0.10**	**0.80**	**<0.01**	**0.16**	**0.05**
Significance Criteria	137	250	550	250	100	55
Significant?	No	No	No	No	No	No

Source: SCAQMD, 2021.

1 CARB uses the term ROG to measure organic gases, which is also contained in the CalEEMod results. The City of San Diego uses the term VOC to describe organic gases in its Significance Determination Thresholds.

2 Values may differ slightly from estimates shown in **Appendix A** due to rounding.

As shown in **Table AQ-3**, emissions associated with operation would be below the significance thresholds for daily and annual emissions. Thus, Project operation would result in a **less-than-significant impact**.

1.4.3 IMPACTS TO SENSITIVE RECEPTORS

Construction of the Project would result in temporary and minor emissions of TACs from construction equipment and motor vehicles. The Project is a residential development and is not a major source of TACs. Therefore, the Project would result in a **less-than-significant impact**.

1.4.4 ODOR IMPACTS

During construction, diesel equipment operating at the site may generate some minor odors; however, due to the distance of sensitive receptors to the Project site and the temporary nature of construction, odors associated with Project construction would not be significant.

According to the SCAQMD CEQA Air Quality Handbook (SCAQMD, 1999), land uses associated with odor complaints include agricultural uses, wastewater treatment plants, food processing plants, chemical plants, composting activities, refineries, landfills, dairies, and fiberglass molding operations. The Project does not propose sources of objectionable odors that would affect a substantial number of persons. Therefore, the Project would result in a **less-than-significant impact**.

1.5 CONCLUSIONS

This air quality analysis for the 1205 Melrose Way Project evaluated emissions associated with both the construction and operation of the Project. The Project would not conflict with the air quality plans for the SDAB. Emissions associated with construction and operation were compared to SDAPCD significance thresholds, which provide a conservative means of evaluating whether Project emissions would cause a significant impact on the ambient air quality or whether further evaluation is warranted. Emissions associated with construction and operation would be well below the significance thresholds for all phases and pollutants. Furthermore, impacts to sensitive receptors from TACs and odors would be less than significant. Thus, the Project would result in a **less-than-significant impact**.

1.6 REFERENCES

City of Vista. 2011. Vista General Plan 2030. December 2011.

City of San Diego. 2016. Significance Determination Thresholds. July 2016.

San Diego Air Pollution Control District (SDAPCD). 2007. Eight-Hour Ozone Attainment Plan for San Diego County.

San Diego Air Pollution Control District (SDAPCD). 2016. 2016 Regional Air Quality Strategy Revision.

South Coast Air Quality Management District (SCAQMD). 1999. CEQA Air Quality Handbook.

South Coast Air Quality Management District (SCAQMD). 2021. CalEEMod Model, Version 2020.4.0. http://www.caleemod.com/

Appendix A

I. CalEEMod Annual Emissions Output

II. CalEEMod Summer Daily Emissions Output

III. CalEEMod Winter Daily Emissions Output

1205 Melrose Way

San Diego County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	15.00	Dwelling Unit	2.55	43,500.00	43

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2025
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	539.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - 15 homes approximately 2800-3000 sq ft each on 2.55 acre site

Construction Phase - 1 to 2 years of construction - estimated at 18 months

Demolition - existing structures to be demolished

Grading - import of 4,034 cubic yards and a 2.55 acre site

Vehicle Trips - 10 trips per dwelling unit (Intersecting Metrics, 2021)

Woodstoves - No woodstoves or fireplaces

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	220.00	340.00
tblConstructionPhase	PhaseEndDate	1/11/2024	6/28/2024
tblConstructionPhase	PhaseEndDate	12/14/2023	5/30/2024

tblConstructionPhase	PhaseEndDate	12/28/2023	6/14/2024
tblConstructionPhase	PhaseStartDate	12/29/2023	6/15/2024
tblConstructionPhase	PhaseStartDate	12/15/2023	6/1/2024
tblFireplaces	FireplaceDayYear	82.00	0.00
tblFireplaces	FireplaceHourDay	3.00	0.00
tblFireplaces	FireplaceWoodMass	3,078.40	0.00
tblFireplaces	NumberGas	8.25	0.00
tblFireplaces	NumberNoFireplace	1.50	0.00
tblFireplaces	NumberWood	5.25	0.00
tblGrading	AcresOfGrading	6.00	2.55
tblGrading	AcresOfGrading	4.50	2.55
tblGrading	MaterialImported	0.00	4,034.00
tblLandUse	LandUseSquareFeet	27,000.00	43,500.00
tblLandUse	LotAcreage	4.87	2.55
tblVehicleTrips	ST_TR	9.54	10.00
tblVehicleTrips	SU_TR	8.55	10.00
tblVehicleTrips	WD_TR	9.44	10.00
tblWoodstoves	NumberCatalytic	0.75	0.00
tblWoodstoves	NumberNoncatalytic	0.75	0.00
tblWoodstoves	WoodstoveDayYear	82.00	0.00
tblWoodstoves	WoodstoveWoodMass	3,019.20	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.2216	1.8334	1.8486	3.5100e-003	0.0433	0.0807	0.1240	0.0152	0.0771	0.0922	0.0000	296.8602	296.8602	0.0547	3.6300e-003	299.3090
2024	0.7737	0.7509	0.8453	1.5100e-003	3.5500e-003	0.0317	0.0352	9.6000e-004	0.0303	0.0312	0.0000	126.5951	126.5951	0.0237	3.7000e-004	127.2989
Maximum	**0.7737**	**1.8334**	**1.8486**	**3.5100e-003**	**0.0433**	**0.0807**	**0.1240**	**0.0152**	**0.0771**	**0.0922**	**0.0000**	**296.8602**	**296.8602**	**0.0547**	**3.6300e-003**	**299.3090**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.2216	1.8334	1.8486	3.5100e-003	0.0433	0.0807	0.1240	0.0152	0.0771	0.0922	0.0000	296.8599	296.8599	0.0547	3.6300e-003	299.3087
2024	0.7737	0.7509	0.8453	1.5100e-003	3.5500e-003	0.0317	0.0352	9.6000e-004	0.0303	0.0312	0.0000	126.5950	126.5950	0.0237	3.7000e-004	127.2987
Maximum	**0.7737**	**1.8334**	**1.8486**	**3.5100e-003**	**0.0433**	**0.0807**	**0.1240**	**0.0152**	**0.0771**	**0.0922**	**0.0000**	**296.8599**	**296.8599**	**0.0547**	**3.6300e-003**	**299.3087**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	1-2-2023	4-1-2023	0.5407	0.5407
2	4-2-2023	7-1-2023	0.5021	0.5021
3	7-2-2023	10-1-2023	0.5076	0.5076
4	10-2-2023	1-1-2024	0.5074	0.5074
5	1-2-2024	4-1-2024	0.4724	0.4724
6	4-2-2024	7-1-2024	1.0387	1.0387
		Highest	1.0387	1.0387

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.2413	1.2800e-003	0.1113	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863
Energy	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	46.0581	46.0581	2.0900e-003	5.3000e-004	46.2682
Mobile	0.0726	0.0807	0.6825	1.4500e-003	0.1602	1.1300e-003	0.1613	0.0428	1.0500e-003	0.0438	0.0000	137.4383	137.4383	9.5800e-003	6.0800e-003	139.4910
Waste						0.0000	0.0000		0.0000	0.0000	3.5787	0.0000	3.5787	0.2115	0.0000	8.8662
Water						0.0000	0.0000		0.0000	0.0000	0.3101	4.7935	5.1035	0.0321	7.9000e-004	6.1417
Total	**0.3156**	**0.0969**	**0.8001**	**1.5600e-003**	**0.1602**	**2.9600e-003**	**0.1632**	**0.0428**	**2.8800e-003**	**0.0456**	**3.8888**	**188.4718**	**192.3605**	**0.2555**	**7.4000e-003**	**200.9534**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.2413	1.2800e-003	0.1113	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863
Energy	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	46.0581	46.0581	2.0900e-003	5.3000e-004	46.2682
Mobile	0.0726	0.0807	0.6825	1.4500e-003	0.1602	1.1300e-003	0.1613	0.0428	1.0500e-003	0.0438	0.0000	137.4383	137.4383	9.5800e-003	6.0800e-003	139.4910
Waste						0.0000	0.0000		0.0000	0.0000	3.5787	0.0000	3.5787	0.2115	0.0000	8.8662
Water						0.0000	0.0000		0.0000	0.0000	0.3101	4.7935	5.1035	0.0321	7.9000e-004	6.1417
Total	**0.3156**	**0.0969**	**0.8001**	**1.5600e-003**	**0.1602**	**2.9600e-003**	**0.1632**	**0.0428**	**2.8800e-003**	**0.0456**	**3.8888**	**188.4718**	**192.3605**	**0.2555**	**7.4000e-003**	**200.9534**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/2/2023	1/27/2023	5	20	
2	Site Preparation	Site Preparation	1/28/2023	2/1/2023	5	3	
3	Grading	Grading	2/2/2023	2/9/2023	5	6	

4	Building Construction	Building Construction	2/10/2023	5/30/2024	5	340	
5	Paving	Paving	6/1/2024	6/14/2024	5	10	
6	Architectural Coating	Architectural Coating	6/15/2024	6/28/2024	5	10	

Acres of Grading (Site Preparation Phase): 2.55

Acres of Grading (Grading Phase): 2.55

Acres of Paving: 0

Residential Indoor: 88,088; Residential Outdoor: 29,363; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Site Preparation	Graders	1	8.00	187	0.41
Site Preparation	Scrapers	1	8.00	367	0.48
Site Preparation	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	2	7.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Building Construction	Welders	3	8.00	46	0.45
Paving	Cement and Mortar Mixers	1	8.00	9	0.56
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36

Paving	Rollers	2	8.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	5	13.00	0.00	88.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	504.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	8	5.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	1.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					9.6300e-003	0.0000	9.6300e-003	1.4600e-003	0.0000	1.4600e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0147	0.1432	0.1346	2.4000e-004		6.7700e-003	6.7700e-003		6.3300e-003	6.3300e-003	0.0000	21.0866	21.0866	5.3500e-003	0.0000	21.2202
Total	**0.0147**	**0.1432**	**0.1346**	**2.4000e-004**	**9.6300e-003**	**6.7700e-003**	**0.0164**	**1.4600e-003**	**6.3300e-003**	**7.7900e-003**	**0.0000**	**21.0866**	**21.0866**	**5.3500e-003**	**0.0000**	**21.2202**

3.2 Demolition - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.0000e-004	5.9700e-003	1.5900e-003	3.0000e-005	7.5000e-004	5.0000e-005	8.0000e-004	2.1000e-004	5.0000e-005	2.5000e-004	0.0000	2.6406	2.6406	1.3000e-004	4.2000e-004	2.7691
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.5000e-004	2.4000e-004	2.9700e-003	1.0000e-005	1.0400e-003	1.0000e-005	1.0500e-003	2.8000e-004	1.0000e-005	2.8000e-004	0.0000	0.8353	0.8353	2.0000e-005	2.0000e-005	0.8427
Total	**4.5000e-004**	**6.2100e-003**	**4.5600e-003**	**4.0000e-005**	**1.7900e-003**	**6.0000e-005**	**1.8500e-003**	**4.9000e-004**	**6.0000e-005**	**5.3000e-004**	**0.0000**	**3.4759**	**3.4759**	**1.5000e-004**	**4.4000e-004**	**3.6118**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					9.6300e-003	0.0000	9.6300e-003	1.4600e-003	0.0000	1.4600e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0147	0.1432	0.1346	2.4000e-004		6.7700e-003	6.7700e-003		6.3300e-003	6.3300e-003	0.0000	21.0865	21.0865	5.3500e-003	0.0000	21.2202
Total	**0.0147**	**0.1432**	**0.1346**	**2.4000e-004**	**9.6300e-003**	**6.7700e-003**	**0.0164**	**1.4600e-003**	**6.3300e-003**	**7.7900e-003**	**0.0000**	**21.0865**	**21.0865**	**5.3500e-003**	**0.0000**	**21.2202**

3.2 Demolition - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.0000e-004	5.9700e-003	1.5900e-003	3.0000e-005	7.5000e-004	5.0000e-005	8.0000e-004	2.1000e-004	5.0000e-005	2.5000e-004	0.0000	2.6406	2.6406	1.3000e-004	4.2000e-004	2.7691
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.5000e-004	2.4000e-004	2.9700e-003	1.0000e-005	1.0400e-003	1.0000e-005	1.0500e-003	2.8000e-004	1.0000e-005	2.8000e-004	0.0000	0.8353	0.8353	2.0000e-005	2.0000e-005	0.8427
Total	**4.5000e-004**	**6.2100e-003**	**4.5600e-003**	**4.0000e-005**	**1.7900e-003**	**6.0000e-005**	**1.8500e-003**	**4.9000e-004**	**6.0000e-005**	**5.3000e-004**	**0.0000**	**3.4759**	**3.4759**	**1.5000e-004**	**4.4000e-004**	**3.6118**

3.3 Site Preparation - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.3500e-003	0.0000	1.3500e-003	1.5000e-004	0.0000	1.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.9500e-003	0.0214	0.0147	4.0000e-005		8.1000e-004	8.1000e-004		7.5000e-004	7.5000e-004	0.0000	3.2317	3.2317	1.0500e-003	0.0000	3.2578
Total	**1.9500e-003**	**0.0214**	**0.0147**	**4.0000e-005**	**1.3500e-003**	**8.1000e-004**	**2.1600e-003**	**1.5000e-004**	**7.5000e-004**	**9.0000e-004**	**0.0000**	**3.2317**	**3.2317**	**1.0500e-003**	**0.0000**	**3.2578**

3.3 Site Preparation - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.0000e-005	2.0000e-005	2.7000e-004	0.0000	1.0000e-004	0.0000	1.0000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0771	0.0771	0.0000	0.0000	0.0778
Total	**3.0000e-005**	**2.0000e-005**	**2.7000e-004**	**0.0000**	**1.0000e-004**	**0.0000**	**1.0000e-004**	**3.0000e-005**	**0.0000**	**3.0000e-005**	**0.0000**	**0.0771**	**0.0771**	**0.0000**	**0.0000**	**0.0778**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.3500e-003	0.0000	1.3500e-003	1.5000e-004	0.0000	1.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.9500e-003	0.0214	0.0147	4.0000e-005		8.1000e-004	8.1000e-004		7.5000e-004	7.5000e-004	0.0000	3.2317	3.2317	1.0500e-003	0.0000	3.2578
Total	**1.9500e-003**	**0.0214**	**0.0147**	**4.0000e-005**	**1.3500e-003**	**8.1000e-004**	**2.1600e-003**	**1.5000e-004**	**7.5000e-004**	**9.0000e-004**	**0.0000**	**3.2317**	**3.2317**	**1.0500e-003**	**0.0000**	**3.2578**

3.3 Site Preparation - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.0000e-005	2.0000e-005	2.7000e-004	0.0000	1.0000e-004	0.0000	1.0000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0771	0.0771	0.0000	0.0000	0.0778
Total	**3.0000e-005**	**2.0000e-005**	**2.7000e-004**	**0.0000**	**1.0000e-004**	**0.0000**	**1.0000e-004**	**3.0000e-005**	**0.0000**	**3.0000e-005**	**0.0000**	**0.0771**	**0.0771**	**0.0000**	**0.0000**	**0.0778**

3.4 Grading - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0197	0.0000	0.0197	0.0101	0.0000	0.0101	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.0000e-003	0.0434	0.0261	6.0000e-005		1.8100e-003	1.8100e-003		1.6700e-003	1.6700e-003	0.0000	5.4312	5.4312	1.7600e-003	0.0000	5.4751
Total	**4.0000e-003**	**0.0434**	**0.0261**	**6.0000e-005**	**0.0197**	**1.8100e-003**	**0.0215**	**0.0101**	**1.6700e-003**	**0.0118**	**0.0000**	**5.4312**	**5.4312**	**1.7600e-003**	**0.0000**	**5.4751**

3.4 Grading - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.6000e-004	0.0342	9.1000e-003	1.5000e-004	4.3200e-003	2.8000e-004	4.6000e-003	1.1900e-003	2.7000e-004	1.4500e-003	0.0000	15.1237	15.1237	7.6000e-004	2.4100e-003	15.8594
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.0000e-005	6.0000e-005	6.9000e-004	0.0000	2.4000e-004	0.0000	2.4000e-004	6.0000e-005	0.0000	7.0000e-005	0.0000	0.1928	0.1928	1.0000e-005	1.0000e-005	0.1945
Total	**6.4000e-004**	**0.0343**	**9.7900e-003**	**1.5000e-004**	**4.5600e-003**	**2.8000e-004**	**4.8400e-003**	**1.2500e-003**	**2.7000e-004**	**1.5200e-003**	**0.0000**	**15.3164**	**15.3164**	**7.7000e-004**	**2.4200e-003**	**16.0539**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0197	0.0000	0.0197	0.0101	0.0000	0.0101	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.0000e-003	0.0434	0.0261	6.0000e-005		1.8100e-003	1.8100e-003		1.6700e-003	1.6700e-003	0.0000	5.4312	5.4312	1.7600e-003	0.0000	5.4751
Total	**4.0000e-003**	**0.0434**	**0.0261**	**6.0000e-005**	**0.0197**	**1.8100e-003**	**0.0215**	**0.0101**	**1.6700e-003**	**0.0118**	**0.0000**	**5.4312**	**5.4312**	**1.7600e-003**	**0.0000**	**5.4751**

3.4 Grading - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.6000e-004	0.0342	9.1000e-003	1.5000e-004	4.3200e-003	2.8000e-004	4.6000e-003	1.1900e-003	2.7000e-004	1.4500e-003	0.0000	15.1237	15.1237	7.6000e-004	2.4100e-003	15.8594
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.0000e-005	6.0000e-005	6.9000e-004	0.0000	2.4000e-004	0.0000	2.4000e-004	6.0000e-005	0.0000	7.0000e-005	0.0000	0.1928	0.1928	1.0000e-005	1.0000e-005	0.1945
Total	**6.4000e-004**	**0.0343**	**9.7900e-003**	**1.5000e-004**	**4.5600e-003**	**2.8000e-004**	**4.8400e-003**	**1.2500e-003**	**2.7000e-004**	**1.5200e-003**	**0.0000**	**15.3164**	**15.3164**	**7.7000e-004**	**2.4200e-003**	**16.0539**

3.5 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1979	1.5736	1.6418	2.8900e-003		0.0709	0.0709		0.0679	0.0679	0.0000	239.8959	239.8959	0.0454	0.0000	241.0301
Total	**0.1979**	**1.5736**	**1.6418**	**2.8900e-003**		**0.0709**	**0.0709**		**0.0679**	**0.0679**	**0.0000**	**239.8959**	**239.8959**	**0.0454**	**0.0000**	**241.0301**

3.5 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.7000e-004	0.0103	3.6200e-003	5.0000e-005	1.5300e-003	6.0000e-005	1.5900e-003	4.4000e-004	6.0000e-005	5.0000e-004	0.0000	4.6350	4.6350	1.4000e-004	6.7000e-004	4.8387
Worker	1.5600e-003	1.0800e-003	0.0132	4.0000e-005	4.6300e-003	3.0000e-005	4.6600e-003	1.2300e-003	2.0000e-005	1.2500e-003	0.0000	3.7105	3.7105	1.1000e-004	1.0000e-004	3.7437
Total	**1.8300e-003**	**0.0113**	**0.0168**	**9.0000e-005**	**6.1600e-003**	**9.0000e-005**	**6.2500e-003**	**1.6700e-003**	**8.0000e-005**	**1.7500e-003**	**0.0000**	**8.3455**	**8.3455**	**2.5000e-004**	**7.7000e-004**	**8.5823**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1979	1.5736	1.6418	2.8900e-003		0.0709	0.0709		0.0679	0.0679	0.0000	239.8956	239.8956	0.0454	0.0000	241.0298
Total	**0.1979**	**1.5736**	**1.6418**	**2.8900e-003**		**0.0709**	**0.0709**		**0.0679**	**0.0679**	**0.0000**	**239.8956**	**239.8956**	**0.0454**	**0.0000**	**241.0298**

3.5 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.7000e-004	0.0103	3.6200e-003	5.0000e-005	1.5300e-003	6.0000e-005	1.5900e-003	4.4000e-004	6.0000e-005	5.0000e-004	0.0000	4.6350	4.6350	1.4000e-004	6.7000e-004	4.8387
Worker	1.5600e-003	1.0800e-003	0.0132	4.0000e-005	4.6300e-003	3.0000e-005	4.6600e-003	1.2300e-003	2.0000e-005	1.2500e-003	0.0000	3.7105	3.7105	1.1000e-004	1.0000e-004	3.7437
Total	**1.8300e-003**	**0.0113**	**0.0168**	**9.0000e-005**	**6.1600e-003**	**9.0000e-005**	**6.2500e-003**	**1.6700e-003**	**8.0000e-005**	**1.7500e-003**	**0.0000**	**8.3455**	**8.3455**	**2.5000e-004**	**7.7000e-004**	**8.5823**

3.5 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0870	0.6989	0.7685	1.3600e-003		0.0293	0.0293		0.0281	0.0281	0.0000	113.2041	113.2041	0.0211	0.0000	113.7312
Total	**0.0870**	**0.6989**	**0.7685**	**1.3600e-003**		**0.0293**	**0.0293**		**0.0281**	**0.0281**	**0.0000**	**113.2041**	**113.2041**	**0.0211**	**0.0000**	**113.7312**

3.5 Building Construction - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.2000e-004	4.8100e-003	1.6700e-003	2.0000e-005	7.2000e-004	3.0000e-005	7.5000e-004	2.1000e-004	3.0000e-005	2.4000e-004	0.0000	2.1490	2.1490	7.0000e-005	3.1000e-004	2.2435
Worker	6.9000e-004	4.6000e-004	5.8300e-003	2.0000e-005	2.1900e-003	1.0000e-005	2.2000e-003	5.8000e-004	1.0000e-005	5.9000e-004	0.0000	1.7070	1.7070	5.0000e-005	5.0000e-005	1.7216
Total	**8.1000e-004**	**5.2700e-003**	**7.5000e-003**	**4.0000e-005**	**2.9100e-003**	**4.0000e-005**	**2.9500e-003**	**7.9000e-004**	**4.0000e-005**	**8.3000e-004**	**0.0000**	**3.8559**	**3.8559**	**1.2000e-004**	**3.6000e-004**	**3.9650**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0870	0.6989	0.7685	1.3600e-003		0.0293	0.0293		0.0281	0.0281	0.0000	113.2040	113.2040	0.0211	0.0000	113.7311
Total	**0.0870**	**0.6989**	**0.7685**	**1.3600e-003**		**0.0293**	**0.0293**		**0.0281**	**0.0281**	**0.0000**	**113.2040**	**113.2040**	**0.0211**	**0.0000**	**113.7311**

3.5 Building Construction - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.2000e-004	4.8100e-003	1.6700e-003	2.0000e-005	7.2000e-004	3.0000e-005	7.5000e-004	2.1000e-004	3.0000e-005	2.4000e-004	0.0000	2.1490	2.1490	7.0000e-005	3.1000e-004	2.2435
Worker	6.9000e-004	4.6000e-004	5.8300e-003	2.0000e-005	2.1900e-003	1.0000e-005	2.2000e-003	5.8000e-004	1.0000e-005	5.9000e-004	0.0000	1.7070	1.7070	5.0000e-005	5.0000e-005	1.7216
Total	**8.1000e-004**	**5.2700e-003**	**7.5000e-003**	**4.0000e-005**	**2.9100e-003**	**4.0000e-005**	**2.9500e-003**	**7.9000e-004**	**4.0000e-005**	**8.3000e-004**	**0.0000**	**3.8559**	**3.8559**	**1.2000e-004**	**3.6000e-004**	**3.9650**

3.6 Paving - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.2100e-003	0.0405	0.0585	9.0000e-005		1.9800e-003	1.9800e-003		1.8300e-003	1.8300e-003	0.0000	7.7574	7.7574	2.4600e-003	0.0000	7.8188
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**4.2100e-003**	**0.0405**	**0.0585**	**9.0000e-005**		**1.9800e-003**	**1.9800e-003**		**1.8300e-003**	**1.8300e-003**	**0.0000**	**7.7574**	**7.7574**	**2.4600e-003**	**0.0000**	**7.8188**

3.6 Paving - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9000e-004	1.3000e-004	1.6000e-003	1.0000e-005	6.0000e-004	0.0000	6.0000e-004	1.6000e-004	0.0000	1.6000e-004	0.0000	0.4698	0.4698	1.0000e-005	1.0000e-005	0.4738
Total	**1.9000e-004**	**1.3000e-004**	**1.6000e-003**	**1.0000e-005**	**6.0000e-004**	**0.0000**	**6.0000e-004**	**1.6000e-004**	**0.0000**	**1.6000e-004**	**0.0000**	**0.4698**	**0.4698**	**1.0000e-005**	**1.0000e-005**	**0.4738**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.2100e-003	0.0405	0.0585	9.0000e-005		1.9800e-003	1.9800e-003		1.8300e-003	1.8300e-003	0.0000	7.7573	7.7573	2.4600e-003	0.0000	7.8188
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**4.2100e-003**	**0.0405**	**0.0585**	**9.0000e-005**		**1.9800e-003**	**1.9800e-003**		**1.8300e-003**	**1.8300e-003**	**0.0000**	**7.7573**	**7.7573**	**2.4600e-003**	**0.0000**	**7.8188**

3.6 Paving - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9000e-004	1.3000e-004	1.6000e-003	1.0000e-005	6.0000e-004	0.0000	6.0000e-004	1.6000e-004	0.0000	1.6000e-004	0.0000	0.4698	0.4698	1.0000e-005	1.0000e-005	0.4738
Total	**1.9000e-004**	**1.3000e-004**	**1.6000e-003**	**1.0000e-005**	**6.0000e-004**	**0.0000**	**6.0000e-004**	**1.6000e-004**	**0.0000**	**1.6000e-004**	**0.0000**	**0.4698**	**0.4698**	**1.0000e-005**	**1.0000e-005**	**0.4738**

3.7 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.6805					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.0000e-004	6.0900e-003	9.0500e-003	1.0000e-005		3.0000e-004	3.0000e-004		3.0000e-004	3.0000e-004	0.0000	1.2766	1.2766	7.0000e-005	0.0000	1.2784
Total	**0.6814**	**6.0900e-003**	**9.0500e-003**	**1.0000e-005**		**3.0000e-004**	**3.0000e-004**		**3.0000e-004**	**3.0000e-004**	**0.0000**	**1.2766**	**1.2766**	**7.0000e-005**	**0.0000**	**1.2784**

3.7 Architectural Coating - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0000e-005	1.0000e-005	1.1000e-004	0.0000	4.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0313	0.0313	0.0000	0.0000	0.0316
Total	**1.0000e-005**	**1.0000e-005**	**1.1000e-004**	**0.0000**	**4.0000e-005**	**0.0000**	**4.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0313**	**0.0313**	**0.0000**	**0.0000**	**0.0316**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.6805					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.0000e-004	6.0900e-003	9.0500e-003	1.0000e-005		3.0000e-004	3.0000e-004		3.0000e-004	3.0000e-004	0.0000	1.2766	1.2766	7.0000e-005	0.0000	1.2784
Total	**0.6814**	**6.0900e-003**	**9.0500e-003**	**1.0000e-005**		**3.0000e-004**	**3.0000e-004**		**3.0000e-004**	**3.0000e-004**	**0.0000**	**1.2766**	**1.2766**	**7.0000e-005**	**0.0000**	**1.2784**

3.7 Architectural Coating - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0000e-005	1.0000e-005	1.1000e-004	0.0000	4.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0313	0.0313	0.0000	0.0000	0.0316
Total	**1.0000e-005**	**1.0000e-005**	**1.1000e-004**	**0.0000**	**4.0000e-005**	**0.0000**	**4.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0313**	**0.0313**	**0.0000**	**0.0000**	**0.0316**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0726	0.0807	0.6825	1.4500e-003	0.1602	1.1300e-003	0.1613	0.0428	1.0500e-003	0.0438	0.0000	137.4383	137.4383	9.5800e-003	6.0800e-003	139.4910
Unmitigated	0.0726	0.0807	0.6825	1.4500e-003	0.1602	1.1300e-003	0.1613	0.0428	1.0500e-003	0.0438	0.0000	137.4383	137.4383	9.5800e-003	6.0800e-003	139.4910

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	150.00	150.00	150.00	428,296	428,296
Total	150.00	150.00	150.00	428,296	428,296

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	10.80	7.30	7.50	41.60	18.80	39.60	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Single Family Housing	0.561854	0.062428	0.177046	0.117565	0.023832	0.006317	0.008949	0.006298	0.000705	0.000577	0.028723	0.000955	0.004751

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	28.7830	28.7830	1.7600e-003	2.1000e-004	28.8906
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	28.7830	28.7830	1.7600e-003	2.1000e-004	28.8906
NaturalGas Mitigated	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	17.2750	17.2750	3.3000e-004	3.2000e-004	17.3777
NaturalGas Unmitigated	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	17.2750	17.2750	3.3000e-004	3.2000e-004	17.3777

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	323722	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	17.2750	17.2750	3.3000e-004	3.2000e-004	17.3777
Total		**1.7500e-003**	**0.0149**	**6.3500e-003**	**1.0000e-004**		**1.2100e-003**	**1.2100e-003**		**1.2100e-003**	**1.2100e-003**	**0.0000**	**17.2750**	**17.2750**	**3.3000e-004**	**3.2000e-004**	**17.3777**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	323722	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	17.2750	17.2750	3.3000e-004	3.2000e-004	17.3777
Total		**1.7500e-003**	**0.0149**	**6.3500e-003**	**1.0000e-004**		**1.2100e-003**	**1.2100e-003**		**1.2100e-003**	**1.2100e-003**	**0.0000**	**17.2750**	**17.2750**	**3.3000e-004**	**3.2000e-004**	**17.3777**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	117515	28.7830	1.7600e-003	2.1000e-004	28.8906
Total		**28.7830**	**1.7600e-003**	**2.1000e-004**	**28.8906**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	117515	28.7830	1.7600e-003	2.1000e-004	28.8906
Total		**28.7830**	**1.7600e-003**	**2.1000e-004**	**28.8906**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.2413	1.2800e-003	0.1113	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863
Unmitigated	0.2413	1.2800e-003	0.1113	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0681					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.1699					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	3.3400e-003	1.2800e-003	0.1113	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863
Total	**0.2413**	**1.2800e-003**	**0.1113**	**1.0000e-005**		**6.2000e-004**	**6.2000e-004**		**6.2000e-004**	**6.2000e-004**	**0.0000**	**0.1819**	**0.1819**	**1.7000e-004**	**0.0000**	**0.1863**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0681					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.1699					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	3.3400e-003	1.2800e-003	0.1113	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863
Total	**0.2413**	**1.2800e-003**	**0.1113**	**1.0000e-005**		**6.2000e-004**	**6.2000e-004**		**6.2000e-004**	**6.2000e-004**	**0.0000**	**0.1819**	**0.1819**	**1.7000e-004**	**0.0000**	**0.1863**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	5.1035	0.0321	7.9000e-004	6.1417
Unmitigated	5.1035	0.0321	7.9000e-004	6.1417

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	0.97731 / 0.61613	5.1035	0.0321	7.9000e-004	6.1417
Total		**5.1035**	**0.0321**	**7.9000e-004**	**6.1417**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	0.97731 / 0.61613	5.1035	0.0321	7.9000e-004	6.1417
Total		**5.1035**	**0.0321**	**7.9000e-004**	**6.1417**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	3.5787	0.2115	0.0000	8.8662
Unmitigated	3.5787	0.2115	0.0000	8.8662

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	17.63	3.5787	0.2115	0.0000	8.8662
Total		**3.5787**	**0.2115**	**0.0000**	**8.8662**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	17.63	3.5787	0.2115	0.0000	8.8662
Total		**3.5787**	**0.2115**	**0.0000**	**8.8662**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

1205 Melrose Way

San Diego County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	15.00	Dwelling Unit	2.55	43,500.00	43

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2025
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	539.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - 15 homes approximately 2800-3000 sq ft each on 2.55 acre site

Construction Phase - 1 to 2 years of construction - estimated at 18 months

Demolition - existing structures to be demolished

Grading - import of 4,034 cubic yards and a 2.55 acre site

Vehicle Trips - 10 trips per dwelling unit (Intersecting Metrics, 2021)

Woodstoves - No woodstoves or fireplaces

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	220.00	340.00
tblConstructionPhase	PhaseEndDate	1/11/2024	6/28/2024
tblConstructionPhase	PhaseEndDate	12/14/2023	5/30/2024

tblConstructionPhase	PhaseEndDate	12/28/2023	6/14/2024
tblConstructionPhase	PhaseStartDate	12/29/2023	6/15/2024
tblConstructionPhase	PhaseStartDate	12/15/2023	6/1/2024
tblFireplaces	FireplaceDayYear	82.00	0.00
tblFireplaces	FireplaceHourDay	3.00	0.00
tblFireplaces	FireplaceWoodMass	3,078.40	0.00
tblFireplaces	NumberGas	8.25	0.00
tblFireplaces	NumberNoFireplace	1.50	0.00
tblFireplaces	NumberWood	5.25	0.00
tblGrading	AcresOfGrading	6.00	2.55
tblGrading	AcresOfGrading	4.50	2.55
tblGrading	MaterialImported	0.00	4,034.00
tblLandUse	LandUseSquareFeet	27,000.00	43,500.00
tblLandUse	LotAcreage	4.87	2.55
tblVehicleTrips	ST_TR	9.54	10.00
tblVehicleTrips	SU_TR	8.55	10.00
tblVehicleTrips	WD_TR	9.44	10.00
tblWoodstoves	NumberCatalytic	0.75	0.00
tblWoodstoves	NumberNoncatalytic	0.75	0.00
tblWoodstoves	WoodstoveDayYear	82.00	0.00
tblWoodstoves	WoodstoveWoodMass	3,019.20	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2023	1.7297	25.4730	14.3657	0.0716	8.1186	0.6981	8.8167	3.7977	0.6456	4.4433	0.0000	7,624.6297	7,624.6297	0.9274	0.8852	7,911.5953
2024	136.2797	12.9162	14.2428	0.0258	0.1232	0.5388	0.5934	0.0327	0.5160	0.5308	0.0000	2,369.3006	2,369.3006	0.5447	7.1400e-003	2,382.1476
Maximum	**136.2797**	**25.4730**	**14.3657**	**0.0716**	**8.1186**	**0.6981**	**8.8167**	**3.7977**	**0.6456**	**4.4433**	**0.0000**	**7,624.6297**	**7,624.6297**	**0.9274**	**0.8852**	**7,911.5953**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2023	1.7297	25.4730	14.3657	0.0716	8.1186	0.6981	8.8167	3.7977	0.6456	4.4433	0.0000	7,624.6297	7,624.6297	0.9274	0.8852	7,911.5953
2024	136.2797	12.9162	14.2428	0.0258	0.1232	0.5388	0.5934	0.0327	0.5160	0.5308	0.0000	2,369.3006	2,369.3006	0.5447	7.1400e-003	2,382.1476
Maximum	**136.2797**	**25.4730**	**14.3657**	**0.0716**	**8.1186**	**0.6981**	**8.8167**	**3.7977**	**0.6456**	**4.4433**	**0.0000**	**7,624.6297**	**7,624.6297**	**0.9274**	**0.8852**	**7,911.5953**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.3409	0.0142	1.2364	7.0000e-005		6.8600e-003	6.8600e-003		6.8600e-003	6.8600e-003	0.0000	2.2283	2.2283	2.1300e-003	0.0000	2.2816
Energy	9.5600e-003	0.0817	0.0348	5.2000e-004		6.6100e-003	6.6100e-003		6.6100e-003	6.6100e-003		104.3423	104.3423	2.0000e-003	1.9100e-003	104.9624
Mobile	0.4159	0.4140	3.7291	8.2900e-003	0.9016	6.2100e-003	0.9078	0.2402	5.7900e-003	0.2460		865.3766	865.3766	0.0560	0.0354	877.3136
Total	**1.7664**	**0.5100**	**5.0002**	**8.8800e-003**	**0.9016**	**0.0197**	**0.9213**	**0.2402**	**0.0193**	**0.2594**	**0.0000**	**971.9472**	**971.9472**	**0.0601**	**0.0373**	**984.5576**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.3409	0.0142	1.2364	7.0000e-005		6.8600e-003	6.8600e-003		6.8600e-003	6.8600e-003	0.0000	2.2283	2.2283	2.1300e-003	0.0000	2.2816
Energy	9.5600e-003	0.0817	0.0348	5.2000e-004		6.6100e-003	6.6100e-003		6.6100e-003	6.6100e-003		104.3423	104.3423	2.0000e-003	1.9100e-003	104.9624
Mobile	0.4159	0.4140	3.7291	8.2900e-003	0.9016	6.2100e-003	0.9078	0.2402	5.7900e-003	0.2460		865.3766	865.3766	0.0560	0.0354	877.3136
Total	**1.7664**	**0.5100**	**5.0002**	**8.8800e-003**	**0.9016**	**0.0197**	**0.9213**	**0.2402**	**0.0193**	**0.2594**	**0.0000**	**971.9472**	**971.9472**	**0.0601**	**0.0373**	**984.5576**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/2/2023	1/27/2023	5	20	
2	Site Preparation	Site Preparation	1/28/2023	2/1/2023	5	3	
3	Grading	Grading	2/2/2023	2/9/2023	5	6	
4	Building Construction	Building Construction	2/10/2023	5/30/2024	5	340	
5	Paving	Paving	6/1/2024	6/14/2024	5	10	
6	Architectural Coating	Architectural Coating	6/15/2024	6/28/2024	5	10	

Acres of Grading (Site Preparation Phase): 2.55

Acres of Grading (Grading Phase): 2.55

Acres of Paving: 0

Residential Indoor: 88,088; Residential Outdoor: 29,363; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Site Preparation	Graders	1	8.00	187	0.41
Site Preparation	Scrapers	1	8.00	367	0.48

Site Preparation	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	2	7.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Building Construction	Welders	3	8.00	46	0.45
Paving	Cement and Mortar Mixers	1	8.00	9	0.56
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	5	13.00	0.00	88.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	504.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	8	5.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	1.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.9628	0.0000	0.9628	0.1458	0.0000	0.1458			0.0000			0.0000
Off-Road	1.4725	14.3184	13.4577	0.0241		0.6766	0.6766		0.6328	0.6328		2,324.3959	2,324.3959	0.5893		2,339.1278
Total	**1.4725**	**14.3184**	**13.4577**	**0.0241**	**0.9628**	**0.6766**	**1.6394**	**0.1458**	**0.6328**	**0.7786**		**2,324.3959**	**2,324.3959**	**0.5893**		**2,339.1278**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	9.9600e-003	0.5756	0.1581	2.6300e-003	0.0770	4.8900e-003	0.0818	0.0211	4.6700e-003	0.0258		290.9620	290.9620	0.0147	0.0463	305.1172
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0356	0.0221	0.3128	9.4000e-004	0.1068	5.7000e-004	0.1074	0.0283	5.3000e-004	0.0289		96.5710	96.5710	2.5800e-003	2.3800e-003	97.3441
Total	**0.0455**	**0.5977**	**0.4709**	**3.5700e-003**	**0.1838**	**5.4600e-003**	**0.1892**	**0.0494**	**5.2000e-003**	**0.0546**		**387.5330**	**387.5330**	**0.0172**	**0.0487**	**402.4613**

3.2 Demolition - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.9628	0.0000	0.9628	0.1458	0.0000	0.1458			0.0000			0.0000
Off-Road	1.4725	14.3184	13.4577	0.0241		0.6766	0.6766		0.6328	0.6328	0.0000	2,324.395 9	2,324.395 9	0.5893		2,339.127 8
Total	**1.4725**	**14.3184**	**13.4577**	**0.0241**	**0.9628**	**0.6766**	**1.6394**	**0.1458**	**0.6328**	**0.7786**	**0.0000**	**2,324.395 9**	**2,324.395 9**	**0.5893**		**2,339.127 8**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	9.9600e-003	0.5756	0.1581	2.6300e-003	0.0770	4.8900e-003	0.0818	0.0211	4.6700e-003	0.0258		290.9620	290.9620	0.0147	0.0463	305.1172
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0356	0.0221	0.3128	9.4000e-004	0.1068	5.7000e-004	0.1074	0.0283	5.3000e-004	0.0289		96.5710	96.5710	2.5800e-003	2.3800e-003	97.3441
Total	**0.0455**	**0.5977**	**0.4709**	**3.5700e-003**	**0.1838**	**5.4600e-003**	**0.1892**	**0.0494**	**5.2000e-003**	**0.0546**		**387.5330**	**387.5330**	**0.0172**	**0.0487**	**402.4613**

3.3 Site Preparation - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.9014	0.0000	0.9014	0.0973	0.0000	0.0973			0.0000			0.0000
Off-Road	1.3027	14.2802	9.7820	0.0245		0.5419	0.5419		0.4985	0.4985		2,374.8634	2,374.8634	0.7681		2,394.0654
Total	**1.3027**	**14.2802**	**9.7820**	**0.0245**	**0.9014**	**0.5419**	**1.4433**	**0.0973**	**0.4985**	**0.5959**		**2,374.8634**	**2,374.8634**	**0.7681**		**2,394.0654**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0219	0.0136	0.1925	5.8000e-004	0.0657	3.5000e-004	0.0661	0.0174	3.3000e-004	0.0178		59.4283	59.4283	1.5900e-003	1.4600e-003	59.9041
Total	**0.0219**	**0.0136**	**0.1925**	**5.8000e-004**	**0.0657**	**3.5000e-004**	**0.0661**	**0.0174**	**3.3000e-004**	**0.0178**		**59.4283**	**59.4283**	**1.5900e-003**	**1.4600e-003**	**59.9041**

3.3 Site Preparation - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.9014	0.0000	0.9014	0.0973	0.0000	0.0973			0.0000			0.0000
Off-Road	1.3027	14.2802	9.7820	0.0245		0.5419	0.5419		0.4985	0.4985	0.0000	2,374.8634	2,374.8634	0.7681		2,394.0654
Total	**1.3027**	**14.2802**	**9.7820**	**0.0245**	**0.9014**	**0.5419**	**1.4433**	**0.0973**	**0.4985**	**0.5959**	**0.0000**	**2,374.8634**	**2,374.8634**	**0.7681**		**2,394.0654**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0219	0.0136	0.1925	5.8000e-004	0.0657	3.5000e-004	0.0661	0.0174	3.3000e-004	0.0178		59.4283	59.4283	1.5900e-003	1.4600e-003	59.9041
Total	**0.0219**	**0.0136**	**0.1925**	**5.8000e-004**	**0.0657**	**3.5000e-004**	**0.0661**	**0.0174**	**3.3000e-004**	**0.0178**		**59.4283**	**59.4283**	**1.5900e-003**	**1.4600e-003**	**59.9041**

3.4 Grading - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5673	0.0000	6.5673	3.3732	0.0000	3.3732			0.0000			0.0000
Off-Road	1.3330	14.4676	8.7038	0.0206		0.6044	0.6044		0.5560	0.5560		1,995.6147	1,995.6147	0.6454		2,011.7503
Total	**1.3330**	**14.4676**	**8.7038**	**0.0206**	**6.5673**	**0.6044**	**7.1716**	**3.3732**	**0.5560**	**3.9292**		**1,995.6147**	**1,995.6147**	**0.6454**		**2,011.7503**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1902	10.9884	3.0185	0.0503	1.4692	0.0933	1.5624	0.4027	0.0892	0.4919		5,554.7297	5,554.7297	0.2799	0.8833	5,824.9649
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0274	0.0170	0.2406	7.3000e-004	0.0822	4.4000e-004	0.0826	0.0218	4.1000e-004	0.0222		74.2854	74.2854	1.9900e-003	1.8300e-003	74.8801
Total	**0.2176**	**11.0054**	**3.2592**	**0.0510**	**1.5513**	**0.0937**	**1.6450**	**0.4245**	**0.0896**	**0.5141**		**5,629.0150**	**5,629.0150**	**0.2819**	**0.8852**	**5,899.8450**

3.4 Grading - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5673	0.0000	6.5673	3.3732	0.0000	3.3732			0.0000			0.0000
Off-Road	1.3330	14.4676	8.7038	0.0206		0.6044	0.6044		0.5560	0.5560	0.0000	1,995.614 7	1,995.614 7	0.6454		2,011.750 3
Total	**1.3330**	**14.4676**	**8.7038**	**0.0206**	**6.5673**	**0.6044**	**7.1716**	**3.3732**	**0.5560**	**3.9292**	**0.0000**	**1,995.614 7**	**1,995.614 7**	**0.6454**		**2,011.750 3**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1902	10.9884	3.0185	0.0503	1.4692	0.0933	1.5624	0.4027	0.0892	0.4919		5,554.729 7	5,554.729 7	0.2799	0.8833	5,824.964 9
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0274	0.0170	0.2406	7.3000e-004	0.0822	4.4000e-004	0.0826	0.0218	4.1000e-004	0.0222		74.2854	74.2854	1.9900e-003	1.8300e-003	74.8801
Total	**0.2176**	**11.0054**	**3.2592**	**0.0510**	**1.5513**	**0.0937**	**1.6450**	**0.4245**	**0.0896**	**0.5141**		**5,629.015 0**	**5,629.015 0**	**0.2819**	**0.8852**	**5,899.845 0**

3.5 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7136	13.6239	14.2145	0.0250		0.6136	0.6136		0.5880	0.5880		2,289.5233	2,289.5233	0.4330		2,300.3479
Total	**1.7136**	**13.6239**	**14.2145**	**0.0250**		**0.6136**	**0.6136**		**0.5880**	**0.5880**		**2,289.5233**	**2,289.5233**	**0.4330**		**2,300.3479**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.3900e-003	0.0857	0.0309	4.1000e-004	0.0136	5.2000e-004	0.0141	3.9000e-003	5.0000e-004	4.4000e-003		44.2094	44.2094	1.3400e-003	6.4000e-003	46.1504
Worker	0.0137	8.4900e-003	0.1203	3.6000e-004	0.0411	2.2000e-004	0.0413	0.0109	2.0000e-004	0.0111		37.1427	37.1427	9.9000e-004	9.1000e-004	37.4400
Total	**0.0161**	**0.0942**	**0.1512**	**7.7000e-004**	**0.0546**	**7.4000e-004**	**0.0554**	**0.0148**	**7.0000e-004**	**0.0155**		**81.3521**	**81.3521**	**2.3300e-003**	**7.3100e-003**	**83.5905**

3.5 Building Construction - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7136	13.6239	14.2145	0.0250		0.6136	0.6136		0.5880	0.5880	0.0000	2,289.5233	2,289.5233	0.4330		2,300.3479
Total	**1.7136**	**13.6239**	**14.2145**	**0.0250**		**0.6136**	**0.6136**		**0.5880**	**0.5880**	**0.0000**	**2,289.5233**	**2,289.5233**	**0.4330**		**2,300.3479**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.3900e-003	0.0857	0.0309	4.1000e-004	0.0136	5.2000e-004	0.0141	3.9000e-003	5.0000e-004	4.4000e-003		44.2094	44.2094	1.3400e-003	6.4000e-003	46.1504
Worker	0.0137	8.4900e-003	0.1203	3.6000e-004	0.0411	2.2000e-004	0.0413	0.0109	2.0000e-004	0.0111		37.1427	37.1427	9.9000e-004	9.1000e-004	37.4400
Total	**0.0161**	**0.0942**	**0.1512**	**7.7000e-004**	**0.0546**	**7.4000e-004**	**0.0554**	**0.0148**	**7.0000e-004**	**0.0155**		**81.3521**	**81.3521**	**2.3300e-003**	**7.3100e-003**	**83.5905**

3.5 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5971	12.8235	14.1002	0.0250		0.5381	0.5381		0.5153	0.5153		2,289.654 1	2,289.654 1	0.4265		2,300.315 4
Total	**1.5971**	**12.8235**	**14.1002**	**0.0250**		**0.5381**	**0.5381**		**0.5153**	**0.5153**		**2,289.654 1**	**2,289.654 1**	**0.4265**		**2,300.315 4**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.3000e-003	0.0852	0.0302	4.0000e-004	0.0136	5.2000e-004	0.0141	3.9000e-003	5.0000e-004	4.4000e-003		43.4386	43.4386	1.3700e-003	6.2900e-003	45.3471
Worker	0.0128	7.6400e-003	0.1124	3.5000e-004	0.0411	2.1000e-004	0.0413	0.0109	1.9000e-004	0.0111		36.2079	36.2079	9.0000e-004	8.5000e-004	36.4852
Total	**0.0151**	**0.0928**	**0.1426**	**7.5000e-004**	**0.0546**	**7.3000e-004**	**0.0554**	**0.0148**	**6.9000e-004**	**0.0155**		**79.6465**	**79.6465**	**2.2700e-003**	**7.1400e-003**	**81.8322**

3.5 Building Construction - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5971	12.8235	14.1002	0.0250		0.5381	0.5381		0.5153	0.5153	0.0000	2,289.6541	2,289.6541	0.4265		2,300.3154
Total	**1.5971**	**12.8235**	**14.1002**	**0.0250**		**0.5381**	**0.5381**		**0.5153**	**0.5153**	**0.0000**	**2,289.6541**	**2,289.6541**	**0.4265**		**2,300.3154**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.3000e-003	0.0852	0.0302	4.0000e-004	0.0136	5.2000e-004	0.0141	3.9000e-003	5.0000e-004	4.4000e-003		43.4386	43.4386	1.3700e-003	6.2900e-003	45.3471
Worker	0.0128	7.6400e-003	0.1124	3.5000e-004	0.0411	2.1000e-004	0.0413	0.0109	1.9000e-004	0.0111		36.2079	36.2079	9.0000e-004	8.5000e-004	36.4852
Total	**0.0151**	**0.0928**	**0.1426**	**7.5000e-004**	**0.0546**	**7.3000e-004**	**0.0554**	**0.0148**	**6.9000e-004**	**0.0155**		**79.6465**	**79.6465**	**2.2700e-003**	**7.1400e-003**	**81.8322**

3.6 Paving - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8425	8.1030	11.7069	0.0179		0.3957	0.3957		0.3652	0.3652		1,710.2024	1,710.2024	0.5420		1,723.7529
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.8425**	**8.1030**	**11.7069**	**0.0179**		**0.3957**	**0.3957**		**0.3652**	**0.3652**		**1,710.2024**	**1,710.2024**	**0.5420**		**1,723.7529**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0385	0.0229	0.3373	1.0500e-003	0.1232	6.3000e-004	0.1239	0.0327	5.8000e-004	0.0333		108.6237	108.6237	2.7100e-003	2.5600e-003	109.4555
Total	**0.0385**	**0.0229**	**0.3373**	**1.0500e-003**	**0.1232**	**6.3000e-004**	**0.1239**	**0.0327**	**5.8000e-004**	**0.0333**		**108.6237**	**108.6237**	**2.7100e-003**	**2.5600e-003**	**109.4555**

3.6 Paving - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8425	8.1030	11.7069	0.0179		0.3957	0.3957		0.3652	0.3652	0.0000	1,710.2024	1,710.2024	0.5420		1,723.7529
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.8425**	**8.1030**	**11.7069**	**0.0179**		**0.3957**	**0.3957**		**0.3652**	**0.3652**	**0.0000**	**1,710.2024**	**1,710.2024**	**0.5420**		**1,723.7529**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0385	0.0229	0.3373	1.0500e-003	0.1232	6.3000e-004	0.1239	0.0327	5.8000e-004	0.0333		108.6237	108.6237	2.7100e-003	2.5600e-003	109.4555
Total	**0.0385**	**0.0229**	**0.3373**	**1.0500e-003**	**0.1232**	**6.3000e-004**	**0.1239**	**0.0327**	**5.8000e-004**	**0.0333**		**108.6237**	**108.6237**	**2.7100e-003**	**2.5600e-003**	**109.4555**

3.7 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	136.0964					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609		281.4481	281.4481	0.0159		281.8443
Total	**136.2771**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**		**281.4481**	**281.4481**	**0.0159**		**281.8443**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.5700e-003	1.5300e-003	0.0225	7.0000e-005	8.2100e-003	4.0000e-005	8.2600e-003	2.1800e-003	4.0000e-005	2.2200e-003		7.2416	7.2416	1.8000e-004	1.7000e-004	7.2970
Total	**2.5700e-003**	**1.5300e-003**	**0.0225**	**7.0000e-005**	**8.2100e-003**	**4.0000e-005**	**8.2600e-003**	**2.1800e-003**	**4.0000e-005**	**2.2200e-003**		**7.2416**	**7.2416**	**1.8000e-004**	**1.7000e-004**	**7.2970**

3.7 Architectural Coating - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	136.0964					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609	0.0000	281.4481	281.4481	0.0159		281.8443
Total	**136.2771**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**	**0.0000**	**281.4481**	**281.4481**	**0.0159**		**281.8443**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.5700e-003	1.5300e-003	0.0225	7.0000e-005	8.2100e-003	4.0000e-005	8.2600e-003	2.1800e-003	4.0000e-005	2.2200e-003		7.2416	7.2416	1.8000e-004	1.7000e-004	7.2970
Total	**2.5700e-003**	**1.5300e-003**	**0.0225**	**7.0000e-005**	**8.2100e-003**	**4.0000e-005**	**8.2600e-003**	**2.1800e-003**	**4.0000e-005**	**2.2200e-003**		**7.2416**	**7.2416**	**1.8000e-004**	**1.7000e-004**	**7.2970**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.4159	0.4140	3.7291	8.2900e-003	0.9016	6.2100e-003	0.9078	0.2402	5.7900e-003	0.2460		865.3766	865.3766	0.0560	0.0354	877.3136
Unmitigated	0.4159	0.4140	3.7291	8.2900e-003	0.9016	6.2100e-003	0.9078	0.2402	5.7900e-003	0.2460		865.3766	865.3766	0.0560	0.0354	877.3136

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	150.00	150.00	150.00	428,296	428,296
Total	150.00	150.00	150.00	428,296	428,296

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	10.80	7.30	7.50	41.60	18.80	39.60	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Single Family Housing	0.561854	0.062428	0.177046	0.117565	0.023832	0.006317	0.008949	0.006298	0.000705	0.000577	0.028723	0.000955	0.004751

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	9.5600e-003	0.0817	0.0348	5.2000e-004		6.6100e-003	6.6100e-003		6.6100e-003	6.6100e-003		104.3423	104.3423	2.0000e-003	1.9100e-003	104.9624
NaturalGas Unmitigated	9.5600e-003	0.0817	0.0348	5.2000e-004		6.6100e-003	6.6100e-003		6.6100e-003	6.6100e-003		104.3423	104.3423	2.0000e-003	1.9100e-003	104.9624

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	886.91	9.5600e-003	0.0817	0.0348	5.2000e-004		6.6100e-003	6.6100e-003		6.6100e-003	6.6100e-003		104.3423	104.3423	2.0000e-003	1.9100e-003	104.9624
Total		**9.5600e-003**	**0.0817**	**0.0348**	**5.2000e-004**		**6.6100e-003**	**6.6100e-003**		**6.6100e-003**	**6.6100e-003**		**104.3423**	**104.3423**	**2.0000e-003**	**1.9100e-003**	**104.9624**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	0.88691	9.5600e-003	0.0817	0.0348	5.2000e-004		6.6100e-003	6.6100e-003		6.6100e-003	6.6100e-003		104.3423	104.3423	2.0000e-003	1.9100e-003	104.9624
Total		**9.5600e-003**	**0.0817**	**0.0348**	**5.2000e-004**		**6.6100e-003**	**6.6100e-003**		**6.6100e-003**	**6.6100e-003**		**104.3423**	**104.3423**	**2.0000e-003**	**1.9100e-003**	**104.9624**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.3409	0.0142	1.2364	7.0000e-005		6.8600e-003	6.8600e-003		6.8600e-003	6.8600e-003	0.0000	2.2283	2.2283	2.1300e-003	0.0000	2.2816
Unmitigated	1.3409	0.0142	1.2364	7.0000e-005		6.8600e-003	6.8600e-003		6.8600e-003	6.8600e-003	0.0000	2.2283	2.2283	2.1300e-003	0.0000	2.2816

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.3729					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.9309					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0371	0.0142	1.2364	7.0000e-005		6.8600e-003	6.8600e-003		6.8600e-003	6.8600e-003		2.2283	2.2283	2.1300e-003		2.2816
Total	**1.3409**	**0.0142**	**1.2364**	**7.0000e-005**		**6.8600e-003**	**6.8600e-003**		**6.8600e-003**	**6.8600e-003**	**0.0000**	**2.2283**	**2.2283**	**2.1300e-003**	**0.0000**	**2.2816**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.3729					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.9309					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0371	0.0142	1.2364	7.0000e-005		6.8600e-003	6.8600e-003		6.8600e-003	6.8600e-003		2.2283	2.2283	2.1300e-003		2.2816
Total	**1.3409**	**0.0142**	**1.2364**	**7.0000e-005**		**6.8600e-003**	**6.8600e-003**		**6.8600e-003**	**6.8600e-003**	**0.0000**	**2.2283**	**2.2283**	**2.1300e-003**	**0.0000**	**2.2816**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

1205 Melrose Way

San Diego County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	15.00	Dwelling Unit	2.55	43,500.00	43

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2025
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	539.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - 15 homes approximately 2800-3000 sq ft each on 2.55 acre site

Construction Phase - 1 to 2 years of construction - estimated at 18 months

Demolition - existing structures to be demolished

Grading - import of 4,034 cubic yards and a 2.55 acre site

Vehicle Trips - 10 trips per dwelling unit (Intersecting Metrics, 2021)

Woodstoves - No woodstoves or fireplaces

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	220.00	340.00
tblConstructionPhase	PhaseEndDate	1/11/2024	6/28/2024
tblConstructionPhase	PhaseEndDate	12/14/2023	5/30/2024

tblConstructionPhase	PhaseEndDate	12/28/2023	6/14/2024
tblConstructionPhase	PhaseStartDate	12/29/2023	6/15/2024
tblConstructionPhase	PhaseStartDate	12/15/2023	6/1/2024
tblFireplaces	FireplaceDayYear	82.00	0.00
tblFireplaces	FireplaceHourDay	3.00	0.00
tblFireplaces	FireplaceWoodMass	3,078.40	0.00
tblFireplaces	NumberGas	8.25	0.00
tblFireplaces	NumberNoFireplace	1.50	0.00
tblFireplaces	NumberWood	5.25	0.00
tblGrading	AcresOfGrading	6.00	2.55
tblGrading	AcresOfGrading	4.50	2.55
tblGrading	MaterialImported	0.00	4,034.00
tblLandUse	LandUseSquareFeet	27,000.00	43,500.00
tblLandUse	LotAcreage	4.87	2.55
tblVehicleTrips	ST_TR	9.54	10.00
tblVehicleTrips	SU_TR	8.55	10.00
tblVehicleTrips	WD_TR	9.44	10.00
tblWoodstoves	NumberCatalytic	0.75	0.00
tblWoodstoves	NumberNoncatalytic	0.75	0.00
tblWoodstoves	WoodstoveDayYear	82.00	0.00
tblWoodstoves	WoodstoveWoodMass	3,019.20	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2023	1.7308	25.9183	14.3606	0.0716	8.1186	0.6982	8.8168	3.7977	0.6458	4.4435	0.0000	7,625.9441	7,625.9441	0.9268	0.8862	7,913.2071
2024	136.2799	12.9208	14.2383	0.0258	0.1232	0.5388	0.5934	0.0327	0.5160	0.5308	0.0000	2,367.3783	2,367.3783	0.5449	7.2200e-003	2,380.2517
Maximum	**136.2799**	**25.9183**	**14.3606**	**0.0716**	**8.1186**	**0.6982**	**8.8168**	**3.7977**	**0.6458**	**4.4435**	**0.0000**	**7,625.9441**	**7,625.9441**	**0.9268**	**0.8862**	**7,913.2071**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2023	1.7308	25.9183	14.3606	0.0716	8.1186	0.6982	8.8168	3.7977	0.6458	4.4435	0.0000	7,625.9441	7,625.9441	0.9268	0.8862	7,913.2071
2024	136.2799	12.9208	14.2383	0.0258	0.1232	0.5388	0.5934	0.0327	0.5160	0.5308	0.0000	2,367.3783	2,367.3783	0.5449	7.2200e-003	2,380.2517
Maximum	**136.2799**	**25.9183**	**14.3606**	**0.0716**	**8.1186**	**0.6982**	**8.8168**	**3.7977**	**0.6458**	**4.4435**	**0.0000**	**7,625.9441**	**7,625.9441**	**0.9268**	**0.8862**	**7,913.2071**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.3409	0.0142	1.2364	7.0000e-005		6.8600e-003	6.8600e-003		6.8600e-003	6.8600e-003	0.0000	2.2283	2.2283	2.1300e-003	0.0000	2.2816
Energy	9.5600e-003	0.0817	0.0348	5.2000e-004		6.6100e-003	6.6100e-003		6.6100e-003	6.6100e-003		104.3423	104.3423	2.0000e-003	1.9100e-003	104.9624
Mobile	0.4061	0.4485	3.8264	7.9200e-003	0.9016	6.2200e-003	0.9078	0.2402	5.8000e-003	0.2460		827.7719	827.7719	0.0591	0.0372	840.3424
Total	**1.7566**	**0.5445**	**5.0975**	**8.5100e-003**	**0.9016**	**0.0197**	**0.9213**	**0.2402**	**0.0193**	**0.2594**	**0.0000**	**934.3425**	**934.3425**	**0.0632**	**0.0391**	**947.5864**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.3409	0.0142	1.2364	7.0000e-005		6.8600e-003	6.8600e-003		6.8600e-003	6.8600e-003	0.0000	2.2283	2.2283	2.1300e-003	0.0000	2.2816
Energy	9.5600e-003	0.0817	0.0348	5.2000e-004		6.6100e-003	6.6100e-003		6.6100e-003	6.6100e-003		104.3423	104.3423	2.0000e-003	1.9100e-003	104.9624
Mobile	0.4061	0.4485	3.8264	7.9200e-003	0.9016	6.2200e-003	0.9078	0.2402	5.8000e-003	0.2460		827.7719	827.7719	0.0591	0.0372	840.3424
Total	**1.7566**	**0.5445**	**5.0975**	**8.5100e-003**	**0.9016**	**0.0197**	**0.9213**	**0.2402**	**0.0193**	**0.2594**	**0.0000**	**934.3425**	**934.3425**	**0.0632**	**0.0391**	**947.5864**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/2/2023	1/27/2023	5	20	
2	Site Preparation	Site Preparation	1/28/2023	2/1/2023	5	3	
3	Grading	Grading	2/2/2023	2/9/2023	5	6	
4	Building Construction	Building Construction	2/10/2023	5/30/2024	5	340	
5	Paving	Paving	6/1/2024	6/14/2024	5	10	
6	Architectural Coating	Architectural Coating	6/15/2024	6/28/2024	5	10	

Acres of Grading (Site Preparation Phase): 2.55

Acres of Grading (Grading Phase): 2.55

Acres of Paving: 0

Residential Indoor: 88,088; Residential Outdoor: 29,363; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Site Preparation	Graders	1	8.00	187	0.41
Site Preparation	Scrapers	1	8.00	367	0.48

Site Preparation	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	2	7.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Building Construction	Welders	3	8.00	46	0.45
Paving	Cement and Mortar Mixers	1	8.00	9	0.56
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	5	13.00	0.00	88.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	504.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	8	5.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	1.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.9628	0.0000	0.9628	0.1458	0.0000	0.1458			0.0000			0.0000
Off-Road	1.4725	14.3184	13.4577	0.0241		0.6766	0.6766		0.6328	0.6328		2,324.3959	2,324.3959	0.5893		2,339.1278
Total	**1.4725**	**14.3184**	**13.4577**	**0.0241**	**0.9628**	**0.6766**	**1.6394**	**0.1458**	**0.6328**	**0.7786**		**2,324.3959**	**2,324.3959**	**0.5893**		**2,339.1278**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	9.3700e-003	0.5988	0.1601	2.6400e-003	0.0770	4.8900e-003	0.0819	0.0211	4.6800e-003	0.0258		291.2448	291.2448	0.0146	0.0463	305.4130
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0386	0.0248	0.2973	8.9000e-004	0.1068	5.7000e-004	0.1074	0.0283	5.3000e-004	0.0289		91.2626	91.2626	2.7500e-003	2.5700e-003	92.0978
Total	**0.0479**	**0.6236**	**0.4573**	**3.5300e-003**	**0.1838**	**5.4600e-003**	**0.1892**	**0.0494**	**5.2100e-003**	**0.0546**		**382.5074**	**382.5074**	**0.0174**	**0.0489**	**397.5108**

3.2 Demolition - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.9628	0.0000	0.9628	0.1458	0.0000	0.1458			0.0000			0.0000
Off-Road	1.4725	14.3184	13.4577	0.0241		0.6766	0.6766		0.6328	0.6328	0.0000	2,324.395 9	2,324.395 9	0.5893		2,339.127 8
Total	**1.4725**	**14.3184**	**13.4577**	**0.0241**	**0.9628**	**0.6766**	**1.6394**	**0.1458**	**0.6328**	**0.7786**	**0.0000**	**2,324.395 9**	**2,324.395 9**	**0.5893**		**2,339.127 8**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	9.3700e-003	0.5988	0.1601	2.6400e-003	0.0770	4.8900e-003	0.0819	0.0211	4.6800e-003	0.0258		291.2448	291.2448	0.0146	0.0463	305.4130
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0386	0.0248	0.2973	8.9000e-004	0.1068	5.7000e-004	0.1074	0.0283	5.3000e-004	0.0289		91.2626	91.2626	2.7500e-003	2.5700e-003	92.0978
Total	**0.0479**	**0.6236**	**0.4573**	**3.5300e-003**	**0.1838**	**5.4600e-003**	**0.1892**	**0.0494**	**5.2100e-003**	**0.0546**		**382.5074**	**382.5074**	**0.0174**	**0.0489**	**397.5108**

3.3 Site Preparation - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.9014	0.0000	0.9014	0.0973	0.0000	0.0973			0.0000			0.0000
Off-Road	1.3027	14.2802	9.7820	0.0245		0.5419	0.5419		0.4985	0.4985		2,374.8634	2,374.8634	0.7681		2,394.0654
Total	**1.3027**	**14.2802**	**9.7820**	**0.0245**	**0.9014**	**0.5419**	**1.4433**	**0.0973**	**0.4985**	**0.5959**		**2,374.8634**	**2,374.8634**	**0.7681**		**2,394.0654**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0237	0.0153	0.1829	5.5000e-004	0.0657	3.5000e-004	0.0661	0.0174	3.3000e-004	0.0178		56.1616	56.1616	1.6900e-003	1.5800e-003	56.6755
Total	**0.0237**	**0.0153**	**0.1829**	**5.5000e-004**	**0.0657**	**3.5000e-004**	**0.0661**	**0.0174**	**3.3000e-004**	**0.0178**		**56.1616**	**56.1616**	**1.6900e-003**	**1.5800e-003**	**56.6755**

3.3 Site Preparation - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.9014	0.0000	0.9014	0.0973	0.0000	0.0973			0.0000			0.0000
Off-Road	1.3027	14.2802	9.7820	0.0245		0.5419	0.5419		0.4985	0.4985	0.0000	2,374.8634	2,374.8634	0.7681		2,394.0654
Total	**1.3027**	**14.2802**	**9.7820**	**0.0245**	**0.9014**	**0.5419**	**1.4433**	**0.0973**	**0.4985**	**0.5959**	**0.0000**	**2,374.8634**	**2,374.8634**	**0.7681**		**2,394.0654**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0237	0.0153	0.1829	5.5000e-004	0.0657	3.5000e-004	0.0661	0.0174	3.3000e-004	0.0178		56.1616	56.1616	1.6900e-003	1.5800e-003	56.6755
Total	**0.0237**	**0.0153**	**0.1829**	**5.5000e-004**	**0.0657**	**3.5000e-004**	**0.0661**	**0.0174**	**3.3000e-004**	**0.0178**		**56.1616**	**56.1616**	**1.6900e-003**	**1.5800e-003**	**56.6755**

3.4 Grading - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5673	0.0000	6.5673	3.3732	0.0000	3.3732			0.0000			0.0000
Off-Road	1.3330	14.4676	8.7038	0.0206		0.6044	0.6044		0.5560	0.5560		1,995.614 7	1,995.614 7	0.6454		2,011.750 3
Total	**1.3330**	**14.4676**	**8.7038**	**0.0206**	**6.5673**	**0.6044**	**7.1716**	**3.3732**	**0.5560**	**3.9292**		**1,995.614 7**	**1,995.614 7**	**0.6454**		**2,011.750 3**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1788	11.4316	3.0561	0.0503	1.4692	0.0934	1.5626	0.4027	0.0894	0.4921		5,560.127 4	5,560.127 4	0.2793	0.8842	5,830.612 4
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0297	0.0191	0.2287	6.9000e-004	0.0822	4.4000e-004	0.0826	0.0218	4.1000e-004	0.0222		70.2020	70.2020	2.1200e-003	1.9800e-003	70.8444
Total	**0.2085**	**11.4507**	**3.2848**	**0.0510**	**1.5513**	**0.0939**	**1.6452**	**0.4245**	**0.0898**	**0.5143**		**5,630.329 4**	**5,630.329 4**	**0.2814**	**0.8862**	**5,901.456 8**

3.4 Grading - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.5673	0.0000	6.5673	3.3732	0.0000	3.3732			0.0000			0.0000
Off-Road	1.3330	14.4676	8.7038	0.0206		0.6044	0.6044		0.5560	0.5560	0.0000	1,995.614 7	1,995.614 7	0.6454		2,011.750 3
Total	**1.3330**	**14.4676**	**8.7038**	**0.0206**	**6.5673**	**0.6044**	**7.1716**	**3.3732**	**0.5560**	**3.9292**	**0.0000**	**1,995.614 7**	**1,995.614 7**	**0.6454**		**2,011.750 3**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1788	11.4316	3.0561	0.0503	1.4692	0.0934	1.5626	0.4027	0.0894	0.4921		5,560.127 4	5,560.127 4	0.2793	0.8842	5,830.612 4
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0297	0.0191	0.2287	6.9000e-004	0.0822	4.4000e-004	0.0826	0.0218	4.1000e-004	0.0222		70.2020	70.2020	2.1200e-003	1.9800e-003	70.8444
Total	**0.2085**	**11.4507**	**3.2848**	**0.0510**	**1.5513**	**0.0939**	**1.6452**	**0.4245**	**0.0898**	**0.5143**		**5,630.329 4**	**5,630.329 4**	**0.2814**	**0.8862**	**5,901.456 8**

3.5 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7136	13.6239	14.2145	0.0250		0.6136	0.6136		0.5880	0.5880		2,289.523 3	2,289.523 3	0.4330		2,300.347 9
Total	**1.7136**	**13.6239**	**14.2145**	**0.0250**		**0.6136**	**0.6136**		**0.5880**	**0.5880**		**2,289.523 3**	**2,289.523 3**	**0.4330**		**2,300.347 9**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.3200e-003	0.0893	0.0318	4.1000e-004	0.0136	5.2000e-004	0.0141	3.9000e-003	5.0000e-004	4.4000e-003		44.2722	44.2722	1.3300e-003	6.4200e-003	46.2176
Worker	0.0148	9.5500e-003	0.1143	3.4000e-004	0.0411	2.2000e-004	0.0413	0.0109	2.0000e-004	0.0111		35.1010	35.1010	1.0600e-003	9.9000e-004	35.4222
Total	**0.0172**	**0.0989**	**0.1462**	**7.5000e-004**	**0.0546**	**7.4000e-004**	**0.0554**	**0.0148**	**7.0000e-004**	**0.0155**		**79.3733**	**79.3733**	**2.3900e-003**	**7.4100e-003**	**81.6398**

3.5 Building Construction - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.7136	13.6239	14.2145	0.0250		0.6136	0.6136		0.5880	0.5880	0.0000	2,289.523 3	2,289.523 3	0.4330		2,300.347 9
Total	**1.7136**	**13.6239**	**14.2145**	**0.0250**		**0.6136**	**0.6136**		**0.5880**	**0.5880**	**0.0000**	**2,289.523 3**	**2,289.523 3**	**0.4330**		**2,300.347 9**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.3200e-003	0.0893	0.0318	4.1000e-004	0.0136	5.2000e-004	0.0141	3.9000e-003	5.0000e-004	4.4000e-003		44.2722	44.2722	1.3300e-003	6.4200e-003	46.2176
Worker	0.0148	9.5500e-003	0.1143	3.4000e-004	0.0411	2.2000e-004	0.0413	0.0109	2.0000e-004	0.0111		35.1010	35.1010	1.0600e-003	9.9000e-004	35.4222
Total	**0.0172**	**0.0989**	**0.1462**	**7.5000e-004**	**0.0546**	**7.4000e-004**	**0.0554**	**0.0148**	**7.0000e-004**	**0.0155**		**79.3733**	**79.3733**	**2.3900e-003**	**7.4100e-003**	**81.6398**

3.5 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5971	12.8235	14.1002	0.0250		0.5381	0.5381		0.5153	0.5153		2,289.654 1	2,289.654 1	0.4265		2,300.315 4
Total	**1.5971**	**12.8235**	**14.1002**	**0.0250**		**0.5381**	**0.5381**		**0.5153**	**0.5153**		**2,289.654 1**	**2,289.654 1**	**0.4265**		**2,300.315 4**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.2300e-003	0.0887	0.0311	4.0000e-004	0.0136	5.3000e-004	0.0141	3.9000e-003	5.0000e-004	4.4000e-003		43.5021	43.5021	1.3600e-003	6.3000e-003	45.4148
Worker	0.0140	8.5900e-003	0.1071	3.3000e-004	0.0411	2.1000e-004	0.0413	0.0109	1.9000e-004	0.0111		34.2220	34.2220	9.7000e-004	9.2000e-004	34.5216
Total	**0.0162**	**0.0973**	**0.1382**	**7.3000e-004**	**0.0546**	**7.4000e-004**	**0.0554**	**0.0148**	**6.9000e-004**	**0.0155**		**77.7242**	**77.7242**	**2.3300e-003**	**7.2200e-003**	**79.9363**

3.5 Building Construction - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.5971	12.8235	14.1002	0.0250		0.5381	0.5381		0.5153	0.5153	0.0000	2,289.6541	2,289.6541	0.4265		2,300.3154
Total	**1.5971**	**12.8235**	**14.1002**	**0.0250**		**0.5381**	**0.5381**		**0.5153**	**0.5153**	**0.0000**	**2,289.6541**	**2,289.6541**	**0.4265**		**2,300.3154**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.2300e-003	0.0887	0.0311	4.0000e-004	0.0136	5.3000e-004	0.0141	3.9000e-003	5.0000e-004	4.4000e-003		43.5021	43.5021	1.3600e-003	6.3000e-003	45.4148
Worker	0.0140	8.5900e-003	0.1071	3.3000e-004	0.0411	2.1000e-004	0.0413	0.0109	1.9000e-004	0.0111		34.2220	34.2220	9.7000e-004	9.2000e-004	34.5216
Total	**0.0162**	**0.0973**	**0.1382**	**7.3000e-004**	**0.0546**	**7.4000e-004**	**0.0554**	**0.0148**	**6.9000e-004**	**0.0155**		**77.7242**	**77.7242**	**2.3300e-003**	**7.2200e-003**	**79.9363**

3.6 Paving - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8425	8.1030	11.7069	0.0179		0.3957	0.3957		0.3652	0.3652		1,710.2024	1,710.2024	0.5420		1,723.7529
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.8425**	**8.1030**	**11.7069**	**0.0179**		**0.3957**	**0.3957**		**0.3652**	**0.3652**		**1,710.2024**	**1,710.2024**	**0.5420**		**1,723.7529**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0419	0.0258	0.3212	1.0000e-003	0.1232	6.3000e-004	0.1239	0.0327	5.8000e-004	0.0333		102.6661	102.6661	2.9000e-003	2.7700e-003	103.5647
Total	**0.0419**	**0.0258**	**0.3212**	**1.0000e-003**	**0.1232**	**6.3000e-004**	**0.1239**	**0.0327**	**5.8000e-004**	**0.0333**		**102.6661**	**102.6661**	**2.9000e-003**	**2.7700e-003**	**103.5647**

3.6 Paving - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.8425	8.1030	11.7069	0.0179		0.3957	0.3957		0.3652	0.3652	0.0000	1,710.2024	1,710.2024	0.5420		1,723.7529
Paving	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**0.8425**	**8.1030**	**11.7069**	**0.0179**		**0.3957**	**0.3957**		**0.3652**	**0.3652**	**0.0000**	**1,710.2024**	**1,710.2024**	**0.5420**		**1,723.7529**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0419	0.0258	0.3212	1.0000e-003	0.1232	6.3000e-004	0.1239	0.0327	5.8000e-004	0.0333		102.6661	102.6661	2.9000e-003	2.7700e-003	103.5647
Total	**0.0419**	**0.0258**	**0.3212**	**1.0000e-003**	**0.1232**	**6.3000e-004**	**0.1239**	**0.0327**	**5.8000e-004**	**0.0333**		**102.6661**	**102.6661**	**2.9000e-003**	**2.7700e-003**	**103.5647**

3.7 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	136.0964					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609		281.4481	281.4481	0.0159		281.8443
Total	**136.2771**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**		**281.4481**	**281.4481**	**0.0159**		**281.8443**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.7900e-003	1.7200e-003	0.0214	7.0000e-005	8.2100e-003	4.0000e-005	8.2600e-003	2.1800e-003	4.0000e-005	2.2200e-003		6.8444	6.8444	1.9000e-004	1.8000e-004	6.9043
Total	**2.7900e-003**	**1.7200e-003**	**0.0214**	**7.0000e-005**	**8.2100e-003**	**4.0000e-005**	**8.2600e-003**	**2.1800e-003**	**4.0000e-005**	**2.2200e-003**		**6.8444**	**6.8444**	**1.9000e-004**	**1.8000e-004**	**6.9043**

3.7 Architectural Coating - 2024

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	136.0964					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.1808	1.2188	1.8101	2.9700e-003		0.0609	0.0609		0.0609	0.0609	0.0000	281.4481	281.4481	0.0159		281.8443
Total	**136.2771**	**1.2188**	**1.8101**	**2.9700e-003**		**0.0609**	**0.0609**		**0.0609**	**0.0609**	**0.0000**	**281.4481**	**281.4481**	**0.0159**		**281.8443**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.7900e-003	1.7200e-003	0.0214	7.0000e-005	8.2100e-003	4.0000e-005	8.2600e-003	2.1800e-003	4.0000e-005	2.2200e-003		6.8444	6.8444	1.9000e-004	1.8000e-004	6.9043
Total	**2.7900e-003**	**1.7200e-003**	**0.0214**	**7.0000e-005**	**8.2100e-003**	**4.0000e-005**	**8.2600e-003**	**2.1800e-003**	**4.0000e-005**	**2.2200e-003**		**6.8444**	**6.8444**	**1.9000e-004**	**1.8000e-004**	**6.9043**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.4061	0.4485	3.8264	7.9200e-003	0.9016	6.2200e-003	0.9078	0.2402	5.8000e-003	0.2460		827.7719	827.7719	0.0591	0.0372	840.3424
Unmitigated	0.4061	0.4485	3.8264	7.9200e-003	0.9016	6.2200e-003	0.9078	0.2402	5.8000e-003	0.2460		827.7719	827.7719	0.0591	0.0372	840.3424

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	150.00	150.00	150.00	428,296	428,296
Total	150.00	150.00	150.00	428,296	428,296

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	10.80	7.30	7.50	41.60	18.80	39.60	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Single Family Housing	0.561854	0.062428	0.177046	0.117565	0.023832	0.006317	0.008949	0.006298	0.000705	0.000577	0.028723	0.000955	0.004751

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	9.5600e-003	0.0817	0.0348	5.2000e-004		6.6100e-003	6.6100e-003		6.6100e-003	6.6100e-003		104.3423	104.3423	2.0000e-003	1.9100e-003	104.9624
NaturalGas Unmitigated	9.5600e-003	0.0817	0.0348	5.2000e-004		6.6100e-003	6.6100e-003		6.6100e-003	6.6100e-003		104.3423	104.3423	2.0000e-003	1.9100e-003	104.9624

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	886.91	9.5600e-003	0.0817	0.0348	5.2000e-004		6.6100e-003	6.6100e-003		6.6100e-003	6.6100e-003		104.3423	104.3423	2.0000e-003	1.9100e-003	104.9624
Total		**9.5600e-003**	**0.0817**	**0.0348**	**5.2000e-004**		**6.6100e-003**	**6.6100e-003**		**6.6100e-003**	**6.6100e-003**		**104.3423**	**104.3423**	**2.0000e-003**	**1.9100e-003**	**104.9624**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	0.88691	9.5600e-003	0.0817	0.0348	5.2000e-004		6.6100e-003	6.6100e-003		6.6100e-003	6.6100e-003		104.3423	104.3423	2.0000e-003	1.9100e-003	104.9624
Total		**9.5600e-003**	**0.0817**	**0.0348**	**5.2000e-004**		**6.6100e-003**	**6.6100e-003**		**6.6100e-003**	**6.6100e-003**		**104.3423**	**104.3423**	**2.0000e-003**	**1.9100e-003**	**104.9624**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.3409	0.0142	1.2364	7.0000e-005		6.8600e-003	6.8600e-003		6.8600e-003	6.8600e-003	0.0000	2.2283	2.2283	2.1300e-003	0.0000	2.2816
Unmitigated	1.3409	0.0142	1.2364	7.0000e-005		6.8600e-003	6.8600e-003		6.8600e-003	6.8600e-003	0.0000	2.2283	2.2283	2.1300e-003	0.0000	2.2816

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.3729					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.9309					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0371	0.0142	1.2364	7.0000e-005		6.8600e-003	6.8600e-003		6.8600e-003	6.8600e-003		2.2283	2.2283	2.1300e-003		2.2816
Total	**1.3409**	**0.0142**	**1.2364**	**7.0000e-005**		**6.8600e-003**	**6.8600e-003**		**6.8600e-003**	**6.8600e-003**	**0.0000**	**2.2283**	**2.2283**	**2.1300e-003**	**0.0000**	**2.2816**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.3729					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.9309					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0371	0.0142	1.2364	7.0000e-005		6.8600e-003	6.8600e-003		6.8600e-003	6.8600e-003		2.2283	2.2283	2.1300e-003		2.2816
Total	**1.3409**	**0.0142**	**1.2364**	**7.0000e-005**		**6.8600e-003**	**6.8600e-003**		**6.8600e-003**	**6.8600e-003**	**0.0000**	**2.2283**	**2.2283**	**2.1300e-003**	**0.0000**	**2.2816**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
La Mesa, CA 91942
619.462.1515 **tel**
619.462.0552 **fax**
www.**helixepi**.com

October 27, 2021 04512.00021.001

Ms. Leslea Meyerhoff
Summit Environmental Group, Inc.
2810 Cazadero Drive
Carlsbad, CA 92009

Subject: Biological Resources Letter Report for the 1205 Melrose Way Project

Dear Ms. Meyerhoff:

This letter report presents the results of a biological resources technical study conducted by HELIX Environmental Planning, Inc. (HELIX) for the proposed 1205 Melrose Way project (project) located at Assessor's Parcel Number (APN) 166-184-10 in the City of Vista (City), San Diego County, California. This letter report summarizes the existing biological resources within the site and provides an analysis of the proposed project's impacts in accordance with the California Environmental Quality Act (CEQA) and other applicable federal, state, and local policies related to biological resources. The City would be the Lead Agency for the project responsible for conducting the environmental review process under CEQA as well as ensuring the project is consistent with pertinent federal/state laws and local ordinances.

INTRODUCTION

Project Location

The approximately 2.6-acre project site is located in the City of Vista, in San Diego County, California (Figure 1, *Regional Location*). The site is located on Section 25, Township 11 South, Range 4 West on the U.S. Geological Survey (USGS) 7.5-minute San Luis Rey quadrangle map (Figure 2, *USGS Topography*). Specifically, the site is immediately north of Melrose Way, west of South Melrose Drive, south of Breeze Hill Road, and east of McGavran Drive (Figure 3, *Aerial Photograph of Project Location*).

The project site is within the boundaries of the North County Multiple Habitat Conservation Program (MHCP; AMEC Earth & Environmental et al. 2003). The proposed project site is recognized within the Vista Subarea of the MHCP, which does not have an approved or adopted subarea plan under the MHCP. Because the City does not have an adopted subarea plan the project would not require compliance to the MHCP provisions; thus, the MHCP is not discussed in detail further in this report.

Project Description

The project proposes the demolition of the existing residence on the property as well as mass grading to construct 15 new, detached, single-family residences. This 15-lot subdivision would include a new private street, a private driveway, a biofiltration basin, and associated hardscape. In addition to the subject property, the project site includes an off-site emergency access road and additional grading to the northwest as well as infrastructure connections/improvements to the south along the interface with Melrose Way (Figure 4, *Project Site Plan*).

METHODS

Literature Review

Prior to conducting the field survey, searches through applicable databases, such as but not limited to the California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB), California Native Plant Society (CNPS) online database, and the U.S. Fish and Wildlife Service (USFWS) sensitive species occurrences database were conducted for information regarding sensitive species known to occur or documented present within the project site and surrounding vicinity.

General Biological Survey

A general biological survey was conducted by HELIX biologist Dane van Tamelen on September 9, 2021. The survey study area comprised of the project property and a 100-foot surrounding buffer, which was surveyed on foot and with the aid of binoculars. The survey included mapping of vegetation communities, habitat assessments for special status species, and identification of other sensitive biological resources that occur or have potential to occur in the study area. Vegetation was mapped on a 1-inch equals 150 feet scale map with a 2019 aerial photograph base. Animal identifications were made in the field by direct, visual observation, or indirectly by detection of calls, burrows, tracks, or scat. Plant identifications were made in the field or in the lab through comparison with voucher specimens or photographs. Plants and animals observed or detected during the survey were recorded (Attachments A and B, respectively). These lists of species identified are not necessarily comprehensive accounts of all species that occur in the study area, as species that are nocturnal, secretive, or seasonally restricted may not have been observed.

Focused surveys for rare plants and sensitive animal species were not conducted as part of the general survey; none were required to inform the technical study. A formal jurisdictional delineation was also not conducted; however, the survey included searching and preliminary mapping of aquatic features in the study area that could be potentially subject to the U.S. Army Corps of Engineers (USACE) jurisdiction pursuant to Section 404 of the Clean Water Act (33 USC 1344), Regional Water Quality Control Board (RWQCB) jurisdiction pursuant to Section 401 of the Clean Water Act or the Porter Cologne Water Quality Control Act, or CDFW jurisdiction pursuant to Section 1600 of the California Fish and Game (CFG) Code.

Nomenclature

Nomenclature used in this report comes from Holland (1986) and Oberbauer (2008) for vegetation communities; Baldwin et al (2012) for plants; the American Ornithologists' Union (2012) for birds; and Baker et al. (2003) for mammals. Plant species status is taken from the CNPS (2021).

ENVIRONMENTAL SETTING

Regional Context

The project site is within the boundaries of the MHCP, specifically the Vista Subarea, and occurs outside any lands targeted for conservation.

General Land Uses

The site is mostly undeveloped land except for an existing single-family residence in the southwest portion of the property. Although mostly undeveloped, the property character is disturbed, and no natural vegetation was observed. Non-native and ornamental species are the dominant plants found in the study area. Disturbances on-site includes evidence of regular mowing of the undeveloped/weedy areas. Additionally, based on a review of historical aerial imagery, the site has been used and an orchard (likely citrus) since the early 1930s and the dwelling on-site was constructed sometime between 1953 and 1964 (Historical Aerials 2021). Existing residential properties and development (commercial, residential, and a church) surround the proposed project study area (Figure 3). Nearest transportation corridors include State Route (SR) 78 located approximately 0.5 mile north of the project and S. Melrose Drive approximately 0.2 mile east of the project.

Topography and Soils

Elevations on the project site range from approximately 353 feet above mean sea level (amsl) in the eastern corner of the property up to 373 feet amsl in the southwest corner of the site. Topography in on-site is generally flat (less than 10 percent slopes) terrain that gently slopes down from south to north. Two soil types are mapped within the site: Placentia sandy loam, five to nine percent slopes, eroded; and Bosanko clay, nine to 15 percent slopes (Figure 5, *Soils*) (U.S. Department of Agriculture 2021).

RESULTS

Vegetation Communities

The project site supports two vegetation communities/habitats: disturbed habitat and developed land (Figure 6, *Vegetation Communities*; Table 1, *Existing Vegetation Communities*).

Table 1
EXISTING VEGETATION COMMUNITIES[1]

Vegetation Community[2]	Project Site		Total
	On-Site[3]	Off-Site	
Disturbed Habitat (11300)	2.0	0.1	2.1
Developed Land (12000)	0.6	0.1	0.7
TOTAL	**2.6**	**0.2**	**2.8**

1 Acreages rounded to the nearest 0.1 acre.
2 Vegetation community classifications and numerical codes from Holland (1986) and Oberbauer (2008).
3 Subject property, APN 166-184-10.

Disturbed Habitat

Disturbed habitat includes land cleared of vegetation (e.g., dirt roads), land containing a preponderance of non-native plant species such as ornamentals or ruderal exotic species that take advantage of disturbance (previously cleared or abandoned landscaping), or land showing signs of past or present animal usage that removes any capability of providing viable habitat. Within the project site, disturbed habitat consists of bare ground and undeveloped areas that predominantly support non-native plant species such as: Russian thistle (*Salsola tragus*), black mustard (*Brassica nigra*), and non-native grasses.

Developed Land

Developed land includes areas that have been constructed upon or otherwise covered with a permanent, unnatural surface and may include, for example, structures, pavement, irrigated landscaping, or hardscape to the extent that no natural land is evident. These areas no longer support native or naturalized vegetation (Oberbauer 2008). Developed land occurs mapped for the project site includes an existing single-family residence and associated areas, ornamental landscaping, and paved/ concrete areas of the site.

Plants

A total of 14 plant species were observed within the project site during the general biological survey, of which 12 species are non-native (Attachment A).

Animals

A total of nine animal species, including eight bird and one mammal species, were observed or detected within the project site during the general biological survey (Attachment B).

Sensitive Biological Resources

Sensitive Vegetation Communities

Sensitive vegetation communities are those considered rare within the local region or sensitive by CDFW; are listed as sensitive under a regional planning program (MHCP for example); support sensitive plants or animals, and as defined by Section 15380 of the State CEQA Guidelines. They are considered sensitive because they have been depleted, are naturally uncommon, or support sensitive species.

No sensitive vegetation communities were observed on-site during the field survey.

Sensitive Plants

Special status plant species have been afforded special status and/or recognition by the USFWS and/or CDFW. They also include species listed in the CNPS' Inventory of Rare and Endangered Plants. Rare plant status is often based on one or more of three distributional attributes: geographic range, habitat specificity, and/or population size. No sensitive plant species observed on the project site.

Searches of the CNDDB and CNPS online databases for within one mile of the site revealed records of one sensitive plant species recorded and located approximately 0.3 mile southeast of the project site: thread-leaved brodiaea (*Brodiaea filifolia*)(Appendix C). This species is federally listed threatened, state listed endangered, CNPS Rare Plant Rank 1B.1, and is considered a Narrow Endemic per the MHCP. Thread-leaved brodiaea is often associated with valley grasslands, vernal pool habitats, foothill woodlands, coastal sage scrub and chaparral; often found in clay soils. Clay soils are mapped in the southwest corner of the site; however, the site does not support vernal pools, grasslands, or other suitable habitats for this species. Because of the high level of historical and current disturbances of the site, thread-leaved brodiaea is not expected to occur. Based on the disturbed site conditions and lack of natural/suitable habitat, no other sensitive plant species are expected to occur or have potential to occur on-site.

Sensitive Animals

No sensitive animal species were observed or detected within the project site during biological surveys, and no federal or state listed species are expected to occur on-site. The site does support marginally suitable nesting habitat for raptors in the area such as Cooper's hawk (*Accipiter cooperii*), which could use the non-native trees on-site for nesting. However, no raptors or raptor nests were detected on-site during the survey.

Based on searches through CNDDB, USFWS, and other databases for within two miles of the project site, the nearest record is of one sensitive animal species located approximately one mile northeast of the project site: California black rail (*Laterallus jamaicensis coturniculus*) (Appendix D). This species is state listed threatened, a CDFW Fully Protected species, and a USFWS Bird of Conservation Concern. Based on the lack of wetland and aquatic habitats required for this species, California black rail is not expected to occur on-site. Additionally, no other sensitive animal species are expected to occur or have potential to occur on-site based on the existing disturbances, absence of native vegetation/habitat, and lack of site connectivity to larger natural open space (habitat) areas.

Jurisdictional Waters and Wetlands

No potentially jurisdictional resources were observed on-site during the survey. The project site is entirely uplands. No aquatic features (e.g., drainages, ponds/pools, riparian, or wetland vegetation) were found on-site.

Wildlife Corridors and Movement

Wildlife corridors connect otherwise isolated pieces of habitat and allow movement or dispersal of plants and animals. Wildlife corridors can be local or regional in scale. Their functions may vary temporally and spatially based on conditions and species presence. Corridors represent areas where wildlife movement is concentrated due to natural or anthropogenic constraints. Local corridors provide access to resources such as food, water, and shelter. Animals use these corridors in daily routine to move between different habitats. Regional corridors also provide these functions and link two or more large habitat areas providing avenues for wildlife dispersal, migration, and contact between otherwise distinct populations.

The project site does not function as or contribute to a local or regional wildlife corridor. The site is relatively small, does not support native habitat, and is bounded on all sides by urban development. The project site does not provide connectivity to larger contiguous open space areas beyond the site.

REGIONAL AND REGULATORY CONTEXT

The following federal, state, and/or local regulations apply to biological resources on-site.

Federal

Migratory Bird Treaty Act

All migratory bird species native to the United States and its territories are protected under the Migratory Bird Treaty Act (MBTA), as amended. The MBTA mandates protection for eggs and chicks of all migratory bird species but does not stipulate specific protection measures. In common practice, the MBTA is used to place restrictions on disturbance of active bird nests during the nesting season (generally February 1 to August 31). In addition, the USFWS commonly places restrictions on disturbances allowed near active raptor nests.

State of California

California Environmental Quality Act

Primary environmental legislation in California is found in CEQA and its implementing guidelines (State CEQA Guidelines), requiring that projects with potential adverse effects or impacts to the environment undergo environmental review. Adverse impacts to the environment are typically mitigated as a result of the environmental review process in accordance with existing laws and regulations.

California Fish and Game Code

Pursuant to California Fish and Game Code Section 3503, it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto. Raptors and owls and their active nests are protected by California Fish and Game Code Section 3503.5, which states that it is unlawful to take, possess, or destroy any birds of prey or to take, possess, or destroy the nest or eggs of any such bird unless authorized by the CDFW.

Natural Communities Conservation Planning Act

The Natural Communities Conservation Planning (NCCP) program is a cooperative effort to protect habitats and species. It began under the State's NCCP Act of 1991, legislation broader in its orientation and objectives than the CESA or FESA. These laws are designed to identify and protect individual species that have already declined significantly in number. The NCCP Act of 1991 and the associated Southern California Coastal Sage Scrub NCCP Process Guidelines (1993), Southern California Coastal Sage Scrub NCCP Conservation Guidelines (1993), and NCCP General Process Guidelines (1998) have been superseded by the NCCP Act of 2003. The MHCP is an enrolled NCCP program and was adopted in 2003 by the County.

City of Vista

General Plan

The Resource Conservation and Sustainability (RCS) Element of the City's General Plan 2030 (City 2011) provides the following RCS goals and policies applicable to the project site as they relate to conservation of natural resources as well as protection and preservation of sensitive species and their habitats.

RCS Goal 5: Preserve and protect, to the extent practicable, the range of natural biological communities and species native to the City and region; and conserve viable populations of endangered, threatened, and key sensitive species and their habitats.

- RCS Policy 5.1: Continue to require development that is proposed in areas identified or expected to contain sensitive vegetation and wildlife communities to consult with wildlife agencies (i.e., USFWS and CDFG) early in the development review process regarding special status plant and wildlife species; conduct biological assessments, as appropriate; and develop and implement project-specific mitigation measures to mitigate impacts on threatened and endangered species.

- RCS Policy 5.2: In areas that are adjacent to sensitive vegetation and/or wildlife communities, continue to require development, uses, and activities to be designed and managed to ensure minimal impacts to those resources. Examples include but are not limited to the following:

    a. Provide buffers or barriers between the development and the biological resources. Buffers from the edge of the existing natural tree canopy should be established based on scientific analysis of the existing site conditions and the development proposal by a qualified biologist. New buildings or parking areas should not be permitted within any buffer area.

    b. Prohibit parking lots and other developed areas from draining into sensitive resources.

    c. Require land uses that use chemicals or fertilizers or generate by- products that are potentially toxic or harmful to wildlife, sensitive species, and habitats to incorporate measures to mitigate those impacts.

d. Require development to incorporate measures that avoid degradation of habitats from erosion and sedimentation.

e. Ensure that sensitive species are protected from night lighting from nearby development.

f. Mitigate noise impacts from development, uses, or activities on nearby sensitive species through noise reduction measures and /or restriction of hours during the breeding season of sensitive species.

g. Require development that is adjacent to sensitive resources to landscape their sites with native, non - invasive vegetation that is similar to or compatible with the adjacent resources and prohibit horticultural regimes (irrigation, fertilization, pest control, and pruning) that could alter site conditions in natural areas.

h. Enforce fire and brush management plans so that both biological and safety goals are met.

- RCS Policy 5.3: Preserve the integrity of riparian habitat areas, creek corridors, and other drainages that support biological resources and contribute to the overall health of the watershed areas through the preservation and restoration of native plants and the removal of invasive, exotic, and nonnative species.

- RCS Policy 5.4: Preserve, protect, and enhance the City' s urban forest (on both public and private property).

- RCS Policy 5.5: Consider adoption of a tree preservation ordinance to address tree preservation on private property.

- RCS Policy 5. 6: Continue to require the use of native, naturalized, and non-invasive plants and turf to avoid or minimize use of irrigation, fertilizers, and pesticides, and to provide increased wildlife habitats for native species.

- RCS Policy 5.7: To the extent practicable, and as determined by the City, avoid sensitive habitats and species during the planning, design, and construction of new public infrastructure (such as sewers, storm drain and flood control facilities, utilities, and roads), unless alternative locations are not practical.

- RCS Policy 5.8: Maintain and regularly update a database of biological resource information relevant to natural resources in Vista, including regional data sets and more focused field investigations within the City.

RCS Goal 6: Implement the provisions of the regional Multiple Habitat Conservation Plan (MHCP).

- RCS Policy 6.1: Establish and maintain a Biological Preserve Overlay (BPO) reflecting the Focused Planning Area (FPA) in the MHCP to the maximum extent practicable. The BPO shall define lands worthy of protection based on the presence of sensitive vegetation and wildlife communities, orthose lands that support viable wildlife corridors.

- RCS Policy 6.2: Limit land uses within the BPO to only those necessary for the protection of public health and safety, or recreational uses that are consistent with the conservation standards in the MHCP. Biological conservation shall be the primary objective within the BPO whenever potential conflicts with recreational uses arise.

- RCS Policy 6.3: Establish maintenance and management standards for the BPO to ensure permanent conservation. The City's standards shall be based on the applicable standards in Section 6.0 of the Final MHCP (Fire Management; Habitat Restoration; Erosion Control; Landscaping Restrictions; Recreation and Public Access; Fencing, Signs and Lighting; Predator and Exotic Species Control; Hydrology and Flood Control; and Species Reintroduction), subject to the availability of permanent funding.

- RCS Policy 6.4: Adopt a Habitat Conservation Plan (i.e., a Subarea Plan) covering, at minimum, the BPO and enter into an Implementing Agreement with the Wildlife Agencies, subject to the availability of permanent funding.

- RCS Policy 6.5: Use the mitigation ratios established in the MHCP for impacts to sensitive biological habitats.

- RCS Policy 6.6: Integrate the City's conservation planning efforts with watershed planning, GHG reductions, and other regional planning efforts involving natural resources when possible in order to maximize opportunities for grant funding for conservation purposes.

RCS Goal 7: Conserve, enhance, and restore, to the extent practicable, open space areas for the protection of wildlife habitats and plant and animal species.

- RCS Policy 7.1: Acquire or otherwise protect, where possible, open space and other properties that contain or protect significant sensitive resources, such as special-status plant and wildlife species know to occur in or near the City, natural habitats, and habitat linkages. Primary consideration shall be given to those properties within the City's BPO. Actions may include but are not limited to:

    a. Acquire private land with significant natural habitat or sensitive resources, assuming the seller is willing and that funding is available.

    b. Encourage the County, state, and federal government, or other conservation agency dedicated to the City’s conservation goals, to acquire private land with significant natural habitat or sensitive resources, assuming the seller is willing.

    c. Enforce state and federal conservation and avoidance regulations, through the development review process, for all new development projects on private property that may potentially impact affect natural vegetation communities or biological resources within the City.

d. Acquire easement rights or establish agreements with public utilities to ensure the protection of natural habitats or sensitive resources within existing or planned utility easements.

e. Require privately owned open space designed as an integral part of a new development to be designated Open Space (OS) on the Land Use Map.

- RCS Policy 7.2: Cooperate with other municipalities and the County to strive to acquire or otherwise protect open space areas that provide key habitat linkages and wildlife movement corridors on a regional level.

Multiple Habitat Conservation Program

The City is part of the MHCP, which is a comprehensive, multiple jurisdictional planning program to address sensitive species and develop an ecosystem preserve in northwestern San Diego County. Implementation of the MHCP regional preserve system is intended to protect viable populations of key sensitive plant and animal species and their habitats, while accommodating continued economic development and quality of life for residents of north county (AMEC 2003). The City is required to develop a subarea plan in order to obtain take authorizations provided by the MHCP. The City is collaborating with other north county jurisdictions and is in the process of preparing a subarea plan (City 2011). Thus, guidance contained within the MHCP is advisory, but is considered for regional context by the City and is implemented through the General Plan as discussed above.

PROJECT EFFECTS AND PROPOSED MITIGATION MEASURES

For the purpose of evaluating potential project effects and as prescribed by the Issues in CEQA Appendix G Section IV Biological Resources, the proposed project would result in a significant impact if it would:

1. Have a substantial adverse effect, either directly or through habitat modifications, on any candidate, sensitive, or special status species in local or regional plans, policies, or regulations or by the USFWS or CDFW;

2. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by USFWS or CDFW;

3. Have a substantial adverse effect on federally protected wetlands as defined by Clean Water Act Section 404;

4. Interfere substantially with movement of any native resident, migratory fish, or wildlife species, or established native resident or migratory wildlife corridors; or impede use of native wildlife nursery sites;

5. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or

6. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state conservation plan.

IMPACTS

This section describes potential direct and indirect affects (impacts) on biological resources associated with the proposed project. Direct impacts are immediate impacts and typically result in permanent removal. Direct impacts for the project were quantified by overlaying the limits of project-related ground disturbance on the biological resources map of the site (Figure 7, *Project Impacts*). Indirect impacts are actions that are not direct removal of resources but affect the surrounding resources either as a secondary effect of the direct impacts (e.g., construction noise, runoff, nighttime lighting, fugitive dust, etc.) or as the cause of degradation of a biological resource over time (e.g., edge/adjacency effects). The magnitude of an indirect impact can be the same as a direct impact; however, the effect usually takes a longer time to become apparent.

Issue 1 – Sensitive Species

Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS?

Issue 1 Analysis of Project Effects

Less than Significant Impact with Mitigation. Potential impacts to special status plants and animals are not expected. Because the project site contains trees, shrubs, and other vegetation that provide suitable nesting habitat for common birds, including raptors, protected under the MBTA and CFG Code the project could result in adverse impacts (both direct and/or indirect) to nesting if project activities such as demolition, clearing, grubbing, or grading are implemented during the general nest season (January 15 to September 15) and nesting is found in the area. Impacts to nesting birds, including raptors, would be a violation of the MBTA and CFG Code and are considered significant. Potential impacts to nesting birds and raptors would be avoided or reduced to less than significant levels through implementation of mitigation measure **BIO-1**.

Issue 1 Mitigation Measures

BIO-1 **Pre-Construction Surveys for Avian Nesting.** Project construction activities (demolition, grading, clearing, grubbing) shall be conducted between September 16 and January 31, which is outside of the nesting season for birds and raptors. If initial grading and vegetation removal activities (i.e., earthwork, clearing, and grubbing) must occur during the general bird nesting season (January 15 to September 15), the project applicant shall retain a qualified biologist to conduct a pre-construction survey for nesting birds and raptors. The survey shall be completed no more than three days prior to the beginning of demolition or other construction impacts. If the survey concludes no active bird or raptor nesting, then project activities shall be allowed to proceed without any further requirements. If active bird nests are confirmed to be present during the pre-construction survey, then a buffer zone shall be established by the biologist. Construction activities shall avoid any active nests until a qualified biologist has verified that the young have fledged, or the nest has otherwise become inactive.

Issue 2 – Sensitive Natural Communities

Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the CDFW or USFWS?

Issue 2 Analysis of Project Effects

No Impact. The proposed project would not have any direct or indirect impacts to sensitive vegetation communities. No sensitive natural communities occur or adjacent to the project site. Project impacts would encompass disturbed habitat and developed land only, neither of which are considered sensitive or require mitigation (Figure 7).

Issue 2 Mitigation Measures

No mitigation required.

Issue 3 – Wetlands

Would the project have a substantial adverse effect on federally-protected wetlands as defined by Section 404 of the federal Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

Issue 3 Analysis of Project Effects

No impact. The project site is entirely upland. There are no wetlands or other potentially jurisdictional aquatic resources on-site or adjacent to the site (Figure 7). No federally protected wetlands or other jurisdictional resources occur within or adjacent to the project site.

Issue 3 Mitigation Measures

No mitigation required.

Issue 4 – Wildlife Movement and Nursery Sites

Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

Issue 4 Analysis of Project Effects

No Impact. The project site is entirely uplands and does not support aquatic resources to support fish. The uplands on-site are classified as developed and disturbed, which do not reflect suitable habitat for wildlife or nursery sites. Because the project site is urban, is surrounded by existing development, and there is no connectivity with natural habitats beyond the site, the project would not interfere with any corridors for local wildlife movement.

Issue 4 Mitigation Measures

No mitigation is required.

Issue 5 – Local Policies and Ordinances

Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

Issue 5 Analysis of Project Effects

No impact. The City does not have a tree preservation policy or other ordinance for the protection of biological resources. The City's adopted General Plan does outline policies for protecting and preserving biological resources in the City; however, because there are no native vegetation communities, natural biological resources, or sensitive species on-site, the project would result in no impact to biological resources and would not conflict with the City's General Plan in this regard.

Issue 5 Mitigation Measures

No mitigation is required.

Issue 6 – Adopted Conservation Plans

Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Conservation Community Plan, or other approved local, regional, or state habitat conservation plan?

Issue 6 Analysis of Project Effects

No Impact. The project would not conflict with an adopted NCCP or other adopted Conservation Plan. The project does occur within the boundaries of the North County MHCP, particularly in the Vista Subarea, which has not yet been approved or adopted. Because implementation of the North County MHCP requires the adoption of individual subarea plans and the Vista subarea plan remains in draft form as of the date of this report, the requirements and guidelines are not applicable to the proposed project. The City's adopted General Plan provides direction and policies per the MHCP for protection and conservation biological resources (see Issue 5 above); however, because no natural biological resources or sensitive species occur on-site, implementation of the proposed project would not conflict with these conservation policies. Implementation of the project would not preclude or prevent finalizing and adoption of the Vista subarea plan.

Issue 6 Mitigation Measures

No mitigation is required.

CONCLUSION

The proposed project would result in less than significant impacts to biological resources, specifically nesting birds/raptors. The timing of project construction and adherence with the mitigation measure listed above, would ensure potential impacts to biological resources are avoided and remain below a level of significance. Please contact me at (619) 462-1515 or ThomasL@helixepi.com if you have questions or need assistance with project mitigation compliance.

Sincerely,

Thomas Liddicoat
Biology Project Manager/Senior Biologist

Enclosures:

Figure 1 Regional Location
Figure 2 USGS Topography
Figure 3 Aerial Photograph of Project Location
Figure 4 Project Site Plan
Figure 5 Soils
Figure 6 Vegetation Communities
Figure 7 Project Impacts

Attachment A Plant Species Observed
Attachment B Animal Species Observed or Detected
Attachment C Plant Species Potential to Occur
Attachment D Plant Species Potential to Occur

REFERENCES

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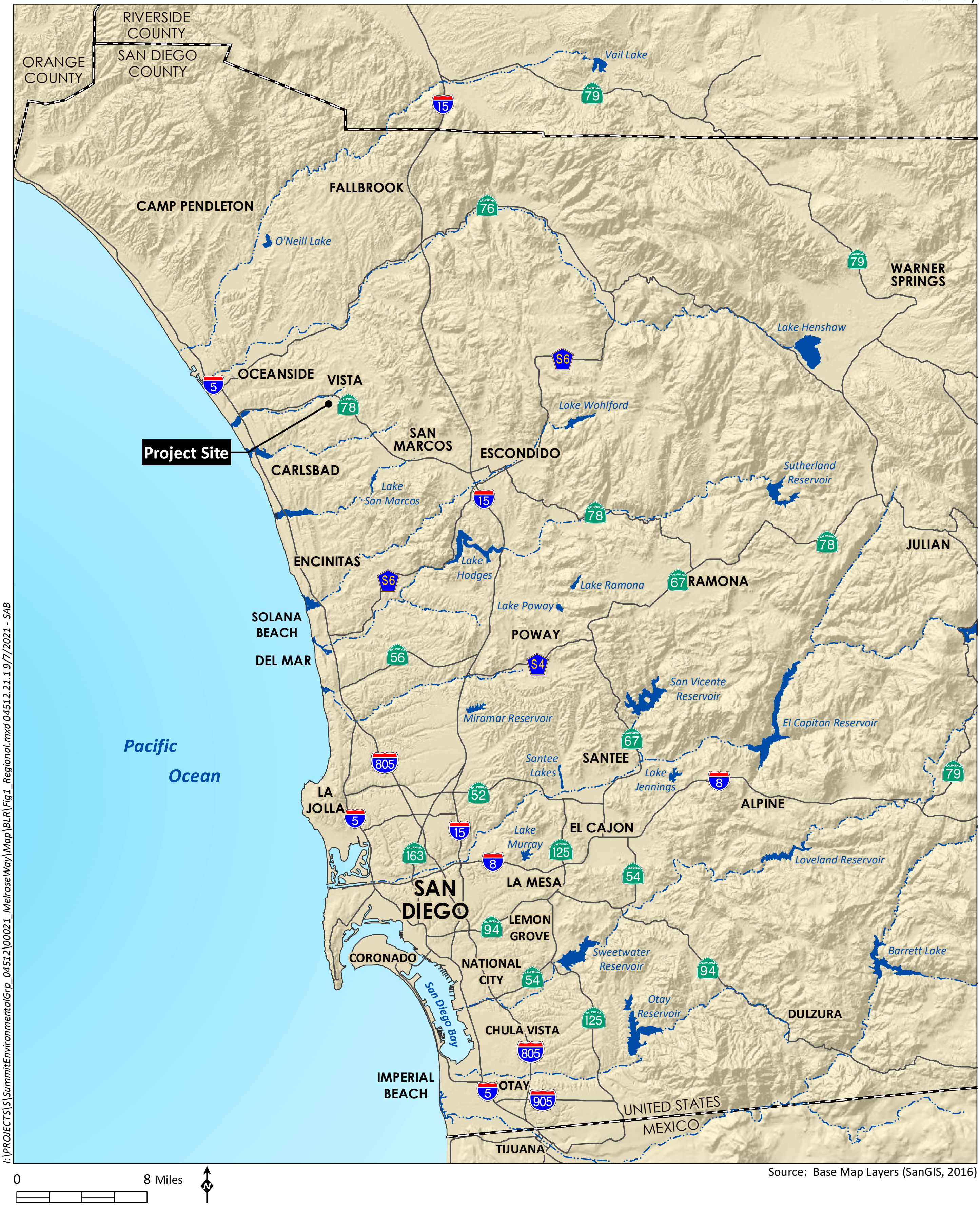

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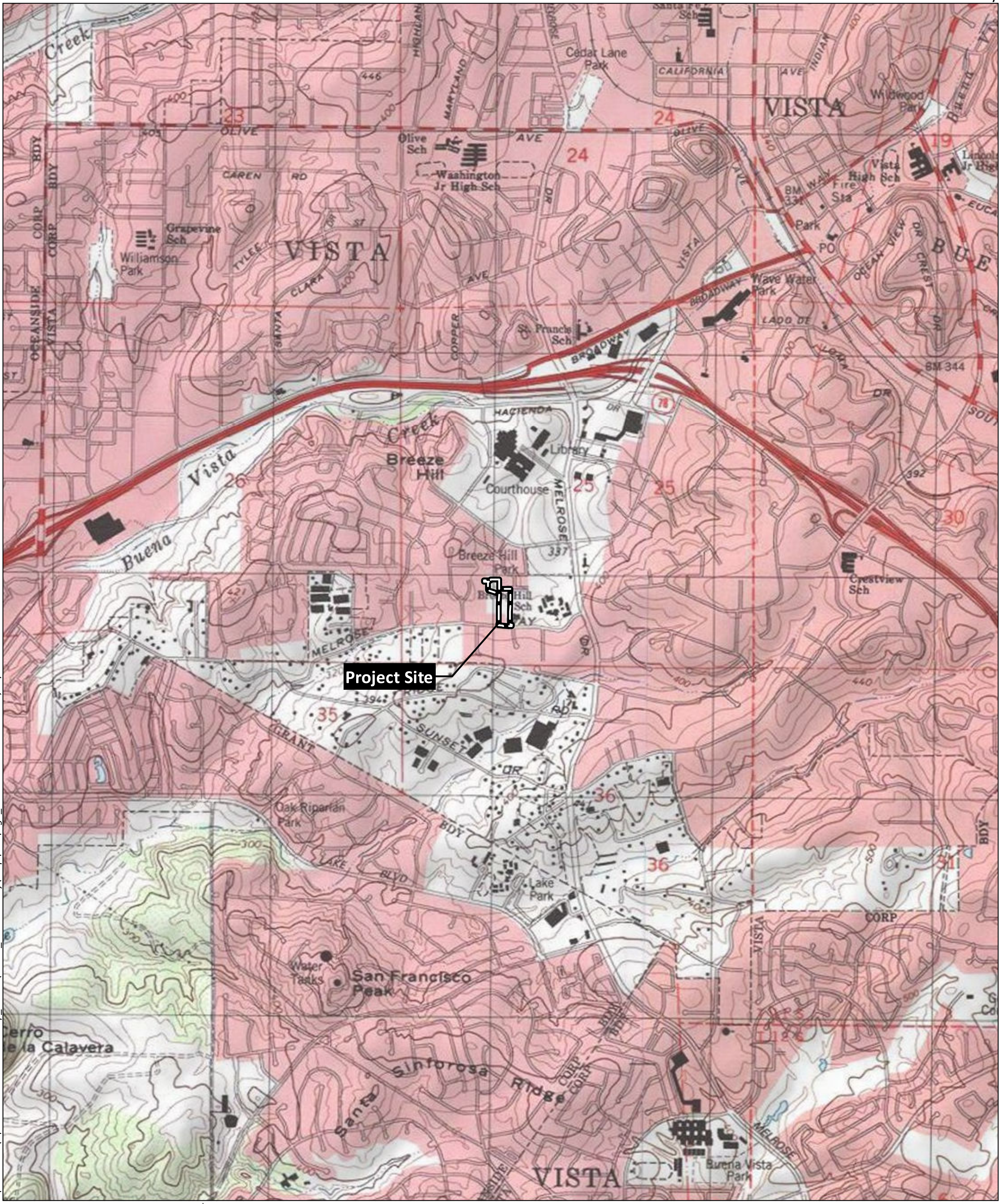
Source: Base Map Layers (SanGIS, 2016)

HELIX Environmental Planning

Regional Location

Figure 1



Source: SAN LUIS REY 7.5' Quad (USGS)

0 2,000 Feet

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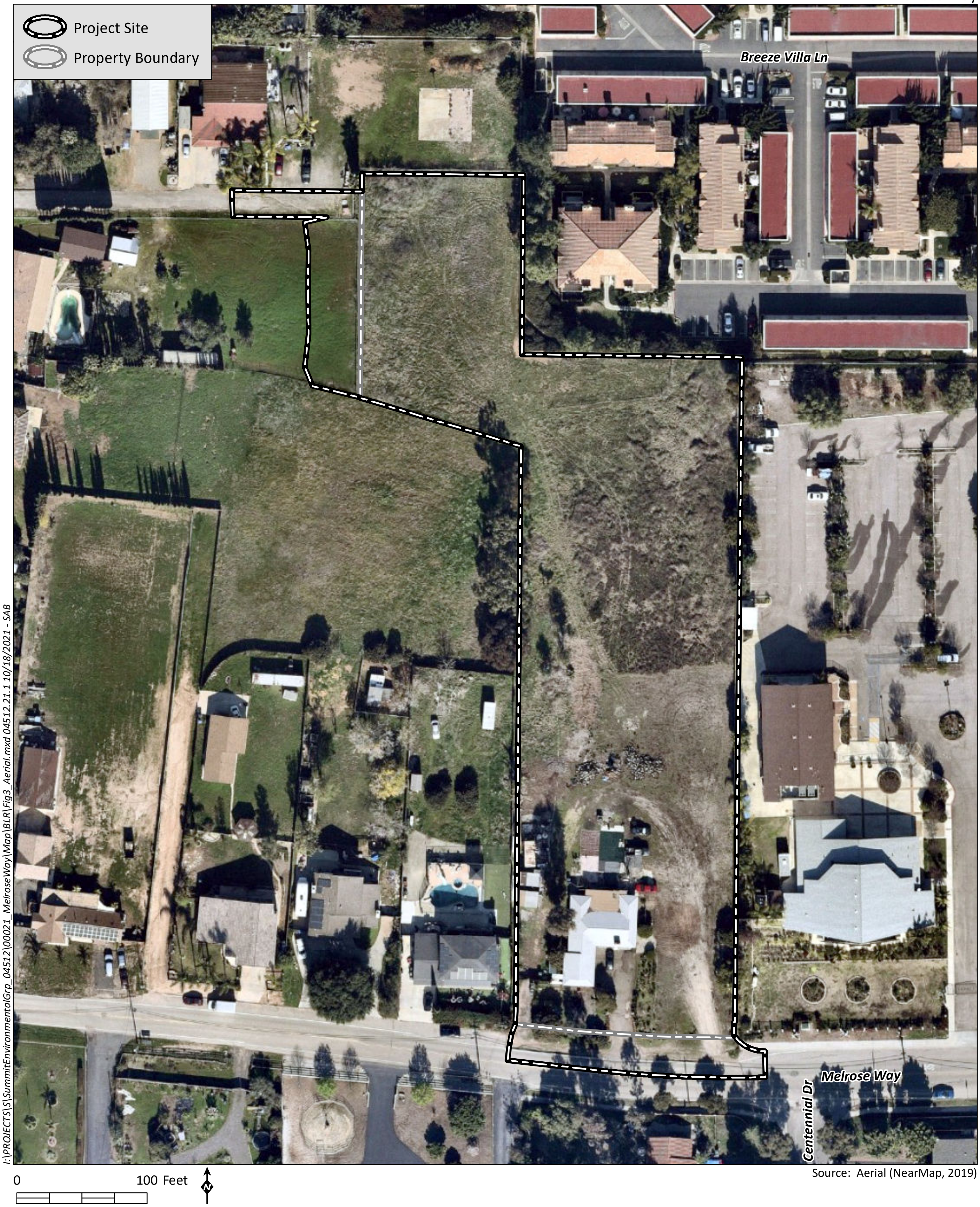
HELIX Environmental Planning

USGS Topography

Figure 2



Source: Aerial (NearMap, 2019)

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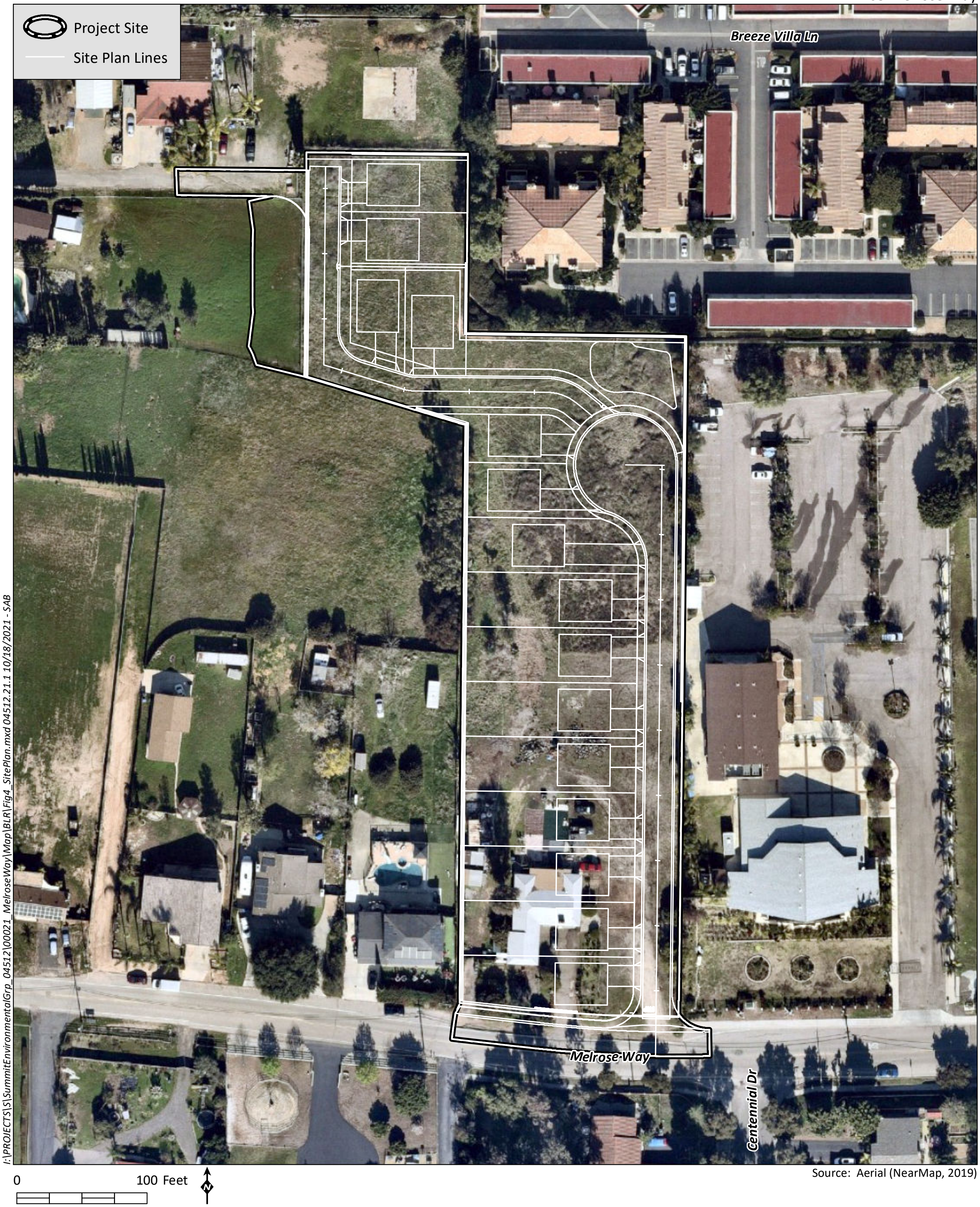
Environmental Planning

Aerial Photograph of Project Location

Figure 3

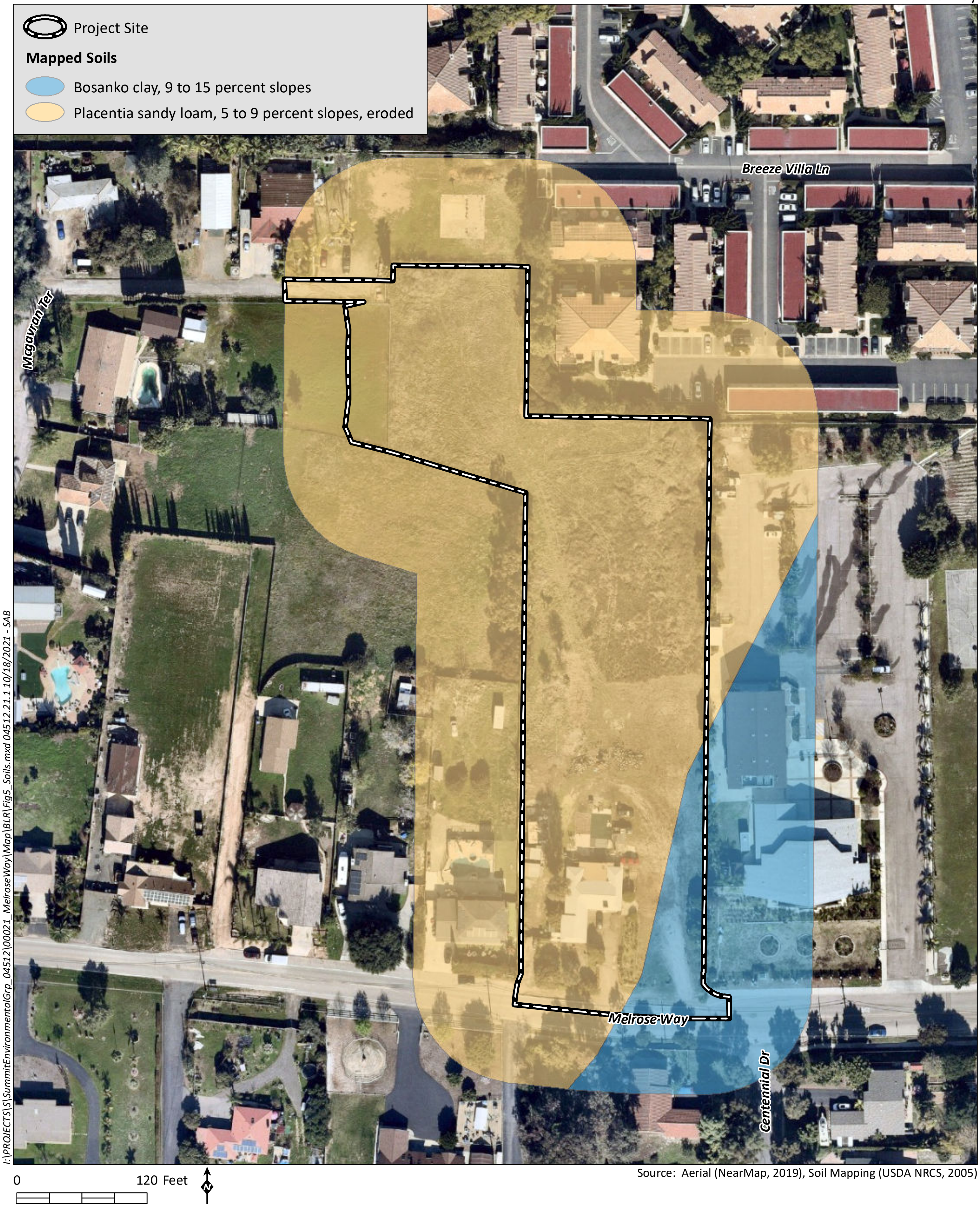


Source: Aerial (NearMap, 2019)

HELIX
Environmental Planning

Project Site Plan

Figure 4

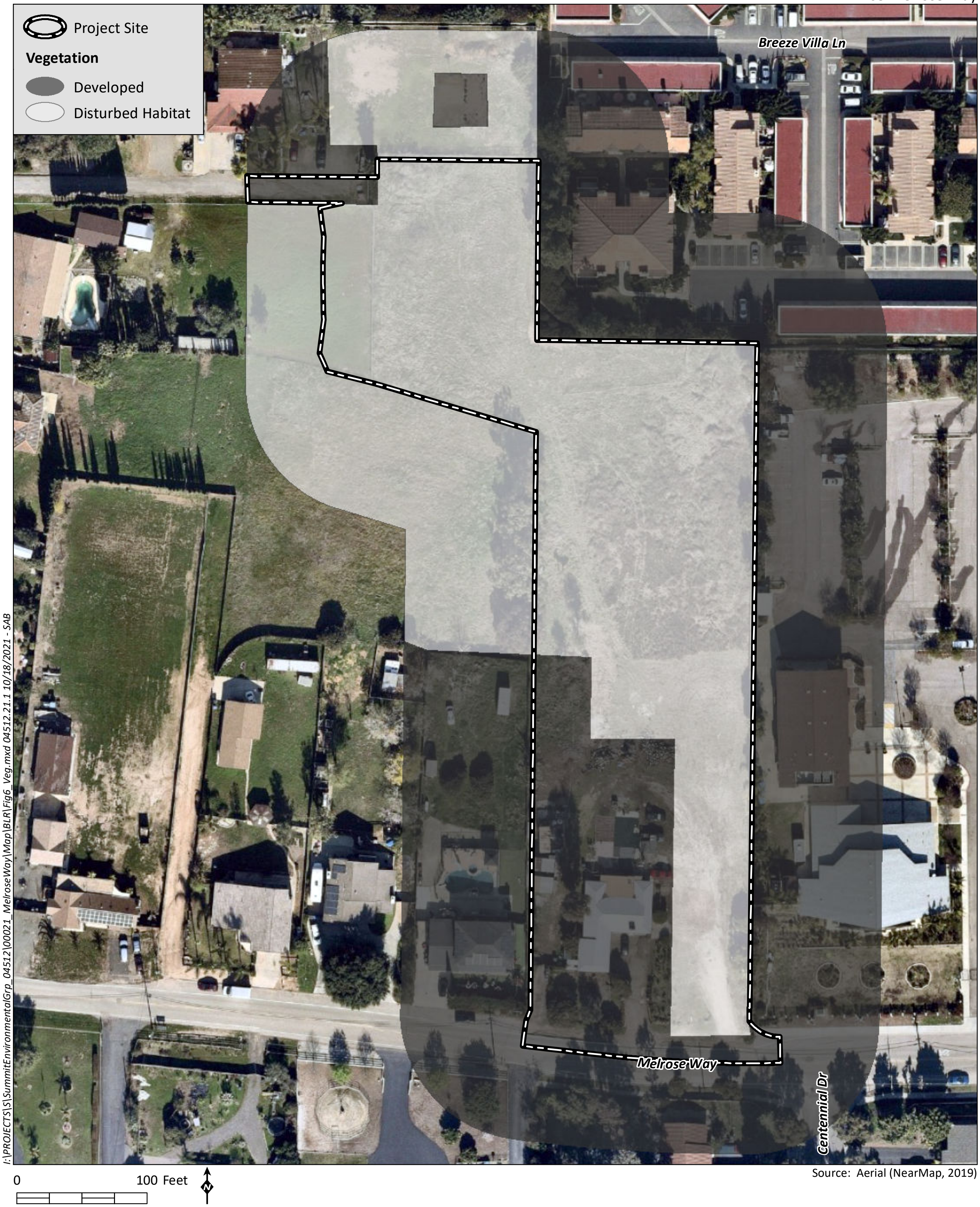


Source: Aerial (NearMap, 2019), Soil Mapping (USDA NRCS, 2005)

HELIX Environmental Planning

Soils

Figure 5



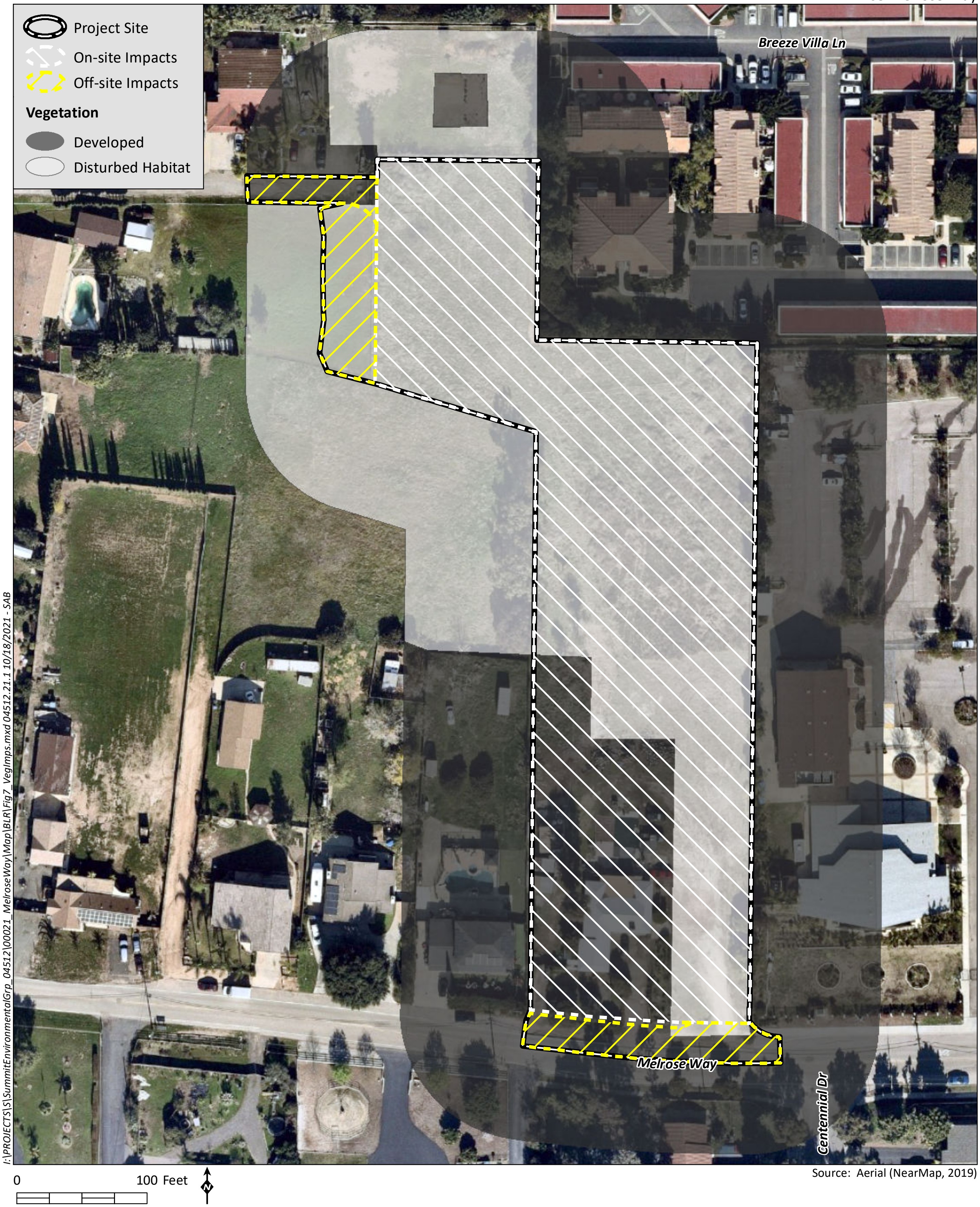
I:\PROJECTS\S\SummitEnvironmentalGrp_04512\00021_MelroseWay\Map\BLR\Fig6_Veg.mxd 04512.21.1 10/18/2021 - SAB

Source: Aerial (NearMap, 2019)

HELIX Environmental Planning

Vegetation Communities

Figure 6



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Source: Aerial (NearMap, 2019)

HELIX
Environmental Planning

Project Impacts

Figure 7

Attachment A

Plant Species Observed

Attachment A
Plant Species Observed

Family	Scientific Name*	Common Name
Dicots		
Anacardiaceae	*Schinus terebinthifolius**	Brazilian pepper tree
Arecaceae	*Washingtonia robusta**	Mexican fan palm
Asteraceae	*Cynara cardunculus**	artichoke thistle
	Heterotheca grandiflora	telegraph weed
	*Sonchus oleraceus**	common sow thistle
Brassicaceae	*Brassica nigra**	black mustard
Chenopodiaceae	*Salsola tragus**	Russian thistle
Fabaceae	*Acacia* sp.*	wattle
Myrtaceae	*Eucalyptus* sp.*	eucalyptus
Polygonaceae	*Rumex crispus**	curly dock
Vitaceae	*Vitis* sp.	grape
Monocots		
Strelitziaceae	*Strelitzia nicolai**	giant bird of paradise
Poaceae	*Bromus hordeaceus**	soft chess
	*Bromus madritensis**	foxtail chess

*Non-native Species

Attachment B

Animal Species Observed or Detected

Attachment B
Animal Species Observed or Otherwise Detected

Taxon		Scientific Name	Common Name
Order	Family		
VERTEBRATES			
Birds			
Apodiformes	Trochilidae	*Calypte anna*	Anna's Hummingbird
Columbiformes	Columbidae	*Zenaida macroura*	Mourning Dove
Passeriformes	Corvidae	*Corvus brachyrhynchos*	American Crow
		Corvus corax	Common Raven
	Emberizidae	*Melozone crissalis*	California Towhee
	Fringillidae	*Haemorhous mexicanus*	House Finch
	Tyrannidae	*Sayornis saya*	Say's Phoebe
	Tyrannidae	*Tyrannus vociferans*	Cassin's Kingbird
Mammals			
Rodentia	Sciuridae	*Otospermophilus beecheyi*	California ground squirrel

Attachment C

Plant Species Potential to Occur

Attachment C
Special Status Plant Species Potential to Occur

Species	Status[1]	Habit, Ecology and Life History	Potential to Occur[2]
Red sand-verbena (*Abronia maritima*)	--/-- CRPR 4.2	Perennial herb. Occurs in coastal dunes. Elevation: below 328 feet (100 meters). Flowering period: February to December.	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.
Chaparral sand-verbena (*Abronia villosa* var. *aurita*)	--/-- CRPR 1B.1	Annual herb. Grows on desert dunes and in sandy areas within coastal scrub, chaparral. Found along the coast from Ventura County south to San Diego County, and east to San Bernardino, Riverside, and Imperial Counties. Flowering period: March to September. Elevation: 245 to 5,250 feet (75 to 1,600 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.
San Diego thorn-mint *(Acanthomintha ilicifolia)*	FT/CE CRPR 1B.1 MHCP Covered	Annual herb. Typically grows on clay soils within chaparral, coastal scrub, valley and foothill grassland, and vernal pools. Found in San Diego County. Flowering period: April to June. Elevation: below 30 to 3,150 feet (10 to 960 meters).	**Low.** Suitable clay soils are present within the project site, however there are not suitable habitats for this species as site has been historically altered/disturbed.
Nuttall's lotus (*Acmispon prostratus*)	--/-- CRPR 1B.1 MHCP Covered	Annual herb. Grows on coastal dunes and sandy areas coastal scrub in San Diego County. Flowering Period: March to June. Elevation: below 35 feet (10 meters).	**None.** Suitable sandy dune habitat is absent from the project site, and the site is located above the species known elevation range.
California adolphia (*Adolphia californica*)	--/-- CRPR 2B.1	Perennial shrub. Most often found in coastal scrub but occasionally occurs in peripheral chaparral habitats, particularly hillsides near creeks on clay soils. Found in San Diego County. Flowering period: December to May. Elevation: 30 to 2,430 feet (10 to 740 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.
San Diego ambrosia (*Ambrosia pumila*)	FE/-- CRPR 1B.1	Perennial herb. Occurs on sandy loam or clay, sometimes alkaline, soils within grasslands, dry drainages, stream floodplain terraces, and vernal pool margins. Also occurs on slopes, disturbed places, and in coastal sage scrub or chaparral. Found in Riverside and San Diego Counties. Flowering period: April to October. Elevation: 65 to 1,360 feet (20 to 415 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.

Attachment C (cont.)
Special Status Plant Species Potential to Occur

Species	Status[1]	Habit, Ecology and Life History	Potential to Occur[2]
Aphanisma (*Aphanisma blitoides*)	--/-- CRPR 1B.2 MSCP Covered	Annual herb. Occurs on sandy or gravelly soils within coastal dunes, coastal bluff scrub, and coastal scrub. Found along the coast from Santa Barbara County south to San Diego County and the Channel Islands. Flowering period: June to September. Elevation: below 656 feet (305 meters).	**Low.** Suitable sandy soils are present within the project site, however suitable coastal dune or scrub habitat is absent and there are no documented occurrences within the immediate project vicinity.
Del Mar manzanita (*Arctostaphylos glandulosa* ssp. *crassifolia*)	FE/-- CRPR 1B.1 MHCP Covered	Perennial shrub. Occurs within relatively open, coastal chaparral and maritime chaparral on sandy soils. At occasional inland sites it occurs in denser mixed chaparral vegetation. Found in San Diego County. Flowering Period: December to June. Elevation: below 1,200 feet (365 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.
San Diego sagewort (*Artemisia palmeri*)	--/-- CRPR 4.2	Perennial herb. Typically found along stream courses, often beneath riparian woodland, on sandy and mesic soils. May occur in coast live oak woodland, coastal sage scrub, and southern mixed chaparral. Found in San Diego County Flowering period: June to October. Elevation: 50 to 3,000 feet (15 to 915 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.
Coulter's saltbush (*Atriplex coulteri*)	--/-- CRPR 1B.2	Perennial herb. Occurs on alkaline or clay soils within coastal dunes, coastal bluffs, coastal sage scrub, and grasslands. Found along the coastal regions from Santa Luis Obispo County south to San Diego County, western portions of San Bernardino and Riverside Counties, and the Channel Islands. Flowering period: March to October. Elevation: below 1,510 feet (460 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.
South coast saltscale (*Atriplex pacifica*)	--/-- CRPR 1B.2	Annual herb. Found coastally on dunes and within playas in alkali sinks, sage scrub, and wetland riparian communities. Found along the coastal regions from Santa Barbara County south to San Diego County, western portions of San Bernardino and Riverside Counties, and the Channel Islands. Flowering period: March to October. Elevation: below 460 feet (140 meters).	**None.** Suitable wetland habitat is absent from the project site.

Attachment C (cont.)
Special Status Plant Species Potential to Occur

Species	Status[1]	Habit, Ecology and Life History	Potential to Occur[2]
San Diego County viguiera (*Bahiopsis laciniata*)	--/-- CRPR 4.3	Perennial shrub. Occurs on a variety of soil types within coastal sage scrub in San Diego County. Generally, shrub cover is more open than at mesic, coastal locales supporting sage scrub. Found along the coastal regions from Ventura County south to San Diego County and western Riverside County. Flowering period: February to August. Elevation: 295 to 2,461 feet (90 to 750 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.
San Diego goldenstar (*Bloomeria clevelandii*)	--/-- CRPR 1B.1	Perennial bulbiferous herb. Occurs in valley grasslands and coastal scrub, particularly near mima mound topography or in the vicinity of vernal pools, on clay soils. Found in Riverside and San Diego Counties. Flowering period: April to May. Elevation: 160 to 1,525 feet (50 to 465 meters).	**Low.** Suitable clay soils are present within the project site, however there are not suitable habitats for this species as site has been historically altered/disturbed.
Thread-leaved brodiaea (*Brodiaea filifolia*)	FT/SE CRPR 1B.1	Perennial herb. Often associated with vernal pools. Also occurs within playas, grasslands, coastal scrub, openings in chaparral, and cismontane woodland; often on clay soils. Found in Los Angeles, Orange, San Bernardino, Riverside, and San Diego Counties. Flowering period: March to June. Elevation: 80 to 3,675 feet (25 to 1,120 meters).	**Low.** Suitable clay soils are present within the project site, however there are not suitable habitats for this species as site has been historically altered/disturbed.
Orcutt's brodiaea (*Brodiaea orcuttii*)	--/-- CRPR 1B.1	Perennial bulbiferous herb. Occurs within closed-cone coniferous forest, chaparral, cismontane woodland, meadows and seeps, valley and foothill grassland, and vernal pools. Prefers mesic or clay soils. Found in Riverside San Diego Counties. Flowering period: May to July. Elevation: 98 to 5,550 feet (30 to 1,692 meters).	**Low.** Suitable clay soils are present within the project site, however there are not suitable habitats for this species as site has been historically altered/disturbed.
Wart-stemmed ceanothus (*Ceanothus verrucosus*)	--/-- CRPR 2B.2 MHCP Covered	Perennial shrub. Found on rocky slopes within chaparral, particularly southern maritime chaparral. Found in Riverside and San Diego Counties. Flowering period: December to May. Elevation: below 1,245 feet (380 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.
Smooth tarplant (*Centromadia pungens* ssp. *laevis*)	--/-- CRPR 1B.1	Annual herb. Occurs on alkaline soils in chenopod scrub, meadows and seeps, playas, riparian woodland, and valley and foothill grassland. Found in San Bernardino, Los Angeles, Riverside, and San Diego Counties. Flowering Period: April to September. Elevation: below 2,100 feet (640 meters).	**None.** Suitable saline and wetland habitat is absent from the project site and the species has not been previously recorded within the immediate vicinity.

Attachment C (cont.)
Special Status Plant Species Potential to Occur

Species	Status[1]	Habit, Ecology and Life History	Potential to Occur[2]
Orcutt's pincushion (*Chaenactis glabriuscula* var. *orcuttiana*)	--/-- CRPR 1B.1	Annual herb. Found on coastal dunes and sandy areas within coastal bluff scrub. Typically, in proximity to moist ocean breezes from Ventura County south to San Diego County. Elevation: below 330 feet (100 meters). Flowering Period: January to August.	**None.** Suitable sandy soils are present; however, the project site is located above the species known elevation range, and this species has not previously been recorded nearby.
Summer holly (*Comarostaphylis diversifolia* ssp. *diversifolia*)	--/-- CRPR 1B.2 MHCP Covered	Perennial shrub. Occurs in chaparral and cismontane woodland. Found in Santa Barbara, Orange, Riverside, and San Diego Counties. Flowering period: April to June. Elevation: 95 to 2,590 feet (30 to 790 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.
Small-flowered morning-glory (*Convolvulus simulans*)	--/-- CRPR 4.2	Annual herb. Occurs on clay soils and serpentinite seeps in openings within chaparral, coastal scrub, and native grassland. Found within the San Francisco Bay area, San Joaquin Valley, western Sierra Nevada foothills, along the coast of southern California, the Channel Islands, and the western Transverse and Peninsular Ranges. Flowering period: April to June. Elevation: 95 to 2,430 feet (30 to 740 meters).	**Low.** Suitable clay soils are present within the project site, however there are not suitable habitats for this species as site has been historically altered/disturbed.
Del Mar Mesa sand aster (*Corethrogyne filaginifolia* var. *linifolia*)	--/-- CRPR 1B.1 MHCP Covered	Perennial herb. Found on sandy soils and disturbed areas within southern maritime chaparral, coastal sage scrub, and coastal bluffs. Found in San Diego County. Flowering Period: May to September. Elevation: 45 to 490 feet (15 to 150 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.
Wiggins' cryptantha (*Cryptantha wigginsii*)	--/-- CRPR 1B.2	Annual herb. Occurs in coastal scrub habitat, often in clay soils. Flowering period: February to June. Elevation: 65 to 900 feet (20 to 275 meters).	**Low.** Suitable clay soils are present within the project site, however there are not suitable habitats for this species as site has been historically altered/disturbed.
Western dichondra (*Dichondra occidentalis*)	--/-- CRPR 4.2	Perennial herb. Found among rocks and shrubs within grasslands, coastal sage scrub, chaparral, and oak woodlands. Often proliferates on recently burned slopes. Found along the coastal regions from San Luis Obispo County south to San Diego County. Flowering period: March to July. Elevation: 165 to 1,640 feet (50 to 500 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.

Attachment C (cont.)
Special Status Plant Species Potential to Occur

Species	Status[1]	Habit, Ecology and Life History	Potential to Occur[2]
Blochman's dudleya (*Dudleya blochmaniae* ssp. *blochmaniae*)	--/-- CRPR 1B.1	Perennial succulent. Grows on open, rocky slopes, often on serpentine or clay dominated soils in coastal sage scrub and valley grassland communities. Found along the coast from San Luis Obispo south to San Diego County. Flowering period: April to June. Elevation: 15 to 1,475 feet (5 to 450 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.
Sticky dudleya (*Dudleya viscida*)	--/-- CRPR 1B.2	Perennial succulent. Occurs in rocky areas within coastal bluffs, coastal sage scrub, chaparral, and woodlands. Grows primarily on very steep north-facing slopes. Found in Orange, Riverside, and San Diego Counties. Flowering period: May to June. Elevation: 30 to 1,805 feet (10 to 550 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.
San Diego button celery (*Eryngium aristulatum* var. *parishii*)	FE/SE CRPR 1B.1	Annual or perennial herb. Grows in vernal pools and other mesic areas, such as marshes. Found in Los Angeles, Orange, Riverside, and San Diego Counties. Flowering period: April to June. Elevation: 65 to 2,035 feet (20 to 620 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.
Sand-loving wallflower (*Erysimum ammophilum*)	--/-- CRPR 1B.2	Perennial herb. Found in open areas and sandy soils within coastal dunes, coastal strand, coastal sage scrub, and maritime chaparral. Found within northern Monterey County, San Diego County, and the northern Channel Islands. Flowering Period: February to June. Elevation: below 195 feet (60 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.
Cliff spurge (*Euphorbia misera*)	--/-- CRPR 2B.2	Perennial shrub. Found in rocky areas of coastal bluffs, coastal sage scrub, and Mojave desert scrub. Found in Riverside, Orange, and San Diego Counties and the Channel Islands. Flowering period: December to August. Elevation: 30 to 1,640 feet (10 to 500 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.
San Diego barrel cactus (*Ferocactus viridescens*)	--/-- CRPR 2B.1 MHCP Covered	Perennial (stem succulent) shrub. Grows in sandy to rocky areas within chaparral, valley grassland and coastal sage scrub communities. Found in San Diego County Flowering period: May to June. Elevation: 5 to 492 feet (3 to 450 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.

Attachment C (cont.)
Special Status Plant Species Potential to Occur

Species	Status[1]	Habit, Ecology and Life History	Potential to Occur[2]
Palmer's grapplinghook (*Harpagonella palmeri*)	--/-- CRPR 4.2	Annual herb. Found in clay soils in annual grasslands and coastal sage scrub. Flowering Period: March to May. Elevation: 65 to 3,100 feet (20 to 955 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.
Orcutt's hazardia (*Hazardia orcuttii*)	--/ST CRPR 1B.1 MHCP Covered	Perennial shrub. Often grows on clay soils within coastal sage scrub and southern maritime chaparral. Found in San Diego County. Flowering period: August to October. Elevation: 260 to 280 feet (80 to 85 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.
Decumbent goldenbush (*Isocoma menziesii* var. *decumbens*)	--/-- CRPR 1B.2	Perennial shrub. Occurs in sandy soil and disturbed areas on the inland side of dunes, hillsides, and arroyos within coastal sage scrub and chaparral communities. Found in along the coast of southern California, Peninsular Ranges, and Channel Islands. Flowering period: July to November. Elevation: below 656 feet (200 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.
San Diego marsh-elder (*Iva hayesiana*)	--/-- CRPR 2B.2 MHCP Covered	Perennial herb. Found in alkaline flats, depressions, and streambanks within wetland communities in San Diego County. Flowering period: April to October. Elevation: 30 to 1,640 feet (10 to 500 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.
Southwestern spiny rush (*Juncus acutus* ssp. *leopoldii*)	--/-- CRPR 4.2	Perennial herb. Found in moist saline environments such as alkaline seeps and meadows, and coastal salt marshes and swamps. Found along the coastal regions from San Luis Obispo south to San Diego County. Flowering period: May to June. Elevation: below 984 feet (300 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.
Robinson's pepper-grass (*Lepidium virginicum* var. *robinsonii*)	--/-- CRPR 4.3	Annual herb. Grows in openings of sage scrub and chaparral at the coastal and foothill elevations throughout California. Typically observed in relatively dry, exposed locales rather than beneath a shrub canopy. Also, found in disturbed areas. Flowering period: March to June. Elevation: below 9,186 feet (2,800 meters).	**Low.** No suitable habitat for this species as the site has been historically altered/disturbed.

Attachment C (cont.)
Special Status Plant Species Potential to Occur

Species	Status[1]	Habit, Ecology and Life History	Potential to Occur[2]
Sea dahlia (*Leptosyne maritima*)	--/-- CRPR 2B.2	Perennial herb. Occurs within coastal scrub and coastal bluffs scrub in San Diego County. Flowering period: March to May. Elevation: below 490 feet (150 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.
Little mousetail (*Myosurus minimus* ssp. *apus*)	--/-- CRPR 3.1 MHCP Covered	Annual herb. Occurs in alkaline vernal pools within native grassland. Flowering period: March to June. Found within San Joaquin Valley south to San Diego County and east to western Riverside and San Bernardino Counties. Elevation: 65 to 2,100 feet (20 to 640 meters).	**None.** Suitable alkaline soils and vernal wetland habitat is absent from the project site and the species has not been previously recorded nearby.
Mud nama (*Nama stenocarpa*)	--/-- CRPR 2B.2	Annual herb. Occurs in intermittently wet areas such as streambanks and muddy lake edges. Found in the San Joaquin Valley, southern coast, Peninsular Ranges, Sonoran Desert, and Channel Islands. Flowering period: January to July. Elevation: 15 to 1,640 feet (5 to 500 meters).	**None.** Suitable fringe wetland habitat is absent from the project site and the species has not been previously recorded nearby.
Spreading navarretia (*Navarretia fossalis*)	FT/-- CRPR 1B.1 MHCP Covered	Annual herb. Occurs in vernal pools, vernal swales, roadside depressions, playas, marshes and swamps, and chenopod scrub. Population size is strongly correlated with rainfall. Depth of pool appears to be a significant factor as this species is rarely found in shallow pools. Found in the Mojave Desert, desert mountains, Channel Islands, and the Transverse and Peninsular Ranges. Flowering period: April to June. Elevation: 98 to 4,265 feet (30 to 1,300 meters).	**None.** Suitable vernal wetland habitat is absent from the project site and the species has not been previously recorded nearby.
Coast woolly-heads (*Nemacaulis denudata* var. *denudata*)	--/-- CRPR 1B.2	Annual herb. Occurs within coastal dunes; seems to prefer the back dunes in mildly protected areas. Flowering Period: April to September. Elevation: below 330 feet (100 meters).	**None.** Suitable coastal dune habitat is absent from the project site and the species has not been previously recorded nearby.
slender cottonheads (*Nemacaulis denudata* var. *gracilis*)	--/-- CRPR 2B.2	Annual herb. Grows on desert dunes and sandy areas of Sonoran desert scrub within San Bernardino, Riverside, Imperial, and San Diego Counties. Flowering period: April to May. Elevation: below 1,310 feet (400 meters).	**None.** Suitable desert dune habitat is absent from the project site and the species has not been previously recorded nearby.

Attachment C (cont.)
Special Status Plant Species Potential to Occur

Species	Status[1]	Habit, Ecology and Life History	Potential to Occur[2]
Nuttall's scrub oak (*Quercus dumosa*)	--/-- CRPR 1B.1 MHCP Covered	Perennial shrub. Occurs on sandy or clay loam soils near the coast within coastal scrub, chaparral, cismontane woodland, and riparian woodland. Found along the coast, San Jacinto Mountains, and Peninsular Ranges of southern California. Flowering period: March to May. Elevation: below 1,310 feet (400 meters).	**Presumed Absent.** No suitable habitat present on-site. Plus, this perennial species would have been observed during biological surveys and was not detected.
Prairie false oat (*Sphenopholis interrupta ssp. californica*)	--/-- CPRP 1B.1	Annual herb. Occurs on clay soils within chaparral habitat. Flowering period: April. Elevation: 50 feet (15 meters).	**None.** Suitable clay soil is present; however, chaparral habitat is absent from the project site, the species has not been recorded nearby, and the site is located above the species known elevation range.

[1] Listing codes as follows: F = Federal; S = State of California; E = Endangered; T = Threatened; CE = Candidate Endangered; R = Rare

CRPR = California Native Plant Society Rare Plant Rank: 1A – presumed extirpated in California and either rare or extinct elsewhere; 1B – rare, threatened, or endangered in California and elsewhere; 2A – presumed extirpated in California, but more common elsewhere; 2B – rare, threatened, or endangered in California, but more common elsewhere; 3 – more information needed; 4 – watch list for species of limited distribution. Extension codes: .1 – seriously endangered; .2 – moderately endangered; .3 – not very endangered.

North County MHCP Covered Species.

[2] Potential to Occur is assessed as follows: **None**: There are no present or historical records of the species occurring on or in the immediate vicinity of the study area and the diagnostic habitats and soils associated with the species do not occur on or in the immediate vicinity of the project; Perennial species would have been detected during survey; **Low**: Suitable habitat is present in the study area and a historical record of the species occurs in the immediate vicinity but existing conditions such as elevation, soils, density of cover, prevalence of non-native species, evidence of disturbance, limited habitat area, and/or isolation substantially reduce the possibility that the species may occur; **Moderate**: The diagnostic habitats associated with the species occur on or in the immediate vicinity of the study area, but there is not a recorded occurrence of the species within the immediate vicinity. Some species that contain extremely limited distributions may be considered moderate, even if there is a recorded occurrence in the immediate vicinity; **High**: Suitable habitat occurs in the study area and the species has been recorded recently on or in the immediate vicinity but the species was not observed during project surveys; **Present**: The species was observed within the study area during biological surveys for the project; **Presumed Absent**: Species would be visible all year and would have been observed if present.

Attachment D

Plant Species Potential to Occur

Attachment D
Special Status Animal Species Potential to Occur

Species	Status[1]	Habitat Associations	Potential to Occur[2]
INVERTEBRATES			
Crotch bumble bee (*Bombus crotchii*)	--/SCE	Found throughout southwestern California from the Central Valley south to the U.S./Mexico border. Inhabits open grasslands and scrub habitats. Primarily nests underground and forages on a wide variety of flowers, but a short tongue renders it best suited to open flowers with short corollas. Most commonly observed on flowering species in the Fabaceae, Asteraceae, and Lamiaceae families. Occurrence has also been linked to habitats containing *Asclepias, Chaenactis, Lupinus, Medicago, Phacelia,* and *Salvia* genera.	**None.** Suitable grassland and scrub habitat and associated flowering species are not present within the project site.
VERTEBRATES			
Reptiles			
Blainville's horned lizard (*Phrynosoma blainvillii*)	--/SSC	In California, predominately occurs from Kern County south to San Diego County, west of the desert at elevations below 8,000 feet. Inhabits a wide variety of vegetation types including sagebrush scrub, chaparral, grasslands, forests, and woodlands but is restricted to areas with suitable sandy, loose soils with open areas for basking. Diet primarily composed of native harvester ants (*Pogonmyrmex* spp.) and are generally excluded from areas invaded by Argentine ants (*Linepithema humile*).	**None.** Preferred vegetation communities and habitat for this species are absent from the site.
Birds			
Cooper's Hawk (*Accipiter cooperii*)	--/WL MHCP Covered	In California, breeds from Siskiyou County south to San Diego County and eastwards to Owens Valley at elevations below 9,000 feet. Inhabits forests, riparian areas, and more recently suburban and urban areas. Nests within dense woodlands and forests and isolated trees in open areas.	**Low.** Although marginally suitable tall trees occur within 500 feet of the project site, preferred vegetation communities and suitable habitat for this species are absent from the site.

Attachment D (cont.)
Special Status Animal Species Potential to Occur

Species	Status[1]	Habitat Associations	Potential to Occur[2]
California Black Rail (*Laterallus jamaicensis coturniculus*)	BCC/ST, FP	In California, breeds in the Sacramento-San Joaquin River delta, San Francisco Bay area, Bolinas Lagoon and Tomales Bay in Marin County, Morro Bay in San Luis Obispo County, White Slough in San Joaquin County, the Salton Sea in Imperial County, and the Lower Colorado River Valley. Inhabits salt and freshwater marshes and wet meadows. Associated with pickleweed (*Salicornia* ssp.), bulrush, alkali heath (*Frankenia salina*), and cordgrass (*Spartina* ssp.). Requires dense cover of upland vegetation in tidal areas for protection when rails must leave marsh habitats during high tide events.	**None.** No aquatic habitat on-site. Preferred vegetation communities and habitat for this species are absent from the site.
Coastal California Gnatcatcher (*Polioptila californica californica*)	FT/SSC MHCP Covered	Year-round resident of California occurring from Ventura County south to San Diego County, and east to the western portions of San Bernardino and Riverside Counties. Typically occurs in arid, open sage scrub habitats on gently slopes hillsides to relatively flat areas at elevations below 3,000 feet. Composition of sage scrub in which gnatcatchers are found varies though California sagebrush present as dominant or co-dominant species. Mostly absent from areas dominated by black sage (*Salvia mellifera*), white sage (*Salvia apiana*), or lemonade berry (*Rhus integrifolia*), though may occur more regularly in inland regions dominated by black sage.	**None.** Preferred vegetation communities and habitat for this species are absent from the site.

Attachment D (cont.)
Special Status Animal Species Potential to Occur

Species	Status[1]	Habitat Associations	Potential to Occur[2]
Mammals			
Western yellow bat (*Lasiurus xanthinus*)	--/SSC	Occurs from southern California from in Los Angeles, San Bernardino, and San Diego Counties. In San Diego, commonly found in Anza-Borrego Desert but is also established west of the desert within rural to suburban areas including Escondido, Vista, Ramona, Lakeside, El Cajon, and La Mesa. Roosts primarily on dead palm frond skirts of native and non-native fan palms but has also been observed in cottonwoods and yuccas. Occurs within a variety of habitats where palms are present including desert riparian, desert washes, palm oasis, cottonwood-willow riparian forest, and developed areas.	**None.** Preferred vegetation communities and suitable habitats for this species are absent from the project site.

1 Listing codes are as follows: F = Federal; S = State of California; E = Endangered; T = Threatened; CE = Candidate Endangered; R = Rare; BCC = Federal Bird of Conservation Concern; SSC = State Species of Special Concern; FP = State Fully Protected; WL = Watch List

MHCP Covered Species: Covered Species under North County MHCP.

2 Potential to Occur is assessed as follows: **None**: Species is so limited to a particular habitat that it cannot disperse on its own, and habitat suitable for its establishment and survival does not occur in the study area; **Not Expected**: There are no present or historical records of the species occurring on or in the immediate vicinity of the study area. The species moves freely and might disperse through or across the study area, but suitable habitat for residence or breeding does not occur; **Low**: Suitable habitat is present in the study area and there is a historical record of the species in the project vicinity, but no sign of the species was observed during surveys. Existing conditions such as elevation, species composition, density of cover, prevalence of non-native species, evidence of disturbance, limited habitat area, and/or isolation may substantially reduce the possibility that the species may occur; **Moderate:** Diagnostic habitats associated with the species occur on or adjacent to the study area, but there is no recent documented occurrence of the species within the immediate vicinity. Some species that contain extremely limited distributions may be considered moderate, even if there is a recorded occurrence in the immediate vicinity; **High**: Suitable habitat associated with the species occurs in the study area and the species has been recorded recently on or near the project, but was not observed during biological surveys; **Present**: The species was observed during biological surveys for the project and is assumed to occupy the study area.

HELIX
Environmental Planning

1205 Melrose Way

Cultural Resources Survey

October 2021 | 04512.00021.001

Submitted to:

City of Vista
200 Civic Center Drive
Vista, CA 92084-6275

Prepared for:

Summit Environmental Group, Inc.
2810 Cazadero Drive
Carlsbad, CA 92009

Prepared by:

HELIX Environmental Planning, Inc.
7578 El Cajon Boulevard
La Mesa, CA 91942

Mary Robbins-Wade
Mary Robbins-Wade
Cultural Resources Group Manager

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National Archaeological Database Information

Authors:	James Turner, RPA, Mary Robbins-Wade, RPA, and Theodore Cooley, RPA
Firm:	HELIX Environmental Planning, Inc.
Client/Project:	Summit Environmental Group, Inc. / 1205 Melrose Way Project
Report Date:	October 2021
Report Title:	Cultural Resources Survey for the 1205 Melrose Way Project, Vista, California
Submitted to:	City of Vista
Type of Study:	Cultural Resources Survey
New Sites:	None
Updated Sites:	None
USGS Quad:	San Luis Rey 7.5' Quadrangle
Acreage:	Approximately 2.7 acres
Key Words:	San Diego County; Township 11 South, Range 4 West; Vista; Melrose Way; cultural resource survey

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ACRONYMS AND ABBREVIATIONS

APN	Assessor's Parcel Number
BLM	Bureau of Land Management
BP	Before Present
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
City	City of Vista
CRHR	California Register of Historical Resources
GLO	General Land Office
HELIX	HELIX Environmental Planning, Inc.
NAHC	Native American Heritage Commission
NHPA	National Historic Preservation Act
NRHP	National Register of Historic Places
OHP	Office of Historic Preservation
project	1205 Melrose Way Project
PRC	Public Resources Code
RCS	Resource Conservation and Sustainability
SCIC	South Coastal Information Center
SLR	San Luis Rey
SR	State Route
TCP	Traditional Cultural Properties
TCR	Tribal Cultural Resources
USGS	U.S. Geological Survey

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EXECUTIVE SUMMARY

HELIX Environmental Planning, Inc. (HELIX) was contracted by Summit Environmental Group, Inc. to provide cultural resources services for the 1205 Melrose Way Project (project) in the City of Vista, San Diego County, California. The project is a proposed approximately 2.7-acre residential subdivision consisting of fifteen lots. A cultural resources study including a records search, Sacred Lands File search, Native American outreach, a review of historic aerial photographs and maps, and a pedestrian survey was conducted for the project area. This report details the methods and results of the cultural resources study and has been prepared to comply with the California Environmental Quality Act (CEQA) and Section 106 of the National Historic Preservation Act (NHPA), as amended.

The records search obtained from the South Coastal Information Center (SCIC) on August 23, 2021, indicated that 73 previous cultural resources studies have been conducted within one mile of the project area, two of which overlap with the project area. The records search results also indicated that a total of 34 cultural resources have been previously recorded within one mile of the project area; however, no sites have been recorded within the project site.

The field investigations included an intensive pedestrian survey of the project area by a HELIX archaeologist and a Native American monitor on August 24, 2021. The survey did not result in the identification of any cultural material within the project area.

Based on the results of the current study, no impacts to cultural resources are anticipated. However, the project site was covered by mulch and grasses, and the original ground surface could not be observed. In addition, the project site is located within a culturally sensitive area where there is the potential for buried cultural resources. Based on this, it is recommended that an archaeological and Native American monitoring program be implemented for ground-disturbing activities. The monitoring program would include attendance by the archaeologist and Native American monitor at a pre-construction meeting with the grading contractor and the presence of archaeological and Native American monitors during initial ground-disturbing activities on site. Both archaeological and Native American monitors would have the authority to temporarily halt or redirect grading and other ground-disturbing activity in the event that cultural resources are encountered. If significant cultural material is encountered, the project archaeologist will coordinate with the applicant and City of Vista staff to develop and implement appropriate mitigation measures.

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1.0 INTRODUCTION

HELIX Environmental Planning, Inc. (HELIX) was contracted by Summit Environmental Group to provide cultural resources services for the 1205 Melrose Way Project (project) in the City of Vista, San Diego County, California. The project is a proposed approximately 2.7-acre residential subdivision consisting of fifteen lots. A cultural resources study including a records search, Sacred Lands File search, Native American outreach, a review of historic aerial photographs and maps, and a pedestrian survey was conducted for the project area. This report details the methods and results of the cultural resources study and has been prepared to comply with the California Environmental Quality Act (CEQA) and Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended.

1.1 PROJECT LOCATION AND DESCRIPTION

The project is located in the City of Vista (City) in northwestern San Diego County (Figure 1, *Regional Location*). The project is located south of State Route (SR) 78 and west of South Melrose Drive, within Section 25 of Township 11 South, Range 4 West, on the U.S. Geological Survey (USGS) 7.5' San Luis Rey quadrangle (Figure 2, *USGS Topography*). The approximately 2.70-acre project site is located within Assessor's Parcel Numbers (APNs) 1661-84-10000, 1661-84-0900, and 1661-83-1700, and is bordered by Melrose Way to the south (Figure 3, *Aerial Photograph of Project Location*).

The 1205 Melrose Way Project proposes to construct 15 single-family detached residences, a new private street, and associated hardscape improvements. The existing residence and associated hardscape improvements will be demolished. Additional off-site improvements consist of grading adjacent to the northeast corner of the project area, and the construction of a permanent gravel access road connecting to the northwest corner of the project area. The off-site improvements include an additional 0.15-acre area, for a study area totaling 2.85 acres.

1.2 REGULATORY FRAMEWORK

1.2.1 California Environmental Quality Act

The California Environmental Quality Act (CEQA) Guidelines (§15064.5) address determining the significance of impacts to archaeological and historic resources. Cultural resources are defined as buildings, sites, structures, or objects, each of which may have historical, architectural, archaeological, cultural, and/or scientific importance (Office of Historic Preservation [OHP] 1995). Significant resources are designated as "historical resources," and are defined per Public Resources Code 21084.1 and CEQA Guidelines, California Code of Regulations (CCR) Title 14 Section 15064.5 as follows:

- resource(s) listed or eligible for listing in the California Register of Historic Resources (CRHR) (14 CCR Section 15064.5[a][1])
- resource(s) either listed in the National Register of Historic Places (NRHP) or in a "local register of historical resources" unless "the preponderance of evidence demonstrates that it is not historically or culturally significant" (14 CCR Section 15064.5[a][2])
- resources identified as significant in a historical resource survey meeting the requirements of Section 5024.1(g) of the Public Resources Code (14 CCR Section 15065.5[a][2])

For listing in the CRHR, a historical resource must be significant at the local, state, or national level under one or more of the following four criteria:

1) It is associated with events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States;

2) It is associated with the lives of persons important to local, California, or national history;

3) It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of a master or possesses high artistic values;

4) It has yielded or has the potential to yield information important to the prehistory or history of the local area, California, or the nation.

All resources nominated for listing must have integrity, which is the authenticity of a historical resource's physical identity evidenced by the survival of characteristics that existed during the resource's period of significance. Resources, therefore, must retain enough of their historic character or appearance to be recognizable as historical resources and to convey the reasons for their significance. Integrity is evaluated with regard to the retention of location, design, setting, materials, workmanship, feeling, and association. A resource must also be judged with reference to the particular criteria under which it is proposed for nomination.

Under 14 CCR Section 15064.5(a)(3), the final category of "historical resources" may be determined at the discretion of the lead agency.

1.2.2 City of Vista General Plan

The Resource Conservation and Sustainability (RCS) Element of the Vista General Plan 2030 includes the following goals related to cultural resources:

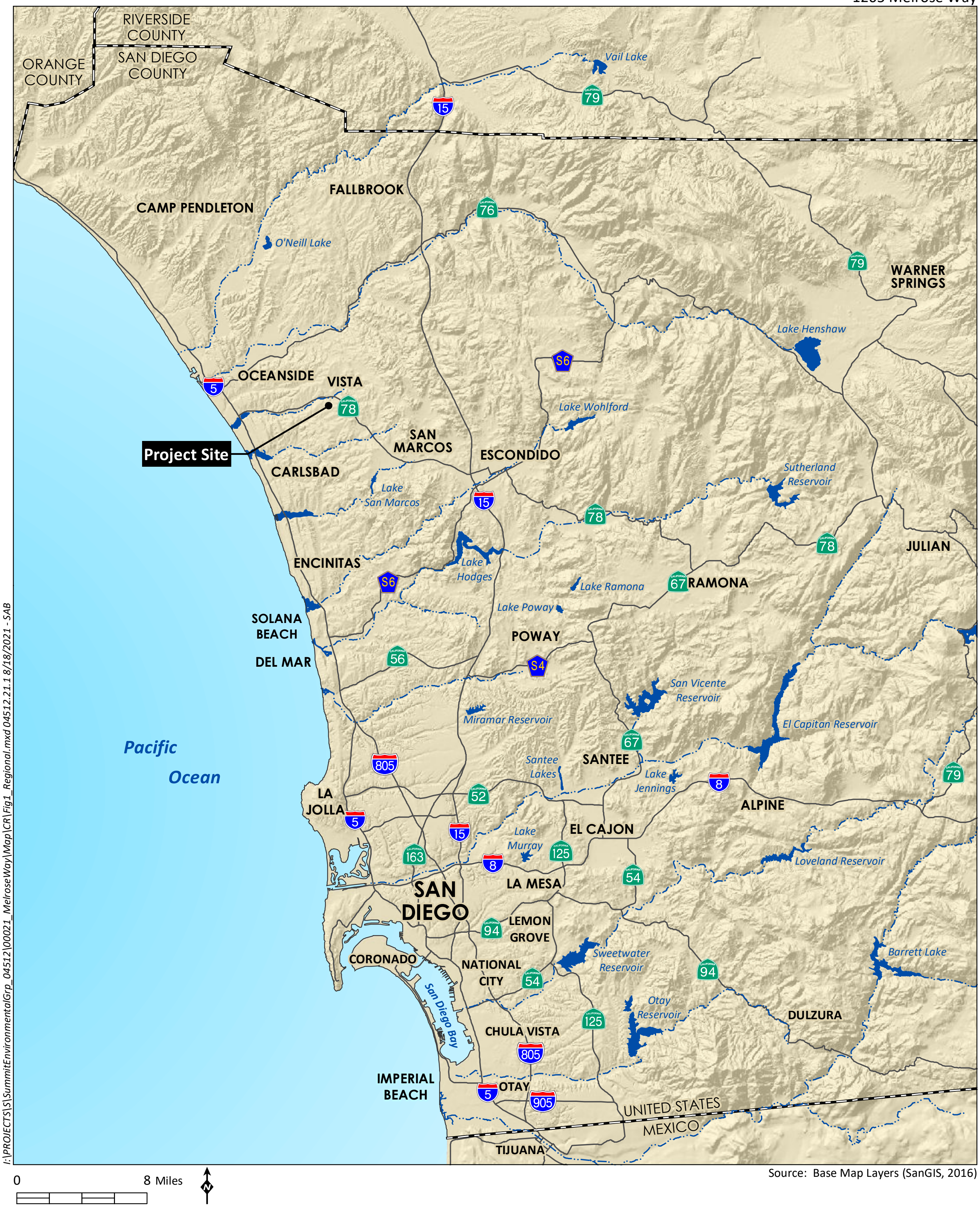
- RCS Goal 11: Continue to preserve and protect places, buildings, and objects that embody the City's social, cultural, commercial, architectural, and agricultural history.

- RCS Goal 12: Acknowledge, preserve, and protect the City's Native American Heritage.

Sub-items under Goal 12 mandate coordination with the State Native American Heritage Commission (NAHC) and the San Luis Rey Band of Luiseño Mission Indians.

1.2.3 Native American Heritage Values

Under the guidance of the City's General Plan, cultural resources can also include Traditional Cultural Properties (TCP), such as gathering areas, landmarks, and ethnographic locations in addition to archaeological districts. "Traditional" in this context refers to those beliefs, customs, and practices of a living community of people that have been passed down through the generations, usually orally or through practice. The traditional cultural significance of a historic property, then, is significance derived from the role the property plays in a community's historically rooted beliefs, customs, and practices (Parker and King 1998). Generally, a TCP may consist of a single site, or group of associated archaeological sites (district or traditional cultural landscape), or an area of cultural/ethnographic importance.

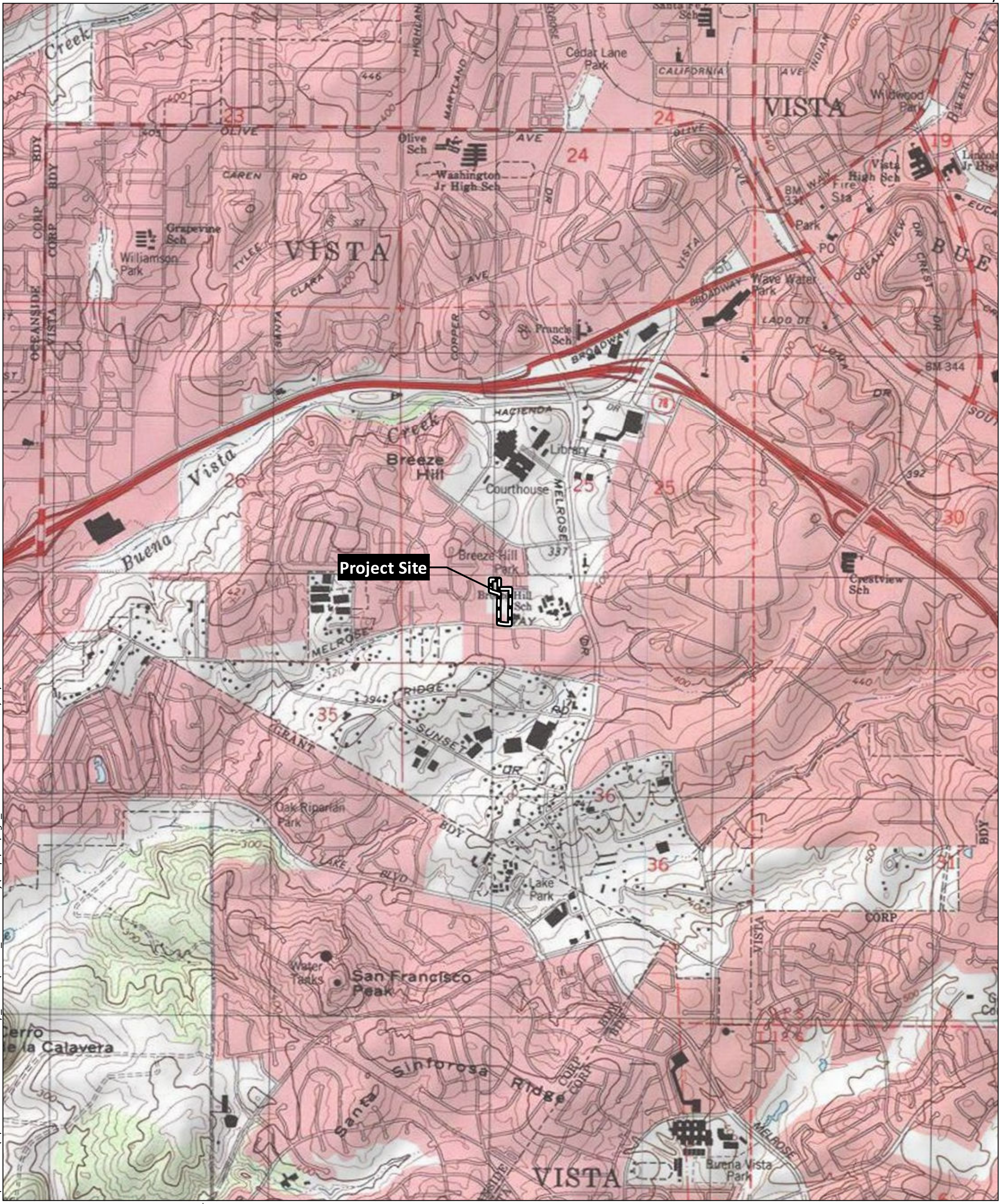


Source: Base Map Layers (SanGIS, 2016)

HELIX Environmental Planning

Regional Location

Figure 1



Source: SAN LUIS REY 7.5' Quad (USGS)

0 2,000 Feet

N

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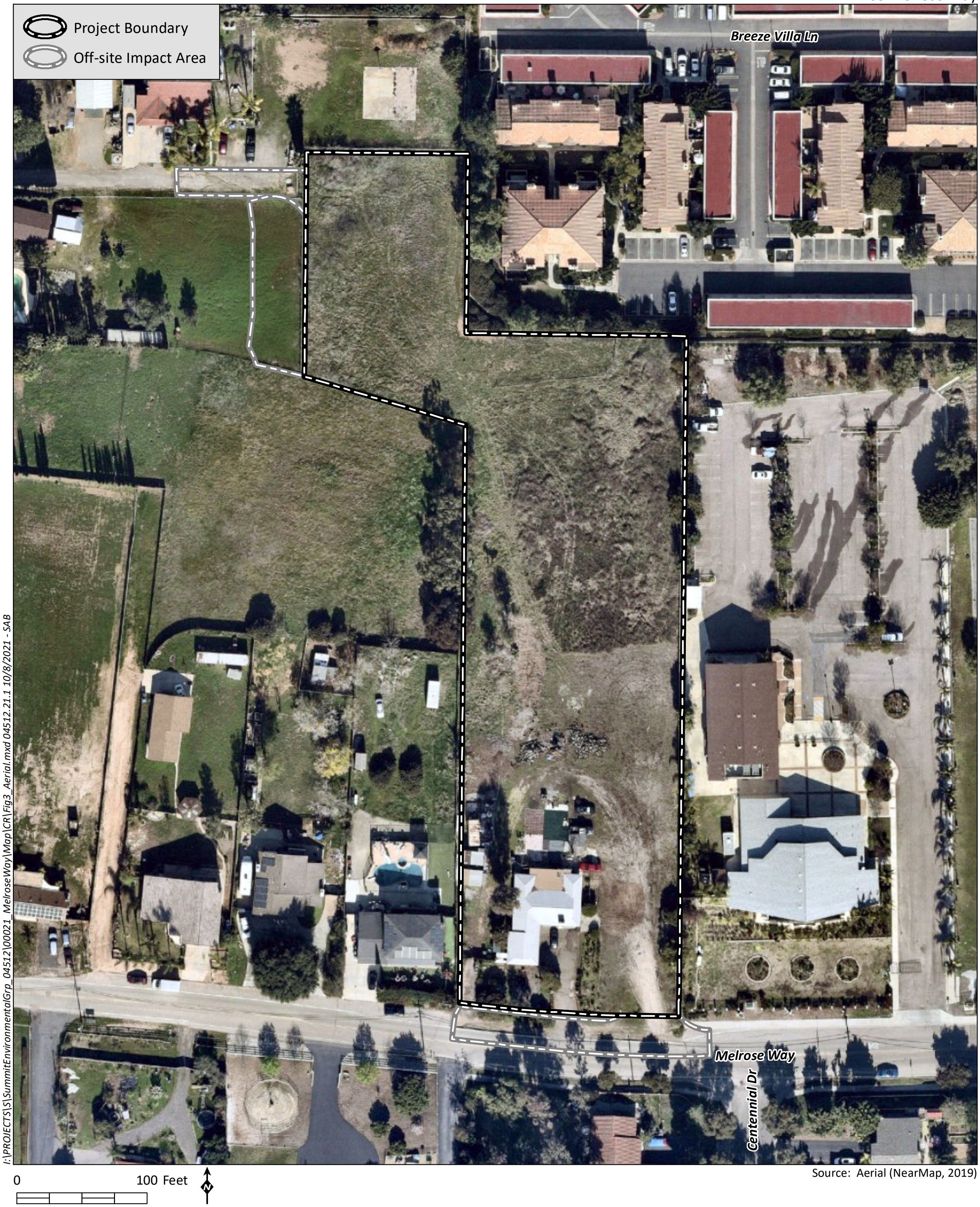
HELIX Environmental Planning

USGS Topography

Figure 2



Source: Aerial (NearMap, 2019)

HELIX
Environmental Planning

Aerial Photograph of Project Location

Figure 3

In addition to the historical resources described above, per Section 21084.2 of the Public Resources Code, the City must take into account the proposed project's impacts on Tribal Cultural Resources (TCR), separately defined in Section 21074 of the Public Resources Code. As a general concept, a TCR is similar to the federally defined TCP; however, it incorporates consideration of local and state significance and required mitigation under CEQA. To determine whether the proposed project may have an impact on tribal cultural resources, the City is conducting government-to-government consultation with California Native American tribes that have requested such consultation per Section 21080.3.1 of the Public Resources Code. Results of this consultation will be documented separately by the City as part of the CEQA process.

1.3 PROJECT PERSONNEL

Mary Robbins-Wade M.A., RPA served as principal investigator and provided the senior review of this technical report. Ms. Robbins-Wade meets the qualifications of the Secretary of Interior's Standards and Guidelines for archaeology. James Turner, M.A., RPA conducted the field survey and is the primary author of this report. Theodore Cooley served as a contributor to the report. Logovi'i Sialo'i (Luiseño Native American monitor) from Saving Sacred Sites participated in the pedestrian survey. Resumes for key project personnel are presented in Appendix A.

2.0 PROJECT SETTING

2.1 NATURAL SETTING

The project area is situated within the coastal plain of western San Diego County, where the climate is characterized as semi-arid steppe, with warm, dry summers and cool, moist winters (Hall 2007; Pryde 2004). The Buena Vista Creek is located approximately 0.5 mile to the north of the project area. The elevation of the project area ranges from approximately 350 to 370 feet above mean sea level.

The project area is characterized predominantly by urban development comprised of residential development. Areas immediately surrounding the project area include transportation infrastructure and residential, large-scale recreational/commercial, and industrial development.

Geologically, the project area is underlain by undivided Tonalite that dates to the mid-Cretaceous (Kennedy and Tan 2007). The area south of Melrose Way is underlain by the Santiago formation, which dates to the mid-Eocene (Kennedy and Tan 2007). Two soil series are mapped for the project site: Placentia sandy loam (5 to 9 percent slopes, eroded), and Bosanko clay (9 to 15 percent slopes). The Placentia sandy loam, consisting of sandy loam and sandy clay that supports the growth of citrus and grasses, is found within most of the project area; the Bosanko clay, a series consisting of sandy clay that typically grows annual grasses, was found within the southeastern corner of the project area (Natural Resources Conservation Service 1997a, b).

Prehistorically, the natural vegetation in the project vicinity likely consisted of coastal sage scrub, riparian, grassland, and freshwater marsh communities. The coastal sage scrub community would have covered most of the canyons in the coastal areas with interspersed areas of native grasslands (Stipa, Elymus, Poa, Muhlenbergia). Prior to historic and modern activities, major drainages contained extensive stands of the riparian community with plants such as sycamore (*Platanus racemosa*), Fremont cottonwood (*Populus fremontii*), coast live oak (*Quercus agrifolia*), and willow (*Salix* sp.) (Beauchamp

1986; Munz 1974). Many of the native plant species found in these vegetation communities and those found in the project vicinity are known to have been used by native populations for food, medicine, tools, and ceremonial and other uses (Bean and Shipek 1978; Sparkman 1908). Many of the animal species living within these communities (such as rabbits, deer, small mammals, and birds) would have been used by native inhabitants as well.

2.2 CULTURAL SETTING

2.2.1 Prehistoric Period

The earliest well-documented sites in the San Diego area belong to the San Dieguito Tradition, dating to over 9,000 years ago (Warren 1967; Warren et al. 1998). The San Dieguito Tradition is thought by most researchers to have an emphasis on big game hunting and coastal resources (Warren 1967). Diagnostic material culture associated with the San Dieguito complex includes scrapers, scraper planes, choppers, large blades, and large projectile points (Rogers 1939; Warren 1967). In the southern coastal region, the traditional view of San Diego prehistory has the San Dieguito Tradition followed by the Archaic Period, dating from circa 8600 Before Present (BP) to circa 1300 BP (Warren et al. 1998).

A large number of archaeological site assemblages dating to this period have been identified at a range of coastal and inland sites. These assemblages, designated as the La Jolla/Pauma complexes, are considered part of Warren's (1968) "Encinitas tradition" and Wallace's (1955) "Early Milling Stone Horizon." The Encinitas tradition is generally "recognized by millingstone assemblages in shell middens, often near sloughs and lagoons" (Moratto 1984:147) and brings a shift toward a more generalized economy and an increased emphasis on seed resources, small game, and shellfish. The local cultural manifestations of the Archaic period are called the La Jollan complex along the coast and the Pauma complex inland. Pauma complex sites lack the shell that dominates many La Jollan complex site assemblages. Sites dating to the Archaic Period are numerous along the coast, near-coastal valleys, and around estuaries. In the inland areas of San Diego County, sites associated with the Archaic Period are less common relative to the Late Prehistoric complexes that succeed them (Cooley and Barrie 2004; Laylander and Christenson 1988; Raven-Jennings and Smith 1999; True 1970). The La Jolla complex tool assemblage is dominated by rough cobble tools, especially choppers and scrapers (Moriarty 1966). The La Jolla complex tool assemblage also includes manos and metates, terrestrial and marine mammal remains, flexed burials, doughnut stones, discoidals, stone balls, plummets, biface points, beads, and bone tools (True 1958, 1980).

While there has been considerable debate about whether San Dieguito and La Jollan patterns might represent the same people using different environments and subsistence techniques, or whether they are separate cultural patterns (e.g., Bull 1983; Ezell 1987; Gallegos 1987; Warren et al. 1998), abrupt shifts in subsistence and new tool technologies occur at the onset of the Late Prehistoric Period (1500 BP to AD 1769). The Late Prehistoric period is characterized by higher population densities and intensification of social, political, and technological systems. The Late Prehistoric period is represented by the San Luis Rey (SLR) complex in the northern portion of San Diego County and the Cuyamaca complex in the southern portion.

The SLR complex is divided into two phases: SLR I and SLR II. Elements of the SLR complex include small, triangular, pressure-flaked projectile points (generally Cottonwood series, but Desert Side-notched series also occurs); milling implements: mortars and pestles, manos and metates, and bedrock milling features; bone awls; Olivella shell beads; other stone and shell ornaments; and cremations (Meighan

1954; Moratto 1984; True et al. 1974). The later SLR II complex also includes several elements not found in the SLR I complex: "pottery vessels, cremation urns, red and black pictographs, and such nonaboriginal items as metal knives and glass beads" (Meighan 1954:223).

SLR I was originally thought to date from AD 1400 to AD 1750, with SLR II dating between AD 1750 and AD 1850 (Meighan 1954). However, that division was based on the assumption that the Luiseño did not practice pottery manufacture until just prior to the arrival of the Spanish. The chronology has since been revised due to evidence that pottery may have been introduced to the Luiseño circa AD 1200 to 1600. Ceramics were probably introduced from the Luiseños' southern neighbors, the Kumeyaay (True et al. 1974).

Based on ethnographic data, including the areas defined for the Hokan-based Yuman-speaking peoples (Kumeyaay) and the Takic-speaking peoples (Luiseño) at the time of contact, it is generally accepted that the Cuyamaca complex is associated with the Yuman Kumeyaay and the San Luis Rey complex with the Shoshonean Luiseño. The name Luiseño derives from Mission San Luis Rey de Francia and has been used to refer to the Indian people associated with that mission, while the Kumeyaay people are also known as Ipai, Tipai, or Diegueño (named for Mission San Diego de Alcala). Agua Hedionda Creek is often described as the division between the territories of the Luiseño and the Kumeyaay people (Bean and Shipek 1978; Luomala 1978; White 1963), although various archaeologists and ethnographers use slightly different boundaries. Native people know their traditional use areas through traditional stories and songs.

2.2.2 Ethnohistory

The name Luiseño derives from Mission San Luis Rey de Francia and has been used to refer to the Native people associated with the mission. The Luiseño language belongs to the Cupan group of the Takic subfamily and is part of the widespread Uto-Aztecan language family (Bean and Shipek 1978; Sparkman 1908; White 1963). Neighboring groups that speak Cupan languages are Cupeño, Cahuilla, and Gabrielino. The people associated with Mission San Juan Capistrano were called Juaneño by the Spanish; they call themselves Acjachemen. The language, culture, and territory of the Luiseño and Juaneño people are so closely related that the two are sometimes considered by ethnographers to be a single ethnic nationality (Bean and Shipek 1978; White 1963); however, the Luiseño and Juaneño people consider themselves to be separate tribes, as do some ethnographers (e.g., Kroeber 1976 [1925]). Cameron (1987:319-321) noted archaeological differences between the two groups.

Ethnographic and ethnohistoric studies of the Luiseño include Bean and Shipek (1978), Boscana (1947), Kroeber (1976 [1925]), Robinson (1947), Shipek (1977), Sparkman (1908), Talley (1982), and White (1963). Archaeological studies addressing the Late Prehistoric San Luis Rey complex include Meighan (1954), McCown (1955), True et al. (1974), and Wallace (1960). Most of the ethnographic studies, as well as the "classic" archaeological studies of the Luiseño, have concentrated on the Pauma Valley and the Palomar Mountain area, although Wallace's (1960) study was an archaeological survey of the Buena Vista Creek watershed.

It must be noted that interpretations by archaeologists and linguistic anthropologists may differ from the beliefs and traditional knowledge of the Luiseño people. The Luiseño creation story indicates that the Luiseño people have always been here, not migrating from elsewhere. The creation story of the Pechanga Band of the Luiseño tells that the world was created at Temecula. "The Káamalam [first people] moved to a place called Nachíivo Pomíisavo, but it was too small, so they moved to a place called 'exva Teméeku,' this place you now know as Temeku. Here they settled while everything was still in darkness (DuBois 1908)" (Masiel-Zamora 2013:2). A traditional Luiseño story tells of a great flood, and the people went to higher ground, where they were saved. The San Luis Rey Band say that this higher ground where the people were saved is Morro Hill. Some Luiseño informants indicated the place in this story is a hill just east of Highway 395 in the San Luis Rey River Valley (Cupples and Hedges 1977).

2.2.3 Historical Background

2.2.3.1 Spanish Period

While Juan Rodriguez Cabrillo visited San Diego briefly in 1542, the beginning of the historic period in the San Diego area is generally given as 1769. It was that year that the Royal Presidio of San Diego was founded on a hill overlooking Mission Valley. The Mission San Diego de Alcala was constructed in its current location five years later. The Spanish Colonial period lasted until 1821 and was characterized by religious and military institutions bringing Spanish culture to the area and attempting to convert the Native American population to Christianity. Mission San Diego was the first mission founded in Southern California. In 1798, the Mission San Luis Rey De Francia was founded in northern San Diego County. Covering almost 950,400 acres, the Mission raised about 26,000 cattle, as well as other livestock (Young and Levick 1988). In the years that followed its establishment, the population of the Luiseño people declined rapidly due to disease (Lightfoot 2004).

2.2.3.2 Mexican Period

Although Mexico gained its independence from Spain in 1821, Spanish patterns of culture and influence remained for a time. The missions continued to operate as they had in the past, and laws governing the distribution of land were also retained in the 1820s. Following the secularization of the missions in 1834, large ranchos were granted to prominent and well-connected individuals, ushering in the Rancho Era, with the society making a transition from one dominated by the church and the military to a more civilian population, with people living on ranchos or in pueblos. With the numerous new ranchos in private hands, cattle ranching expanded and prevailed over agricultural activities.

The project site is located approximately 0.6 mile northeast of the former Agua Hedionda Rancho land grant. The 13,311-acre Rancho was granted to Don Juan Maria Marrón in the 1840s and covered an area extending from the Pacific Ocean almost to Vista from Carlsbad (Moyer 1969). Initially utilized for sheep ranching, Don Marrón used the land primarily for cattle ranching (Christenson and Sweet 2008).

2.2.3.3 American Period

The American period began in 1848, when California was ceded to the United States. The territory became a state in 1850. Terms of the Treaty of Guadalupe Hidalgo brought about the creation of the Lands Commission in response to the Homestead Act of 1851, which was adopted as a means of validating and settling land ownership claims throughout the state. Few of the large Mexican ranchos remained intact, due to legal costs and the difficulty of producing sufficient evidence to prove title claims. Much of the land that once constituted rancho holdings became available for settlement by immigrants to California. The influx of people to California and to the San Diego region resulted from several factors, including the discovery of gold in the state, the end of the Civil War, the availability of free land through the passage of the Homestead Act, and later, the importance of San Diego County as an agricultural area supported by roads, irrigation systems, and connecting railways. During the late nineteenth and early twentieth centuries, rural areas of San Diego County developed small agricultural communities centered on one-room schoolhouses. Such rural farming communities consisted of individuals and families tied together through geographical boundaries, a common schoolhouse, and a church. Farmers living in small rural communities were instrumental in the development of San Diego County. They fed the growing urban population and provided business for local markets. Rural farm school districts represented the most common type of community in the county from 1870 to 1930.

When Don Juan Maria Marrón, owner of the nearby Rancho Agua Hedionda, died in 1853, his widow and children inherited the majority of Rancho Agua Hedionda, along with Marron's brother, Silvestre Marrón, who inherited 360 acres of the rancho lands (Moyer 1969). The Rancho was leased by the Marróns to Frances Hinton in 1860 for $6000, and in 1865, Hinton assumed full ownership of the property after drought decimated the grazing lands for which it was valued. Hinton died five years later and willed Rancho Agua Hedionda to his mayordomo, Robert Kelly, who had served as the mayordomo for Jamacha Rancho in San Diego.

Upon Kelly's death in 1890, the rancho lands again changed hands and became the property of Kelly's nine nieces and nephews. In 1950, the last of Kelly's heirs died, leaving his son Allan 820 acres of the rancho that included the eastern portion of Agua Hedionda Lagoon (Moyer 1969).

The City of Vista was established in 1886 by the Vista Land Company, which purchased a sizeable portion of Rancho Buena Vista, located south of the District. Before this, in 1882, John Frazier applied to open the first post office – initially naming the city "Frazier's Crossing," and then "Buena Vista," Frazier ultimately chose "Vista" when he learned the other two names were already taken (City of Vista n.d.; Vista Historical Society 2020). By the twentieth century, Vista had access to a railroad that linked Oceanside and Escondido (Vista Historical Society 2020).

Vista grew slowly in the early 1910s and 1920s due to the lack of an adequate water supply (City of Vista n.d.). The Vista Irrigation District was created in 1923 to supply the fledgling city with water from Lake Henshaw; local agriculture flourished, and the population boomed. Like most of the nation, Vista felt the effects of the Great Depression; growth resumed in 1936. By 1948, the City had become the "avocado capital of the world" (City of Vista n.d.). Agricultural production reached its peak in the 1960s, and the City voted to incorporate on January 28, 1963 (City of Vista n.d.; Vista Historical Society 2020).

2.3 PROJECT VICINITY

The Buena Vista Creek area was surveyed by Wallace in the 1950s, and 37 open habitation sites (recorded as campsites) were recorded within the watershed (1960). Fifteen of the sites had marine shellfish remains present, but shell was abundant at only three of the sites (Wallace 1960). Most of the sites also had lithic artifacts (ground stone and flaked stone), and several had bedrock milling features. Wallace noted that the sites in the Buena Vista area showed evidence of occupation during three different temporal periods. Ceramic sherds were found at three of the sites, indicative of the Late Prehistoric San Luis Rey complex, and several sites appeared to represent the Pauma and La Jolla complexes, which as discussed above, are generally now thought to be contemporaneous (Gallegos 1987).

As mentioned above, the project site is approximately 0.6 mile northwest of the historic Mexican land grant Rancho Agua Hedionda, which was granted to Juan Maria Romouldo Marron in 1842. The original home built by Marron at the rancho is sometimes called the Marron Adobe but also known as the Kelly House; it is located several miles from the current study area. A second Marron home, the core of the historic Marron-Hayes Adobe, was built by Sylvestre Marron sometime between 1842 and 1851. Ownership of the vast majority of the Rancho Agua Hedionda eventually passed to Robert Kelly, with 360 acres retained by Sylvestre Marron's family. In 1875, Sylvestre's daughter, Felipe, married J. Chauncey Hayes, son of Judge Benjamin I. Hayes. The couple lived in an adobe house (the Marron Adobe) about .25 mile west of Sylvestre's home (the Marron-Hayes Adobe). By the 1960s, little remained of the Marron Adobe (see Kyle et al. 2000; Mikesell 2000; Rush 1965), and the remnants of this house are recorded as archaeological site CA-SDI-9474H.

During the 1940s Fred Hayes, son of J. Chauncey and Felipe, purchased the 360-acre parcel that had been owned by his grandfather, Sylvestre Marron. In 1947 Fred Hayes undertook the remodeling and restoration of the Marron-Hayes Adobe. The house currently retains much of its appearance from the 1947 remodel. The Adobe, which is owned and occupied by Shelley Hayes Caron, has been determined eligible for the National Register of Historic Places and the California Register of Historical Resources.

3.0 METHODS

HELIX obtained a records search of the project site and a one-mile radius from the South Coastal Information Center (SCIC) at San Diego State University, San Diego on August 24, 2021. The records search covered a one-mile radius around the project area and included the identification of previously recorded cultural resources and locations and citations for previous cultural resources studies. A review of the California Historical Resources and the state Office of Historic Preservation (OHP) historic properties directories was also conducted. The records search maps are included as Confidential Appendix B to this report. Historic maps and aerial photographs were reviewed to assess the potential for historic archaeological resources to be present.

The NAHC was contacted on August 21, 2021, for a Sacred Lands File search and list of Native American contacts, which were received on September 20, 2021. Letters were sent on September 21, 2021, to the contacts listed by the NAHC. Native American correspondence is included as Confidential Appendix C to this report.

A pedestrian field survey of the project site was conducted by HELIX archaeologist James Turner and Native American monitor Logovi'i Sialo'i of Saving Sacred Sites on August 23, 2021. A residential structure constructed prior to 1964 is present within the project site; this structure was not evaluated or documented for CEQA significance as part of the current cultural resources study.

4.0 RESULTS

4.1 RECORDS SEARCH

4.1.1 Previous Surveys

The records search results identified 73 previous cultural resource studies within the record search limits, two of which overlap with the project area (Table 1, *Previous Studies within One Mile of the Project Area*). The studies include 26 cultural resource surveys and site visits, 13 archaeological studies, eight monitoring reports, six testing and data recovery reports, five investigations, and four cultural resource assessments. The remaining studies include two environmental impact reports, the results of two record searches, two inventories, two constraint analyses, a nomination form, and an evaluation.

The two studies that overlap with the project area include a historic resources survey (Marben-Laird Associates 1987) and a cultural resources evaluation for the Vista and Buena Sanitation District's 2007 Sewer Master Plan Update (Rosenberg, Dorrler, and Smith, 2007).

Table 1
PREVIOUS STUDIES WITHIN ONE MILE OF THE PROJECT AREA

Report Number (SD-)	Year	Author	Report Title
00192	1978	Berryman, Stanley R.	Archaeological Field Investigation: Adult Mobile Home Park in Vista
00296	1973	Bull, Charles S. and Paul H. Ezell	An Archaeological Impact Statement for A. F. Anzlover of Centurion International
00359	1975	Carrico, Richard	Archaeological Survey of the TMI Project
00574	1979	Carrillo, Charles and Charles Bull	McMillin North Pointe: Archaeological Studies of SDM W 2133, Oceanside, California
00575	1980	Carrillo, Charles	Archaeological Survey of the Radestock property, Vista, California
00690	1975	Fink, Gary R.	Archaeological Survey for the Proposed Vista Center Addition, Vista, California
00192	1978	Berryman, Stanley R.	Archaeological Field Investigation: Adult Mobile Home Park in Vista
00746	1977	Chace, Paul G.	An Archaeological Survey of the Buena Vista Creek Relief Trunk Sewer Line, in the City of Vista, California (E-77-89)
00814	1981	Laylander, Don	An Archaeological Assessment of the Bradley Property Near Escondido, County of San Diego.
00840	1980	Laylander, Don	An Archaeological and Paleontological Survey of the Karlin Property in the City of Vista, California
01014	1987	Gallegos, Dennis and Andrew Pigniolo	Cultural Resource Survey of the Proposed South Melrose Drive Street Improvements, Vista, California
01016	1987	Gallegos, Dennis and Andrew Pigniolo	Cultural Resource Survey of the Mar Vista OV1 Trunk Sewer Line, Vista, California
01023	1986	Gallegos, Dennis and Dayle Cheever	Cultural Resource Survey of the Barsby Trunk Line and Melrose Way Sewer, Vista, California
01089	1979	Franklin, Randy L. and Richard L. Carrico	An Archaeological Survey for the Proposed Calvin Leung Mobile Home Park, Oceanside, California
01329	1989	Pigniolo, Andrew	Cultural Resource Investigation: Site SDi- 6835 (W-1895) Within the Palomar Airport Center Project Area
01473	1981	Scientific Resource Surveys, Inc.	Archaeological Report on a Portion of the Shadowridge Development Project Located in the City of Vista, San Diego County, California
01502	1986	Wade, Sue A.	Archaeological Testing of SDM-W-413, SDM- W-2131, and SDM-W-2132 Oak Riparian Park City of Oceanside, California

Report Number (SD-)	Year	Author	Report Title
01672	1980	Walker, Carol J. and Charles S. Bull	An Archaeological Test Investigation of Seven Cultural Resources for Leisure Village Oceanside
01874	1984	Hector, Susan	Archaeological Survey of Vista Point
02015	1984	Engineering Management Inc.	Environmental Assessment San Diego Pipeline Expansion Project Los Angeles, Orange, and San Diego Counties, California
02294	1991	Smith, Brian F.	Archaeological Survey of the Vista Centre Project
02694	1993	Mooney, Brian and John Cook	Archaeological Survey Report for a Portion of Adams Street Widening Project in the City of Carlsbad, California
03075	1995	Carrico, Richard, Andrew Pigniolo, Brian Glenn, and Kathleen Crawford	Historic Property Survey Report for the State Route 78 Corridor Enhancement Project 11-SD-78, P.M. 5.3-9.8, 965100, City of Vista, California
03528	1998	Gross, G. Timothy and Ruth C. Alter	Archaeological Testing of a Portion of SDI-14,809, an Archaeological Site on a Segment of the South Agua Hedionda Trunk Sewer Carlsbad, California
04110	1990	John Whitehouse	A Cultural Resource Survey of the Melrose and Hacienda Commercial Center, City of Vista, California
04111	1982	Larry Seeman	Draft Environmental Impact Report Revised Parks and Recreation Element, Carlsbad, California
04116	1978	The City of Vista	Environmental Impact Report for the Rancho Vista Area
04308	1979	Westec Services, Inc. And R.L. Franklin	An Archaeological Survey for The Proposed Calvin Lueng Mobile Home Park, Oceanside, California
04361	1991	Gallegos, Dennis and Danielle Huey	Cultural Resources Testing Program for SDI-4922, SDI-4923, SDI- 4925, SDI-11941, SAD-11942, SDI-11943, and SDI-12125, Calavera Lake, Carlsbad, California
04806	1994	Strudwick, Ivan H.	Historical/Archaeological Survey Report for the Moffatt Parcel Agua Hedionda Lagoon, Carlsbad, California
04835	1982	Corum, Joyce	Summary Report for an Archaeological Test Excavation at Site CA-SDI-9473, Oceanside, California. 11-SD-78 P.M. O.O/3.1
05078	2001	Robbins-Wade, Mary	Cultural Resources Inventory for the Taylor Street Extension and Escondido Ave. Extension, Vista, San Diego County, California
07466	1991	ERCE	Cultural Resource Testing Programs for SDI-4922, 1923, 1925, 4927, 11941, 11942, 11943, 12125 Calavera Lake, Carlsbad, California
08746	1979	Advance Planning and Research and Associates	An Archaeological Report Submitted to City of Oceanside, California, Broadmoor-Oceanside Subdivision Phase II Archaeologic Report for Archaeological Site Tmi-4 Oceanside, California
08755	1981	Flower, Douglas and Linda Roth	Archaeological Investigations of South Ridge Trails Oceanside, California SDM-W-2130, SDM-W-2135, SDM-W-2137
08965	2003	Mc Lean, Deborah K. B.	Archaeological Survey Report West Vista Way Widening, City of Vista, San Diego County, California

Report Number (SD-)	Year	Author	Report Title
09291	2004	Robbins-Wade, Mary	Buie Condominium Project- Archaeology
09645	2001	Kyle, Carolyn	Cultural Resource Assessment/Evaluation for Cingular Wireless Site SD 611-01, San Diego, California
09654	2005	Kyle, Carolyn	Cultural Resource Constraint Analysis for the Lake Calavera Trails Project City of Carlsbad, California
09766	2005	Robbins-Wade, Mary	Archaeological Resources Survey, West Vista Way Medical Office Project, Vista, San Diego County, California
09935	2004	Aislin-Kay, Marnie and Christeen Taniguchi	Records Search Results for Cingular Telecommunications Facility Candidate SD- 965-12 (Breeze Hill Park), 900 South Melrose Drive, Vista, San Diego County, California
10062	1975	Eckhardt, William	Archaeological Survey for TMI Oceanside Property
10551	2006	Arrington, Cindy	Cultural Resources Final Report of Monitoring and Findings for the Qwest Network Construction Project, State of California
10791	1984	Brandes, Raymond and Rick Alexander	Nomination Form for the Charles A. Braun House/ Willard and Susan Michlin House
11228*	1987	Marben-Laird Associates	Historic Resource Survey, A Project of the City of Vista, California
11388	2007	Robbins-Wade, Mary and Andrew Giletti	Archaeological Resources Survey, Vale View Drive Subdivision, Vista, San Diego County, California PC2-098
11524*	2007	Rosenberg, Seth A., Adriane Dorrler, And Brian F. Smith	A Cultural Resources Evaluation for the Vista and Buena Sanitation District 2007 Sewer Master Plan Update
11707	2008	Tuma, Michael W., Caprice D. Harper, and Susan Underbrink	Archaeological Survey, Testing, and Evaluation of Three Bedrock Milling Feature Sites, and Evaluation of One Built Environment Resource for the Stonemark Estates Project in Unincorporated San Diego County, California
12233	2009	Gardner, Jill	Cultural Resources Monitoring for the SDG&E Gas Pipeline Access Road Grading at Calavera Hills, Carlsbad, San Diego County, California
13283	2011	Ruston, Rachel S.	Cultural Resources Review and Records Searches for Line 3010 Operations & Maintenance Potholing and Phase 1 & 2 Pipeline Integrity/ Retrofit Activities
13296	2011	Loftus, Shannon	AT&T Site NS0015 Oak Riparian Part LTE 4585 1/2 Lake Boulevard Oceanside, San Diego County, California
13626	2011	Morgan, Nichole B.	TCM Access Road Grading Project, Cultural Resources Inventory Report
13633	2010	Blotner, Nicole	ETS #20554, Cultural Resources Monitoring for the Gas Grid 3010-10 Project, Carlsbad, San Diego County, California

Report Number (SD-)	Year	Author	Report Title
13868	2012	Hoffman, Robin D.	Phase II Archaeological Investigation of Site CA-SDi-644, for the Proposed California Highway Patrol Oceanside Replacement Facility Project, Vista, County of San Diego, California
14069	2011	Ní Ghabhláin, Sinéad	Cultural And Historical Resource Study for the City of Oceanside General Plan- Circulation Element Update Program Environmental Impact Report (PEIR)
14081	2009	Ní Ghabhláin, Sinéad	Cultural And Historical Resources Survey for the Downtown Vista Specific Plan Update Program Environmental Impact Report
14251	2013	Sanka, Jennifer M.	Phase I Cultural Resources Assessment Digital Messaging Boards Project City of Vista, San Diego County, California
14701	2005	Kyle, Carolyn E.	Cultural Resource Constraint Analysis for the Lake Calavera Trails Project City of Carlsbad, California
14886	2013	Loftus, Shannon	Cultural Resource Records Search and Site Survey AT&T Site Ns0016 Ocean Hills Country Club 1298 Navel Place Vista, San Diego County, California
15876	2014	Carrie D. Wills and Sarah A. Williams	Cultural Resource Records Search and Site Visit Results for Verizon Wireless Candidate 'Hackmore Drive', Located At 1455 West Vista Way, Vista, San Diego County, California
16560	2015	Castells, Shelby Gunderman	Cultural Resources Study for the Presidio Vista Project, City of Vista, San Diego County, California
17149	2017	Garrison, Andrew J. And J.R.K. Stropes	Cultural Resources Study for the Valencia Drive Project, City of Vista, San Diego County, California
17233	2017	Brunzell, David	San Diego 129 Project, San Diego County, California
17235	2017	Brunzell, David	T-Mobile PUC Project 365239, San Diego County, California
17341	2017	Robbins-Wade, Mary and Nicole Falvey	South Melrose Self-Storage Project - Cultural Resources Survey
17468	2015	Wade, Sue	Verizon Hackmore Drive/1455 W. Vista Way Telecommunication Facility, PC8-259): Cultural Resource Monitoring
17951	2018	Neal, Jessica and Kirby Page-Schmit	Cultural Resources Review for The Sd34xc785 Stealth Tower Project, 171 Unity Way (APN: 164-250- 17-00), City of Vista, San Diego County, California
17952	2019	Tactikos, Joanne, Jessica Neal, and Kirby Page-Schmit	Cultural Resources Review for the Sd34xc785 Project, 171 Unity Way, City of Vista, San Diego County, California
18543	2020	Pigniolo, Andrew	Cultural Resources Monitoring Report for the Storquest Vista Project, City of Vista
18688	2020	Jordan, Amy	Archaeological Monitoring for the SDG&E Line Easement Clearance, San Diego County, California
18883	2021	Pigniolo, Andrew	Cultural Resources Monitoring Report for the Hacienda Retail Project, City of Vista, California

Report Number (SD-)	Year	Author	Report Title
19029	2020	O'connor, John	Summary of Cultural Resources Monitoring for the Vista Village Drive Trunk Sewer Project, CIP 8212, City of Vista, San Diego County
19236	2018	Daniels, James T.	Cultural Resources Study for Sunroad Plaza Project, California

* Overlaps project area

4.1.2 Previously Recorded Resources

The SCIC has a record of 37 previously recorded cultural resources within a one-mile radius of the project, but none have been recorded within the project area (Table 2, *Previously Recorded Resources within One Mile of the Project Area*). In general, the sites recorded within the one-mile search radius consist of prehistoric resources consisting of habitation and campsites, bedrock milling features, artifact scatters, trails, a pictograph site, and isolated artifacts. One multi-component site is recorded as a medium-sized campsite with historic metal and glass artifacts. Ten historic addresses, a historic building, a segment of a road, and a historic artifact scatter are also documented within the record search limits.

Table 2
PREVIOUSLY RECORDED RESOURCES WITHIN ONE MILE OF THE PROJECT AREA

Primary Number (P-37-#)	Trinomial (CA-SDI-#)	Age and Resources Present	Description	Recorder, Date
000637	637	Prehistoric Site	Recorded as a campsite; observed artifacts include manos and a hammerstone.	Wallace, 1958
000638	638	Prehistoric Site	Small campsite with a petroglyph present on boulder outcrop.	Wallace, 1958; Ezell, 1972; Hedges, 1977
000639	639	Prehistoric Site	Large campsite with bedrock metates and mortars. Additional artifacts include ground stone and flaked stone artifacts.	Wallace, 1958
000640	640	Prehistoric Site	Small campsite with associated ground stone artifacts.	Wallace, 1958
000641	641	Prehistoric Site	Large campsite with associated ground stone artifacts.	Wallace, 1958
000642	642	Prehistoric Site	Small campsite with associated bedrock mortar and ground stone artifacts.	Wallace, 1958
000643	643	Prehistoric Site	Campsite with associated ground stone artifacts.	Wallace, 1958
000644	644	Multicomponent Site	Medium campsite with flaked stone and ground stone artifacts. Subsurface testing recovered lithic debitage, historic faunal bone fragments, and historic mental and glass artifacts.	Wallace, 1958; Serr and Hoffman, 2011; Bietz and Castells, 2019
000646	646	Prehistoric Site	Campsite with associated ground stone artifacts.	Wallace, 1958
004918	4918	Prehistoric Site	Bedrock milling features with three oval basins.	Norwood, 1979
004924	4924	Prehistoric Site	High density shell midden deposit. Associated artifacts include flaked stone and fire affected rock.	Norwood, 1979

Primary Number (P-37-#)	Trinomial (CA-SDI-#)	Age and Resources Present	Description	Recorder, Date
004926	4926	Prehistoric Site	Milling features with at least three milling slicks.	Norwood, 1979
004927	4927	Prehistoric Site	Habitation area with midden shell and numerous artifacts, including flaked stone, ground stone, and ceramic fragments.	Norwood, 1979; Huey and Baker, 1990
004929	4929	Prehistoric Site	Several milling surfaces with an associated light midden deposit.	Norwood, 1979
004930	4930	Prehistoric Site	Several isolated artifacts within a single project area – artifacts include flakes, hammerstones, petrified wood fragments, a chopper, and a metate.	Norwood, 1979
005792	5792	Prehistoric Site	A traditional Indian trail from Mission San Luis Rey through the San Marcos plains to the Cuyamaca Mountains.	Hatley, 1978
006841	6841	Prehistoric Site	Highly disturbed La Jollan site with scattered midden, shell, and flakes.	Fink and Hightower, 1978
008246	8246	Prehistoric Site	Low to medium density shell and lithic scatter with associated midden deposit.	Dittmar, 1980
020178	---	Historic Address	The Charles A. Braun house, built in 1929.	Unknown, 1929
024932	16502	Prehistoric Site	Habitation site consisting of bedrock milling features, marine shell, and a small amount of brownware pottery.	Strudwick, McLean, and Russell, 2003; Robbins-Wade, 2012
025149	---	Historic Address	A one-story single family home built in 1947.	Marvin, 2003
025150	---	Historic Address	A one-story single family residence built in 1948 and remodeled in 2002.	Marvin, 2003
025151	---	Historic Address	A one and one-half story frame barn built in 1923.	Marvin, 2003
025152	---	Historic Address	A one-story tract residence built in 1954.	Marvin, 2003
025153	---	Historic Address	A one-story residence built in 1950 and converted to a commercial use.	Marvin, 2003
025154	---	Historic Address	A one-story residence built in 1952 and converted to a commercial use.	Marvin, 2003
028770	---	Historic Address	A two-story house built in 1929.	Marben-Laird Associates, 1987
029304	---	Prehistoric Isolate	Isolated flake.	Ramirez and Hares, 2008
036153	---	Historic Building.	A wood-frame building used as a utilitarian garage and built between 1953 and 1964.	Castells, 2015
036621	22123	Historic Site	Artifact scatter consisting of glass and ceramic fragments within two loci.	Garrison and Ellis, 2017
036622	---	Historic Address	A single-family residence built in the early to mid-1900s.	Garrison and Ellis, 2017
036623	---	Historic Address	A single-family residence built between 1938 and 1946.	Garrison and Ellis, 2017
038601	---	Historic Road	A 560-ft segment of a historic road consisting of several stretches of asphalt.	Castells, 2019

Primary Number (P-37-#)	Trinomial (CA-SDI-#)	Age and Resources Present	Description	Recorder, Date
039086	---	Prehistoric Isolate	Two isolated pieces of debitage.	Pigniolo, 2020

4.2 OTHER ARCHIVAL RESEARCH

Various archival sources were consulted, including historic topographic maps, aerial imagery (NETR Online 2021), and the Bureau of Land Management (BLM) General Land Office (GLO) Records. These include historic aerials from 1928, 1938, 1946, 1953, 1964, 1967, 1978, and 1980 (NETR Online 2021) and several historic USGS topographic maps, including the 1901 San Luis Rey (1:125,000), 1948, 1968, 1975, and 1997 San Luis Rey (1:24,000) topographic maps. The purpose of this research was to identify historic structures and land use in the area.

No buildings appear in the project site on the 1901 San Luis Rey map, though the Buena Vista Creek is recorded to the north, and the Southern California Rail Road (Escondido Branch) is recorded to the north and northeast of the project area. Additionally, a road is recorded to the south and east of the project area. The 1938 aerial photograph shows Melrose Way to the south of the project area, which appears to have been cleared for agricultural purposes. By the time the 1946 aerial was taken and 1948 San Luis Rey (1:24,000) topographic map was made, an orchard was planted in the area surrounding the property. Additionally, a structure is seen in the southwest corner of the project area on the 1946 and 1947 aerial photographs. A new structure is seen on the 1964 aerial photograph – this structure appears to be the residence that currently exists on the property. By the time this photograph was taken, the orchard on the property had been cleared. The subsequent aerial photographs and topographic maps show the development of the region surrounding the project area. To the south and east of the project area, residential neighborhoods were constructed in the 1970s and 1980s.

According to BLM GLO records, the project area is located within Lot 16 of Section 25, granted to William Larson in 1911, under the authority of the Homestead Entry Original (12 stat. 392) (GLO 1911). Larson also owned lots 15 and 17 of Section 25 and lot four of Section 26, within Township 11 South, Range 4 West.

4.3 NATIVE AMERICAN CONTACT PROGRAM

HELIX contacted the NAHC on August 19, 2021, for a Sacred Lands File search and a list of Native American contacts for the project area. The NAHC indicated in a response dated September 20, 2021, that the results of the search were positive, and that the La Jolla Band of Luiseño Indians and the San Luis Rey Band of Mission Indians should be contacted for further information. Letters were sent on September 21, 2021, to Native American representatives and interested parties identified by the NAHC. To date, two written responses have been received; the Rincon Band of Luiseño Indians noted that the project area is within the Territory of the Luiseño people, and within Rincon's Area of Historic Interest. As such, they requested a copy of this cultural resources assessment for review and comment. Additionally, the Rincon Band wishes to consult with the City of Vista regarding project impacts to cultural resources. The San Pasqual Band of Mission Indians also responded, noting that while the project area is not within the boundaries of the recognized San Pasqual Indian Reservation, it is within the area which it considers its Traditional Use Area – as such, the Tribe wishes to engage in consultation, and be given access to any cultural resource reports produced for the project. Although the Pechanga

Band of Luiseño Indians (Pechanga) did not provide a written response, Paul Macarro, the Pechanga Cultural Resources Manager, indicated to Principal Investigator, Mary Robbins-Wade, in a conversation on October 20, 2021, that Pechanga would defer to the San Luis Rey Band regarding this project. If any additional responses are received, they will be forwarded to the City of Vista staff. Native American correspondence is included as Appendix C (Confidential Appendices, bound separately).

Ms. Robbins-Wade spoke to Cami Mojado, representing the San Luis Rey Band of Mission Indians, on October 20, 2021, regarding the project and the cultural resources sensitivity of the area. Ms. Mojado indicated that there are a number of known resources in relative proximity to the project site and that cultural material has been encountered during monitoring in the general vicinity. This, combined with the proximity to Buena Vista Creek and the many resources located along that drainage, indicates a sensitivity for buried cultural resources within the project site. Thus, monitoring during ground-disturbing activities should be undertaken.

4.4 FIELD SURVEY

A pedestrian survey of the project site was conducted on August 24, 2021, by HELIX staff archaeologist James Turner and Logovi'i Sialo'i from Saving Sacred Sites. The property was walked in approximately five-meter transects. Much of the southern half of the project area was covered in mulch and bark – visibility in this area was very low, ranging from zero to 15 percent (Plate 1). The northern half was covered in mowed grasses and weeds; visibility here ranged from zero to 30 percent (Plates 2 and 3). Visible soil, including that produced by rodent burrows, was inspected; this soil consisted of medium and light brown silty sand.

No cultural material was observed within the archaeological survey area; however, as noted above, the project area contained heavily disturbed soils and visibility was poor.

Plate 1. Overview of project area from Melrose Way, view to the north.

Plate 2. Overview of project area from the northeast corner, view to the south.

Plate 3. Overview of northwest corner of the project area, view to the northwest.

5.0 SUMMARY AND MANGEMENT RECOMMENDATIONS

A study was undertaken to identify cultural resources that are present in the 1205 Melrose Way Project area and to determine the effects of the project on historical resources per CEQA and historic properties per NRHP. The cultural resources survey did not identify any cultural resources within the project area; therefore, no impacts to cultural resources are anticipated.

While the surrounding area remained relatively undeveloped until the 1960s, it has since been highly disturbed by residential development, agricultural activities, utility installations, and road formation. The project area itself has been disturbed by nineteenth and twentieth century agricultural activities, irrigation systems, dirt road formation, and residential development. Much of the project area was cleared for these activities, in particular the agricultural pursuits.

5.1 MANAGEMENT RECOMMENDATIONS

The majority of the project site was covered by mulch and dead grasses, and the original ground surface could not be observed. Based on the results of the current study, no historic properties will be affected by the project. However, it is located within a region rich in cultural resources and the results of the Sacred Lands File Search were positive. Therefore, a grading monitoring program should be implemented for the project. The monitoring program should include the following elements:

- Prior to issuance of grading permits, a pre-excavation agreement shall be developed among the appropriate Native American Tribe(s), the applicant, and the City, as the lead agency;
- The qualified archaeologist and the Native American representative(s) shall attend the pre-grading meeting with the contractors to explain the requirements of the monitoring program;
- An archaeologist and a Native American monitor shall be on-site during grading, trenching, and other ground-disturbing activities, including brushing/grubbing, unless otherwise agreed upon by the archaeological Principal Investigator, the Native American representative, and City staff;
- If cultural resources are encountered, both the archaeologist and the Native American monitor shall have the authority to temporarily halt or redirect grading/trenching while the cultural resources are documented and assessed. If significant resources are encountered, appropriate mitigation measures must be developed and implemented;
- If any human remains are discovered, the County Coroner shall be contacted. In the event that the remains are determined to be of Native American origin, the Most Likely Descendant, as identified by the NAHC, shall be contacted in order to determine proper treatment and disposition of the remains;
- Recovered artifactual materials shall be cataloged and analyzed;
- A report shall be completed describing the methods and results of the monitoring and data recovery program; and
- Recovered cultural material shall be curated with accompanying catalog to current professional repository standards or the collection will be returned to the appropriate Native American Tribe(s), as agreed upon by the Principal Investigator, Native American representative(s), and City staff and specified in the pre-excavation agreement.
- If cultural material will be returned to the Tribe(s) rather than curated, diagnostic artifacts or particularly good examples of specific tool types, if such are recovered, should be scanned for 3D printing, with the permission of the Tribe(s). The data from 3D scanning would be curated at an appropriate repository, such as the San Diego Archaeological Center. The cultural material can then be returned to the Tribe(s) for reburial or other treatment.

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Appendix A

Resumes

James Turner, RPA
Staff Archaeologist

HELIX Environmental Planning

Summary of Qualifications

Mr. Turner is a Registered Professional Archaeologist (RPA) with a Master's degree in Anthropology and field and college-level teaching experience in archaeology. He is experienced in Section 106, the Native American Graves Protection and Repatriation Act (NAGPRA), and writing detailed reports. Mr. Turner has archaeological research and fieldwork expertise throughout southern California. He has also received training in identifying and analyzing animal remains in archaeological contexts, historic artifact identification, and technical writing. Mr. Turner's experience meets the Secretary of the Interior's Professional Qualification Standards for archaeology.

Selected Project Experience

eTS 43472 "Gold Mine" Monitoring (2020). Archaeologist for an erosion control and repair project in the community of Julian. Conducted cultural resource monitoring and report preparation. Work performed for San Diego Gas & Electric.

Aliso Creek Canyon Restoration Project (2020). Archaeologist for an erosion repair project in Lake Forest. Conducted a field survey of the project area, performed background research, and produced a cultural resources report. Work performed for the Orange County Department of Public Works.

Broadway Channel Improvements - Phase A (2020 -). Archaeologist for an earthen channel improvement project in the city of El Cajon. Performed background research and prepared cultural resource survey report. Work performed for City of El Cajon.

Clairemont Community Plan Update EIR Ph1 (2020). Archaeologist for the Clairemont Community Plan Update. Performed background research and assisted with preparing the Community Plan Update cultural resources section. Work performed for the City of San Diego.

Cordial Road Pipeline (2020). Archaeologist for a pipeline replacement project in the unincorporated portion of the City of El Cajon. Performed background research and field survey. Other responsibilities included the production of a letter report detailing the methods and results of the survey, as well as the completion of a site record update to submit to the South Coastal Information Center. Work performed for the Padre Dam Municipal Water District.

Carmel Mountain Road Life Sciences Project (2020). Archaeologist for a proposed commercial development project in the Torrey Hills Community Plan area.

Education

Master of Arts, Anthropology, San Diego State University, 2018

Bachelor of Arts, Biology and Anthropology, San Diego State University, 2015

Registrations/ Certifications

Registered Professional Archaeologist #17338

Professional Affiliations

Society for Historical Archaeology

Society for California Archaeology

Responsibilities included performing background and archival research and producing an archaeological resources report. Work performed for Allen Matkins Leck Gabme Mallory & Natsis, LLP.

Draft EIS/Overseas EIS - Disposal of Decommissioned, Defueled Ex-Enterprise (CVN 65) & Associated Naval Reactor Plants (2020 -). Archaeologist for the Draft EIS for the disposal of the Navy ex-Enterprise. Responsible for background research and citation management and assisted with document preparation. Work performed for the United States Navy as a subconsultant to ManTech.

Eastlake Village Park (2020). Archaeologist for a telecommunication project in the community of Eastlake in the City of Chula Vista. Conducted cultural resource monitoring for the drilling of a cassion hole. Work performed for Terracon.

General Coatings (2020). Archaeologist for a due diligence project for the possible future expansion of the General Coatings property. Conducted background research, which included analyzing a records search and viewing historic maps and aerial photographs of the project area. Additional responsibilities included performing a field survey of the project area and producing a cultural resources due diligence report. Work performed for General Coatings.

Lake Rancho Viejo Environmental Consulting (2020). Archaeologist for a cultural resources survey for a proposed housing development in the community of Fallbrook in northern San Diego County. Conducted background research and report preparation. Work performed for Q Technology Direct LLC with County of San Diego as the lead agency.

Mtn View Connector Pipeline - Cultural (2020). Archaeologist for a waterline replacement project in the community of Alpine. Conducted cultural resource monitoring and prepared the final monitoring report. Work performed for Padre Dam Municipal Water District.

Salt Bay Design District Specific Plan EIR (2020). Archaeologist for a mixed-use development project, which proposes to include wholesale/retail shopping and light industrial uses. Participated in an archaeological testing program and produced artifact tables for report. Work performed for M & A Gabaee.

Santa Ysabel Trail (2020 -). Staff Archaeologist for a proposed 3 mile hiking trail in the unincorporated community of Julian. Performed background research, participated in the cultural resource survey, and contributed to the cultural resources survey report. Work performed for the County of San Diego Parks and Recreation Department.

Mary Robbins-Wade, RPA

Cultural Resources Group Manager

HELIX Environmental Planning

Summary of Qualifications

Ms. Robbins-Wade has 41 years of extensive experience in both archaeological research and general environmental studies. She oversees the management of all archaeological, historic, and interpretive projects; prepares and administers budgets and contracts; designs research programs; supervises personnel; and writes reports. Ms. Robbins-Wade has managed or participated in hundreds of projects under the California Environmental Quality Act (CEQA), as well as numerous archaeological studies under various federal jurisdictions, addressing Section 106 compliance and National Environmental Policy Act (NEPA) issues. She has excellent relationships with local Native American communities and the Native American Heritage Commission (NAHC), as well as has supported a number of local agency clients with Native American consultation under State Bill 18 and assistance with notification and Native American outreach for Assembly Bill 52 consultation. Ms. Robbins-Wade is a Registered Professional Archaeologist (RPA) and meets the U.S. Secretary of the Interior's Professional Qualifications for prehistoric and historic archaeology.

Selected Project Experience

12 Oaks Winery Resort. Project Manager/ Principal Investigator for a cultural resources survey of approximately 650 acres for a proposed project in the County of Riverside. Oversaw background research, field survey, site record updates, Native American coordination, and report preparation. Met with Pechanga Cultural Resources staff to discuss Native American concerns. Worked with applicant and Pechanga to design the project to avoid impacts to cultural resources. Work performed for Standard Portfolio Temecula, LLC.

28th Street between Island Avenue and Clay Avenue Utilities Undergrounding Archaeological Monitoring. Project Manager/Principal Investigator for a utilities undergrounding project in a historic neighborhood of East San Diego. Responsible for project management; coordination of archaeological and Native American monitors; coordination with forensic anthropologist, Native American representative/Most Likely Descendent, and City staff regarding treatment of possible human remains; oversaw identification of artifacts and cultural features, report preparation, and resource documentation. Work performed for the City of San Diego.

Archaeological Testing F11 Project. Project Manager for a cultural resources study for a proposed mixed-use commercial and residential tower in downtown San Diego. Initial work included an archaeological records search and a historic study, including assessment of the potential for historic archaeological resources. Subsequent work included development and implementation of an archaeological testing plan, as well as construction monitoring and the assessment of historic archaeological resources encountered. Work performed for the Richman Group of Companies.

Education

Master of Arts, Anthropology, San Diego State University, California, 1990

Bachelor of Arts, Anthropology, University of California, Santa Barbara, 1981

Registrations/ Certifications

Caltrans, Professionally Qualified Staff-Equivalent Principal Investigator for prehistoric archaeology,

, Bureau of Land Management Statewide Cultural Resource Use Permit (California), permit #CA-18-35,

, Register of Professional Archaeologists #10294, 1991

County of San Diego, Approved CEQA Consultant for Archaeological Resources, 2007

, Orange County Approved Archaeologist, 2016

Blended Reverse Osmosis (RO) Line Project. Project Manager/ Principal Investigator for cultural resources monitoring during construction of a 24-inch recycled water pipeline in the City of Escondido. Oversaw monitoring program, including Worker Environmental Awareness Training; responsible for Native American outreach/coordination, coordination with City staff and construction crews, and general project management. Work performed for the City of Escondido.

Buena Sanitation District Green Oak Sewer Replacement Project. Project Manager/Principal Investigator for a cultural resources testing program in conjunction with a proposed sewer replacement project for the City of Vista. Oversaw background research, fieldwork, site record update, Native American coordination, and report preparation. Work performed for Harris & Associates, Inc., with the City of Vista as the lead agency.

Cactus II Feeder Transmission Pipeline IS/MND. Cultural Resources Task Lead for this project in the City of Moreno Valley. Eastern Municipal Water District proposed to construct approximately five miles of new 30-inch to 42 inch-diameter pipeline; the project would address existing system deficiencies within the City and provide supply for developing areas. Oversaw background research, field survey, and report preparation. Responsible for Native American outreach for cultural resources survey. Assisted District with Native American outreach and consultation under AB 52. Work performed under an as-needed contract for Eastern Municipal Water District.

Dale 2199C Pressure Zone Looping Pipeline Project. Cultural Resources Task Lead for this project in Moreno Valley. Eastern Municipal Water District proposed construction of a new pipeline to connect two existing pipelines in the District’s 2199C Pressure Zone. The pipeline would consist of an 18-inch-diameter pipeline between Kitching Street and Alta Vista Drive that would connect to an existing 12-inch-diameter pipeline in the northern end of Kitching Street and to an existing 18-inch-diameter pipeline at the eastern end of Alta Vista Drive. The project will improve reliability and boost the Dale Pressure Zone’s baseline pressure and fire flow availabilities. Four potential alignments were under consideration; three of these bisect undeveloped land to varying degrees, while the other is entirely situated within developed roadways. Oversaw background research and field survey. Responsible for Native American outreach for cultural resources survey and co-authored technical report. Work performed under an as-needed contract for Eastern Municipal Water District.

Downtown Riverside Metrolink Station Track & Platform Project. Cultural Resources Task Lead for this project involving changes to and expansion of the Downtown Riverside Metrolink Station. Overseeing records search and background information, archaeological survey, and report preparation. Responsible for coordination with Native American Heritage Commission, Riverside County Transportation Commission (RCTC), and Federal Transportation Authority (FTA) on Native American outreach. Work performed for Riverside County Transportation Commission as a subconsultant to HNTB Corporation.

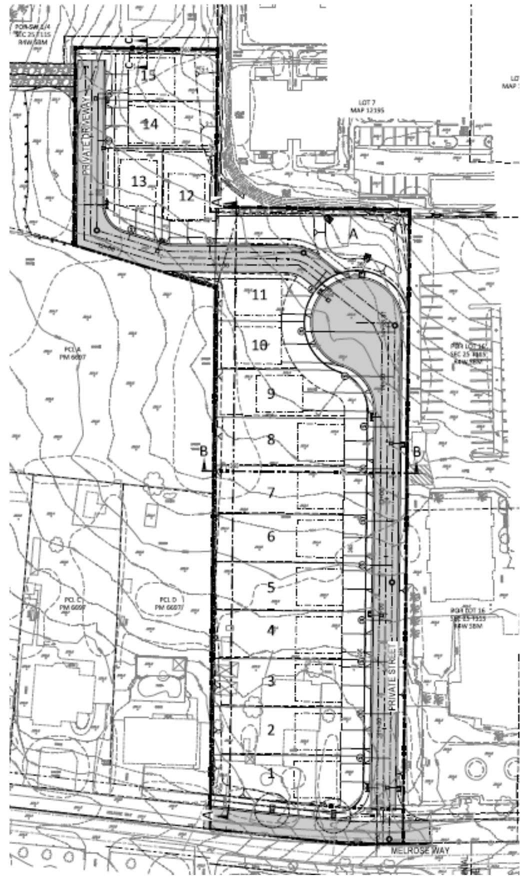
Appendix B

Records Search Results
(Confidential, Bound Separately)

Appendix C

Native American Correspondence (Confidential, Bound Separately)

1205 Melrose Way Project, City of Vista
Greenhouse Gas Emissions Technical Report



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City of Vista
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Vista, CA 92084

Prepared by:

RCHGROUP
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September 2021

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GREENHOUSE GAS EMISSIONS TECHNICAL REPORT

1205 MELROSE WAY PROJECT, CITY OF VISTA

1.1 INTRODUCTION

This report presents an analysis of potential greenhouse gas (GHG) emissions impacts associated with the 1205 Melrose Way Project (the "Project") in the City of Vista, CA. The Project consists of the development of 15 new single-family homes on 2.55 acres. The Project would change the existing E-1 (Estates Residential) zoning to R-1 zoning (Single Family Residential). The Project would also require a General Plan Amendment to change the existing Low Density Residential (LD) designation to Medium Density Residential (MD), as well as a Density Bonus.

The 15 new single-family homes are estimated to be approximately 2,800 to 3,000 square feet each. Project construction would commence in January 2023 and would be completed in June 2024 (approximately 18 months). Demolition would be required to remove the existing structures onsite. Site preparation and grading activities would follow and would require approximately 4,034 cubic yards of soil import, requiring approximately 252 haul truck round trips. Building construction, paving, and architectural coating phases would follow.

There are residences immediately north (multifamily apartments) and west (single-family homes) of the Project site. An existing church (Vista Samoan Seventh-Day Adventist Temple) is immediately east of the Project site. Breeze Hill Elementary School is approximately 350 feet east of eastern boundary of the Project site. Residences are also located to the south opposite of Melrose Way.

This report presents a background on GHG emissions, an overview of regulations applicable to the Project, and an analysis of potential GHG emissions impacts that would result from implementation of the Project. All GHG emissions impacts were found to be **less than significant**.

1.2 EXISTING CONDITIONS

1.2.1 BACKGROUND AND GENERAL PRINCIPLES

"Global warming" and "global climate change" are the terms used to describe the increase in the average temperature of the earth's near-surface air and oceans since the mid-20th century and its projected continuation. Warming of the climate system is now considered to be unequivocal, with global surface temperature increasing approximately 1.33 degrees Fahrenheit (°F) over the last 100 years. Continued warming is projected to increase global average temperature between 2 and 11°F over the next 100 years.

Natural processes and human actions have been identified as the causes of this warming. The International Panel on Climate Change (IPCC) concludes that variations in natural phenomena such as solar radiation and volcanoes produced most of the warming from pre-industrial times to 1950 and had a small cooling effect afterward (IPCC, 2014). After 1950, however, increasing GHG concentrations resulting from human activity such as fossil fuel burning, and deforestation have been responsible for most of the observed temperature increase. These basic conclusions have been endorsed by more than 45 scientific societies and academies of science, including all the national academies of science of the major industrialized countries. Since 2007, no scientific body of national or international standing has maintained a dissenting opinion.

Increases in GHG concentrations in the earth's atmosphere are thought to be the main cause of human-induced climate change. The IPCC is now 95 percent certain that humans are the main cause of current global warming (IPCC, 2014). GHG naturally trap heat by impeding the exit of solar radiation that has hit the earth and is reflected back into space. Some GHG occur naturally and are necessary for keeping the earth's surface inhabitable. However, increases in the concentrations of these gases in the atmosphere during the last 100 years have decreased the amount of solar radiation that is reflected back into space, intensifying the natural greenhouse effect and resulting in the increase of global average temperature.

Gases that trap heat in the atmosphere are referred to as GHG because they capture heat radiated from the sun as it is reflected back into the atmosphere, much like a greenhouse does. The accumulation of GHG has been implicated as the driving force for global climate change. The primary GHG are carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), ozone, and water vapor.

While the presence of the primary GHG in the atmosphere are naturally occurring, CO_2, CH_4, and N_2O are also emitted from human activities, accelerating the rate at which these compounds occur within earth's atmosphere. Emissions of CO_2 are largely by-products of fossil fuel combustion, whereas methane results from off-gassing associated with agricultural practices, coal mines, and landfills. Other GHG include hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, and are generated in certain industrial processes.

CO_2 is the reference gas for climate change because it is the predominant GHG emitted. The effect that each of the aforementioned gases can have on global warming is a combination of the mass of their emissions and their global warming potential (GWP). GWP indicates, on a pound-for-pound basis, how much a gas is predicted to contribute to global warming relative to how much warming would be predicted to be caused by the same mass of CO_2. CH_4 and N_2O are substantially more potent GHG than CO_2, with GWP of 28 and 265 times that of CO_2, respectively (IPCC, 2014).

In emissions inventories, GHG emissions are typically reported in terms of pounds or metric tons of CO_2 equivalents (CO_2e). CO_2e are calculated as the product of the mass emitted of a given GHG and its specific GWP. While CH_4 and N_2O have much higher GWP than CO_2, CO_2 is emitted in such vastly higher quantities that it accounts for the majority of GHG emissions in CO_2e.

Fossil fuel combustion, especially for the generation of electricity and powering of motor vehicles, has led to substantial increases in CO_2 emissions (and thus substantial increases in atmospheric concentrations of CO_2). In pre-industrial times (c. 1860), concentrations of atmospheric CO_2 were approximately 280 parts per million (ppm). By December 2020, atmospheric CO_2 concentrations had increased to 414 ppm, 48 percent above pre-industrial concentrations (NOAA, 2021).

There is international scientific consensus that human-caused increases in GHGs have and will continue to contribute to global warming. Potential global warming impacts in California may include, but are not limited to, loss in snow pack, sea level rise, more extreme heat days per year, more high ozone days, more large forest fires, and more drought years. Secondary effects are likely to include a global rise in sea level, impacts to agriculture, changes in disease vectors, and changes in habitat and biodiversity (CalEPA, 2006).

1.2.2 REGULATORY SETTING

State Regulations and Standards

State regulations and standards applicable to the Project are listed below. The Project would not generate vehicle trips, thus State regulations focused on motor vehicles are not discussed further.

Solid Waste Regulations

The California Integrated Waste Management Act of 1989, as modified by AB 341, requires each jurisdiction's source reduction and recycling element to include an implementation schedule that shows: (1) diversion of 25 percent of all solid waste by January 1, 1995, through source reduction, recycling, and composting activities; (2) diversion of 50 percent of all solid waste on and after January 1, 2000; and (3) diversion of 75 percent of all solid waste on or after 2020, and annually thereafter. The California Department of Resources Recycling and Recovery (CalRecycle) is required to develop strategies, including source reduction, recycling, and composting activities, to achieve the 2020 goal.

CalRecycle published a discussion document, entitled *California's New Goal: 75 Percent Recycling,* which identified concepts that would assist the State in reaching the 75 percent goal by 2020. Subsequently, in August 2015, CalRecycle released the *AB 341 Report to the Legislature*, which identifies five priority strategies for achievement of the 75 percent goal: (1) moving organics out of landfills; (2) expanding recycling/manufacturing infrastructure; (3) exploring new approaches for State and local funding of sustainable waste management programs; (4) promoting State procurement of post-consumer recycled content products; and, (5) promoting extended producer responsibility.

California Code of Regulations Title 24

Although not originally intended to reduce greenhouse gas emissions, Title 24 of the California Code of Regulations, Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings, were first established in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow for the consideration and possible incorporation of new energy efficiency technologies and methods. Energy efficient buildings require less electricity, natural gas, and other fuels. Electricity production from fossil fuels and on-site fuel combustion (typically for water heating) results in GHG emissions. Therefore, increased energy efficiency results in decreased GHG emissions. Accordingly, Title 24 in the CALGreen Building Code is now a part of the statewide strategy for reducing GHG emissions and is the only statewide plan for reduction of GHG emissions that every local agency must adopt in a public hearing by adopting the state building code. Consistent with CALGreen, the state recognized that GHG reductions would be achieved through buildings that exceed minimum energy-efficiency standards, decrease consumption of potable water, reduce sold waste during construction and operation, and incorporate sustainable materials. Compliance with Title 24 of the CALGreen Building Code is thus a vehicle to achieve statewide electricity and natural gas efficiency targets, and lower GHG emissions from waste and water transport sectors. The Title 24 Building Energy Efficiency Standards were updated in 2019 and buildings whose permit application are dated on or after January 1, 2020 must comply with the 2019 Standards.

Pavley Standards

California AB 1493 (Pavley) enacted on July 22, 2002, required the California Air Resource Board (CARB) to develop and adopt regulations that reduce greenhouse gases emitted by passenger vehicles and light duty trucks for model years 2009–2016, which are often times referred to as the “Pavley I” standards. The CARB obtained a waiver from the USEPA that allows for implementation of these regulations notwithstanding possible federal preemption concerns.

Executive Order S-3-05

Executive Order (EO) S-3-05, signed by Governor Schwarzenegger on June 1, 2005, calls for a reduction in GHG emissions to 1990 levels by 2020 and for an 80 percent reduction in GHG emissions below 1990 levels by 2050. EO S-3-05 also calls for the CalEPA to prepare biennial science reports on the potential impact of continued global climate change on certain sectors of the California economy. The first of these reports, “Our Changing Climate: Assessing Risks to California”, and its supporting document “Scenarios of Climate Change in California: An Overview” were published by the California Climate Change Center in 2006.

Assembly Bill 32

In September 2006, Governor Schwarzenegger signed Assembly Bill (AB) 32 into law. AB 32 required that, by January 1, 2008, the California Air Resources Board (CARB) shall determine what the statewide GHG emissions level was in 1990 and approve a statewide GHG emissions limit that is equivalent to that level, to be achieved by 2020. The CARB adopted its AB 32 Scoping Plan in December 2008, which provided estimates of the 1990 GHG emissions level and identified sectors for the reduction of GHG emissions. In 2011, the CARB developed a Supplement to the AB 32 Scoping Plan which updated the emissions inventory based on current projections and included adopted measures such as the Pavley Fuel Efficiency Standards and 20 percent Renewable Portfolio Standard (RPS) requirement.

In 2014, the CARB published its First Update to the Climate Change Scoping Plan. This update indicated that the State is on target to meet the goal of reducing GHG emissions to 1990 level by 2020. The First Update tracks progress in achieving the goals of AB 32 and lays out a new set of actions that will move the State further along the path to achieving the 2050 goal of reducing emissions to 80 percent below 1990 levels. While the First Update discusses setting a mid-term target, the plan does not yet set a quantifiable target toward meeting the 2050 goal.

In January 2017, the CARB released the draft of The 2017 Climate Change Scoping Plan Update: The Proposed Strategy for Achieving California's 2030 Greenhouse Gas Target (Second Update). This update addresses the statewide emissions reduction target established pursuant to Senate Bill (SB) 32 and Executive Order B-30-15, as discussed below. The major elements of the Second Update, as proposed in the CARB's January 2017 draft, include (but are not limited to) achieving the following milestones by 2030: a 50 percent Renewable Portfolio Standard (discussed below); a more stringent Low Carbon Fuel Standard (discussed below) that requires an 18 percent reduction in carbon intensity; deploying additional near-zero and zero emissions technologies in the transportation sectors; increasing the stringency of the SB 375 (discussed below) reduction targets for 2035; a 20 percent reduction in GHG emissions from the refinery sector; and, continued deployment of a declining emissions cap under the Cap-and-Trade Program.

Senate Bill 97

Senate Bill (SB) 97, enacted in 2007, amends the CEQA statute to clearly establish that GHG emissions and the effects of GHG emissions are appropriate subjects for CEQA analysis. SB 97 directed the Governor's Office of Planning and Research (OPR) to develop draft CEQA guidelines "for the mitigation of greenhouse gas emissions or the effects of OPR published a technical advisory on CEQA and climate change on June 19, 2008. The guidance did not include a suggested threshold but stated that the OPR had asked the CARB to "recommend a method for setting thresholds which will encourage consistency and uniformity in the CEQA analysis of greenhouse gas emissions throughout the state."

The OPR technical advisory does recommend that CEQA analyses include the following components:

- Identification of greenhouse gas emissions;
- Determination of significance; and
- Mitigation of impacts, as needed and as feasible.

On December 31, 2009, the California Natural Resources Agency adopted the proposed amendments to the State CEQA Guidelines. These amendments became effective on March 18, 2010.

Senate Bill 375

The Sustainable Communities and Climate Protection Act of 2008 (SB 375) finds that GHG from autos and light trucks can be substantially reduced by new vehicle technology, but even so "it will be necessary to achieve significant additional GHG reductions from changed land use patterns and improved transportation. Without improved land use and transportation policy, California will not be able to achieve the goals of AB 32." Therefore, SB 375 requires that regions with metropolitan planning organizations adopt sustainable communities' strategies, as part of their regional transportation plans, which are designed to achieve certain goals for the reduction of GHG emissions from mobile sources.

SB 375 also includes CEQA streamlining provisions for "transit priority projects" that are consistent with an adopted sustainable communities' strategy. As defined in SB 375, a "transit priority project" shall: (1) contain at least 50 percent residential use, based on total building square footage and, if the project contains between 26 and 50 percent nonresidential uses, a floor area ratio of not less than 0.75; (2) provide a maximum net density of at least 20 dwelling units per acre; and (3) be within 0.5 mile of a major transit stop or high quality transit corridor.

Low Carbon Fuel Standard

Executive Order S-1-07 requires a 10 percent or greater reduction in the average fuel carbon intensity for transportation fuels in California regulated by the CARB by 2020. In 2009, the CARB approved the Low Carbon Fuel Standard (LCFS) regulations, which became fully effective in April 2010. The regulations were subsequently re-adopted in September 2015 in response to related litigation.

Advanced Clean Cars Program

In 2012, the CARB approved the Advanced Clean Cars (ACC) program, a new emissions-control program for model years 2017–2025. (This program is sometimes referred to as "Pavley II.") The program combines the control of smog, soot, and GHGs with requirements for greater numbers of zero-emission vehicles. By 2025, when the rules will be fully implemented, new automobiles will emit 34 percent fewer GHGs.

Zero Emission Vehicles

Zero emission vehicles (ZEVs) include plug-in electric vehicles, such as battery electric vehicles and plug-in hybrid electric vehicles, and hydrogen fuel cell electric vehicles.

In 2012, Governor Brown issued Executive Order B-16-2012, which calls for the increased penetration of ZEVs into California's vehicle fleet in order to help California achieve a reduction of GHG emissions from the transportation sector equaling 80 percent less than 1990 levels by 2050. In furtherance of that statewide target for the transportation sector, the Executive Order also calls upon the CARB, CEC and the California Public Utilities Commission to establish benchmarks that will: (1) allow over 1.5 million ZEVs to be on California roadways by 2025, and (2) provide the State's residents with easy access to ZEV infrastructure.

The proliferation of zero emission vehicles is being supported in multiple ways. For example, California is incentivizing the purchase of ZEVs through implementation of the Clean Vehicle Rebate Project (CVRP), which is administered by a non-profit organization (The Center for Sustainable Energy) for the ARB and currently subsidizes the purchase of passenger near-zero and zero emission vehicles. Additionally, CALGreen requires new residential and non-residential construction to be pre-wired to facilitate the future installation and use of electric vehicle chargers (see Section 4.106.4 and Section 5.106.5.3 of CALGreen Standards for the residential and non-residential pre-wiring requirements, respectively). As a final example, in January 2017, San Diego Gas & Electric Company (SDG&E) applied to the California Public Utilities Commission for authority to implement numerous programs intended to accelerate the electrification of the transportation sector. SDG&E's application includes, but is not limited to, proposals to: (i) install up to 90,000 charging stations at single-family homes throughout the company's service area; (ii) install charging infrastructure at various park-and-ride locations; (iii) provide incentives for electric taxis and shuttles; and, (iv) provide educational programs and financial incentives for the sale of electric vehicles.

Executive Order B-30-15

In April 2015, Governor Brown signed Executive Order B-30-15, which established the following GHG emission reduction goal for California: by 2030, reduce GHG emissions to 40 percent below 1990 levels. This Executive Order also directed all state agencies with jurisdiction over GHG-emitting sources to implement measures designed to achieve the new interim 2030 goal, as well as the pre-existing, long-term 2050 goal identified in Executive Order S-3-05.

Senate Bill 32 and Assembly Bill 197

Enacted in 2016, SB 32 codifies the 2030 emissions reduction goal of Executive Order B-30-15 by requiring the CARB to ensure that statewide GHG emissions are reduced to 40 percent below 1990 levels by 2030. SB 32 was coupled with a companion bill: AB 197. Designed to improve the transparency of the CARB's regulatory and policy-oriented processes, AB 197 created the Joint Legislative Committee on Climate Change Policies, a committee with the responsibility to ascertain facts and make recommendations to the Legislature concerning statewide programs, policies and investments related to climate change. AB 197 also requires the CARB to make certain GHG emissions inventory data publicly available on its web site; consider the social costs of GHG emissions when adopting rules and regulations designed to achieve GHG emission reductions; and include specified information in all Scoping Plan updates for the emission reduction measures contained therein.

City of Vista Regulations and Standards

City of Vista General Plan 2030

In February 2012, the City of Vista (COV) adopted GP 2030 (City of Vista, 2012a) and certified the accompanying Program EIR (PEIR) (City of Vista, 2012b). The GP 2030 PEIR included Mitigation Measure MCC1, which required the COV to implement a quantified Climate Action Plan (CAP) within 24 months of adoption of GP 2030. GP 2030 includes a Resource Conservation and Sustainability Element, which includes the following: "RCS Goal 2: Reduce GHG emissions from community activities and municipal facilities and operations within the COV boundaries to support the State's efforts under AB 32, SB 375, and other State and federal mandates, and to mitigate the community's contributions to global climate change." The GP 2030 policy that applies to the project includes the following:

RCS Policy 2.7: Through California Environmental Quality Act (CEQA) documents, evaluate and disclose the contribution new projects could have on climate change and require mitigation measures as appropriate.

City of Vista Climate Action Plan

The COV adopted its CAP in 2013 to reduce GHG emissions in Vista in order to comply with AB 32. The CAP provided an estimate of business as usual emissions by the year 2020, and a projection of the amount of reductions needed to meet the COV's requirement to reduce GHG emissions to 1990 levels. The CAP estimated that a reduction of 27,187 metric tons of CO_2e would be required. The CAP adopts climate action measures designed to provide the necessary reductions to meet the 2020 target. The measures that would apply to development projects include energy efficiency measures, transportation and land use measures designed to reduce vehicle miles traveled, and solid waste reduction measures.

1.2.3 PROJECT SITE

The Project site is at 1205 Melrose Way (APN 166-184-10-00, 166-183-17-00, and 166-184-09-00) in Vista, CA. The Project consists of the development of 15 new single-family homes on 2.55 acres. The Project would change the existing E-1 (Estates Residential) zoning to R-1 zoning (Single Family Residential). The Project would also require a General Plan Amendment to change the existing Low Density Residential (LD) designation to Medium Density Residential (MD), as well as a Density Bonus. The Project would demolish the existing structures onsite.

There are residences immediately north (multifamily apartments) and west (single-family homes) of the Project site. An existing church (Vista Samoan Seventh-Day Adventist Temple) is immediately east of the Project site. Breeze Hill Elementary School is approximately 350 feet east of eastern boundary of the Project site. Residences are also to the south of Melrose Way.

1.3 THRESHOLDS OF SIGNIFICANCE

According to the California Natural Resources Agency (July 2009), "due to the global nature of GHG emissions and their potential effects, GHG emissions will typically be addressed in a cumulative impacts analysis." Significance criteria were developed in Appendix G of the CEQA Guidelines.

In the GP 2030 PEIR (City of Vista 2012b), the following criteria were used to establish the significance of GCC emissions:

The Project would have a significant impact if it would:

- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

- Expose property and persons to the physical effects of climate change, including but not limited to flooding, public health, wildfire risk or other impacts resulting from climate change.

The California Resources Agency adopted an Amendment to the State CEQA Guidelines to assist lead agencies in determining the significance of impact from GHG emissions. State CEQA Guidelines Section 15064.4, CEQA Guidelines for Determining the Significance of Impacts from Greenhouse Gas Emissions, states the following:

a. The determination of the significance of greenhouse gas emissions calls for a careful judgment by the lead agency consistent with the provisions in section 15064. A lead agency should make a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate or estimate the amount of greenhouse gas emissions resulting from a project. A lead agency shall have discretion to determine, in the context of a particular project, whether to:

   i. Use a model or methodology to quantify greenhouse gas emissions resulting from a project, and which model or methodology to use. The lead agency has discretion to select the model or methodology it considers most appropriate provided it supports its decision with substantial evidence. The lead agency should explain the limitations of the particular model or methodology selected for use; and/or

   ii. Rely on a qualitative analysis or performance-based standards.

b. A lead agency should consider the following factors, among others, when assessing the significance of impacts from greenhouse gas emissions on the environment:

   i. The extent to which the project may increase or reduce greenhouse gas emissions as compared to the existing environmental setting;

   ii. Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project;

   iii. The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions. Such requirements must be adopted by the relevant public agency through a public review process and must reduce or mitigate the project's incremental contribution of greenhouse gas emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project.

The COV has not established a GHG significance threshold to date. Several lead agencies in California have adopted a screening threshold as recommended by the CAPCOA Report, CEQA and Climate Change – Evaluating and Addressing Greenhouse Gas Emissions from Projects

Subject to the California Environmental Quality Act, which proposes a screening-level threshold of 900 metric tons of CO_2e to evaluate whether a project must conduct further analysis.

Based on a review of projects within the city, a level of 1,185 metric tons of CO_2e would capture 90 percent of the city's emissions that are attributable to development projects. Therefore, a "bright line" threshold of 1,185 metric tons of CO_2e is an appropriate significance threshold for the COV. The Project's emissions were evaluated based on this threshold.

1.4 IMPACT ANALYSIS

1.4.1 CONSTRUCTION AND OPERATIONAL GHG EMISSIONS

GHG emissions associated with the Project were estimated for six categories of emissions: (1) construction; (2) area sources; (3) energy (electricity) use; (4) motor vehicles; (5) water and wastewater conveyance; and (6) solid waste disposal. The Project site currently generates GHG emissions associated with the existing residence, which is likely very minor. Therefore, this analysis conservatives assumes the existing baseline generates zero GHG emissions.

Construction Impacts

Construction GHG emissions include emissions from heavy construction equipment, haul trucks and worker trips. GHG emissions from construction of the Project were estimated using the California Emissions Estimator Model (CalEEMod). Construction of the Project would generate approximately 427 metric tons of CO_2e over the approximately 18-month construction period. Per guidance from the SCAQMD (SCAQMD 2008), construction emissions are amortized over a 30-year period to account for the contribution of construction emissions over the lifetime of the project. Amortizing the emissions from construction of the Project over a 30-year period would result in an annual contribution of approximately 14 metric tons of CO_2e. These emissions are added to operational emissions to account for the contribution of construction to GHG emissions for the lifetime of the Project.

Operational Impacts

The main source of Project operational GHG emissions would be vehicle trips and energy use, as well as other minor GHG emissions from areas sources (i.e., application of paints, cleaning chemicals, etc.), water/wastewater conveyance, and solid waste disposal. The Project would generate approximately 150 vehicle trips per day. Project operational GHG emissions assumed an operational year of 2025 and were modeled with CalEEMod as shown in **Table GHG-1** and in **Appendix A**.

TABLE GHG-1 ESTIMATED GHG EMISSIONS (FIRST YEAR OF OPERATION -2025)

Emission Source	Annual Emissions (Metric tons CO_2e per year)
Area Sources	0.2
Energy Use	46.3
Vehicle Trips	139.5
Solid Waste Disposal	8.9
Water/Wastewater Conveyance	6.1
Amortized Construction Emissions	14
Total CO_2 Equivalent Emissions	**215**
Significance Threshold	1,150

Source: SCAQMD, 2021.
1 Values may differ slightly from estimates shown in **Appendix A** due to rounding.

As shown in **Table GHG-1**, emissions would be below the annual bright line significance threshold. Therefore, the Project would result in a **less-than-significant impact**.

1.4.2 CONSISTENCY WITH PLANS AND REGULATIONS

Horizon Years 2030 and 2050

As described in Section 1.2, Executive Order B-30-15 established a statewide emissions reduction target of 40% below 1990 levels by 2030, which has been implemented by SB 32. This measure was identified to keep the state on a trajectory needed to meet the 2050 goal of reducing GHG emissions to 80% below 1990 levels by 2050 pursuant to Executive Order S-3-05.

Further analyses were conducted to provide information on future GHG emissions in the years 2030 and 2050. **Tables GHG-2** and **GHG-3** present estimated emissions for 2030 and 2050 for the Project. Because there is no information on additional plans and programs that may be implemented pursuant to SB 32, **Tables GHG-2** and **GHG-3** consider the following additional GHG measures beyond the year 2025 analysis:

- Implementation of the 60% Renewable Portfolio Standard by 2030, and net zero GHG emissions for SDG&E by 2045.
- Various state regulations that reduce GHG emissions from vehicle trips assumed within CalEEMod.

As shown in **Tables GHG-2** and **GHG-3**, GHG emissions would be further reduced in 2030 and 2050 from the 2025 Project emissions shown in **Table GHG-1** with further implementation of the Renewable Portfolio Standard and other statewide measures for reducing GHG emissions from motor vehicles. The Project would not conflict with the state's goals and regulations adopted for reducing GHG emissions. Therefore, the Project would result in a **less-than-significant impact**.

TABLE GHG-2 ESTIMATED GHG EMISSIONS (YEAR 2030)

Emission Source	Annual Emissions (Metric tons CO_2e per year)
Area Sources	0.2
Energy Use	34.4
Vehicle Trips	125.5
Solid Waste Disposal	8.9
Water/Wastewater Conveyance	4.2
Amortized Construction Emissions	14
Total CO_2 Equivalent Emissions	187

Source: SCAQMD, 2021.
1 Values may differ slightly from estimates shown in **Appendix A** due to rounding.

TABLE GHG-3 ESTIMATED GHG EMISSIONS (YEAR 2050)

Emission Source	Annual Emissions (Metric tons CO_2e per year)
Area Sources	0.2
Energy Use	1.4
Vehicle Trips	113.4
Solid Waste Disposal	8.9
Water/Wastewater Conveyance	1.3
Amortized Construction Emissions	14
Total CO_2 Equivalent Emissions	139

Source: SCAQMD, 2016.
1 Values may differ slightly from estimates shown in **Appendix A** due to rounding.

1.5 CONCLUSIONS

Emissions of GHGs were quantified for both construction and operation of the Project. The Project's GHG emissions would be below bright line significance threshold of 1,150 metric tons of CO_2e per year. Through the Renewable Portfolio Standard and other statewide measures for reducing GHG emissions from motor vehicles, GHG emissions would be reduced further for the Project to a level that is consistent with the goals of AB 32 and SB 32. Therefore, the Project would not result in a cumulatively considerable global climate change impact.

1.6 REFERENCES

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Appendix A

I. CalEEMod Annual Emissions Output (Project Year 2025)

II. CalEEMod Annual Emissions Output (Future Year 2030)

III. CalEEMod Annual Emissions Output (Future Year 2050)

1205 Melrose Way

San Diego County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	15.00	Dwelling Unit	2.55	43,500.00	43

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2025
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	539.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - 15 homes approximately 2800-3000 sq ft each on 2.55 acre site

Construction Phase - 1 to 2 years of construction - estimated at 18 months

Demolition - existing structures to be demolished

Grading - import of 4,034 cubic yards and a 2.55 acre site

Vehicle Trips - 10 trips per dwelling unit (Intersecting Metrics, 2021)

Woodstoves - No woodstoves or fireplaces

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	220.00	340.00
tblConstructionPhase	PhaseEndDate	1/11/2024	6/28/2024
tblConstructionPhase	PhaseEndDate	12/14/2023	5/30/2024

tblConstructionPhase	PhaseEndDate	12/28/2023	6/14/2024
tblConstructionPhase	PhaseStartDate	12/29/2023	6/15/2024
tblConstructionPhase	PhaseStartDate	12/15/2023	6/1/2024
tblFireplaces	FireplaceDayYear	82.00	0.00
tblFireplaces	FireplaceHourDay	3.00	0.00
tblFireplaces	FireplaceWoodMass	3,078.40	0.00
tblFireplaces	NumberGas	8.25	0.00
tblFireplaces	NumberNoFireplace	1.50	0.00
tblFireplaces	NumberWood	5.25	0.00
tblGrading	AcresOfGrading	6.00	2.55
tblGrading	AcresOfGrading	4.50	2.55
tblGrading	MaterialImported	0.00	4,034.00
tblLandUse	LandUseSquareFeet	27,000.00	43,500.00
tblLandUse	LotAcreage	4.87	2.55
tblVehicleTrips	ST_TR	9.54	10.00
tblVehicleTrips	SU_TR	8.55	10.00
tblVehicleTrips	WD_TR	9.44	10.00
tblWoodstoves	NumberCatalytic	0.75	0.00
tblWoodstoves	NumberNoncatalytic	0.75	0.00
tblWoodstoves	WoodstoveDayYear	82.00	0.00
tblWoodstoves	WoodstoveWoodMass	3,019.20	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.2216	1.8334	1.8486	3.5100e-003	0.0433	0.0807	0.1240	0.0152	0.0771	0.0922	0.0000	296.8602	296.8602	0.0547	3.6300e-003	299.3090
2024	0.7737	0.7509	0.8453	1.5100e-003	3.5500e-003	0.0317	0.0352	9.6000e-004	0.0303	0.0312	0.0000	126.5951	126.5951	0.0237	3.7000e-004	127.2989
Maximum	**0.7737**	**1.8334**	**1.8486**	**3.5100e-003**	**0.0433**	**0.0807**	**0.1240**	**0.0152**	**0.0771**	**0.0922**	**0.0000**	**296.8602**	**296.8602**	**0.0547**	**3.6300e-003**	**299.3090**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.2216	1.8334	1.8486	3.5100e-003	0.0433	0.0807	0.1240	0.0152	0.0771	0.0922	0.0000	296.8599	296.8599	0.0547	3.6300e-003	299.3087
2024	0.7737	0.7509	0.8453	1.5100e-003	3.5500e-003	0.0317	0.0352	9.6000e-004	0.0303	0.0312	0.0000	126.5950	126.5950	0.0237	3.7000e-004	127.2987
Maximum	**0.7737**	**1.8334**	**1.8486**	**3.5100e-003**	**0.0433**	**0.0807**	**0.1240**	**0.0152**	**0.0771**	**0.0922**	**0.0000**	**296.8599**	**296.8599**	**0.0547**	**3.6300e-003**	**299.3087**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	1-2-2023	4-1-2023	0.5407	0.5407
2	4-2-2023	7-1-2023	0.5021	0.5021
3	7-2-2023	10-1-2023	0.5076	0.5076
4	10-2-2023	1-1-2024	0.5074	0.5074
5	1-2-2024	4-1-2024	0.4724	0.4724
6	4-2-2024	7-1-2024	1.0387	1.0387
		Highest	1.0387	1.0387

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.2413	1.2800e-003	0.1113	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863
Energy	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	46.0581	46.0581	2.0900e-003	5.3000e-004	46.2682
Mobile	0.0726	0.0807	0.6825	1.4500e-003	0.1602	1.1300e-003	0.1613	0.0428	1.0500e-003	0.0438	0.0000	137.4383	137.4383	9.5800e-003	6.0800e-003	139.4910
Waste						0.0000	0.0000		0.0000	0.0000	3.5787	0.0000	3.5787	0.2115	0.0000	8.8662
Water						0.0000	0.0000		0.0000	0.0000	0.3101	4.7935	5.1035	0.0321	7.9000e-004	6.1417
Total	**0.3156**	**0.0969**	**0.8001**	**1.5600e-003**	**0.1602**	**2.9600e-003**	**0.1632**	**0.0428**	**2.8800e-003**	**0.0456**	**3.8888**	**188.4718**	**192.3605**	**0.2555**	**7.4000e-003**	**200.9534**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.2413	1.2800e-003	0.1113	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863
Energy	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	46.0581	46.0581	2.0900e-003	5.3000e-004	46.2682
Mobile	0.0726	0.0807	0.6825	1.4500e-003	0.1602	1.1300e-003	0.1613	0.0428	1.0500e-003	0.0438	0.0000	137.4383	137.4383	9.5800e-003	6.0800e-003	139.4910
Waste						0.0000	0.0000		0.0000	0.0000	3.5787	0.0000	3.5787	0.2115	0.0000	8.8662
Water						0.0000	0.0000		0.0000	0.0000	0.3101	4.7935	5.1035	0.0321	7.9000e-004	6.1417
Total	**0.3156**	**0.0969**	**0.8001**	**1.5600e-003**	**0.1602**	**2.9600e-003**	**0.1632**	**0.0428**	**2.8800e-003**	**0.0456**	**3.8888**	**188.4718**	**192.3605**	**0.2555**	**7.4000e-003**	**200.9534**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/2/2023	1/27/2023	5	20	
2	Site Preparation	Site Preparation	1/28/2023	2/1/2023	5	3	
3	Grading	Grading	2/2/2023	2/9/2023	5	6	

4	Building Construction	Building Construction	2/10/2023	5/30/2024		5	340	
5	Paving	Paving	6/1/2024	6/14/2024		5	10	
6	Architectural Coating	Architectural Coating	6/15/2024	6/28/2024		5	10	

Acres of Grading (Site Preparation Phase): 2.55

Acres of Grading (Grading Phase): 2.55

Acres of Paving: 0

Residential Indoor: 88,088; Residential Outdoor: 29,363; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

<u>OffRoad Equipment</u>

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Site Preparation	Graders	1	8.00	187	0.41
Site Preparation	Scrapers	1	8.00	367	0.48
Site Preparation	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	2	7.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Building Construction	Welders	3	8.00	46	0.45
Paving	Cement and Mortar Mixers	1	8.00	9	0.56
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36

Paving	Rollers	2	8.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	5	13.00	0.00	88.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	504.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	8	5.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	1.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					9.6300e-003	0.0000	9.6300e-003	1.4600e-003	0.0000	1.4600e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0147	0.1432	0.1346	2.4000e-004		6.7700e-003	6.7700e-003		6.3300e-003	6.3300e-003	0.0000	21.0866	21.0866	5.3500e-003	0.0000	21.2202
Total	**0.0147**	**0.1432**	**0.1346**	**2.4000e-004**	**9.6300e-003**	**6.7700e-003**	**0.0164**	**1.4600e-003**	**6.3300e-003**	**7.7900e-003**	**0.0000**	**21.0866**	**21.0866**	**5.3500e-003**	**0.0000**	**21.2202**

3.2 Demolition - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.0000e-004	5.9700e-003	1.5900e-003	3.0000e-005	7.5000e-004	5.0000e-005	8.0000e-004	2.1000e-004	5.0000e-005	2.5000e-004	0.0000	2.6406	2.6406	1.3000e-004	4.2000e-004	2.7691
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.5000e-004	2.4000e-004	2.9700e-003	1.0000e-005	1.0400e-003	1.0000e-005	1.0500e-003	2.8000e-004	1.0000e-005	2.8000e-004	0.0000	0.8353	0.8353	2.0000e-005	2.0000e-005	0.8427
Total	**4.5000e-004**	**6.2100e-003**	**4.5600e-003**	**4.0000e-005**	**1.7900e-003**	**6.0000e-005**	**1.8500e-003**	**4.9000e-004**	**6.0000e-005**	**5.3000e-004**	**0.0000**	**3.4759**	**3.4759**	**1.5000e-004**	**4.4000e-004**	**3.6118**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					9.6300e-003	0.0000	9.6300e-003	1.4600e-003	0.0000	1.4600e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0147	0.1432	0.1346	2.4000e-004		6.7700e-003	6.7700e-003		6.3300e-003	6.3300e-003	0.0000	21.0865	21.0865	5.3500e-003	0.0000	21.2202
Total	**0.0147**	**0.1432**	**0.1346**	**2.4000e-004**	**9.6300e-003**	**6.7700e-003**	**0.0164**	**1.4600e-003**	**6.3300e-003**	**7.7900e-003**	**0.0000**	**21.0865**	**21.0865**	**5.3500e-003**	**0.0000**	**21.2202**

3.2 Demolition - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.0000e-004	5.9700e-003	1.5900e-003	3.0000e-005	7.5000e-004	5.0000e-005	8.0000e-004	2.1000e-004	5.0000e-005	2.5000e-004	0.0000	2.6406	2.6406	1.3000e-004	4.2000e-004	2.7691
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.5000e-004	2.4000e-004	2.9700e-003	1.0000e-005	1.0400e-003	1.0000e-005	1.0500e-003	2.8000e-004	1.0000e-005	2.8000e-004	0.0000	0.8353	0.8353	2.0000e-005	2.0000e-005	0.8427
Total	**4.5000e-004**	**6.2100e-003**	**4.5600e-003**	**4.0000e-005**	**1.7900e-003**	**6.0000e-005**	**1.8500e-003**	**4.9000e-004**	**6.0000e-005**	**5.3000e-004**	**0.0000**	**3.4759**	**3.4759**	**1.5000e-004**	**4.4000e-004**	**3.6118**

3.3 Site Preparation - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.3500e-003	0.0000	1.3500e-003	1.5000e-004	0.0000	1.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.9500e-003	0.0214	0.0147	4.0000e-005		8.1000e-004	8.1000e-004		7.5000e-004	7.5000e-004	0.0000	3.2317	3.2317	1.0500e-003	0.0000	3.2578
Total	**1.9500e-003**	**0.0214**	**0.0147**	**4.0000e-005**	**1.3500e-003**	**8.1000e-004**	**2.1600e-003**	**1.5000e-004**	**7.5000e-004**	**9.0000e-004**	**0.0000**	**3.2317**	**3.2317**	**1.0500e-003**	**0.0000**	**3.2578**

3.3 Site Preparation - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.0000e-005	2.0000e-005	2.7000e-004	0.0000	1.0000e-004	0.0000	1.0000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0771	0.0771	0.0000	0.0000	0.0778
Total	**3.0000e-005**	**2.0000e-005**	**2.7000e-004**	**0.0000**	**1.0000e-004**	**0.0000**	**1.0000e-004**	**3.0000e-005**	**0.0000**	**3.0000e-005**	**0.0000**	**0.0771**	**0.0771**	**0.0000**	**0.0000**	**0.0778**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.3500e-003	0.0000	1.3500e-003	1.5000e-004	0.0000	1.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.9500e-003	0.0214	0.0147	4.0000e-005		8.1000e-004	8.1000e-004		7.5000e-004	7.5000e-004	0.0000	3.2317	3.2317	1.0500e-003	0.0000	3.2578
Total	**1.9500e-003**	**0.0214**	**0.0147**	**4.0000e-005**	**1.3500e-003**	**8.1000e-004**	**2.1600e-003**	**1.5000e-004**	**7.5000e-004**	**9.0000e-004**	**0.0000**	**3.2317**	**3.2317**	**1.0500e-003**	**0.0000**	**3.2578**

3.3 Site Preparation - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.0000e-005	2.0000e-005	2.7000e-004	0.0000	1.0000e-004	0.0000	1.0000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0771	0.0771	0.0000	0.0000	0.0778
Total	**3.0000e-005**	**2.0000e-005**	**2.7000e-004**	**0.0000**	**1.0000e-004**	**0.0000**	**1.0000e-004**	**3.0000e-005**	**0.0000**	**3.0000e-005**	**0.0000**	**0.0771**	**0.0771**	**0.0000**	**0.0000**	**0.0778**

3.4 Grading - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0197	0.0000	0.0197	0.0101	0.0000	0.0101	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.0000e-003	0.0434	0.0261	6.0000e-005		1.8100e-003	1.8100e-003		1.6700e-003	1.6700e-003	0.0000	5.4312	5.4312	1.7600e-003	0.0000	5.4751
Total	**4.0000e-003**	**0.0434**	**0.0261**	**6.0000e-005**	**0.0197**	**1.8100e-003**	**0.0215**	**0.0101**	**1.6700e-003**	**0.0118**	**0.0000**	**5.4312**	**5.4312**	**1.7600e-003**	**0.0000**	**5.4751**

3.4 Grading - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.6000e-004	0.0342	9.1000e-003	1.5000e-004	4.3200e-003	2.8000e-004	4.6000e-003	1.1900e-003	2.7000e-004	1.4500e-003	0.0000	15.1237	15.1237	7.6000e-004	2.4100e-003	15.8594
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.0000e-005	6.0000e-005	6.9000e-004	0.0000	2.4000e-004	0.0000	2.4000e-004	6.0000e-005	0.0000	7.0000e-005	0.0000	0.1928	0.1928	1.0000e-005	1.0000e-005	0.1945
Total	**6.4000e-004**	**0.0343**	**9.7900e-003**	**1.5000e-004**	**4.5600e-003**	**2.8000e-004**	**4.8400e-003**	**1.2500e-003**	**2.7000e-004**	**1.5200e-003**	**0.0000**	**15.3164**	**15.3164**	**7.7000e-004**	**2.4200e-003**	**16.0539**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0197	0.0000	0.0197	0.0101	0.0000	0.0101	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.0000e-003	0.0434	0.0261	6.0000e-005		1.8100e-003	1.8100e-003		1.6700e-003	1.6700e-003	0.0000	5.4312	5.4312	1.7600e-003	0.0000	5.4751
Total	**4.0000e-003**	**0.0434**	**0.0261**	**6.0000e-005**	**0.0197**	**1.8100e-003**	**0.0215**	**0.0101**	**1.6700e-003**	**0.0118**	**0.0000**	**5.4312**	**5.4312**	**1.7600e-003**	**0.0000**	**5.4751**

3.4 Grading - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.6000e-004	0.0342	9.1000e-003	1.5000e-004	4.3200e-003	2.8000e-004	4.6000e-003	1.1900e-003	2.7000e-004	1.4500e-003	0.0000	15.1237	15.1237	7.6000e-004	2.4100e-003	15.8594
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.0000e-005	6.0000e-005	6.9000e-004	0.0000	2.4000e-004	0.0000	2.4000e-004	6.0000e-005	0.0000	7.0000e-005	0.0000	0.1928	0.1928	1.0000e-005	1.0000e-005	0.1945
Total	**6.4000e-004**	**0.0343**	**9.7900e-003**	**1.5000e-004**	**4.5600e-003**	**2.8000e-004**	**4.8400e-003**	**1.2500e-003**	**2.7000e-004**	**1.5200e-003**	**0.0000**	**15.3164**	**15.3164**	**7.7000e-004**	**2.4200e-003**	**16.0539**

3.5 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1979	1.5736	1.6418	2.8900e-003		0.0709	0.0709		0.0679	0.0679	0.0000	239.8959	239.8959	0.0454	0.0000	241.0301
Total	**0.1979**	**1.5736**	**1.6418**	**2.8900e-003**		**0.0709**	**0.0709**		**0.0679**	**0.0679**	**0.0000**	**239.8959**	**239.8959**	**0.0454**	**0.0000**	**241.0301**

3.5 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.7000e-004	0.0103	3.6200e-003	5.0000e-005	1.5300e-003	6.0000e-005	1.5900e-003	4.4000e-004	6.0000e-005	5.0000e-004	0.0000	4.6350	4.6350	1.4000e-004	6.7000e-004	4.8387
Worker	1.5600e-003	1.0800e-003	0.0132	4.0000e-005	4.6300e-003	3.0000e-005	4.6600e-003	1.2300e-003	2.0000e-005	1.2500e-003	0.0000	3.7105	3.7105	1.1000e-004	1.0000e-004	3.7437
Total	**1.8300e-003**	**0.0113**	**0.0168**	**9.0000e-005**	**6.1600e-003**	**9.0000e-005**	**6.2500e-003**	**1.6700e-003**	**8.0000e-005**	**1.7500e-003**	**0.0000**	**8.3455**	**8.3455**	**2.5000e-004**	**7.7000e-004**	**8.5823**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1979	1.5736	1.6418	2.8900e-003		0.0709	0.0709		0.0679	0.0679	0.0000	239.8956	239.8956	0.0454	0.0000	241.0298
Total	**0.1979**	**1.5736**	**1.6418**	**2.8900e-003**		**0.0709**	**0.0709**		**0.0679**	**0.0679**	**0.0000**	**239.8956**	**239.8956**	**0.0454**	**0.0000**	**241.0298**

3.5 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.7000e-004	0.0103	3.6200e-003	5.0000e-005	1.5300e-003	6.0000e-005	1.5900e-003	4.4000e-004	6.0000e-005	5.0000e-004	0.0000	4.6350	4.6350	1.4000e-004	6.7000e-004	4.8387
Worker	1.5600e-003	1.0800e-003	0.0132	4.0000e-005	4.6300e-003	3.0000e-005	4.6600e-003	1.2300e-003	2.0000e-005	1.2500e-003	0.0000	3.7105	3.7105	1.1000e-004	1.0000e-004	3.7437
Total	**1.8300e-003**	**0.0113**	**0.0168**	**9.0000e-005**	**6.1600e-003**	**9.0000e-005**	**6.2500e-003**	**1.6700e-003**	**8.0000e-005**	**1.7500e-003**	**0.0000**	**8.3455**	**8.3455**	**2.5000e-004**	**7.7000e-004**	**8.5823**

3.5 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0870	0.6989	0.7685	1.3600e-003		0.0293	0.0293		0.0281	0.0281	0.0000	113.2041	113.2041	0.0211	0.0000	113.7312
Total	**0.0870**	**0.6989**	**0.7685**	**1.3600e-003**		**0.0293**	**0.0293**		**0.0281**	**0.0281**	**0.0000**	**113.2041**	**113.2041**	**0.0211**	**0.0000**	**113.7312**

3.5 Building Construction - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.2000e-004	4.8100e-003	1.6700e-003	2.0000e-005	7.2000e-004	3.0000e-005	7.5000e-004	2.1000e-004	3.0000e-005	2.4000e-004	0.0000	2.1490	2.1490	7.0000e-005	3.1000e-004	2.2435
Worker	6.9000e-004	4.6000e-004	5.8300e-003	2.0000e-005	2.1900e-003	1.0000e-005	2.2000e-003	5.8000e-004	1.0000e-005	5.9000e-004	0.0000	1.7070	1.7070	5.0000e-005	5.0000e-005	1.7216
Total	**8.1000e-004**	**5.2700e-003**	**7.5000e-003**	**4.0000e-005**	**2.9100e-003**	**4.0000e-005**	**2.9500e-003**	**7.9000e-004**	**4.0000e-005**	**8.3000e-004**	**0.0000**	**3.8559**	**3.8559**	**1.2000e-004**	**3.6000e-004**	**3.9650**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0870	0.6989	0.7685	1.3600e-003		0.0293	0.0293		0.0281	0.0281	0.0000	113.2040	113.2040	0.0211	0.0000	113.7311
Total	**0.0870**	**0.6989**	**0.7685**	**1.3600e-003**		**0.0293**	**0.0293**		**0.0281**	**0.0281**	**0.0000**	**113.2040**	**113.2040**	**0.0211**	**0.0000**	**113.7311**

3.5 Building Construction - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.2000e-004	4.8100e-003	1.6700e-003	2.0000e-005	7.2000e-004	3.0000e-005	7.5000e-004	2.1000e-004	3.0000e-005	2.4000e-004	0.0000	2.1490	2.1490	7.0000e-005	3.1000e-004	2.2435
Worker	6.9000e-004	4.6000e-004	5.8300e-003	2.0000e-005	2.1900e-003	1.0000e-005	2.2000e-003	5.8000e-004	1.0000e-005	5.9000e-004	0.0000	1.7070	1.7070	5.0000e-005	5.0000e-005	1.7216
Total	**8.1000e-004**	**5.2700e-003**	**7.5000e-003**	**4.0000e-005**	**2.9100e-003**	**4.0000e-005**	**2.9500e-003**	**7.9000e-004**	**4.0000e-005**	**8.3000e-004**	**0.0000**	**3.8559**	**3.8559**	**1.2000e-004**	**3.6000e-004**	**3.9650**

3.6 Paving - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.2100e-003	0.0405	0.0585	9.0000e-005		1.9800e-003	1.9800e-003		1.8300e-003	1.8300e-003	0.0000	7.7574	7.7574	2.4600e-003	0.0000	7.8188
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**4.2100e-003**	**0.0405**	**0.0585**	**9.0000e-005**		**1.9800e-003**	**1.9800e-003**		**1.8300e-003**	**1.8300e-003**	**0.0000**	**7.7574**	**7.7574**	**2.4600e-003**	**0.0000**	**7.8188**

3.6 Paving - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9000e-004	1.3000e-004	1.6000e-003	1.0000e-005	6.0000e-004	0.0000	6.0000e-004	1.6000e-004	0.0000	1.6000e-004	0.0000	0.4698	0.4698	1.0000e-005	1.0000e-005	0.4738
Total	**1.9000e-004**	**1.3000e-004**	**1.6000e-003**	**1.0000e-005**	**6.0000e-004**	**0.0000**	**6.0000e-004**	**1.6000e-004**	**0.0000**	**1.6000e-004**	**0.0000**	**0.4698**	**0.4698**	**1.0000e-005**	**1.0000e-005**	**0.4738**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.2100e-003	0.0405	0.0585	9.0000e-005		1.9800e-003	1.9800e-003		1.8300e-003	1.8300e-003	0.0000	7.7573	7.7573	2.4600e-003	0.0000	7.8188
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**4.2100e-003**	**0.0405**	**0.0585**	**9.0000e-005**		**1.9800e-003**	**1.9800e-003**		**1.8300e-003**	**1.8300e-003**	**0.0000**	**7.7573**	**7.7573**	**2.4600e-003**	**0.0000**	**7.8188**

3.6 Paving - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9000e-004	1.3000e-004	1.6000e-003	1.0000e-005	6.0000e-004	0.0000	6.0000e-004	1.6000e-004	0.0000	1.6000e-004	0.0000	0.4698	0.4698	1.0000e-005	1.0000e-005	0.4738
Total	**1.9000e-004**	**1.3000e-004**	**1.6000e-003**	**1.0000e-005**	**6.0000e-004**	**0.0000**	**6.0000e-004**	**1.6000e-004**	**0.0000**	**1.6000e-004**	**0.0000**	**0.4698**	**0.4698**	**1.0000e-005**	**1.0000e-005**	**0.4738**

3.7 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.6805					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.0000e-004	6.0900e-003	9.0500e-003	1.0000e-005		3.0000e-004	3.0000e-004		3.0000e-004	3.0000e-004	0.0000	1.2766	1.2766	7.0000e-005	0.0000	1.2784
Total	**0.6814**	**6.0900e-003**	**9.0500e-003**	**1.0000e-005**		**3.0000e-004**	**3.0000e-004**		**3.0000e-004**	**3.0000e-004**	**0.0000**	**1.2766**	**1.2766**	**7.0000e-005**	**0.0000**	**1.2784**

3.7 Architectural Coating - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0000e-005	1.0000e-005	1.1000e-004	0.0000	4.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0313	0.0313	0.0000	0.0000	0.0316
Total	**1.0000e-005**	**1.0000e-005**	**1.1000e-004**	**0.0000**	**4.0000e-005**	**0.0000**	**4.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0313**	**0.0313**	**0.0000**	**0.0000**	**0.0316**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.6805					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.0000e-004	6.0900e-003	9.0500e-003	1.0000e-005		3.0000e-004	3.0000e-004		3.0000e-004	3.0000e-004	0.0000	1.2766	1.2766	7.0000e-005	0.0000	1.2784
Total	**0.6814**	**6.0900e-003**	**9.0500e-003**	**1.0000e-005**		**3.0000e-004**	**3.0000e-004**		**3.0000e-004**	**3.0000e-004**	**0.0000**	**1.2766**	**1.2766**	**7.0000e-005**	**0.0000**	**1.2784**

3.7 Architectural Coating - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0000e-005	1.0000e-005	1.1000e-004	0.0000	4.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0313	0.0313	0.0000	0.0000	0.0316
Total	**1.0000e-005**	**1.0000e-005**	**1.1000e-004**	**0.0000**	**4.0000e-005**	**0.0000**	**4.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0313**	**0.0313**	**0.0000**	**0.0000**	**0.0316**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0726	0.0807	0.6825	1.4500e-003	0.1602	1.1300e-003	0.1613	0.0428	1.0500e-003	0.0438	0.0000	137.4383	137.4383	9.5800e-003	6.0800e-003	139.4910
Unmitigated	0.0726	0.0807	0.6825	1.4500e-003	0.1602	1.1300e-003	0.1613	0.0428	1.0500e-003	0.0438	0.0000	137.4383	137.4383	9.5800e-003	6.0800e-003	139.4910

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	150.00	150.00	150.00	428,296	428,296
Total	150.00	150.00	150.00	428,296	428,296

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	10.80	7.30	7.50	41.60	18.80	39.60	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Single Family Housing	0.561854	0.062428	0.177046	0.117565	0.023832	0.006317	0.008949	0.006298	0.000705	0.000577	0.028723	0.000955	0.004751

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	28.7830	28.7830	1.7600e-003	2.1000e-004	28.8906
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	28.7830	28.7830	1.7600e-003	2.1000e-004	28.8906
NaturalGas Mitigated	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	17.2750	17.2750	3.3000e-004	3.2000e-004	17.3777
NaturalGas Unmitigated	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	17.2750	17.2750	3.3000e-004	3.2000e-004	17.3777

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	323722	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	17.2750	17.2750	3.3000e-004	3.2000e-004	17.3777
Total		**1.7500e-003**	**0.0149**	**6.3500e-003**	**1.0000e-004**		**1.2100e-003**	**1.2100e-003**		**1.2100e-003**	**1.2100e-003**	**0.0000**	**17.2750**	**17.2750**	**3.3000e-004**	**3.2000e-004**	**17.3777**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	323722	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	17.2750	17.2750	3.3000e-004	3.2000e-004	17.3777
Total		**1.7500e-003**	**0.0149**	**6.3500e-003**	**1.0000e-004**		**1.2100e-003**	**1.2100e-003**		**1.2100e-003**	**1.2100e-003**	**0.0000**	**17.2750**	**17.2750**	**3.3000e-004**	**3.2000e-004**	**17.3777**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	117515	28.7830	1.7600e-003	2.1000e-004	28.8906
Total		**28.7830**	**1.7600e-003**	**2.1000e-004**	**28.8906**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	117515	28.7830	1.7600e-003	2.1000e-004	28.8906
Total		**28.7830**	**1.7600e-003**	**2.1000e-004**	**28.8906**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.2413	1.2800e-003	0.1113	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863
Unmitigated	0.2413	1.2800e-003	0.1113	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0681					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.1699					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	3.3400e-003	1.2800e-003	0.1113	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863
Total	**0.2413**	**1.2800e-003**	**0.1113**	**1.0000e-005**		**6.2000e-004**	**6.2000e-004**		**6.2000e-004**	**6.2000e-004**	**0.0000**	**0.1819**	**0.1819**	**1.7000e-004**	**0.0000**	**0.1863**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0681					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.1699					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	3.3400e-003	1.2800e-003	0.1113	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863
Total	**0.2413**	**1.2800e-003**	**0.1113**	**1.0000e-005**		**6.2000e-004**	**6.2000e-004**		**6.2000e-004**	**6.2000e-004**	**0.0000**	**0.1819**	**0.1819**	**1.7000e-004**	**0.0000**	**0.1863**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	5.1035	0.0321	7.9000e-004	6.1417
Unmitigated	5.1035	0.0321	7.9000e-004	6.1417

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	0.97731 / 0.61613	5.1035	0.0321	7.9000e-004	6.1417
Total		**5.1035**	**0.0321**	**7.9000e-004**	**6.1417**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	0.97731 / 0.61613	5.1035	0.0321	7.9000e-004	6.1417
Total		**5.1035**	**0.0321**	**7.9000e-004**	**6.1417**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	3.5787	0.2115	0.0000	8.8662
Unmitigated	3.5787	0.2115	0.0000	8.8662

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	17.63	3.5787	0.2115	0.0000	8.8662
Total		**3.5787**	**0.2115**	**0.0000**	**8.8662**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	17.63	3.5787	0.2115	0.0000	8.8662
Total		**3.5787**	**0.2115**	**0.0000**	**8.8662**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

1205 Melrose Way

San Diego County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	15.00	Dwelling Unit	2.55	43,500.00	43

1.2 Other Project Characteristics

Urbanization Urban | **Wind Speed (m/s)** 2.6 | **Precipitation Freq (Days)** 40

Climate Zone 13 | **Operational Year** 2030

Utility Company San Diego Gas & Electric

CO2 Intensity (lb/MWhr) 318.218 | **CH4 Intensity (lb/MWhr)** 0.033 | **N2O Intensity (lb/MWhr)** 0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics - 60% RPS by 2030

Land Use - 15 homes approximately 2800-3000 sq ft each on 2.55 acre site

Construction Phase - 1 to 2 years of construction - estimated at 18 months

Demolition - existing structures to be demolished

Grading - import of 4,034 cubic yards and a 2.55 acre site

Vehicle Trips - 10 trips per dwelling unit (Intersecting Metrics, 2021)

Woodstoves - No woodstoves or fireplaces

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	220.00	340.00
tblConstructionPhase	PhaseEndDate	1/11/2024	6/28/2024
tblConstructionPhase	PhaseEndDate	12/14/2023	5/30/2024

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblConstructionPhase	PhaseEndDate	12/28/2023	6/14/2024
tblConstructionPhase	PhaseStartDate	12/29/2023	6/15/2024
tblConstructionPhase	PhaseStartDate	12/15/2023	6/1/2024
tblFireplaces	FireplaceDayYear	82.00	0.00
tblFireplaces	FireplaceHourDay	3.00	0.00
tblFireplaces	FireplaceWoodMass	3,078.40	0.00
tblFireplaces	NumberGas	8.25	0.00
tblFireplaces	NumberNoFireplace	1.50	0.00
tblFireplaces	NumberWood	5.25	0.00
tblGrading	AcresOfGrading	6.00	2.55
tblGrading	AcresOfGrading	4.50	2.55
tblGrading	MaterialImported	0.00	4,034.00
tblLandUse	LandUseSquareFeet	27,000.00	43,500.00
tblLandUse	LotAcreage	4.87	2.55
tblProjectCharacteristics	CO2IntensityFactor	539.98	318.218
tblVehicleTrips	ST_TR	9.54	10.00
tblVehicleTrips	SU_TR	8.55	10.00
tblVehicleTrips	WD_TR	9.44	10.00
tblWoodstoves	NumberCatalytic	0.75	0.00
tblWoodstoves	NumberNoncatalytic	0.75	0.00
tblWoodstoves	WoodstoveDayYear	82.00	0.00
tblWoodstoves	WoodstoveWoodMass	3,019.20	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.2216	1.8334	1.8486	3.5100e-003	0.0433	0.0807	0.1240	0.0152	0.0771	0.0922	0.0000	296.8602	296.8602	0.0547	3.6300e-003	299.3090
2024	0.7737	0.7509	0.8453	1.5100e-003	3.5500e-003	0.0317	0.0352	9.6000e-004	0.0303	0.0312	0.0000	126.5951	126.5951	0.0237	3.7000e-004	127.2989
Maximum	**0.7737**	**1.8334**	**1.8486**	**3.5100e-003**	**0.0433**	**0.0807**	**0.1240**	**0.0152**	**0.0771**	**0.0922**	**0.0000**	**296.8602**	**296.8602**	**0.0547**	**3.6300e-003**	**299.3090**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.2216	1.8334	1.8486	3.5100e-003	0.0433	0.0807	0.1240	0.0152	0.0771	0.0922	0.0000	296.8599	296.8599	0.0547	3.6300e-003	299.3087
2024	0.7737	0.7509	0.8453	1.5100e-003	3.5500e-003	0.0317	0.0352	9.6000e-004	0.0303	0.0312	0.0000	126.5950	126.5950	0.0237	3.7000e-004	127.2987
Maximum	**0.7737**	**1.8334**	**1.8486**	**3.5100e-003**	**0.0433**	**0.0807**	**0.1240**	**0.0152**	**0.0771**	**0.0922**	**0.0000**	**296.8599**	**296.8599**	**0.0547**	**3.6300e-003**	**299.3087**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	1-2-2023	4-1-2023	0.5407	0.5407
2	4-2-2023	7-1-2023	0.5021	0.5021
3	7-2-2023	10-1-2023	0.5076	0.5076
4	10-2-2023	1-1-2024	0.5074	0.5074
5	1-2-2024	4-1-2024	0.4724	0.4724
6	4-2-2024	7-1-2024	1.0387	1.0387
		Highest	1.0387	1.0387

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.2413	1.2800e-003	0.1111	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863
Energy	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	34.2373	34.2373	2.0900e-003	5.3000e-004	34.4475
Mobile	0.0613	0.0635	0.5872	1.2700e-003	0.1602	8.7000e-004	0.1611	0.0427	8.1000e-004	0.0436	0.0000	123.7188	123.7188	8.3700e-003	5.2900e-003	125.5052
Waste						0.0000	0.0000		0.0000	0.0000	3.5787	0.0000	3.5787	0.2115	0.0000	8.8662
Water						0.0000	0.0000		0.0000	0.0000	0.3101	2.8249	3.1349	0.0321	7.9000e-004	4.1731
Total	**0.3043**	**0.0797**	**0.7047**	**1.3800e-003**	**0.1602**	**2.7000e-003**	**0.1629**	**0.0427**	**2.6400e-003**	**0.0454**	**3.8888**	**160.9629**	**164.8516**	**0.2543**	**6.6100e-003**	**173.1781**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.2413	1.2800e-003	0.1111	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863
Energy	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	34.2373	34.2373	2.0900e-003	5.3000e-004	34.4475
Mobile	0.0613	0.0635	0.5872	1.2700e-003	0.1602	8.7000e-004	0.1611	0.0427	8.1000e-004	0.0436	0.0000	123.7188	123.7188	8.3700e-003	5.2900e-003	125.5052
Waste						0.0000	0.0000		0.0000	0.0000	3.5787	0.0000	3.5787	0.2115	0.0000	8.8662
Water						0.0000	0.0000		0.0000	0.0000	0.3101	2.8249	3.1349	0.0321	7.9000e-004	4.1731
Total	**0.3043**	**0.0797**	**0.7047**	**1.3800e-003**	**0.1602**	**2.7000e-003**	**0.1629**	**0.0427**	**2.6400e-003**	**0.0454**	**3.8888**	**160.9629**	**164.8516**	**0.2543**	**6.6100e-003**	**173.1781**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/2/2023	1/27/2023	5	20	
2	Site Preparation	Site Preparation	1/28/2023	2/1/2023	5	3	
3	Grading	Grading	2/2/2023	2/9/2023	5	6	

4	Building Construction	Building Construction	2/10/2023	5/30/2024	5	340	
5	Paving	Paving	6/1/2024	6/14/2024	5	10	
6	Architectural Coating	Architectural Coating	6/15/2024	6/28/2024	5	10	

Acres of Grading (Site Preparation Phase): 2.55

Acres of Grading (Grading Phase): 2.55

Acres of Paving: 0

Residential Indoor: 88,088; Residential Outdoor: 29,363; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Site Preparation	Graders	1	8.00	187	0.41
Site Preparation	Scrapers	1	8.00	367	0.48
Site Preparation	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	2	7.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Building Construction	Welders	3	8.00	46	0.45
Paving	Cement and Mortar Mixers	1	8.00	9	0.56
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36

Paving	Rollers	2	8.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	5	13.00	0.00	88.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	504.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	8	5.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	1.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					9.6300e-003	0.0000	9.6300e-003	1.4600e-003	0.0000	1.4600e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0147	0.1432	0.1346	2.4000e-004		6.7700e-003	6.7700e-003		6.3300e-003	6.3300e-003	0.0000	21.0866	21.0866	5.3500e-003	0.0000	21.2202
Total	**0.0147**	**0.1432**	**0.1346**	**2.4000e-004**	**9.6300e-003**	**6.7700e-003**	**0.0164**	**1.4600e-003**	**6.3300e-003**	**7.7900e-003**	**0.0000**	**21.0866**	**21.0866**	**5.3500e-003**	**0.0000**	**21.2202**

3.2 Demolition - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.0000e-004	5.9700e-003	1.5900e-003	3.0000e-005	7.5000e-004	5.0000e-005	8.0000e-004	2.1000e-004	5.0000e-005	2.5000e-004	0.0000	2.6406	2.6406	1.3000e-004	4.2000e-004	2.7691
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.5000e-004	2.4000e-004	2.9700e-003	1.0000e-005	1.0400e-003	1.0000e-005	1.0500e-003	2.8000e-004	1.0000e-005	2.8000e-004	0.0000	0.8353	0.8353	2.0000e-005	2.0000e-005	0.8427
Total	**4.5000e-004**	**6.2100e-003**	**4.5600e-003**	**4.0000e-005**	**1.7900e-003**	**6.0000e-005**	**1.8500e-003**	**4.9000e-004**	**6.0000e-005**	**5.3000e-004**	**0.0000**	**3.4759**	**3.4759**	**1.5000e-004**	**4.4000e-004**	**3.6118**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					9.6300e-003	0.0000	9.6300e-003	1.4600e-003	0.0000	1.4600e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0147	0.1432	0.1346	2.4000e-004		6.7700e-003	6.7700e-003		6.3300e-003	6.3300e-003	0.0000	21.0865	21.0865	5.3500e-003	0.0000	21.2202
Total	**0.0147**	**0.1432**	**0.1346**	**2.4000e-004**	**9.6300e-003**	**6.7700e-003**	**0.0164**	**1.4600e-003**	**6.3300e-003**	**7.7900e-003**	**0.0000**	**21.0865**	**21.0865**	**5.3500e-003**	**0.0000**	**21.2202**

3.2 Demolition - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.0000e-004	5.9700e-003	1.5900e-003	3.0000e-005	7.5000e-004	5.0000e-005	8.0000e-004	2.1000e-004	5.0000e-005	2.5000e-004	0.0000	2.6406	2.6406	1.3000e-004	4.2000e-004	2.7691
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.5000e-004	2.4000e-004	2.9700e-003	1.0000e-005	1.0400e-003	1.0000e-005	1.0500e-003	2.8000e-004	1.0000e-005	2.8000e-004	0.0000	0.8353	0.8353	2.0000e-005	2.0000e-005	0.8427
Total	**4.5000e-004**	**6.2100e-003**	**4.5600e-003**	**4.0000e-005**	**1.7900e-003**	**6.0000e-005**	**1.8500e-003**	**4.9000e-004**	**6.0000e-005**	**5.3000e-004**	**0.0000**	**3.4759**	**3.4759**	**1.5000e-004**	**4.4000e-004**	**3.6118**

3.3 Site Preparation - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.3500e-003	0.0000	1.3500e-003	1.5000e-004	0.0000	1.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.9500e-003	0.0214	0.0147	4.0000e-005		8.1000e-004	8.1000e-004		7.5000e-004	7.5000e-004	0.0000	3.2317	3.2317	1.0500e-003	0.0000	3.2578
Total	**1.9500e-003**	**0.0214**	**0.0147**	**4.0000e-005**	**1.3500e-003**	**8.1000e-004**	**2.1600e-003**	**1.5000e-004**	**7.5000e-004**	**9.0000e-004**	**0.0000**	**3.2317**	**3.2317**	**1.0500e-003**	**0.0000**	**3.2578**

3.3 Site Preparation - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.0000e-005	2.0000e-005	2.7000e-004	0.0000	1.0000e-004	0.0000	1.0000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0771	0.0771	0.0000	0.0000	0.0778
Total	**3.0000e-005**	**2.0000e-005**	**2.7000e-004**	**0.0000**	**1.0000e-004**	**0.0000**	**1.0000e-004**	**3.0000e-005**	**0.0000**	**3.0000e-005**	**0.0000**	**0.0771**	**0.0771**	**0.0000**	**0.0000**	**0.0778**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.3500e-003	0.0000	1.3500e-003	1.5000e-004	0.0000	1.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.9500e-003	0.0214	0.0147	4.0000e-005		8.1000e-004	8.1000e-004		7.5000e-004	7.5000e-004	0.0000	3.2317	3.2317	1.0500e-003	0.0000	3.2578
Total	**1.9500e-003**	**0.0214**	**0.0147**	**4.0000e-005**	**1.3500e-003**	**8.1000e-004**	**2.1600e-003**	**1.5000e-004**	**7.5000e-004**	**9.0000e-004**	**0.0000**	**3.2317**	**3.2317**	**1.0500e-003**	**0.0000**	**3.2578**

3.3 Site Preparation - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.0000e-005	2.0000e-005	2.7000e-004	0.0000	1.0000e-004	0.0000	1.0000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0771	0.0771	0.0000	0.0000	0.0778
Total	**3.0000e-005**	**2.0000e-005**	**2.7000e-004**	**0.0000**	**1.0000e-004**	**0.0000**	**1.0000e-004**	**3.0000e-005**	**0.0000**	**3.0000e-005**	**0.0000**	**0.0771**	**0.0771**	**0.0000**	**0.0000**	**0.0778**

3.4 Grading - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0197	0.0000	0.0197	0.0101	0.0000	0.0101	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.0000e-003	0.0434	0.0261	6.0000e-005		1.8100e-003	1.8100e-003		1.6700e-003	1.6700e-003	0.0000	5.4312	5.4312	1.7600e-003	0.0000	5.4751
Total	**4.0000e-003**	**0.0434**	**0.0261**	**6.0000e-005**	**0.0197**	**1.8100e-003**	**0.0215**	**0.0101**	**1.6700e-003**	**0.0118**	**0.0000**	**5.4312**	**5.4312**	**1.7600e-003**	**0.0000**	**5.4751**

3.4 Grading - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.6000e-004	0.0342	9.1000e-003	1.5000e-004	4.3200e-003	2.8000e-004	4.6000e-003	1.1900e-003	2.7000e-004	1.4500e-003	0.0000	15.1237	15.1237	7.6000e-004	2.4100e-003	15.8594
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.0000e-005	6.0000e-005	6.9000e-004	0.0000	2.4000e-004	0.0000	2.4000e-004	6.0000e-005	0.0000	7.0000e-005	0.0000	0.1928	0.1928	1.0000e-005	1.0000e-005	0.1945
Total	**6.4000e-004**	**0.0343**	**9.7900e-003**	**1.5000e-004**	**4.5600e-003**	**2.8000e-004**	**4.8400e-003**	**1.2500e-003**	**2.7000e-004**	**1.5200e-003**	**0.0000**	**15.3164**	**15.3164**	**7.7000e-004**	**2.4200e-003**	**16.0539**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0197	0.0000	0.0197	0.0101	0.0000	0.0101	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.0000e-003	0.0434	0.0261	6.0000e-005		1.8100e-003	1.8100e-003		1.6700e-003	1.6700e-003	0.0000	5.4312	5.4312	1.7600e-003	0.0000	5.4751
Total	**4.0000e-003**	**0.0434**	**0.0261**	**6.0000e-005**	**0.0197**	**1.8100e-003**	**0.0215**	**0.0101**	**1.6700e-003**	**0.0118**	**0.0000**	**5.4312**	**5.4312**	**1.7600e-003**	**0.0000**	**5.4751**

3.4 Grading - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.6000e-004	0.0342	9.1000e-003	1.5000e-004	4.3200e-003	2.8000e-004	4.6000e-003	1.1900e-003	2.7000e-004	1.4500e-003	0.0000	15.1237	15.1237	7.6000e-004	2.4100e-003	15.8594
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.0000e-005	6.0000e-005	6.9000e-004	0.0000	2.4000e-004	0.0000	2.4000e-004	6.0000e-005	0.0000	7.0000e-005	0.0000	0.1928	0.1928	1.0000e-005	1.0000e-005	0.1945
Total	**6.4000e-004**	**0.0343**	**9.7900e-003**	**1.5000e-004**	**4.5600e-003**	**2.8000e-004**	**4.8400e-003**	**1.2500e-003**	**2.7000e-004**	**1.5200e-003**	**0.0000**	**15.3164**	**15.3164**	**7.7000e-004**	**2.4200e-003**	**16.0539**

3.5 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1979	1.5736	1.6418	2.8900e-003		0.0709	0.0709		0.0679	0.0679	0.0000	239.8959	239.8959	0.0454	0.0000	241.0301
Total	**0.1979**	**1.5736**	**1.6418**	**2.8900e-003**		**0.0709**	**0.0709**		**0.0679**	**0.0679**	**0.0000**	**239.8959**	**239.8959**	**0.0454**	**0.0000**	**241.0301**

3.5 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.7000e-004	0.0103	3.6200e-003	5.0000e-005	1.5300e-003	6.0000e-005	1.5900e-003	4.4000e-004	6.0000e-005	5.0000e-004	0.0000	4.6350	4.6350	1.4000e-004	6.7000e-004	4.8387
Worker	1.5600e-003	1.0800e-003	0.0132	4.0000e-005	4.6300e-003	3.0000e-005	4.6600e-003	1.2300e-003	2.0000e-005	1.2500e-003	0.0000	3.7105	3.7105	1.1000e-004	1.0000e-004	3.7437
Total	**1.8300e-003**	**0.0113**	**0.0168**	**9.0000e-005**	**6.1600e-003**	**9.0000e-005**	**6.2500e-003**	**1.6700e-003**	**8.0000e-005**	**1.7500e-003**	**0.0000**	**8.3455**	**8.3455**	**2.5000e-004**	**7.7000e-004**	**8.5823**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1979	1.5736	1.6418	2.8900e-003		0.0709	0.0709		0.0679	0.0679	0.0000	239.8956	239.8956	0.0454	0.0000	241.0298
Total	**0.1979**	**1.5736**	**1.6418**	**2.8900e-003**		**0.0709**	**0.0709**		**0.0679**	**0.0679**	**0.0000**	**239.8956**	**239.8956**	**0.0454**	**0.0000**	**241.0298**

3.5 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.7000e-004	0.0103	3.6200e-003	5.0000e-005	1.5300e-003	6.0000e-005	1.5900e-003	4.4000e-004	6.0000e-005	5.0000e-004	0.0000	4.6350	4.6350	1.4000e-004	6.7000e-004	4.8387
Worker	1.5600e-003	1.0800e-003	0.0132	4.0000e-005	4.6300e-003	3.0000e-005	4.6600e-003	1.2300e-003	2.0000e-005	1.2500e-003	0.0000	3.7105	3.7105	1.1000e-004	1.0000e-004	3.7437
Total	**1.8300e-003**	**0.0113**	**0.0168**	**9.0000e-005**	**6.1600e-003**	**9.0000e-005**	**6.2500e-003**	**1.6700e-003**	**8.0000e-005**	**1.7500e-003**	**0.0000**	**8.3455**	**8.3455**	**2.5000e-004**	**7.7000e-004**	**8.5823**

3.5 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0870	0.6989	0.7685	1.3600e-003		0.0293	0.0293		0.0281	0.0281	0.0000	113.2041	113.2041	0.0211	0.0000	113.7312
Total	**0.0870**	**0.6989**	**0.7685**	**1.3600e-003**		**0.0293**	**0.0293**		**0.0281**	**0.0281**	**0.0000**	**113.2041**	**113.2041**	**0.0211**	**0.0000**	**113.7312**

3.5 Building Construction - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.2000e-004	4.8100e-003	1.6700e-003	2.0000e-005	7.2000e-004	3.0000e-005	7.5000e-004	2.1000e-004	3.0000e-005	2.4000e-004	0.0000	2.1490	2.1490	7.0000e-005	3.1000e-004	2.2435
Worker	6.9000e-004	4.6000e-004	5.8300e-003	2.0000e-005	2.1900e-003	1.0000e-005	2.2000e-003	5.8000e-004	1.0000e-005	5.9000e-004	0.0000	1.7070	1.7070	5.0000e-005	5.0000e-005	1.7216
Total	**8.1000e-004**	**5.2700e-003**	**7.5000e-003**	**4.0000e-005**	**2.9100e-003**	**4.0000e-005**	**2.9500e-003**	**7.9000e-004**	**4.0000e-005**	**8.3000e-004**	**0.0000**	**3.8559**	**3.8559**	**1.2000e-004**	**3.6000e-004**	**3.9650**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0870	0.6989	0.7685	1.3600e-003		0.0293	0.0293		0.0281	0.0281	0.0000	113.2040	113.2040	0.0211	0.0000	113.7311
Total	**0.0870**	**0.6989**	**0.7685**	**1.3600e-003**		**0.0293**	**0.0293**		**0.0281**	**0.0281**	**0.0000**	**113.2040**	**113.2040**	**0.0211**	**0.0000**	**113.7311**

3.5 Building Construction - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.2000e-004	4.8100e-003	1.6700e-003	2.0000e-005	7.2000e-004	3.0000e-005	7.5000e-004	2.1000e-004	3.0000e-005	2.4000e-004	0.0000	2.1490	2.1490	7.0000e-005	3.1000e-004	2.2435
Worker	6.9000e-004	4.6000e-004	5.8300e-003	2.0000e-005	2.1900e-003	1.0000e-005	2.2000e-003	5.8000e-004	1.0000e-005	5.9000e-004	0.0000	1.7070	1.7070	5.0000e-005	5.0000e-005	1.7216
Total	**8.1000e-004**	**5.2700e-003**	**7.5000e-003**	**4.0000e-005**	**2.9100e-003**	**4.0000e-005**	**2.9500e-003**	**7.9000e-004**	**4.0000e-005**	**8.3000e-004**	**0.0000**	**3.8559**	**3.8559**	**1.2000e-004**	**3.6000e-004**	**3.9650**

3.6 Paving - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.2100e-003	0.0405	0.0585	9.0000e-005		1.9800e-003	1.9800e-003		1.8300e-003	1.8300e-003	0.0000	7.7574	7.7574	2.4600e-003	0.0000	7.8188
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**4.2100e-003**	**0.0405**	**0.0585**	**9.0000e-005**		**1.9800e-003**	**1.9800e-003**		**1.8300e-003**	**1.8300e-003**	**0.0000**	**7.7574**	**7.7574**	**2.4600e-003**	**0.0000**	**7.8188**

3.6 Paving - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9000e-004	1.3000e-004	1.6000e-003	1.0000e-005	6.0000e-004	0.0000	6.0000e-004	1.6000e-004	0.0000	1.6000e-004	0.0000	0.4698	0.4698	1.0000e-005	1.0000e-005	0.4738
Total	**1.9000e-004**	**1.3000e-004**	**1.6000e-003**	**1.0000e-005**	**6.0000e-004**	**0.0000**	**6.0000e-004**	**1.6000e-004**	**0.0000**	**1.6000e-004**	**0.0000**	**0.4698**	**0.4698**	**1.0000e-005**	**1.0000e-005**	**0.4738**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.2100e-003	0.0405	0.0585	9.0000e-005		1.9800e-003	1.9800e-003		1.8300e-003	1.8300e-003	0.0000	7.7573	7.7573	2.4600e-003	0.0000	7.8188
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**4.2100e-003**	**0.0405**	**0.0585**	**9.0000e-005**		**1.9800e-003**	**1.9800e-003**		**1.8300e-003**	**1.8300e-003**	**0.0000**	**7.7573**	**7.7573**	**2.4600e-003**	**0.0000**	**7.8188**

3.6 Paving - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9000e-004	1.3000e-004	1.6000e-003	1.0000e-005	6.0000e-004	0.0000	6.0000e-004	1.6000e-004	0.0000	1.6000e-004	0.0000	0.4698	0.4698	1.0000e-005	1.0000e-005	0.4738
Total	**1.9000e-004**	**1.3000e-004**	**1.6000e-003**	**1.0000e-005**	**6.0000e-004**	**0.0000**	**6.0000e-004**	**1.6000e-004**	**0.0000**	**1.6000e-004**	**0.0000**	**0.4698**	**0.4698**	**1.0000e-005**	**1.0000e-005**	**0.4738**

3.7 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.6805					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.0000e-004	6.0900e-003	9.0500e-003	1.0000e-005		3.0000e-004	3.0000e-004		3.0000e-004	3.0000e-004	0.0000	1.2766	1.2766	7.0000e-005	0.0000	1.2784
Total	**0.6814**	**6.0900e-003**	**9.0500e-003**	**1.0000e-005**		**3.0000e-004**	**3.0000e-004**		**3.0000e-004**	**3.0000e-004**	**0.0000**	**1.2766**	**1.2766**	**7.0000e-005**	**0.0000**	**1.2784**

3.7 Architectural Coating - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0000e-005	1.0000e-005	1.1000e-004	0.0000	4.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0313	0.0313	0.0000	0.0000	0.0316
Total	**1.0000e-005**	**1.0000e-005**	**1.1000e-004**	**0.0000**	**4.0000e-005**	**0.0000**	**4.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0313**	**0.0313**	**0.0000**	**0.0000**	**0.0316**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.6805					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.0000e-004	6.0900e-003	9.0500e-003	1.0000e-005		3.0000e-004	3.0000e-004		3.0000e-004	3.0000e-004	0.0000	1.2766	1.2766	7.0000e-005	0.0000	1.2784
Total	**0.6814**	**6.0900e-003**	**9.0500e-003**	**1.0000e-005**		**3.0000e-004**	**3.0000e-004**		**3.0000e-004**	**3.0000e-004**	**0.0000**	**1.2766**	**1.2766**	**7.0000e-005**	**0.0000**	**1.2784**

3.7 Architectural Coating - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0000e-005	1.0000e-005	1.1000e-004	0.0000	4.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0313	0.0313	0.0000	0.0000	0.0316
Total	**1.0000e-005**	**1.0000e-005**	**1.1000e-004**	**0.0000**	**4.0000e-005**	**0.0000**	**4.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0313**	**0.0313**	**0.0000**	**0.0000**	**0.0316**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0613	0.0635	0.5872	1.2700e-003	0.1602	8.7000e-004	0.1611	0.0427	8.1000e-004	0.0436	0.0000	123.7188	123.7188	8.3700e-003	5.2900e-003	125.5052
Unmitigated	0.0613	0.0635	0.5872	1.2700e-003	0.1602	8.7000e-004	0.1611	0.0427	8.1000e-004	0.0436	0.0000	123.7188	123.7188	8.3700e-003	5.2900e-003	125.5052

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	150.00	150.00	150.00	428,296	428,296
Total	150.00	150.00	150.00	428,296	428,296

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	10.80	7.30	7.50	41.60	18.80	39.60	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Single Family Housing	0.575453	0.061728	0.171227	0.112384	0.022882	0.006522	0.009800	0.006298	0.000679	0.000623	0.027611	0.000857	0.003936

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	16.9623	16.9623	1.7600e-003	2.1000e-004	17.0698
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	16.9623	16.9623	1.7600e-003	2.1000e-004	17.0698
NaturalGas Mitigated	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	17.2750	17.2750	3.3000e-004	3.2000e-004	17.3777
NaturalGas Unmitigated	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	17.2750	17.2750	3.3000e-004	3.2000e-004	17.3777

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	323722	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	17.2750	17.2750	3.3000e-004	3.2000e-004	17.3777
Total		**1.7500e-003**	**0.0149**	**6.3500e-003**	**1.0000e-004**		**1.2100e-003**	**1.2100e-003**		**1.2100e-003**	**1.2100e-003**	**0.0000**	**17.2750**	**17.2750**	**3.3000e-004**	**3.2000e-004**	**17.3777**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	323722	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	17.2750	17.2750	3.3000e-004	3.2000e-004	17.3777
Total		**1.7500e-003**	**0.0149**	**6.3500e-003**	**1.0000e-004**		**1.2100e-003**	**1.2100e-003**		**1.2100e-003**	**1.2100e-003**	**0.0000**	**17.2750**	**17.2750**	**3.3000e-004**	**3.2000e-004**	**17.3777**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	117515	16.9623	1.7600e-003	2.1000e-004	17.0698
Total		**16.9623**	**1.7600e-003**	**2.1000e-004**	**17.0698**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	117515	16.9623	1.7600e-003	2.1000e-004	17.0698
Total		**16.9623**	**1.7600e-003**	**2.1000e-004**	**17.0698**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.2413	1.2800e-003	0.1111	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863
Unmitigated	0.2413	1.2800e-003	0.1111	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0681					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.1699					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	3.3200e-003	1.2800e-003	0.1111	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863
Total	**0.2413**	**1.2800e-003**	**0.1111**	**1.0000e-005**		**6.2000e-004**	**6.2000e-004**		**6.2000e-004**	**6.2000e-004**	**0.0000**	**0.1819**	**0.1819**	**1.7000e-004**	**0.0000**	**0.1863**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0681					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.1699					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	3.3200e-003	1.2800e-003	0.1111	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863
Total	**0.2413**	**1.2800e-003**	**0.1111**	**1.0000e-005**		**6.2000e-004**	**6.2000e-004**		**6.2000e-004**	**6.2000e-004**	**0.0000**	**0.1819**	**0.1819**	**1.7000e-004**	**0.0000**	**0.1863**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	3.1349	0.0321	7.9000e-004	4.1731
Unmitigated	3.1349	0.0321	7.9000e-004	4.1731

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	0.97731 / 0.61613	3.1349	0.0321	7.9000e-004	4.1731
Total		**3.1349**	**0.0321**	**7.9000e-004**	**4.1731**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	0.97731 / 0.61613	3.1349	0.0321	7.9000e-004	4.1731
Total		**3.1349**	**0.0321**	**7.9000e-004**	**4.1731**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	3.5787	0.2115	0.0000	8.8662
Unmitigated	3.5787	0.2115	0.0000	8.8662

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	17.63	3.5787	0.2115	0.0000	8.8662
Total		**3.5787**	**0.2115**	**0.0000**	**8.8662**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	17.63	3.5787	0.2115	0.0000	8.8662
Total		**3.5787**	**0.2115**	**0.0000**	**8.8662**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

1205 Melrose Way

San Diego County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	15.00	Dwelling Unit	2.55	43,500.00	43

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2050
Utility Company	San Diego Gas & Electric				
CO2 Intensity (lb/MWhr)	0	**CH4 Intensity (lb/MWhr)**	0	**N2O Intensity (lb/MWhr)**	0

1.3 User Entered Comments & Non-Default Data

Project Characteristics - SDGE Net Zero by 2045

Land Use - 15 homes approximately 2800-3000 sq ft each on 2.55 acre site

Construction Phase - 1 to 2 years of construction - estimated at 18 months

Demolition - existing structures to be demolished

Grading - import of 4,034 cubic yards and a 2.55 acre site

Vehicle Trips - 10 trips per dwelling unit (Intersecting Metrics, 2021)

Woodstoves - No woodstoves or fireplaces

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	220.00	340.00
tblConstructionPhase	PhaseEndDate	1/11/2024	6/28/2024
tblConstructionPhase	PhaseEndDate	12/14/2023	5/30/2024

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

tblConstructionPhase	PhaseEndDate	12/28/2023	6/14/2024
tblConstructionPhase	PhaseStartDate	12/29/2023	6/15/2024
tblConstructionPhase	PhaseStartDate	12/15/2023	6/1/2024
tblFireplaces	FireplaceDayYear	82.00	0.00
tblFireplaces	FireplaceHourDay	3.00	0.00
tblFireplaces	FireplaceWoodMass	3,078.40	0.00
tblFireplaces	NumberGas	8.25	0.00
tblFireplaces	NumberNoFireplace	1.50	0.00
tblFireplaces	NumberWood	5.25	0.00
tblGrading	AcresOfGrading	6.00	2.55
tblGrading	AcresOfGrading	4.50	2.55
tblGrading	MaterialImported	0.00	4,034.00
tblLandUse	LandUseSquareFeet	27,000.00	43,500.00
tblLandUse	LotAcreage	4.87	2.55
tblProjectCharacteristics	CH4IntensityFactor	0.033	0
tblProjectCharacteristics	CO2IntensityFactor	539.98	0
tblProjectCharacteristics	N2OIntensityFactor	0.004	0
tblVehicleTrips	ST_TR	9.54	10.00
tblVehicleTrips	SU_TR	8.55	10.00
tblVehicleTrips	WD_TR	9.44	10.00
tblWoodstoves	NumberCatalytic	0.75	0.00
tblWoodstoves	NumberNoncatalytic	0.75	0.00
tblWoodstoves	WoodstoveDayYear	82.00	0.00
tblWoodstoves	WoodstoveWoodMass	3,019.20	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.2216	1.8334	1.8486	3.5100e-003	0.0433	0.0807	0.1240	0.0152	0.0771	0.0922	0.0000	296.8602	296.8602	0.0547	3.6300e-003	299.3090
2024	0.7737	0.7509	0.8453	1.5100e-003	3.5500e-003	0.0317	0.0352	9.6000e-004	0.0303	0.0312	0.0000	126.5951	126.5951	0.0237	3.7000e-004	127.2989
Maximum	**0.7737**	**1.8334**	**1.8486**	**3.5100e-003**	**0.0433**	**0.0807**	**0.1240**	**0.0152**	**0.0771**	**0.0922**	**0.0000**	**296.8602**	**296.8602**	**0.0547**	**3.6300e-003**	**299.3090**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2023	0.2216	1.8334	1.8486	3.5100e-003	0.0433	0.0807	0.1240	0.0152	0.0771	0.0922	0.0000	296.8599	296.8599	0.0547	3.6300e-003	299.3087
2024	0.7737	0.7509	0.8453	1.5100e-003	3.5500e-003	0.0317	0.0352	9.6000e-004	0.0303	0.0312	0.0000	126.5950	126.5950	0.0237	3.7000e-004	127.2987
Maximum	**0.7737**	**1.8334**	**1.8486**	**3.5100e-003**	**0.0433**	**0.0807**	**0.1240**	**0.0152**	**0.0771**	**0.0922**	**0.0000**	**296.8599**	**296.8599**	**0.0547**	**3.6300e-003**	**299.3087**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	1-2-2023	4-1-2023	0.5407	0.5407
2	4-2-2023	7-1-2023	0.5021	0.5021
3	7-2-2023	10-1-2023	0.5076	0.5076
4	10-2-2023	1-1-2024	0.5074	0.5074
5	1-2-2024	4-1-2024	0.4724	0.4724
6	4-2-2024	7-1-2024	1.0387	1.0387
		Highest	1.0387	1.0387

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.2413	1.2800e-003	0.1109	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863
Energy	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	17.2750	17.2750	3.3000e-004	3.2000e-004	17.3777
Mobile	0.0476	0.0515	0.5019	1.1000e-003	0.1602	5.2000e-004	0.1608	0.0428	4.9000e-004	0.0433	0.0000	111.8075	111.8075	7.1600e-003	4.7900e-003	113.4150
Waste						0.0000	0.0000		0.0000	0.0000	3.5787	0.0000	3.5787	0.2115	0.0000	8.8662
Water						0.0000	0.0000		0.0000	0.0000	0.3101	0.0000	0.3101	0.0319	7.5000e-004	1.3303
Total	**0.2906**	**0.0677**	**0.6191**	**1.2100e-003**	**0.1602**	**2.3500e-003**	**0.1626**	**0.0428**	**2.3200e-003**	**0.0451**	**3.8888**	**129.2645**	**133.1533**	**0.2510**	**5.8600e-003**	**141.1754**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.2413	1.2800e-003	0.1109	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863
Energy	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	17.2750	17.2750	3.3000e-004	3.2000e-004	17.3777
Mobile	0.0476	0.0515	0.5019	1.1000e-003	0.1602	5.2000e-004	0.1608	0.0428	4.9000e-004	0.0433	0.0000	111.8075	111.8075	7.1600e-003	4.7900e-003	113.4150
Waste						0.0000	0.0000		0.0000	0.0000	3.5787	0.0000	3.5787	0.2115	0.0000	8.8662
Water						0.0000	0.0000		0.0000	0.0000	0.3101	0.0000	0.3101	0.0319	7.5000e-004	1.3303
Total	**0.2906**	**0.0677**	**0.6191**	**1.2100e-003**	**0.1602**	**2.3500e-003**	**0.1626**	**0.0428**	**2.3200e-003**	**0.0451**	**3.8888**	**129.2645**	**133.1533**	**0.2510**	**5.8600e-003**	**141.1754**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/2/2023	1/27/2023	5	20	
2	Site Preparation	Site Preparation	1/28/2023	2/1/2023	5	3	
3	Grading	Grading	2/2/2023	2/9/2023	5	6	

4	Building Construction	Building Construction	2/10/2023	5/30/2024		5	340	
5	Paving	Paving	6/1/2024	6/14/2024		5	10	
6	Architectural Coating	Architectural Coating	6/15/2024	6/28/2024		5	10	

Acres of Grading (Site Preparation Phase): 2.55

Acres of Grading (Grading Phase): 2.55

Acres of Paving: 0

Residential Indoor: 88,088; Residential Outdoor: 29,363; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Rubber Tired Dozers	1	8.00	247	0.40
Demolition	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Site Preparation	Graders	1	8.00	187	0.41
Site Preparation	Scrapers	1	8.00	367	0.48
Site Preparation	Tractors/Loaders/Backhoes	1	7.00	97	0.37
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	2	7.00	97	0.37
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Forklifts	2	7.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	1	6.00	97	0.37
Building Construction	Welders	3	8.00	46	0.45
Paving	Cement and Mortar Mixers	1	8.00	9	0.56
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	1	8.00	132	0.36

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Applied

Paving	Rollers	2	8.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	5	13.00	0.00	88.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	3	8.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	10.00	0.00	504.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	8	5.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	1.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					9.6300e-003	0.0000	9.6300e-003	1.4600e-003	0.0000	1.4600e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0147	0.1432	0.1346	2.4000e-004		6.7700e-003	6.7700e-003		6.3300e-003	6.3300e-003	0.0000	21.0866	21.0866	5.3500e-003	0.0000	21.2202
Total	**0.0147**	**0.1432**	**0.1346**	**2.4000e-004**	**9.6300e-003**	**6.7700e-003**	**0.0164**	**1.4600e-003**	**6.3300e-003**	**7.7900e-003**	**0.0000**	**21.0866**	**21.0866**	**5.3500e-003**	**0.0000**	**21.2202**

3.2 Demolition - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.0000e-004	5.9700e-003	1.5900e-003	3.0000e-005	7.5000e-004	5.0000e-005	8.0000e-004	2.1000e-004	5.0000e-005	2.5000e-004	0.0000	2.6406	2.6406	1.3000e-004	4.2000e-004	2.7691
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.5000e-004	2.4000e-004	2.9700e-003	1.0000e-005	1.0400e-003	1.0000e-005	1.0500e-003	2.8000e-004	1.0000e-005	2.8000e-004	0.0000	0.8353	0.8353	2.0000e-005	2.0000e-005	0.8427
Total	**4.5000e-004**	**6.2100e-003**	**4.5600e-003**	**4.0000e-005**	**1.7900e-003**	**6.0000e-005**	**1.8500e-003**	**4.9000e-004**	**6.0000e-005**	**5.3000e-004**	**0.0000**	**3.4759**	**3.4759**	**1.5000e-004**	**4.4000e-004**	**3.6118**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					9.6300e-003	0.0000	9.6300e-003	1.4600e-003	0.0000	1.4600e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0147	0.1432	0.1346	2.4000e-004		6.7700e-003	6.7700e-003		6.3300e-003	6.3300e-003	0.0000	21.0865	21.0865	5.3500e-003	0.0000	21.2202
Total	**0.0147**	**0.1432**	**0.1346**	**2.4000e-004**	**9.6300e-003**	**6.7700e-003**	**0.0164**	**1.4600e-003**	**6.3300e-003**	**7.7900e-003**	**0.0000**	**21.0865**	**21.0865**	**5.3500e-003**	**0.0000**	**21.2202**

3.2 Demolition - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.0000e-004	5.9700e-003	1.5900e-003	3.0000e-005	7.5000e-004	5.0000e-005	8.0000e-004	2.1000e-004	5.0000e-005	2.5000e-004	0.0000	2.6406	2.6406	1.3000e-004	4.2000e-004	2.7691
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.5000e-004	2.4000e-004	2.9700e-003	1.0000e-005	1.0400e-003	1.0000e-005	1.0500e-003	2.8000e-004	1.0000e-005	2.8000e-004	0.0000	0.8353	0.8353	2.0000e-005	2.0000e-005	0.8427
Total	**4.5000e-004**	**6.2100e-003**	**4.5600e-003**	**4.0000e-005**	**1.7900e-003**	**6.0000e-005**	**1.8500e-003**	**4.9000e-004**	**6.0000e-005**	**5.3000e-004**	**0.0000**	**3.4759**	**3.4759**	**1.5000e-004**	**4.4000e-004**	**3.6118**

3.3 Site Preparation - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.3500e-003	0.0000	1.3500e-003	1.5000e-004	0.0000	1.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.9500e-003	0.0214	0.0147	4.0000e-005		8.1000e-004	8.1000e-004		7.5000e-004	7.5000e-004	0.0000	3.2317	3.2317	1.0500e-003	0.0000	3.2578
Total	**1.9500e-003**	**0.0214**	**0.0147**	**4.0000e-005**	**1.3500e-003**	**8.1000e-004**	**2.1600e-003**	**1.5000e-004**	**7.5000e-004**	**9.0000e-004**	**0.0000**	**3.2317**	**3.2317**	**1.0500e-003**	**0.0000**	**3.2578**

3.3 Site Preparation - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.0000e-005	2.0000e-005	2.7000e-004	0.0000	1.0000e-004	0.0000	1.0000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0771	0.0771	0.0000	0.0000	0.0778
Total	**3.0000e-005**	**2.0000e-005**	**2.7000e-004**	**0.0000**	**1.0000e-004**	**0.0000**	**1.0000e-004**	**3.0000e-005**	**0.0000**	**3.0000e-005**	**0.0000**	**0.0771**	**0.0771**	**0.0000**	**0.0000**	**0.0778**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.3500e-003	0.0000	1.3500e-003	1.5000e-004	0.0000	1.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	1.9500e-003	0.0214	0.0147	4.0000e-005		8.1000e-004	8.1000e-004		7.5000e-004	7.5000e-004	0.0000	3.2317	3.2317	1.0500e-003	0.0000	3.2578
Total	**1.9500e-003**	**0.0214**	**0.0147**	**4.0000e-005**	**1.3500e-003**	**8.1000e-004**	**2.1600e-003**	**1.5000e-004**	**7.5000e-004**	**9.0000e-004**	**0.0000**	**3.2317**	**3.2317**	**1.0500e-003**	**0.0000**	**3.2578**

3.3 Site Preparation - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	3.0000e-005	2.0000e-005	2.7000e-004	0.0000	1.0000e-004	0.0000	1.0000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0771	0.0771	0.0000	0.0000	0.0778
Total	**3.0000e-005**	**2.0000e-005**	**2.7000e-004**	**0.0000**	**1.0000e-004**	**0.0000**	**1.0000e-004**	**3.0000e-005**	**0.0000**	**3.0000e-005**	**0.0000**	**0.0771**	**0.0771**	**0.0000**	**0.0000**	**0.0778**

3.4 Grading - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0197	0.0000	0.0197	0.0101	0.0000	0.0101	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.0000e-003	0.0434	0.0261	6.0000e-005		1.8100e-003	1.8100e-003		1.6700e-003	1.6700e-003	0.0000	5.4312	5.4312	1.7600e-003	0.0000	5.4751
Total	**4.0000e-003**	**0.0434**	**0.0261**	**6.0000e-005**	**0.0197**	**1.8100e-003**	**0.0215**	**0.0101**	**1.6700e-003**	**0.0118**	**0.0000**	**5.4312**	**5.4312**	**1.7600e-003**	**0.0000**	**5.4751**

3.4 Grading - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.6000e-004	0.0342	9.1000e-003	1.5000e-004	4.3200e-003	2.8000e-004	4.6000e-003	1.1900e-003	2.7000e-004	1.4500e-003	0.0000	15.1237	15.1237	7.6000e-004	2.4100e-003	15.8594
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.0000e-005	6.0000e-005	6.9000e-004	0.0000	2.4000e-004	0.0000	2.4000e-004	6.0000e-005	0.0000	7.0000e-005	0.0000	0.1928	0.1928	1.0000e-005	1.0000e-005	0.1945
Total	**6.4000e-004**	**0.0343**	**9.7900e-003**	**1.5000e-004**	**4.5600e-003**	**2.8000e-004**	**4.8400e-003**	**1.2500e-003**	**2.7000e-004**	**1.5200e-003**	**0.0000**	**15.3164**	**15.3164**	**7.7000e-004**	**2.4200e-003**	**16.0539**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0197	0.0000	0.0197	0.0101	0.0000	0.0101	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	4.0000e-003	0.0434	0.0261	6.0000e-005		1.8100e-003	1.8100e-003		1.6700e-003	1.6700e-003	0.0000	5.4312	5.4312	1.7600e-003	0.0000	5.4751
Total	**4.0000e-003**	**0.0434**	**0.0261**	**6.0000e-005**	**0.0197**	**1.8100e-003**	**0.0215**	**0.0101**	**1.6700e-003**	**0.0118**	**0.0000**	**5.4312**	**5.4312**	**1.7600e-003**	**0.0000**	**5.4751**

3.4 Grading - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.6000e-004	0.0342	9.1000e-003	1.5000e-004	4.3200e-003	2.8000e-004	4.6000e-003	1.1900e-003	2.7000e-004	1.4500e-003	0.0000	15.1237	15.1237	7.6000e-004	2.4100e-003	15.8594
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	8.0000e-005	6.0000e-005	6.9000e-004	0.0000	2.4000e-004	0.0000	2.4000e-004	6.0000e-005	0.0000	7.0000e-005	0.0000	0.1928	0.1928	1.0000e-005	1.0000e-005	0.1945
Total	**6.4000e-004**	**0.0343**	**9.7900e-003**	**1.5000e-004**	**4.5600e-003**	**2.8000e-004**	**4.8400e-003**	**1.2500e-003**	**2.7000e-004**	**1.5200e-003**	**0.0000**	**15.3164**	**15.3164**	**7.7000e-004**	**2.4200e-003**	**16.0539**

3.5 Building Construction - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1979	1.5736	1.6418	2.8900e-003		0.0709	0.0709		0.0679	0.0679	0.0000	239.8959	239.8959	0.0454	0.0000	241.0301
Total	**0.1979**	**1.5736**	**1.6418**	**2.8900e-003**		**0.0709**	**0.0709**		**0.0679**	**0.0679**	**0.0000**	**239.8959**	**239.8959**	**0.0454**	**0.0000**	**241.0301**

3.5 Building Construction - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.7000e-004	0.0103	3.6200e-003	5.0000e-005	1.5300e-003	6.0000e-005	1.5900e-003	4.4000e-004	6.0000e-005	5.0000e-004	0.0000	4.6350	4.6350	1.4000e-004	6.7000e-004	4.8387
Worker	1.5600e-003	1.0800e-003	0.0132	4.0000e-005	4.6300e-003	3.0000e-005	4.6600e-003	1.2300e-003	2.0000e-005	1.2500e-003	0.0000	3.7105	3.7105	1.1000e-004	1.0000e-004	3.7437
Total	**1.8300e-003**	**0.0113**	**0.0168**	**9.0000e-005**	**6.1600e-003**	**9.0000e-005**	**6.2500e-003**	**1.6700e-003**	**8.0000e-005**	**1.7500e-003**	**0.0000**	**8.3455**	**8.3455**	**2.5000e-004**	**7.7000e-004**	**8.5823**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1979	1.5736	1.6418	2.8900e-003		0.0709	0.0709		0.0679	0.0679	0.0000	239.8956	239.8956	0.0454	0.0000	241.0298
Total	**0.1979**	**1.5736**	**1.6418**	**2.8900e-003**		**0.0709**	**0.0709**		**0.0679**	**0.0679**	**0.0000**	**239.8956**	**239.8956**	**0.0454**	**0.0000**	**241.0298**

3.5 Building Construction - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	2.7000e-004	0.0103	3.6200e-003	5.0000e-005	1.5300e-003	6.0000e-005	1.5900e-003	4.4000e-004	6.0000e-005	5.0000e-004	0.0000	4.6350	4.6350	1.4000e-004	6.7000e-004	4.8387
Worker	1.5600e-003	1.0800e-003	0.0132	4.0000e-005	4.6300e-003	3.0000e-005	4.6600e-003	1.2300e-003	2.0000e-005	1.2500e-003	0.0000	3.7105	3.7105	1.1000e-004	1.0000e-004	3.7437
Total	**1.8300e-003**	**0.0113**	**0.0168**	**9.0000e-005**	**6.1600e-003**	**9.0000e-005**	**6.2500e-003**	**1.6700e-003**	**8.0000e-005**	**1.7500e-003**	**0.0000**	**8.3455**	**8.3455**	**2.5000e-004**	**7.7000e-004**	**8.5823**

3.5 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0870	0.6989	0.7685	1.3600e-003		0.0293	0.0293		0.0281	0.0281	0.0000	113.2041	113.2041	0.0211	0.0000	113.7312
Total	**0.0870**	**0.6989**	**0.7685**	**1.3600e-003**		**0.0293**	**0.0293**		**0.0281**	**0.0281**	**0.0000**	**113.2041**	**113.2041**	**0.0211**	**0.0000**	**113.7312**

3.5 Building Construction - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.2000e-004	4.8100e-003	1.6700e-003	2.0000e-005	7.2000e-004	3.0000e-005	7.5000e-004	2.1000e-004	3.0000e-005	2.4000e-004	0.0000	2.1490	2.1490	7.0000e-005	3.1000e-004	2.2435
Worker	6.9000e-004	4.6000e-004	5.8300e-003	2.0000e-005	2.1900e-003	1.0000e-005	2.2000e-003	5.8000e-004	1.0000e-005	5.9000e-004	0.0000	1.7070	1.7070	5.0000e-005	5.0000e-005	1.7216
Total	**8.1000e-004**	**5.2700e-003**	**7.5000e-003**	**4.0000e-005**	**2.9100e-003**	**4.0000e-005**	**2.9500e-003**	**7.9000e-004**	**4.0000e-005**	**8.3000e-004**	**0.0000**	**3.8559**	**3.8559**	**1.2000e-004**	**3.6000e-004**	**3.9650**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0870	0.6989	0.7685	1.3600e-003		0.0293	0.0293		0.0281	0.0281	0.0000	113.2040	113.2040	0.0211	0.0000	113.7311
Total	**0.0870**	**0.6989**	**0.7685**	**1.3600e-003**		**0.0293**	**0.0293**		**0.0281**	**0.0281**	**0.0000**	**113.2040**	**113.2040**	**0.0211**	**0.0000**	**113.7311**

3.5 Building Construction - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.2000e-004	4.8100e-003	1.6700e-003	2.0000e-005	7.2000e-004	3.0000e-005	7.5000e-004	2.1000e-004	3.0000e-005	2.4000e-004	0.0000	2.1490	2.1490	7.0000e-005	3.1000e-004	2.2435
Worker	6.9000e-004	4.6000e-004	5.8300e-003	2.0000e-005	2.1900e-003	1.0000e-005	2.2000e-003	5.8000e-004	1.0000e-005	5.9000e-004	0.0000	1.7070	1.7070	5.0000e-005	5.0000e-005	1.7216
Total	**8.1000e-004**	**5.2700e-003**	**7.5000e-003**	**4.0000e-005**	**2.9100e-003**	**4.0000e-005**	**2.9500e-003**	**7.9000e-004**	**4.0000e-005**	**8.3000e-004**	**0.0000**	**3.8559**	**3.8559**	**1.2000e-004**	**3.6000e-004**	**3.9650**

3.6 Paving - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.2100e-003	0.0405	0.0585	9.0000e-005		1.9800e-003	1.9800e-003		1.8300e-003	1.8300e-003	0.0000	7.7574	7.7574	2.4600e-003	0.0000	7.8188
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**4.2100e-003**	**0.0405**	**0.0585**	**9.0000e-005**		**1.9800e-003**	**1.9800e-003**		**1.8300e-003**	**1.8300e-003**	**0.0000**	**7.7574**	**7.7574**	**2.4600e-003**	**0.0000**	**7.8188**

3.6 Paving - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9000e-004	1.3000e-004	1.6000e-003	1.0000e-005	6.0000e-004	0.0000	6.0000e-004	1.6000e-004	0.0000	1.6000e-004	0.0000	0.4698	0.4698	1.0000e-005	1.0000e-005	0.4738
Total	**1.9000e-004**	**1.3000e-004**	**1.6000e-003**	**1.0000e-005**	**6.0000e-004**	**0.0000**	**6.0000e-004**	**1.6000e-004**	**0.0000**	**1.6000e-004**	**0.0000**	**0.4698**	**0.4698**	**1.0000e-005**	**1.0000e-005**	**0.4738**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	4.2100e-003	0.0405	0.0585	9.0000e-005		1.9800e-003	1.9800e-003		1.8300e-003	1.8300e-003	0.0000	7.7573	7.7573	2.4600e-003	0.0000	7.8188
Paving	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**4.2100e-003**	**0.0405**	**0.0585**	**9.0000e-005**		**1.9800e-003**	**1.9800e-003**		**1.8300e-003**	**1.8300e-003**	**0.0000**	**7.7573**	**7.7573**	**2.4600e-003**	**0.0000**	**7.8188**

3.6 Paving - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9000e-004	1.3000e-004	1.6000e-003	1.0000e-005	6.0000e-004	0.0000	6.0000e-004	1.6000e-004	0.0000	1.6000e-004	0.0000	0.4698	0.4698	1.0000e-005	1.0000e-005	0.4738
Total	**1.9000e-004**	**1.3000e-004**	**1.6000e-003**	**1.0000e-005**	**6.0000e-004**	**0.0000**	**6.0000e-004**	**1.6000e-004**	**0.0000**	**1.6000e-004**	**0.0000**	**0.4698**	**0.4698**	**1.0000e-005**	**1.0000e-005**	**0.4738**

3.7 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.6805					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.0000e-004	6.0900e-003	9.0500e-003	1.0000e-005		3.0000e-004	3.0000e-004		3.0000e-004	3.0000e-004	0.0000	1.2766	1.2766	7.0000e-005	0.0000	1.2784
Total	**0.6814**	**6.0900e-003**	**9.0500e-003**	**1.0000e-005**		**3.0000e-004**	**3.0000e-004**		**3.0000e-004**	**3.0000e-004**	**0.0000**	**1.2766**	**1.2766**	**7.0000e-005**	**0.0000**	**1.2784**

3.7 Architectural Coating - 2024

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0000e-005	1.0000e-005	1.1000e-004	0.0000	4.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0313	0.0313	0.0000	0.0000	0.0316
Total	**1.0000e-005**	**1.0000e-005**	**1.1000e-004**	**0.0000**	**4.0000e-005**	**0.0000**	**4.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0313**	**0.0313**	**0.0000**	**0.0000**	**0.0316**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.6805					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	9.0000e-004	6.0900e-003	9.0500e-003	1.0000e-005		3.0000e-004	3.0000e-004		3.0000e-004	3.0000e-004	0.0000	1.2766	1.2766	7.0000e-005	0.0000	1.2784
Total	**0.6814**	**6.0900e-003**	**9.0500e-003**	**1.0000e-005**		**3.0000e-004**	**3.0000e-004**		**3.0000e-004**	**3.0000e-004**	**0.0000**	**1.2766**	**1.2766**	**7.0000e-005**	**0.0000**	**1.2784**

3.7 Architectural Coating - 2024

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0000e-005	1.0000e-005	1.1000e-004	0.0000	4.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0313	0.0313	0.0000	0.0000	0.0316
Total	**1.0000e-005**	**1.0000e-005**	**1.1000e-004**	**0.0000**	**4.0000e-005**	**0.0000**	**4.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0313**	**0.0313**	**0.0000**	**0.0000**	**0.0316**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0476	0.0515	0.5019	1.1000e-003	0.1602	5.2000e-004	0.1608	0.0428	4.9000e-004	0.0433	0.0000	111.8075	111.8075	7.1600e-003	4.7900e-003	113.4150
Unmitigated	0.0476	0.0515	0.5019	1.1000e-003	0.1602	5.2000e-004	0.1608	0.0428	4.9000e-004	0.0433	0.0000	111.8075	111.8075	7.1600e-003	4.7900e-003	113.4150

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	150.00	150.00	150.00	428,296	428,296
Total	150.00	150.00	150.00	428,296	428,296

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	10.80	7.30	7.50	41.60	18.80	39.60	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Single Family Housing	0.584721	0.061219	0.165591	0.108994	0.022611	0.007030	0.011356	0.006685	0.000606	0.000664	0.026637	0.000823	0.003063

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	17.2750	17.2750	3.3000e-004	3.2000e-004	17.3777
NaturalGas Unmitigated	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	17.2750	17.2750	3.3000e-004	3.2000e-004	17.3777

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	323722	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	17.2750	17.2750	3.3000e-004	3.2000e-004	17.3777
Total		**1.7500e-003**	**0.0149**	**6.3500e-003**	**1.0000e-004**		**1.2100e-003**	**1.2100e-003**		**1.2100e-003**	**1.2100e-003**	**0.0000**	**17.2750**	**17.2750**	**3.3000e-004**	**3.2000e-004**	**17.3777**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	323722	1.7500e-003	0.0149	6.3500e-003	1.0000e-004		1.2100e-003	1.2100e-003		1.2100e-003	1.2100e-003	0.0000	17.2750	17.2750	3.3000e-004	3.2000e-004	17.3777
Total		**1.7500e-003**	**0.0149**	**6.3500e-003**	**1.0000e-004**		**1.2100e-003**	**1.2100e-003**		**1.2100e-003**	**1.2100e-003**	**0.0000**	**17.2750**	**17.2750**	**3.3000e-004**	**3.2000e-004**	**17.3777**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	117515	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Single Family Housing	117515	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.2413	1.2800e-003	0.1109	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863
Unmitigated	0.2413	1.2800e-003	0.1109	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0681					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.1699					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	3.3200e-003	1.2800e-003	0.1109	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863
Total	**0.2413**	**1.2800e-003**	**0.1109**	**1.0000e-005**		**6.2000e-004**	**6.2000e-004**		**6.2000e-004**	**6.2000e-004**	**0.0000**	**0.1819**	**0.1819**	**1.7000e-004**	**0.0000**	**0.1863**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0681					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.1699					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	3.3200e-003	1.2800e-003	0.1109	1.0000e-005		6.2000e-004	6.2000e-004		6.2000e-004	6.2000e-004	0.0000	0.1819	0.1819	1.7000e-004	0.0000	0.1863
Total	**0.2413**	**1.2800e-003**	**0.1109**	**1.0000e-005**		**6.2000e-004**	**6.2000e-004**		**6.2000e-004**	**6.2000e-004**	**0.0000**	**0.1819**	**0.1819**	**1.7000e-004**	**0.0000**	**0.1863**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.3101	0.0319	7.5000e-004	1.3303
Unmitigated	0.3101	0.0319	7.5000e-004	1.3303

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	0.97731 / 0.61613	0.3101	0.0319	7.5000e-004	1.3303
Total		**0.3101**	**0.0319**	**7.5000e-004**	**1.3303**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Single Family Housing	0.97731 / 0.61613	0.3101	0.0319	7.5000e-004	1.3303
Total		**0.3101**	**0.0319**	**7.5000e-004**	**1.3303**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	3.5787	0.2115	0.0000	8.8662
Unmitigated	3.5787	0.2115	0.0000	8.8662

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	17.63	3.5787	0.2115	0.0000	8.8662
Total		**3.5787**	**0.2115**	**0.0000**	**8.8662**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Single Family Housing	17.63	3.5787	0.2115	0.0000	8.8662
Total		**3.5787**	**0.2115**	**0.0000**	**8.8662**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

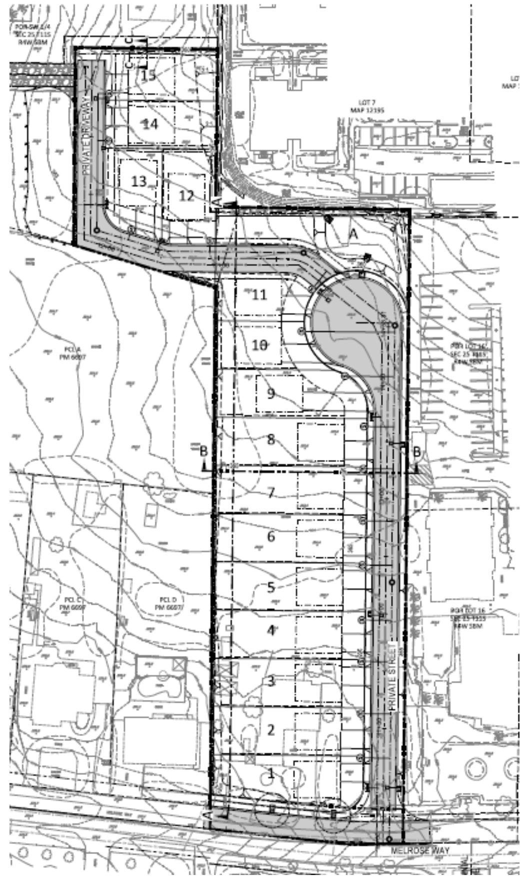
Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

1205 Melrose Way Project, City of Vista
Noise Technical Report



Submitted to:

City of Vista
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Prepared by:

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September 2021

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1205 MELROSE WAY PROJECT, CITY OF VISTA
NOISE TECHNICAL REPORT

NOISE TECHNICAL REPORT

1205 MELROSE WAY PROJECT, CITY OF VISTA

1.1 INTRODUCTION

This report presents an analysis of potential noise impacts associated with the 1205 Melrose Way Project (the "Project") in the City of Vista, CA. The Project consists of the development of 15 new single-family homes on 2.55 acres. The Project would change the existing E-1 (Estates Residential) zoning to R-1 zoning (Single Family Residential). The Project would also require a General Plan Amendment to change the existing Low Density Residential (LD) designation to Medium Density Residential (MD), as well as a Density Bonus.

The Project would include development of 15 new single-family homes. Project construction would commence in January 2023 and would be completed in June 2024 (approximately 18 months). Demolition would be required to remove the existing structures onsite.

There are residences immediately north (multifamily apartments) and west (single-family homes) of the Project site. An existing church (Vista Samoan Seventh-Day Adventist Temple) is immediately east of the Project site. Breeze Hill Elementary School is approximately 350 feet east of eastern boundary of the Project site. Residences are also located to the south opposite of Melrose Way.

This report presents an overview of existing noise conditions at the Project site, an overview of noise background information, noise regulatory setting, and an analysis of potential noise impacts of the Project. All noise impacts were found to be **less than significant with mitigation**.

1.2 SETTING

1.2.1 NOISE SETTING

Noise Descriptors

Sound is mechanical energy transmitted by pressure waves through a medium such as air. Noise is defined as unwanted sound. Sound pressure level has become the most common descriptor used to characterize the "loudness" of an ambient sound level. Sound pressure level is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing, and 120 to 140 dB corresponding to the threshold of pain. Decibels are measured using different scales, and it has been found that A- weighting of sound levels best reflects the human ear's reduced sensitivity to low frequencies, and correlates well with human perceptions of the annoying aspects of noise. The A-weighted decibel scale (dBA) is cited in most noise criteria. All references to decibels (dB) in this report will be A-weighted unless noted otherwise.

Several time-averaged scales represent noise environments and consequences of human activities. The most commonly used noise descriptors are the equivalent A–weighted sound level over a given time period (Leq)[1]; average day–night 24-hour average sound level (Ldn)[2] with a nighttime increase of 10 dB to account for sensitivity to noise during the nighttime; and community noise equivalent level (CNEL)[3], also a 24-hour average that includes both an evening and a nighttime sensitivity weighting.

Noise Attenuation

Stationary point sources of noise, including construction equipment, attenuate (lessen) at a rate of 6 to 7.5 dB per doubling of distance from the source, depending on ground absorption. Soft sites attenuate at 7.5 dB per doubling because they have an absorptive ground surface such as soft dirt, grass, or scattered bushes and trees. Hard sites have reflective surfaces (e.g., parking lots or smooth bodies of water) and therefore have less attenuation (6.0 dB per doubling). A street or roadway with moving vehicles (known as a "line" source), would typically attenuate at a lower rate, approximately 3 to 4.5 dB each time the distance doubles from the source, which also depends on ground absorption (CalTrans, 1998). Physical barriers located between a noise source and the noise receptor, such as berms or sound walls, will increase the attenuation that occurs by distance alone.

1.2.2 REGULATORY SETTING

City of Vista General Plan, Noise Element

The Noise Element of the City of Vista (COV) *GP 2030* includes a noise/land use compatibility matrix for assessing the suitability of different categories of planned land uses based on exterior noise level exposure (Table NE-3 from the COV's *GP 2030*). For Single Family Residential land use, the Noise Element specifies exterior noise levels up to 65 dB, CNEL as normally acceptable and up to 70 dB, CNEL as conditionally acceptable. Noise levels exceeding 70 dB, CNEL are generally unacceptable for Single Family residential uses.

In addition, the COV defines specific maximum noise levels that shall not be exceeded for both interior and exterior use areas. A proposed project shall not generate noise levels that exceed these standards. The COV extends the provisions of the State of California Noise Insulation Standards (Title 24), limiting interior noise levels to 45 dB CNEL for Single Family residential development. **Table NOI-1,** *Interior and Exterior Noise Guidelines*, provides Maximum Noise Level limits for various types of land uses.

1 The Equivalent Sound Level (Leq) is a single value of a constant sound level for the same measurement period duration, which has sound energy equal to the time–varying sound energy in the measurement period.

2 Ldn is the day–night average sound level that is equal to the 24-hour A-weighted equivalent sound level with a 10-decibel penalty applied to night between 10:00 p.m. and 7:00 a.m.

3 CNEL is the average A-weighted noise level during a 24-hour day, obtained by addition of 5 decibels in the evening from 7:00 to 10:00 p.m., and an addition of a 10–decibel penalty in the night between 10:00 p.m. and 7:00 a.m.

TABLE NOI-1 INTERIOR AND EXTERIOR NOISE GUIDELINES

Land Use	Maximum Noise Level (L_{DN} or CNEL, dBA)	
	Interior[1,2]	Exterior
Residential – Single Family, Multi-family, Duplex	45	65[3]
Residential – Nursing Homes, Hospital	45	65[3]
Private Offices, Church Sanctuaries, Libraries, Board Rooms, Conference Rooms, Theaters, Auditoriums, Concert Halls, Meeting Halls, etc.	45	-
Schools	45	65[4]
General Offices, Reception, Clerical, etc.	50	-
Bank Lobby, Retail Store, Restaurant, Typing Pool, etc.	60	-
Manufacturing, Kitchen, Warehousing, etc.	65	-
Parks, Playgrounds, etc.	-	65[4]
Golf Courses, Outdoor Spectator Sports, Amusement Parks, etc.	-	70[4]

Notes:
1 Noise standard with windows closed. Mechanical ventilation shall be provided per UBC requirements to provide a habitable environment.
2 Indoor environment excluding bathrooms, toilets, closets, and corridors.
3 Outdoor environment limited to rear yard of single-family homes, multi-family patios and balconies (with a depth of 6 feet or more) and common recreation areas.
4 Outdoor environment limited to playground areas, picnic areas, and other areas of frequent human use.
LDN=Day-Night Level; CNEL=Community Noise Equivalent Level; dBA=A-weighted decibel

City of Vista Noise Ordinance (Municipal Code, Chapter 8.32, Noise Control)

Sections 8.32.010 through 8.32.060 of the City of Vista Municipal Code pertain to City noise requirements and enforcement of violations. The City has adopted the County of San Diego Noise Ordinance for the purpose of controlling excessive noise levels, including noise from construction activities.

Table NOI-2, *Applicable Exterior Property Line Noise Limits,* lists the applicable exterior property line noise limits. This table is specific to the City of Vista and replaces the table in Section 36.404 of the County noise ordinance. It is unlawful for any person to cause or allow the creation of any noise to the extent that the one-hour average sound level at any point on or beyond the boundaries of the property exceeds these limits. The sound level limit at a location on a boundary between two zones is the arithmetic mean of the respective limits for the two zones.

TABLE NOI-2 APPLICABLE EXTERIOR PROPERTY LINE NOISE LIMITS

Zone	Time	Applicable Limit One-hour Average Sound Level (dBA)
A-1, E-1, O, OSR R-1B, MHP	7:00 a.m. – 10:00 p. m. 10:00 p.m. – 7:00 a. m.	50 45
R-M	7:00 a.m. – 10:00 p.m. 10:00 p.m. – 7:00 a.m.	55 50
C-1, C-2, O-3, C-T, OP, M-U and Downtown Specific Plan	7:00 a.m. – 10:00 p.m. 10:00 p.m. – 7:00 a.m.	60 55
M-1, I-P, all areas of the Vista Business Park Specific Plan and Specific Plan 14	Any time	70

Source: City of Vista Municipal Code Section 8.32.40

A-1 = Agricultural; C-1 = Commercial; C-2 = Commercial; C-T = Commercial Transient; E-1 = Estate; I-P = Industrial; MHP = Mobile Home Park; M-U = Mixed Use; O = Open Space; O-3 = Office Park; OP = Office Professional; OSR = Open Space Residential; R-1B = Residence; R-M = Multi-Residential

As discussed above, the Project site would be re-zoned to R-1, therefore, the applicable exterior property line noise limits are 50 dB (one-hour average from 7:00 am to 10:00 p.m.) and 45 dB (one-hour average from 10:00 p.m. to 7:00 a.m.).

The adopted County of San Diego Noise Ordinance also stipulates controlling construction noise. San Diego County Code Sections 36.408 and 36.409, Construction Equipment, state that, except for emergency work, it shall be unlawful for any person to operate or cause to be operated, construction equipment:

a. Between 7:00 p.m. and 7:00 a.m.

b. On Sunday or a holiday. For the purposes of this section, a holiday means January 1, the last Monday in May, July 4, the first Monday in September, December 25, and any day appointed by the President as a special national holiday or the Governor of the State as a special State holiday. A person may, however, operate construction equipment on a Sunday or holiday between the hours of 10:00 a.m. and 5:00 p.m. at the person’s residence or for the purpose of construction of a residence for himself or herself, provided that the operation of construction equipment is not carried out for financial consideration or other consideration of any kind and does not violate the limits in Sections 36.409 and 36.410.

c. Except for emergency work, it shall be unlawful for any person to operate construction equipment or cause construction equipment to be operated, that exceeds an average sound level of 75 dBA for an 8-hour period, between 7:00 a.m. and 7:00 p.m., when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is being received.

Section 36.410 of the County ordinance provides additional limitation on construction equipment beyond Section 36.404 pertaining to impulsive noise. Except for emergency work or work on a public road project, no person shall produce or cause to be produced an impulsive noise that exceeds the maximum sound level shown in **Table NOI-3***, Maximum Sound Levels (Impulsive)*, when measured at the boundary line of the property where the noise source is located or on any occupied property where the noise is received, for 25 percent of the minutes in the measurement period.

TABLE NOI-3 MAXIMUM SOUND LEVELS (IMPULSIVE)

Occupied Property Use	Decibels (dBA) L_{MAX}
Residential, village zoning or civic use	82
Agricultural, commercial or industrial use	85

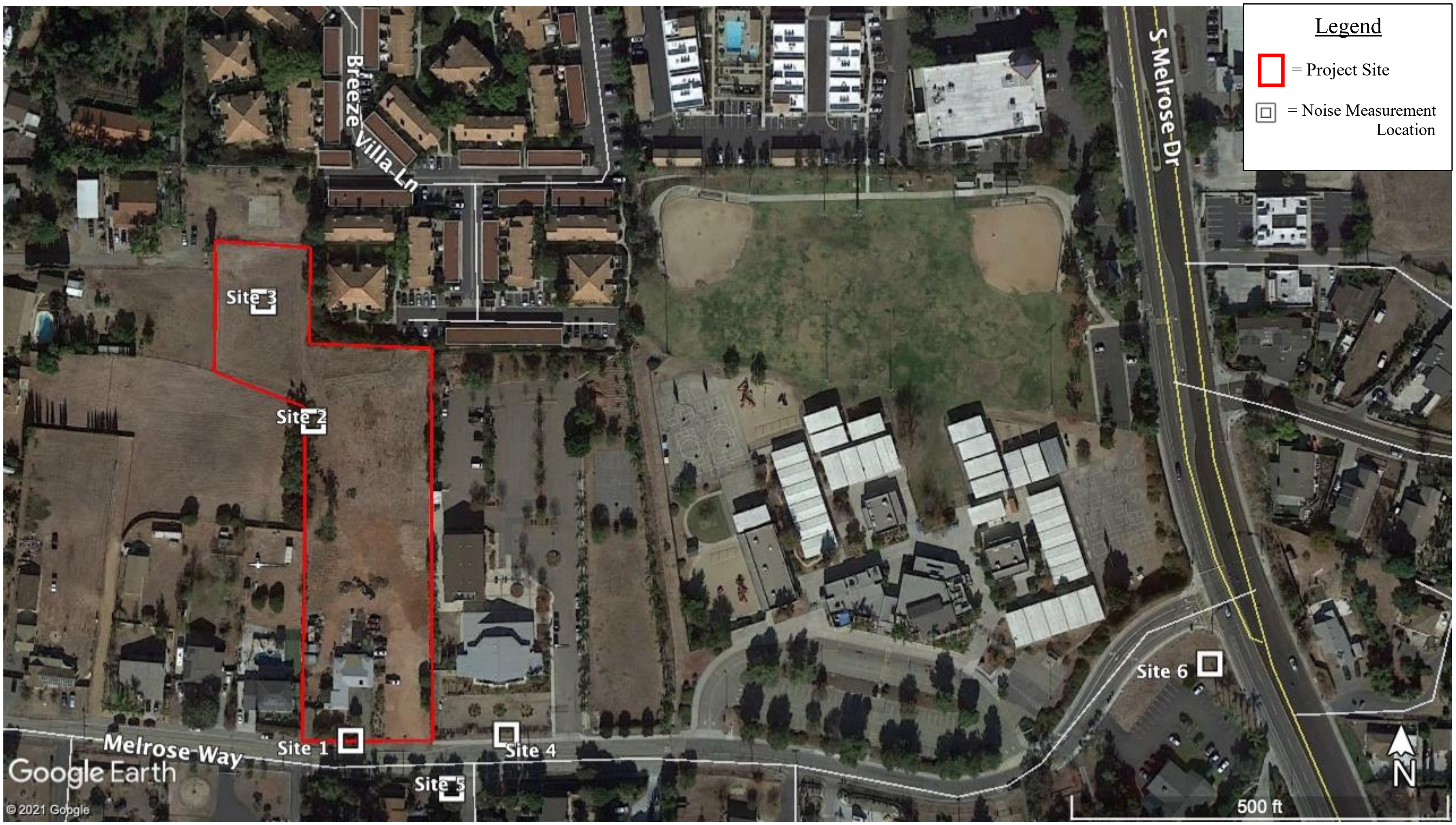
Source: County of San Diego Municipal Code Section 36.410

1.2.3 ENVIRONMENTAL SETTING

To quantify existing ambient noise levels, RCH Group conducted two long-term (72-hour) and several short-term (10-minute noise measurements) at the Project site. Long-term noise measurements were made using Metrosonics db308 Sound Level Meters calibrated before and after the measurements. Short-term measurements were made using a Larson Davis SoundTrack LxT Sound Level Meter calibrated before and after the measurements. **Table NOI-4,** *Existing Noise Levels,* summarizes the locations and results of the noise measurements. **Figure 1** shows the measurement locations on a map.

The **Noise Appendix** includes 24-hour noise plots for Site 1 and Site 2 and hourly measurements results. Based on observations from the short-term measurements, the main source of noise in the Project vicinity is traffic noise from Melrose Way. Additional noise sources include dogs, ambulance sirens, aircraft, yard work, and birds.

FIGURE 1: NOISE MEASUREMENT LOCATIONS



RCHGROUP planning & environmental consulting

Source: RCH Group and Google Earth, 2021.

TABLE NOI-4 EXISTING NOISE LEVELS

Location	Time Period	Noise Levels (dB)	Noise Sources
Site 1: South property line of the Project Site, approximately 25 feet north of the centerline of Melrose Way.	August 31, 2021 12:00 a.m. through September 2, 11:59 p.m. Tuesday – Thursday 72-hour measurement.	Hourly Leq's ranged from: 42-61 CNELs: 58,58,59	Unattended noise measurements do not identify noise sources.
Site 1: South property line of the Project Site, approximately 25 feet north of the centerline of Melrose Way.	Monday August 30, 2021 1:38 p.m. to 1:48 p.m.	5-minute Leq's: 55, 53	Cars passing on Melrose Way 66-69 dB, neighbors doing yard work 65 dB, birds 55 dB.
Site 1: South property line of the Project Site, approximately 25 feet north of the centerline of Melrose Way.	Friday September 3, 2021 11:24 a.m. to 11:34 a.m.	5-minute Leq's: 58, 50	Cars passing on Melrose Way 66-72 dB, birds on trees nearby 60 dB.
Site 2: West area of the Project site.	August 31, 2021 12:00 a.m. through September 2, 11:59 p.m. Tuesday – Thursday 72-hour measurement.	Hourly Leq's ranged from: 44-51 CNELs: 52, 52, 52	Unattended noise measurements do not identify noise sources.
Site 2: West area of the Project site.	Monday August 30, 2021 1:52 p.m. to 2:02 p.m.	5-minute Leq's: 51, 44	Quiet Area. Sirens from ambulance on Melrose Way 60 dB, birds, airplane overhead 59 dB.
Site 2: West area of the Project site.	Friday September 3, 2021 11:42 a.m. to 11:52 a.m.	5-minute Leq's: 49, 42	Quiet Area. Plane overhead 58 dB.
Site 3: North area of the Project site, approximately 75 feet west of nearby residences.	Monday August 30, 2021 2:04 p.m. to 2:14 p.m.	5-minute Leq's: 48, 49	Quiet Area. Motorcycle 55 dB, birds 53 dB.
Site 3: North area of the Project site, approximately 75 feet west of nearby residences.	Friday September 3, 2021 11:54 a.m. to 12:04 p.m.	5-minute Leq's: 42, 43	Quiet Area. Neighbors talking at a distance 45 dB.
Site 4: South property line of adjacent church, approximately 80 feet east of Project site, approximately 30 feet north of the centerline of Melrose Way.	Monday August 30, 2021 2:17 p.m. to 2:27 p.m.	5-minute Leq's: 56, 55	Cars passing on Melrose Way 66-71 dB, Neighbors dogs barking 53 dB.

Site 5: Northeast corner of Melrose Way and Centennial Drive, approximately 25 feet south of the centerline of Melrose Way.	Monday August 30, 2021 2:27 p.m. to 2:37 p.m.	5-minute Leq's: 55, 44	Cars passing on Melrose Way 64-70 dB, neighbors dogs barking 54 dB.
Site 6: Approximately 65 feet west of the centerline of S. Melrose Drive	Monday August 30, 2021 2:51 p.m. to 3:01 p.m.	5-minute Leq's: 64, 64	Traffic on S. Melrose Drive 69-76 dB.

Source: RCH Group 2021.

1.2.4 SENSITIVE RECEPTORS

Noise-sensitive land uses are land uses that may be subject to stress and/or interference from excessive noise, including residences, hospitals, churches, schools, hotels, resorts, libraries, sensitive wildlife habitat, or similar facilities where quiet is an important attribute of the environment. There are residences immediately north and west of the Project site. The Vista Samoan Seventh-Day Adventist Temple is immediately east of the Project site. Breeze Hill Elementary School is approximately 350 feet east of the eastern boundary of the Project site. Residences are also located to the south opposite of Melrose Way.

1.3 THRESHOLDS OF SIGNIFICANCE

The significance of potential impacts was determined based on State CEQA Guidelines, Appendix G. Using Appendix G evaluation thresholds, the Project would be considered to have significant noise impacts if it results in:

A. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

- Impacts would be significant if the Project would expose proposed residential uses to levels exceeding 65 dB, CNEL or interior noise levels exceeding 45 dB, CNEL, as described in the COV GP Noise Element.

- Per the COV Noise Ordinance, impacts would be significant if the Project would generate noise levels at a common property line with a multi-family residential zone that would exceed the following one-hour average exterior noise levels: 50 dB from 7:00 a.m. to 10:00 p.m. and 45 dB from 10:00 p.m. to 7:00 a.m.

- For traffic related noise, impacts are considered significant where existing traffic noise is less than 65 dB, CNEL and implementation of a Project would result in an increase of the noise level by 5 dB, CNEL or more.

- Construction activity would be considered significant for nearby residences if it exceeds an 8-hour average exterior noise level of 75 dB, or a maximum impulsive noise level of 82 dB, Lmax on an occupied residential use. The ordinance prohibits construction and building work between the hours of 7:00 p.m. and 7:00 a.m. the next day, on Sundays, or on a holiday.

B. Generation of excessive groundborne vibration or groundborne noise levels; or

   i. If Project construction vibration exceeds Caltrans structural damage thresholds for structures on adjacent properties.

C. For a project located within the vicinity of a private airstrip or an airport land use plan, or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels.

   i. The Project is not within the vicinity of a private airstrip or an airport land use plan or within two miles of a public airport, thus this impact is not addressed further.

1.4 IMPACT ANALYSIS

1.4.1 CONSISTENCY WITH CITY NOISE STANDARDS

Construction Noise Impacts

Project construction activities would include demolition of the existing residence on-site and construction of the Project. Construction activities would occur during the construction hours contained in the adopted County of San Diego Noise Ordinance Sections 36.408 and 36.409 between the hours of 7:00 a.m. and 7:00 p.m. Monday through Saturday. No construction is permitted on Sundays or on holidays.

Demolition and construction activities would require the use of numerous pieces of noise-generating equipment, such as excavating machinery (e.g., backhoes, excavators, front loaders, etc.) and other construction equipment (e.g., compactors, pavers, concrete mixers, trucks, etc.). The noise levels generated by construction equipment would vary greatly depending upon factors such as the type and specific model of the equipment, the operation being performed, the condition of the equipment. The nearest receptors to the construction would be the adjacent residential properties to the west, north, and northwest and the adjacent church to the east (80 feet away) and Breeze Hill Elementary School to the east (400 feet away). These are the distances from the center of the Project site to the receptor property lines. The maximum noise levels at 80 and 400 feet for various types of construction equipment that could be used during construction are provided in **Table NOI-5**.

TABLE NOI-5 CONSTRUCTION EQUIPMENT NOISE LEVELS

Construction Equipment	LMAX at 50 feet	LMAX at 80 feet[1]	LMAX at 400 feet[2]
Backhoe	78	73	55
Compactor (ground)	83	78	60
Compressor	78	73	55
Concrete Mixer Truck	79	74	56
Concrete Saws	90	85	65
Dozer	82	77	59
Dump Truck	76	71	53
Excavator	74	69	51
Flat Bed Truck	77	72	54
Front End Loader	76	71	53
Generator	80	75	57
Grader	81	76	58
Jackhammer	81	76	58
Paver	85	80	62
Roller	80	75	57
Tractor	84	79	61
Vibratory Concrete Mixer	79	74	56
Welder	73	68	50

Source: Federal Highway Administration (FHWA) Roadway Construction Noise Model User's Guide, 2006.

Notes:
1 This is the distance from the center of the Project site to the nearest residential and church property lines.
2 This is the distance from the center of the Project site to the nearest school property line.

Construction equipment would not all operate at the same time or location. Furthermore, construction equipment would not be in constant use during the 8-hour operating day. A dozer and an excavator may be working on the Project site simultaneously but would not be working in close proximity to one another at a given time due to the nature of their respective operations. An excavator, loader, and dump truck were analyzed together for construction noise impacts (due to their likelihood of being used in conjunction with one another) using the Federal Highway Administration's (FHWA's) Roadway Construction Noise Model (RCNM Version 1.1) (**See Appendix A** for construction noise modeling). Based on these assumptions, grading operations using an excavator, loader, and dump truck at the nearest residential or church property line would be 75.8 dB, Leq at 80 feet (See **Noise Appendix** for construction noise modeling). These noise levels could potentially exceed the COV's Noise Ordinance standard of 75 dB, Leq (8-hour standard). As a result, Mitigation Measure NOI-1 would be required to reduce noise levels from Project construction to a **less-than-significant impact.**

Mitigation Measure NOI-1: Construction Noise Management Plan: Noise levels from Project-related demolition, grading, and construction activities shall not exceed the noise limit specified in San Diego County Code (adopted by City of Vista) Sections 36.408 and 36.409 of 75 dBA (8-hour average), when measured at the boundary line of the property where the noise is located or any occupied property where noise is being received. A Construction Management Plan shall be submitted to the City of Vista Planning Division for approval prior to issuance of the Grading Permit. The following measures may be included to reduce construction/demolition noise:

- Construction equipment shall be properly outfitted and maintained with manufacturer-recommended noise-reduction devices.
- Diesel equipment shall be operated with closed engine doors and equipped with factory- recommended mufflers.
- Mobile or fixed "package" equipment (e.g., arc-welders and air compressors) shall be equipped with shrouds and noise control features that are readily available for that type of equipment.
- Electrically powered equipment shall be used instead of pneumatic or internal-combustion powered equipment, where feasible.
- Unnecessary idling of internal combustion engines (e.g., in excess of 5 minutes) shall be prohibited.
- Material stockpiles and mobile equipment staging, parking, and maintenance areas shall be located as far as practicable from noise sensitive receptors.
- The use of noise-producing signals, including horns, whistles, alarms, and bells, shall be used for safety warning purposes only.
- No project-related public address or music system shall be audible at any adjacent sensitive receptor.
- Prior to construction activities, designate a "Construction Noise Coordinator" who shall be responsible for responding to local complaints about construction noise. The Construction Noise Coordinator shall determine the cause of the complaint and shall require that reasonable measures be warranted to correct the problem be implemented (potentially including temporary noise barriers). The telephone number for the Construction Noise Coordinator shall be conspicuously posted at the construction site.
- Prior to construction activities, notify the adjacent church and residences of the construction schedule in writing and provide them with the contact information of the Construction Noise Coordinator.

Operational Noise Impacts

Potential Noise Impacts of Project Residences

As shown in **Table NOI-4**, existing 24-hour noise levels at Site 1 are 58-59 dB, CNEL and 52 dB, CNEL at Site 2. Therefore, the Project site is less than 65 dB and would be within the Normally Acceptable range for Single Family Residential uses. Interior noise levels would be considered significant if they exceed 45 dB CNEL. Residential building facades typically provide a minimum exterior-to-interior noise reduction of 25 dB with windows closed (Caltrans, 2002). Interior noise levels would be well below the 45 dB, CNEL threshold for interior noise standards in the General Plan. Therefore, the Project would be compatible with Normally acceptable exterior and interior noise level planning criteria. In summary, the Project site is noise appropriate for single family residential use. The effect of existing noise on the Project would result in a **less-than-significant impact**.

Traffic Impacts on Project Residences

A doubling of sound energy results in a 3 dB increase in sound, which means that a doubling of sound energy (e.g., doubling the volume of traffic on a road) would result in a barely perceptible change in sound level. Traffic noise from Melrose Way at the Project site is about 58 dB, CNEL based on noise measurement results at Site 1 (see Table NOI-4). As discussed above, a 5 dB increase would be considered a significant increase since traffic noise along Melrose Way is below 65 dB, CNEL. The existing traffic volumes on Melrose Way are 1,952 average daily traffic (ADT) (City of Vista, 2017). The Project would result in approximately 150 vehicle trips per day. The Project would not double the existing traffic volumes on Melrose Way and would result in a negligible increase in operational traffic noise. Thus, traffic volumes from Project operations would result in a **less-than-significant impact**.

Stationary Equipment Impacts on Project Residences

The Project would include rooftop mounted mechanical equipment including heating, ventilating and air conditioning equipment (HVAC). Noise generated by HVAC varies significantly depending on the equipment type, capacity, location and enclosure design. Noise levels up to 60 dBA at a distance of 15 feet are typical for HVAC equipment (Illigworth and Rodkin, Inc. 2009). Final Project design and development review would comply with the City's Exterior Property Line Noise limits outlined in Section 8.32.40 and would implement design features for mechanical equipment to not exceed the City's noise limits. Final design of the HVAC equipment would need to meet the most conservative threshold, which is the maximum nighttime (10:00 p.m.–7:00 a.m.) outdoor noise level of 45 dBA as measured at the adjacent receiving property. Therefore, noise impacts from stationary equipment from the Project would result in a **less-than-significant impact.**

1.4.2 CONSTRUCTION VIBRATION IMPACTS

Construction activities have the potential to result in varying degrees of temporary ground vibration, depending on the specific construction equipment used and operations involved. At the highest levels of vibration, damage to structures is primarily architectural and rarely results in any structural damage. A peak particle velocity (ppv) threshold of 0.5 inches per second or less is sufficient to avoid structural damage (Caltrans, 2013). Project construction would utilize typical construction equipment and would not generate significant sources of vibration such as pile driving and/or blasting. Vibrational effects from typical construction activities are only a concern within 25 feet of existing structures (Caltrans, 2002). Construction would not occur within 25 feet of an existing off-site structure. Thus, the Project would result in a **less-than-significant impact**.

1.4.3 AIRCRAFT NOISE IMPACTS

The Project site is subject to some distant aircraft noise, though the Project site is not within the vicinity of a public airport or private airstrip, or within an airport land use plan. The nearest airport is the McClellan-Palomar Airport, located approximately six miles to the southwest. At this distance, airport noise impacts would be a **less than significant**.

1.5 REFERENCES

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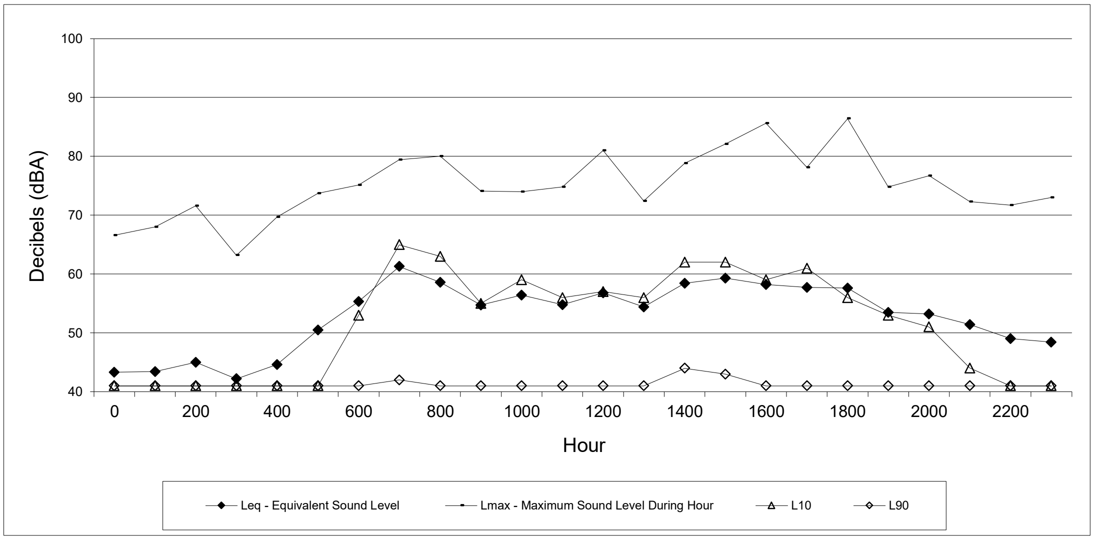
Noise Appendix

Long Term Noise Measurement Graphs for Site 1 and Site 2

Construction Noise Modeling - RCNM Noise Modeling Results

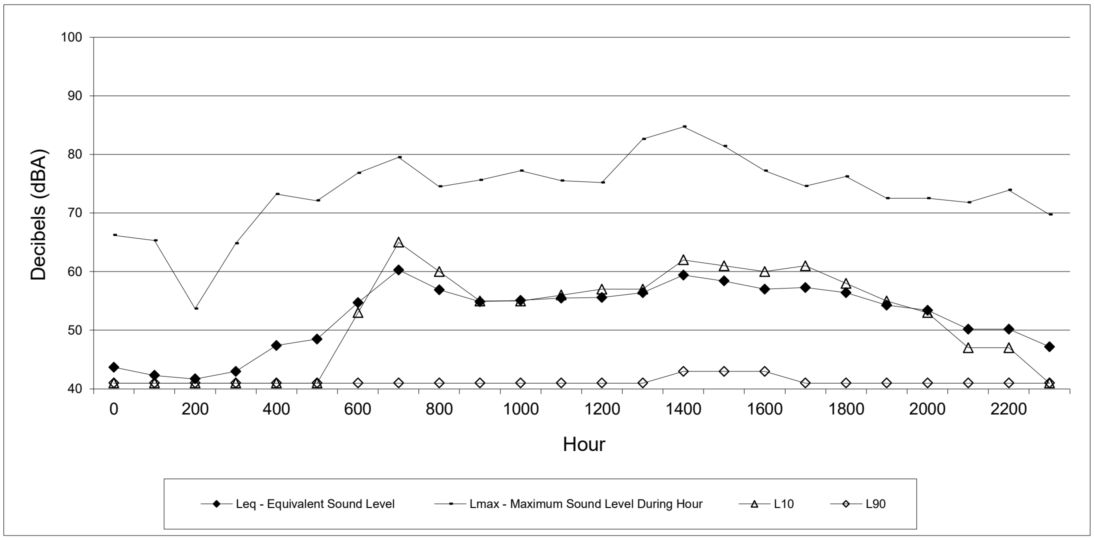
RCHGROUP
planning & environmental consulting



Site 1: South property line of the Project Site, approximately 25 feet north of the centerline of Melrose Way
Tuesday August 31, 2021

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	43	67	41	41
100	43	68	41	41
200	45	72	41	41
300	42	63	41	41
400	45	70	41	41
500	51	74	41	41
600	55	75	53	41
700	61	79	65	42
800	59	80	63	41
900	55	74	55	41
1000	56	74	59	41
1100	55	75	56	41
1200	57	81	57	41
1300	54	72	56	41
1400	58	79	62	44
1500	59	82	62	43
1600	58	86	59	41
1700	58	78	61	41
1800	58	86	56	41
1900	54	75	53	41
2000	53	77	51	41
2100	51	72	44	41
2200	49	72	41	41
2300	48	73	41	41

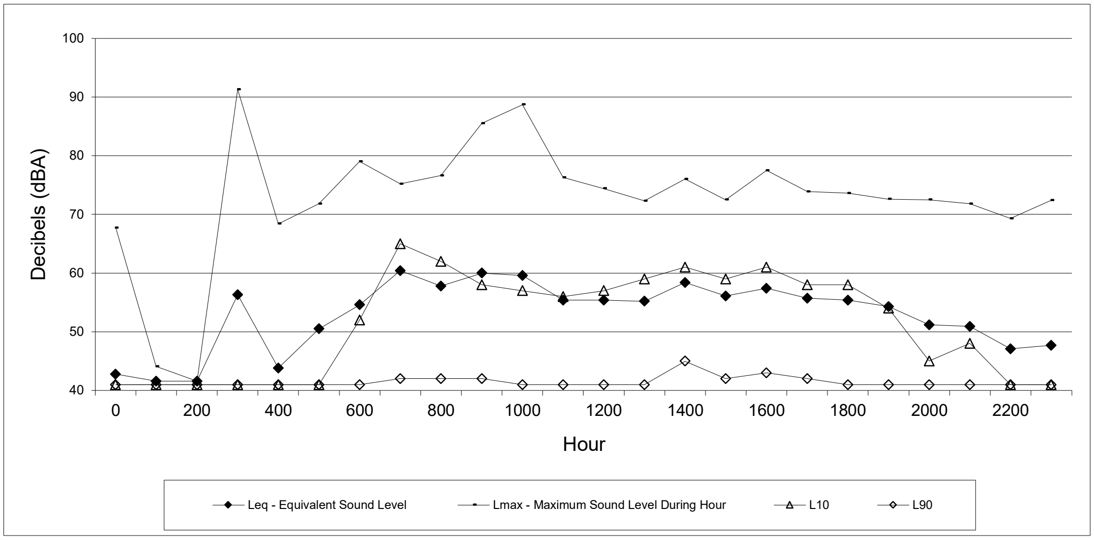
CNEL 58



Site 1: South property line of the Project Site, approximately 25 feet north of the centerline of Melrose Way
Wednesday September 1, 2021

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	44	66	41	41
100	42	65	41	41
200	42	54	41	41
300	43	65	41	41
400	47	73	41	41
500	49	72	41	41
600	55	77	53	41
700	60	80	65	41
800	57	75	60	41
900	55	76	55	41
1000	55	77	55	41
1100	56	76	56	41
1200	56	75	57	41
1300	56	83	57	41
1400	59	85	62	43
1500	58	81	61	43
1600	57	77	60	43
1700	57	75	61	41
1800	56	76	58	41
1900	54	73	55	41
2000	53	73	53	41
2100	50	72	47	41
2200	50	74	47	41
2300	47	70	41	41

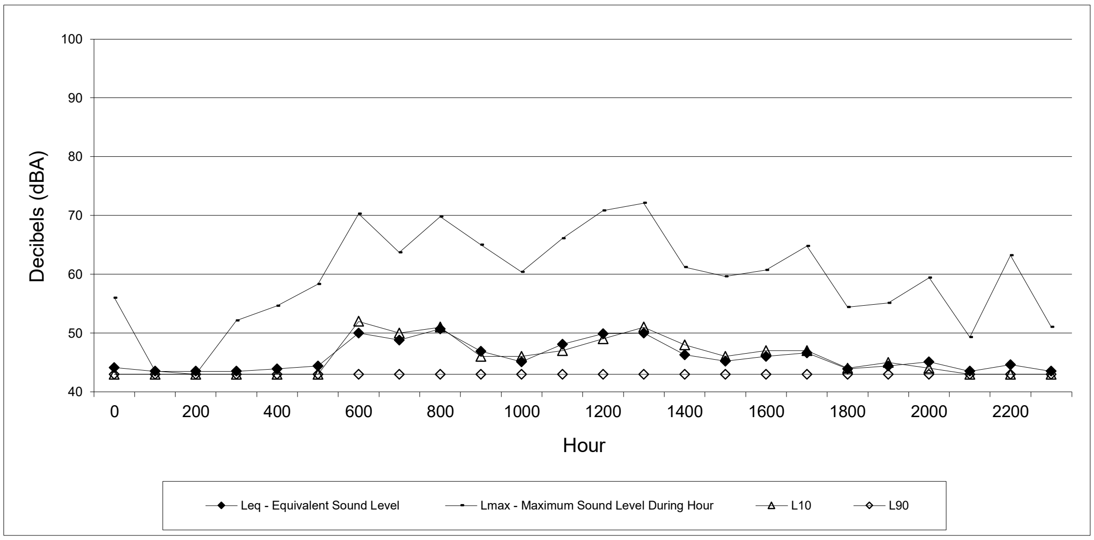
CNEL: 58



Site 1: South property line of the Project Site, approximately 25 feet north of the centerline of Melrose Way
Thursday September 2, 2021

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	43	68	41	41
100	42	44	41	41
200	42	42	41	41
300	56	91	41	41
400	44	68	41	41
500	51	72	41	41
600	55	79	52	41
700	60	75	65	42
800	58	77	62	42
900	60	86	58	42
1000	60	89	57	41
1100	55	76	56	41
1200	55	74	57	41
1300	55	72	59	41
1400	58	76	61	45
1500	56	73	59	42
1600	57	78	61	43
1700	56	74	58	42
1800	55	74	58	41
1900	54	73	54	41
2000	51	73	45	41
2100	51	72	48	41
2200	47	69	41	41
2300	48	72	41	41

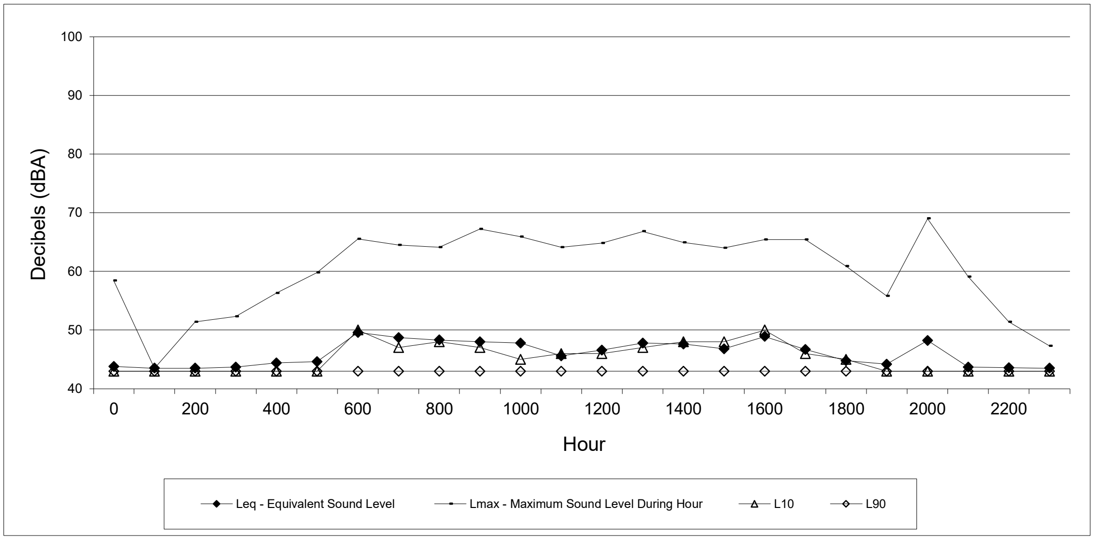
CNEL: 59



Site 2: West area of the Project Site
Tuesday August 31, 2021

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	44	56	43	43
100	44	44	43	43
200	44	43	43	43
300	44	52	43	43
400	44	55	43	43
500	44	58	43	43
600	50	70	52	43
700	49	64	50	43
800	51	70	51	43
900	47	65	46	43
1000	45	60	46	43
1100	48	66	47	43
1200	50	71	49	43
1300	50	72	51	43
1400	46	61	48	43
1500	45	60	46	43
1600	46	61	47	43
1700	47	65	47	43
1800	44	54	44	43
1900	44	55	45	43
2000	45	59	44	43
2100	44	49	43	43
2200	45	63	43	43
2300	44	51	43	43

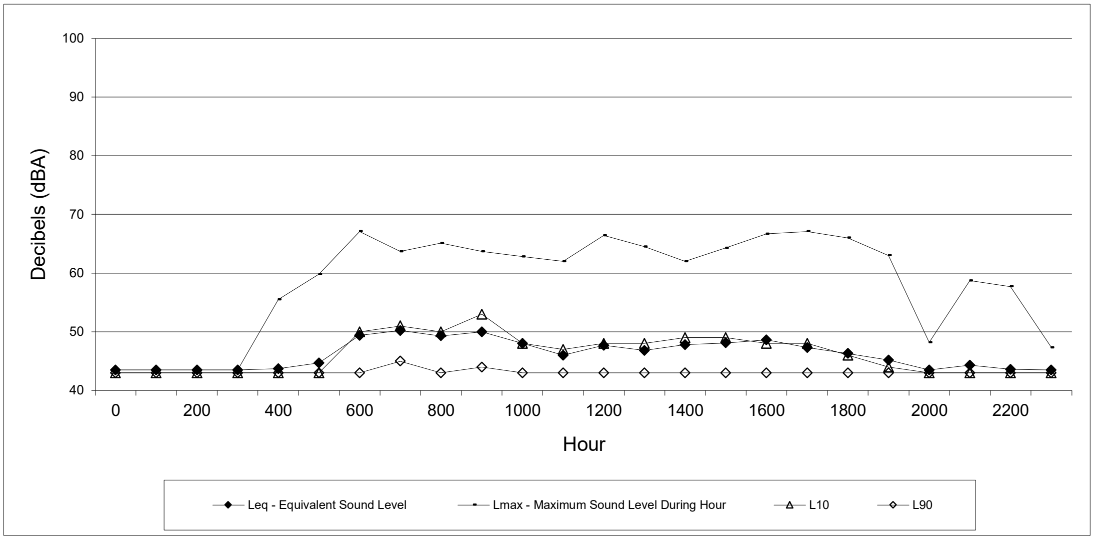
CNEL 52



Site 2: West area of the Project Site
Wednesday September 1, 2021

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	44	58	43	43
100	44	44	43	43
200	44	51	43	43
300	44	52	43	43
400	44	56	43	43
500	45	60	43	43
600	50	66	50	43
700	49	65	47	43
800	48	64	48	43
900	48	67	47	43
1000	48	66	45	43
1100	46	64	46	43
1200	47	65	46	43
1300	48	67	47	43
1400	48	65	48	43
1500	47	64	48	43
1600	49	65	50	43
1700	47	65	46	43
1800	45	61	45	43
1900	44	56	43	43
2000	48	69	43	43
2100	44	59	43	43
2200	44	51	43	43
2300	44	47	43	43

CNEL: 52



Site 2: West area of the Project Site
Thursday September 2, 2021

Hour	Leq - Equivalent Sound Level	Lmax - Maximum Sound Level During Hour	L10	L90
0	44	44	43	43
100	44	44	43	43
200	44	44	43	43
300	44	44	43	43
400	44	56	43	43
500	45	60	43	43
600	49	67	50	43
700	50	64	51	45
800	49	65	50	43
900	50	64	53	44
1000	48	63	48	43
1100	46	62	47	43
1200	48	66	48	43
1300	47	65	48	43
1400	48	62	49	43
1500	48	64	49	43
1600	49	67	48	43
1700	47	67	48	43
1800	46	66	46	43
1900	45	63	44	43
2000	44	48	43	43
2100	44	59	43	43
2200	44	58	43	43
2300	44	47	43	43

CNEL: 52

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 09/28/2021
Case Description: 1205 Melrose Way - Construction Analysis for COV's 75 dB Threshold

**** Receptor #1 ****

		Baselines (dBA)		
Description	Land Use	Daytime	Evening	Night
1205 Melrose Way	Residential	57.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40		80.7	80.0	0.0
Front End Loader	No	40		79.1	80.0	0.0
Dump Truck	No	40		76.5	80.0	0.0

Results

			Noise Limits (dBA)						Noise Limit Exceedance (dBA)					
	Calculated (dBA)		Day		Evening		Night		Day		Evening		Night	
Equipment	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq	Lmax	Leq
Excavator	76.6	72.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	75.0	71.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dump Truck	72.4	68.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	76.6	75.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

PRELIMINARY GEOTECHNICAL INVESTIGATION,
PROPOSED 15-LOT SUBDIVISION
1205 MELROSE WAY, VISTA
SAN DIEGO COUNTY, CALIFORNIA 92081
APNs 166-184-10-00 & 166-183-17-00

FOR

MR. ZORAN DJORDJEVICH
551 LYNWOOD DRIVE
ENCINITAS, CALIFORNIA 92024

W.O. 8058-A-SC MARCH 5, 2021

GeoSoils, Inc.

Geotechnical • Geologic • Coastal • Environmental

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March 5, 2021

W.O. 8058-A-SC

Mr. Zoran Djordjevich
551 Lynwood Drive
Encinitas, California 92024

Subject: Preliminary Geotechnical Investigation, Proposed 15-Lot Subdivision, 1205 Melrose Way, Vista, San Diego County, California 92081, APNs 166-184-10-00 & 166-183-17-00

Dear Mr. Djordjevich:

In accordance with your request and authorization, GeoSoils, Inc. (GSI) is pleased to present the results of our preliminary geotechnical investigation of the subject site. The purpose of our study was to evaluate the site geologic and geotechnical conditions in order to develop preliminary recommendations for earthwork and the design of foundations, walls, and pavements, as they relate to the proposed subdivision at the subject property.

EXECUTIVE SUMMARY

Based upon our field exploration, geologic, and geotechnical engineering analysis, the proposed development is considered feasible from a geotechnical engineering and geologic viewpoint, provided that the recommendations presented in the text of this report are properly incorporated into the design and construction of the project. The most significant elements of our study are summarized below:

- In general, the site is characterized as being underlain by Cretaceous-age granitic bedrock belonging to the Southern California Batholith, with a relatively thin layer of Quaternary-age colluvium (topsoil) at the surface. Although not directly encountered during field explorations, localized undocumented artificial fill is likely associated with the existing residence.

- Due to their relatively low density, lack of uniformity, and porous nature, all undocumented artificial fill, colluvium, and highly weathered granitic bedrock (if encountered) are considered potentially compressible and unsuitable for the support of settlement-sensitive improvements (i.e., the residential foundation, the concrete slab-on-grade floors, site walls, underground utilities, the driveway pavement, exterior hardscape, etc.) and/or engineered fill in their existing state. Based on the available data, the thickness of potentially compressible soils across the site is anticipated to vary up to approximately 2 to 4 feet. However, localized thicker sections of unsuitable soils cannot be precluded and should be anticipated, especially within the existing sewer and water easement. Conversely, any underlying granitic bedrock, that is not highly weathered, is considered suitable for the support of settlement-sensitive improvements and engineered fill.

- In order to: 1) facilitate excavations for the currently proposed and future site improvements; 2) mitigate the potential for water vapor transmission through floor slabs; and 3) provide for the uniform support of structures; areas of the building pad where the planned plus remedial fill thickness does not provide for at least 3 feet of compacted fill below pad grade or 24 inches of compacted fill below the lowest foundation element (whichever is greater) should be overexcavated (undercut), and then brought to the design grades with suitable, compacted fill soil. Consideration may be given to overexcavating the street area to facilitate utility construction, however, this is not a geotechnical requirement. Overexcavation recommendations are presented herein.

- The 2019 California Building Code ([2019 CBC], California Building Standards Commission [CBSC], 2019) indicates that removals of unsuitable soils be performed across all areas to be graded, under the purview of the grading permit, not just within the influence of the residential structure. Relatively deep removals may also necessitate a special zone of consideration, on perimeter/confining areas. This zone would be approximately equal to the depth of removals, if removals cannot be performed onsite or offsite. In general, any planned improvement located above a 1:1 (horizontal:vertical [h:v]) projection up from the bottom, outboard edge of the remedial grading excavation at the subdivision boundary would be affected by perimeter conditions. On a preliminary basis, any planned settlement-sensitive improvement located within approximately 2 to 4 feet from the site boundary would require deepened foundations or additional reinforcement by means of ground improvement or specific structural design. Otherwise these improvements may be subject to distress and a reduced service life. This will also require proper disclosure to all interested/affected parties should this condition exist at the conclusion of grading.

- Current laboratory testing indicates that some of the onsite sandy soils exhibit expansion index values less than 21. However, the onsite clayey soils exhibit a plasticity index (PI) of 32. As such, some site soils appear to meet the criteria for detrimentally expansive soils as defined in Section 1803.5.3 of the 2019 CBC (CBSC, 2019a). Residential building foundations within the influence of expansive soils should be designed and constructed in accordance with Sections 1808.6.1 or 1808.6.2 of the 2019 CBC.

- Corrosion testing performed on a representative sample of the onsite soils indicates that the sample is neutral with respect to soil acidity/alkalinity, corrosive to exposed buried metals when in a saturated state, presents negligible sulfate exposure to concrete, and exhibits low chloride exposure. Additional comments may be obtained from a corrosion engineer, depending on the level of protection required, as determined by the Project Civil Engineer, Project Structural Engineer, and/or Project Architect.

- The removal and recompaction of potentially compressible soils below a 1:1 (h:v) plane projected down from the bottom, outside of planned settlement-sensitive improvements and fill along the perimeter of the site will be limited due to boundary restrictions. As such, any settlement-sensitive improvement located above a 1:1 (h:v) plane projected up from the bottom outboard edge of the remedial grading excavation at the property line would require deepened foundations below this plane, additional reinforcement, or would retain some potential for distress and therefore, a reduced service life.

- Neither the regional groundwater table nor perched water was encountered during our subsurface studies to the depth explored. As such, regional groundwater is not anticipated to significantly affect the planned improvements. Perched water may occur in the future along zones of contrasting permeability and/or density, or seepage may occur along bedrock joints and fractures. Perched groundwater can be shallow on sites underlain by similar geologic conditions. This potential should be disclosed to all interested/affected parties.

- Our evaluation indicates there are no known active faults crossing the site and the natural slope upon which the site is located has very low susceptibility to deep-seated landslides. Owing to the depth to groundwater and the dense nature of the granitic bedrock, the potential for the site to be adversely affected by liquefaction/lateral spreading is considered very low. Some of the site soils are considered erosive due to low cohesive properties. Thus, properly designed and maintained site drainage is considered necessary in reducing erosion damage to the planned improvements.

- The seismic acceleration values and design parameters provided herein should be considered during the design of the proposed development. The adverse effects of seismic shaking on the structure will likely be wall cracks, some foundation/slab distress, and some seismic settlement. However, it is anticipated that the proposed structure will be repairable in the event of the design seismic event. This potential should be disclosed to all interested/affected parties.

- A "desk top" review of storm water infiltration indicates that a <u>no</u> infiltration design is recommended, owing to the potential to cause distress to existing and proposed improvements.

- Additional adverse geologic features that would preclude project feasibility were not encountered, based on the available data.

- The recommendations presented in this report should be incorporated into the design and construction considerations of the project.

The opportunity to be of service is sincerely appreciated. If you should have any questions, please do not hesitate to contact our office.

Respectfully submitted,

GeoSoils, Inc.

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Distribution: (3) Addressee (2 wet signed and PDF via email)

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PRELIMINARY GEOTECHNICAL EVALUATION, PROPOSED 15-LOT SUBDIVISION 1205 MELROSE WAY, VISTA SAN DIEGO COUNTY, CALIFORNIA 92081 APNs 166-184-10-00 & 166-183-17-00

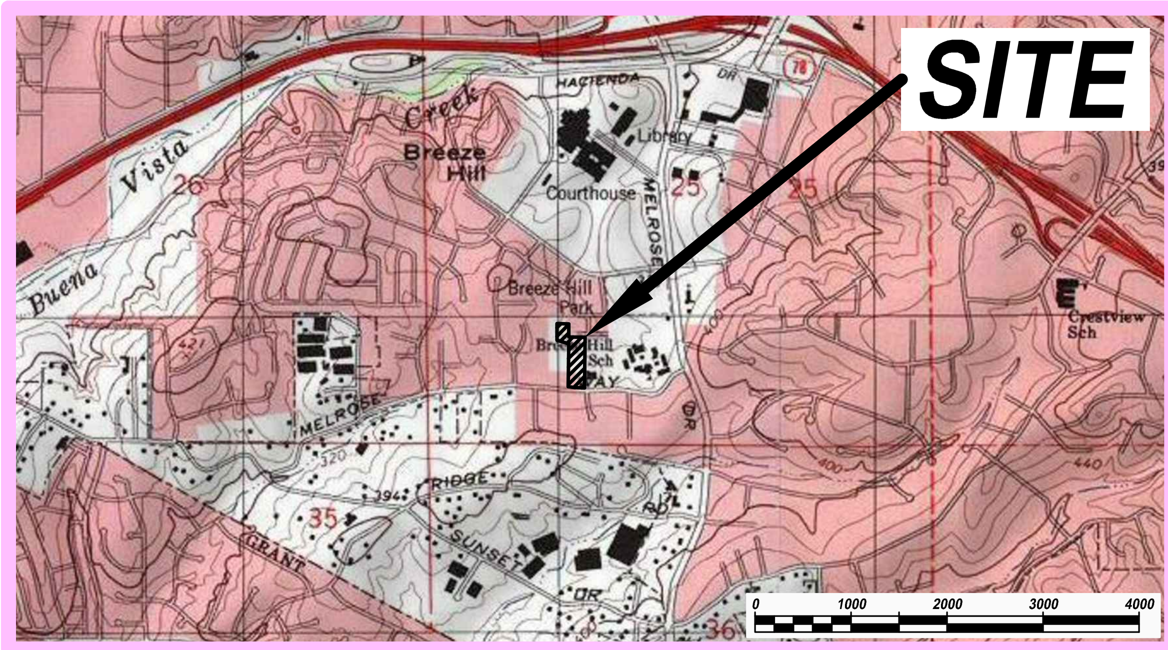
SCOPE OF SERVICES

GSI has provided the following services for the geotechnical evaluation of the subject site.

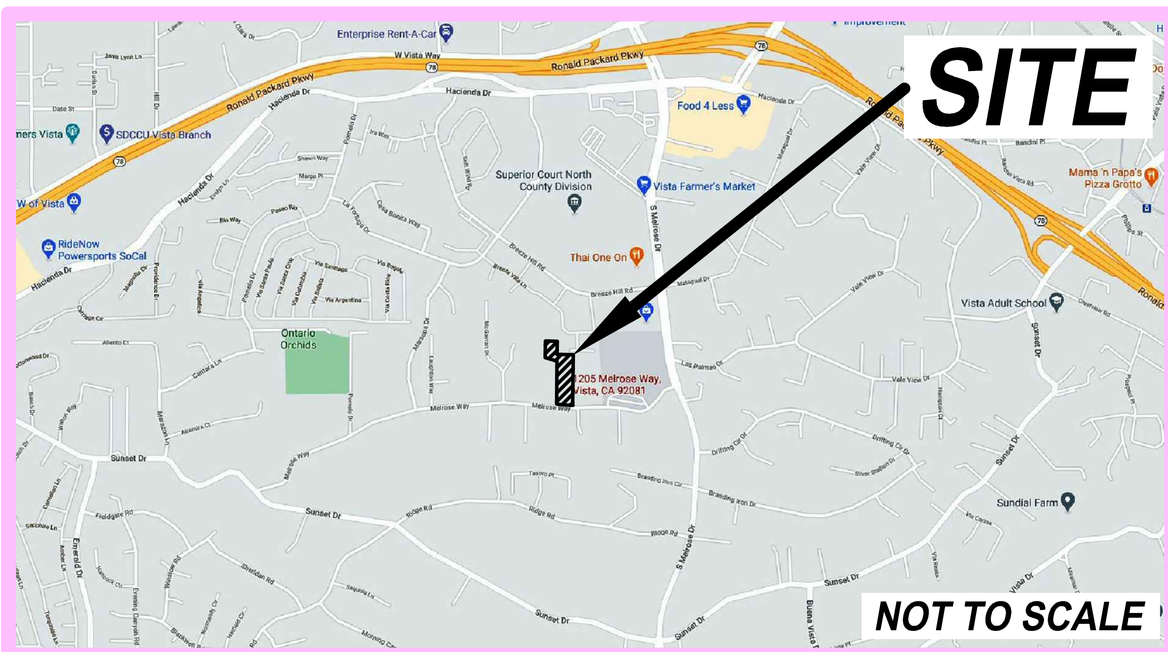
- Reviews of available published literature, maps, and aerial photos of the vicinity (see Appendix A).
- Geologic site reconnaissance, mapping, and subsurface exploration with four (4) hand-powered auger borings (see Appendix B).
- General geologic hazards and areal seismicity evaluations (see Appendix C).
- Laboratory testing of collected soil samples (see Appendix D).
- A "Desktop" infiltration feasibility study (see Appendix E).
- Analysis of field and laboratory data relative to the proposed development.
- Preparation of this appropriately illustrated preliminary geotechnical report.

SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The subject site is a panhandle-shaped property consisting of two parcels located at 1205 Melrose Way, in the City of Vista, San Diego County, California (see Figure 1, Site Location Map). The geographic coordinates of the approximate centroid of the property area under review are 33.1854, -117.2569. The subject site consists of a one-story, single-family residence, with an asphaltic concrete driveway, a CMU block wall along the eastern property line, minor hardscaping, and a few sparse trees, shrubs, and boulders throughout the property. The site is bounded by Melrose Way to the south, a church and parking lot to the east, multi-family residential buildings to the north/northeast, and by existing relatively-undeveloped residential properties to the remaining quadrants. The property slopes gently to the north/northeast, and based on the site plan prepared by Pasco Laret Suiter & Associates (PLSA, 2020), existing elevations across the site range from about 371feet mean sea level (MSL) near the southwest corner, to 354 feet MSL near the northeast corner, resulting in an overall relief of ±17 feet in the study area. Existing site drainage appears to be accommodated by topographic sheet flow runoff directed toward the north, generally through small meandering channels trending north/northeast. Vegetation generally consists of seasonal grasses, with sparse trees and shrubs located around the existing residence.



Base Map: TOPO!® ©2003 National Geographic, U.S.G.S. San Marcos Quadrangle, California --
San Diego Co., 7.5 Minute, dated 1997, current, 1999.



Base Map: Google Maps, Copyright 2021 Google, Map Data Copyright 2021 Google

GSI GeoSoils, Inc.	W.O. **8058-A-SC**
SITE LOCATION MAP	
	Figure 1

N

Based on our review of PLSA (2020), it is our understanding that the site is proposed to be subdivided into 15 individual residential lots, with the existing residence to be razed. It appears that access to the residences will occur through the use of a planned private road cul-de-sac and shared driveway. Cut and fill grading appears necessary to achieve design grades with maximum planned cuts and fills anticipated to be on the order of ±3 to 5 feet. Architectural and grading plans have not yet been provided for GSI review. However, we anticipate that the proposed residence will be one (1) to two (2) stories, comprised of a wooden frame, and supported by typical shallow foundations with a slab-on-grade floor.

FIELD STUDIES

Site-specific field studies were conducted by GSI in February 2021, and consisted of reconnaissance geologic mapping, and advancing four (4) exploratory borings, with a hand-powered auger, for an evaluation of the onsite subsurface conditions. The borings were logged by a representative of this office who collected representative bulk and undisturbed soil samples for appropriate laboratory testing. The logs of the borings are presented in Appendix B. The approximate location of the borings completed on the subject site are presented on the Geotechnical Map, which uses PLSA (2020) as a base (see Plate 1).

REGIONAL GEOLOGY

The subject property lies within the coastal plains physiographic region of the Peninsular Ranges Geomorphic Province of Southern California. This region consists of dissected, mesa-like terraces that transition inland to rolling hills. The encompassing Peninsular Ranges Geomorphic Province is characterized as elongated mountain ranges and valleys that trend northwesterly (Norris and Webb, 1990). This geomorphic province extends from the base of the east-west aligned Santa Monica - San Gabriel Mountains, and continues south into Baja California. The mountain ranges within this province are underlain by basement rocks consisting of pre-Cretaceous metasedimentary rocks, Jurassic metavolcanic rocks, and Cretaceous plutonic (granitic) rocks.

In the Southern California region, deposition occurred during the Cretaceous Period and Cenozoic Era in the continental margin of a forearc basin. Sediments, derived from Cretaceous-age plutonic rocks and Jurassic-age volcanic rocks, were deposited during the Tertiary Period (Eocene-age) into the narrow, steep, coastal plain and continental margin of the basin. These rocks have been uplifted, eroded, and deeply incised. During early Pleistocene time, a broad coastal plain was developed from the deposition of marine terrace deposits (currently termed "paralic deposits"). During mid- to late Pleistocene time, this plain was uplifted, eroded and incised. Alluvial deposits have since filled the lower valleys, and young marine sediments are currently being deposited/eroded within coastal and beach areas. Regional geologic mapping by Kennedy and Tan (2007) indicates the site is underlain by Cretaceous-age granitic bedrock of tonalite composition.

SITE GEOLOGIC UNITS

General

The geologic units observed and/or encountered at the subject site consisted of Quaternary-age colluvium (topsoil) and granitic bedrock exhibiting varying degrees of weathering. A general description of each soil type is presented as follows, from youngest to oldest.

Undocumented Artificial Fill (Map Symbol - Afu)

Although not encountered in our explorations during the study, the southwest corner of the property and an area within the northwest corner of the property, appeared to contain undocumented fill, likely associated with the development of the existing residence and offsite improvements. Based on the surficial appearance and classification, these fill soils appeared to have been locally derived and consisted of moist, soft, dark olive brown and gray brown silty clay with construction debris. As a result of the potentially compressible nature of these soils, they are considered unsuitable for the support of settlement sensitive structures and/or improvements in their existing state. These materials should be removed, moisture-conditioned, and recompacted and/or processed in place, should settlement-sensitive improvements be proposed.

Quaternary Colluvium (Map Symbol - Qcol)

As observed, existing colluvium was encountered in each of our explorations as a surficial layer (or below organic mulch) with a thickness ranging from ±1½ to ±4 feet. Where observed, colluvium generally consisted of a dark brown, dark olive brown, and dark to moderate reddish brown silty/sandy clay, with occasional areas of silty sand, both consisting of mostly fine to coarse grained sand. The colluvium was typically noted as damp to moist, soft to medium stiff/dense, having low visible porosity, and containing sporadic subangular gravels. All colluvium is considered potentially compressible and prone to settlement under loading in its existing state. As such, it should not be used for the support of settlement-sensitive improvements and/or any planned fills, unless adequately remediated.

Cretaceous Granitic Bedrock (Map Symbol - Kt)

Granitic bedrock of tonalite composition was encountered at relatively shallow depths of roughly 1½ to 4 feet below the existing grades. The granitic bedrock exhibited varying degrees of weathering in some of our borings. The weathered granitic bedrock encountered in our borings generally disintegrated to gray, pale yellow, light yellowish brown, and very light to dark reddish brown silty sand and clayey sand. This weathered bedrock was typically observed as dry to moist, medium dense to very dense, and containing relic bedrock structure and fragments. The granitic bedrock encountered is considered suitable for the support of fills and settlement-sensitive improvements in its existing state.

Structural Geology

No adverse geologic structures were observed on the site; the granitic bedrock and typically displays high angle fractures/joints.

GROUNDWATER

GSI did not observe evidence of a regional groundwater table nor perched water within our subsurface explorations. Therefore, regional groundwater is not anticipated to significantly affect proposed site development, provided that the recommendations contained in this report are properly incorporated into final design and construction. These observations reflect site conditions at the time of our investigation and do not preclude future changes in local groundwater conditions from excessive irrigation, precipitation, or that were not obvious, at the time of our investigation.

Seeps, springs, or other indications of subsurface water were not noted on the subject property during the time of our field investigation. The regional groundwater table is likely at elevations near mean sea level or approximately 350 feet below the lowest site elevation. However, perched water seepage may occur locally (as a result of heavy precipitation and/or irrigation, or damaged wet underground utilities) along zones of contrasting permeabilities/densities (fill/bedrock contacts, sandy/clayey fill lifts, etc.) or along geologic discontinuities (contacts, joints/fractures). This potential should be anticipated and disclosed to all interested/affected parties.

Due to the potential for post-development perched water to manifest near the surface, owing to as-graded permeability/density contrasts, more onerous slab design is necessary for any new slab-on-grade floor (State of California, 2021). Recommendations for reducing the amount of water and/or water vapor through slab-on-grade floors are provided in the "Soil Moisture Considerations" sections of this report.

FAULTING AND REGIONAL SEISMICITY

Regional Faults

Our review indicates that there are no known active faults crossing the project and the site is not within an Alquist-Priolo Earthquake Fault Zone (California Geological Survey [CGS], 2018). However, the site is situated in an area of active faulting. The Rose Canyon fault is the closest known active fault to the site (located at a distance of approximately 9.9 miles [16.0 kilometers]) and should have the greatest effect on the site in the form of strong ground shaking, should the design earthquake occur. The location of the Rose Canyon fault and other major faults relative to the site are shown on the "California Fault Map" in Appendix C. The possibility of ground acceleration, or shaking at the site, may be considered as approximately similar to the southern California region as a whole.

Local Faulting

Although active faults lie within a few miles of the site, no local active faulting was noted in our review, nor observed to specifically transect the site during the field investigation. Additionally, a review of available regional geologic maps does not indicate the presence of local active faults crossing the specific project site.

Seismicity

The acceleration-attenuation relation of Bozorgnia, Campbell, and Niazi (1999) has been incorporated into EQFAULT (Blake, 2000a). EQFAULT is a computer program developed by Thomas F. Blake (2000a), which performs deterministic seismic hazard analyses using digitized California faults as earthquake sources. The program estimates the closest distance between each fault and a given site. If a fault is found to be within a user-selected radius, the program estimates peak horizontal ground acceleration that may occur at the site from an upper bound (formerly "maximum credible earthquake"), on that fault. Upper bound refers to the maximum expected ground acceleration produced from a given fault. Site acceleration (g) was computed by one user-selected acceleration-attenuation relation that is contained in EQFAULT. Based on the EQFAULT program, a peak horizontal ground acceleration from an upper bound event on the Rose Canyon fault may be on the order of 0.407 g (1-sigma). The computer printouts of pertinent portions of the EQFAULT program are included within Appendix C.

Historical site seismicity was evaluated with the acceleration-attenuation relation of Bozorgnia, Campbell, and Niazi (1999), and the computer program EQSEARCH (Blake, 2000b, updated to August 2018). This program performs a search of the historical earthquake records for magnitude 5.0 to 9.0 seismic events within a 100-kilometer radius, between the years 1800 through August 2018. Based on the selected acceleration-attenuation relationship, a peak horizontal ground acceleration is estimated, which may have affected the site during the specific event listed. Based on the available data and the attenuation relationship used, the estimated maximum (peak) site acceleration during the period 1800 through August 2018 was about 0.209 g. A historic earthquake epicenter map and a seismic recurrence curve are also estimated/generated from the historical data. Computer printouts of the EQSEARCH program are presented in Appendix C.

Seismic Shaking Parameters

It is our understanding that site-specific seismic design criteria from the 2019 California Building Code ([2019 CBC], California Building Standards Commission [CBSC], 2019a), are to be utilized for foundation design. Much of the 2019 CBC relies on the American Society of Civil Engineers (ASCE) Minimum Design Loads for Buildings and Other Structures (ASCE Standard 7-16). Based on the site conditions, the following table summarizes the updated site-specific design criteria obtained from the 2019 CBC, Chapter 16 Structural Design, Section 1613, Earthquake Loads. The computer program "OSHPD Seismic design Maps," provided by a joint effort between the Structural Engineers Association of California and the Office of Statewide Health Planning and Development ([OSHPD] SEAC/OSHPD, 2021) was utilized for design (http://seismicmaps.org). The short spectral response utilizes a period of 0.2 seconds.

2019 CBC SEISMIC DESIGN PARAMETERS		
PARAMETER	**VALUE**	**2019 CBC or REFERENCE**
Risk Category	II	Table 1604.5
Site Class	C	Section 1613.2.2/Chap. 20 ASCE 7-16 (p. 203-204)
Spectral Response - (0.2 sec), S_s	0.919 g	Section 1613.2.1 Figure 1613.2.1(1)
Spectral Response - (1 sec), S_1	0.339 g	Section 1613.2.1 Figure 1613.2.1(2)
Site Coefficient, F_a		Table 1613.2.3(1)
Site Coefficient, F_v		Table 1613.2.3(2)
Maximum Considered Earthquake Spectral Response Acceleration (0.2 sec), S_{MS}	1.102 g	Section 1613.2.3 (Eqn 16-36)
Maximum Considered Earthquake Spectral Response Acceleration (1 sec), S_{M1}	0.509 g	Section 1613.2.3 (Eqn 16-37)
5% Damped Design Spectral Response Acceleration (0.2 sec), S_{DS}	0.735 g	Section 1613.2.4 (Eqn 16-38)
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.477 g	Section 1613.2.4 (Eqn 16-39)
PGA_M - Probabilistic Vertical Ground Acceleration may be assumed as about 50% of these values.	0. g	ASCE 7-16 (Eqn 11.8.1)
Seismic Design Category	D	Section 1613.2.5/ASCE 7-16 (p. 85: Table 11.6-1 or 11.6-2)

GENERAL SEISMIC PARAMETERS	
PARAMETER	**VALUE**
Distance to Seismic Source - Rose Canyon fault	9.9 mi (16.0 km)[1]
Upper Bound Earthquake - Rose Canyon fault	M_w = 7.2[2]
[1] - From Blake (2000a) [2] - Cao, et al. (2003)	

Conformance to the criteria above for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur in the event of a large earthquake. The primary goal of seismic design is to protect life, not to eliminate all damage, since such design may be economically prohibitive. Cumulative effects of seismic events are not addressed in the 2019 CBC and regular maintenance and repair following locally significant seismic events (i.e., M_w5.5) will likely be necessary, as is the case in all of Southern California.

GEOLOGIC HAZARDS EVALUATION

Mass Wasting/Landslide Susceptibility

Mass wasting refers to the various processes by which earth materials are moved down slope in response to the force of gravity. Examples of these processes include slope creep, surficial failures, and deep-seated landslides. Creep is the slowest form of mass wasting and generally involves the outer 5 to 10 feet of a slope surface. During heavy rains, such as those in El Niño years, creep-affected materials may become saturated, resulting in a more rapid form of downslope movement (i.e., landslides and/or surficial failures).

According to regional landslide susceptibility mapping by Tan and Giffen (1995), the site is located within landslide susceptibility Subarea 3-1, which is characterized as being "generally susceptible" to landsliding. However, geomorphic expressions indicative of past mass wasting events (i.e., scarps, hummocky terrain, arcuate drainage courses, etc.) were not observed on the property during our field studies nor our review of stereoscopic aerial photographs. Further, no adverse geologic structures were encountered during our subsurface exploration. Regional geologic maps do not indicate the presence of landslide deposits on the property (Tan and Kennedy, 2007).

The onsite soils are considered erosive. Therefore, slopes comprised of these materials may be subject to rilling, gullying, sloughing, and surficial slope failures depending on rainfall severity and frequency, and surface drainage practices. Such risks can be minimized through properly designed, and regularly and periodically maintained surface drainage.

SECONDARY SEISMIC HAZARDS

The following list includes other geologic/seismic related hazards that have been considered during our evaluation of the site. The hazards listed are considered negligible and/or mitigated as a result of site location, soil characteristics, and typical site development procedures:

- Liquefaction
- Lateral Spreading
- Subsidence
- Ground Lurching or Shallow Ground Rupture
- Tsunami
- Seiche
- Slope Stability

LABORATORY TESTING

Laboratory tests were performed on representative samples of site earth materials collected during our subsurface exploration in order to evaluate their physical characteristics. Test procedures used and results obtained are presented below.

Classification

Soils were visually classified with respect to the Unified Soil Classification System (U.S.C.S.) in general accordance with ASTM D 2487 and D 2488. The soil classifications of the onsite soils are provided on the Boring Logs in Appendix B.

Moisture-Density Relations

The field moisture contents and dry unit weights were determined for selected samples in the laboratory. Testing was performed in general accordance with ASTM D 2937 and ASTM D 2216. The dry unit weight was determined in pounds per cubic foot (pcf), and the field moisture content was determined as a percentage of the dry weight. The results of these tests are shown on the Boring Logs in Appendix B.

Expansion Index

A representative sample of near-surface site soil was evaluated for expansion potential. Expansion Index (E.I.) testing and expansion potential classification was performed in general accordance with ASTM Standard D 4829, the results of the expansion testing are presented in the following table.

SAMPLE LOCATION AND DEPTH (FT)	EXPANSION INDEX	EXPANSION POTENTIAL
B-3 @ 1½'-6'	18	Very Low

Atterberg Limits

Testing of a representative soil sample to evaluate its liquid limit, plastic limit, and plasticity index (P.I.) was performed in general accordance with ASTM D 4318. The test results are presented in Appendix D, and the following table:

SAMPLE LOCATION	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX
B-2 @ 0'-4'	45	13	32

Laboratory Standard

The maximum density and optimum moisture content was evaluated for representative soil types in general accordance with the laboratory standard, ASTM D 1557. The moisture-density relationships obtained for this soil is shown in the following table:

SAMPLE LOCATION	DESCRIPTION	MAXIMUM DENSITY (PCF)	OPTIMUM MOISTURE CONTENT (%)
B-2/B-3 @ 0'-6'	Dark Brown, Clayey Sand	123.8	10.4

Direct Shear Test

Shear testing was performed on a representative, undisturbed sample of site soil in general accordance with ASTM Test Method D 3080 in a Direct Shear Machine of the strain control type. Prior to testing, the sample was remolded to 90 percent of the laboratory maximum density and its optimum moisture content (per ASTM D 1557). The shear test results are presented in Appendix D, and the following table:

SAMPLE LOCATION AND DEPTH (FT)	PRIMARY		RESIDUAL	
	COHESION (PSF)	FRICTION ANGLE (DEGREES)	COHESION (PSF)	FRICTION ANGLE (DEGREES)
B-2/B-3 @ 0'-6' (Remolded)	274	28.5	155	28.8

Saturated Resistivity, pH, and Soluble Sulfates, and Chlorides

GSI conducted sampling and testing of a representative sample of the onsite earth materials for general soil corrosivity and soluble sulfates, and chlorides testing. The testing included evaluation of soil pH, soluble sulfates, chlorides, and saturated resistivity. Test results are presented in the following table:

SAMPLE LOCATION AND DEPTH (FT)	pH	SATURATED RESISTIVITY (ohm-cm)	SOLUBLE SULFATES (% by weight)	SOLUBLE CHLORIDES (ppm)
B-2/B-3 @ 0'-6'	6.8	1,600	0.005	40

Corrosion Summary

Laboratory testing indicates that the tested sample of the onsite soils is neutral with respect to soil acidity/alkalinity; is corrosive to exposed, buried metals when in a moist state; presents negligible sulfate exposure to concrete (Exposure Class S0 per Table 19.3.1.1 of American Concrete Institute [ACI] 318-14), and contains low concentrations of soluble chlorides. It should be noted that GSI does not consult in the field of corrosion engineering. Thus, the Client may obtain additional consultation from a qualified corrosion engineer based on the level of corrosion protection required for the project, as determined by the Client, the Project Architect, the Project Structural Engineer, and the Project Civil Engineer.

STORM WATER TREATMENT AND HYDROMODIFICATION MANAGEMENT

USDA Study

A review of the United States Department of Agriculture database ([USDA]; 1973, 2021) indicates that site soils are classified as Bosanko Clay (9 to 15 percent slopes [BsD]) and Placentia Sandy Loam (5 to 9 percent slopes [PeC2]). The USDA study further indicates that the onsite soils are classified as belonging to Hydrologic Soil Group "D," which generally warrants "no" infiltration conditions, based on infiltration rates alone.

Infiltration Feasibility

In general accordance with the City BMP design manual (City, 2016), the infiltration feasibility for this site was evaluated. An evaluation of the soils infiltration characteristics and potential impact on site development was performed for this evaluation, using a "desk top" analysis. A review of USDA (1973 and 2021) indicates that the capacity of the most limiting layer to transmit water (K_{sat}) within both the Bosanko Clay and Placentia Sandy Loam (BsD & PeC2), is very low to moderately low (0.00 to 0.06 inches per hour [in/hr]). The USDA further indicates that these soils (BsD & PeC2) fall into Hydrologic Soil Group (HSG) "D", which may be assigned a design infiltration rate of 0.025 inches per hour (no correction/safety factors required), based on the Natural Resources Conservation Service (NRCS) soil type default design infiltration rates. This design infiltration rate is below the recommended feasibility threshold of 0.52 inches per hour per the EPA (Clar, et al., 2004), and 0.50 inches per hour per the City (2016) for full infiltration. In general, the permeability of the underlying soil/bedrock can be expected to decrease with depth, as the soil/bedrock becomes less weathered, thereby promoting the lateral migration of water in soil.

Storm water BMPs can adversely affect the performance of the onsite and offsite structures foundation systems by: 1) increasing soil moisture transmission rates through concrete flooring; 2) reducing the stability of slopes and; and 3) increasing the potential for a loss in bearing strength of soil. Infiltration would increase this potential, as well as the potential for distress to proposed onsite and existing offsite improvements. Further, any onsite mitigative grading of compressible near-surface soils for the support of structures generally involves removal and recompaction. This is anticipated to create a permeability contrast, and exacerbate the potential for the development of a shallow "perched" and mounded water table, which can reasonably be anticipated to migrate laterally, beneath the structure(s), and offsite onto adjacent property, causing settlement and associated distress to public and private improvements.

Based on our review and engineering analysis, the site generally appears unsuitable for storm water infiltration from a geotechnical viewpoint. As such, a "no infiltration" BMP design is recommended. Furthermore, any basin constructed entirely of compacted fill is considered as belonging to Hydrologic Soil Group "D," and a "no infiltration" BMP design is warranted ([EPA], Clar, et al., 2004). For hydromodification structures located <u>within 10 feet</u> of a structure or settlement-sensitive improvement, storm water treatment and hydromodification management should be designed for <u>no infiltration</u>. The civil designer should also take into account that any infiltrated storm water would likely perch upon the underlying bedrock and migrate laterally, potentially adversely impacting improvements on adjoining properties, including utility slopes and trenches. An additional discussion of infiltration feasibility is presented in Appendix E, which contains a categorization of infiltration feasibility worksheet, Worksheet C.4-1, and a Factor of safety infiltration rate worksheet, Worksheet D.5-1, provided by the City (2016).

<u>Onsite Infiltration-Runoff Retention Systems</u>

General design criteria regarding the use of onsite infiltration-runoff retention systems (OIRRS) are presented below. Should onsite infiltration-runoff retention systems (OIRRS) be planned for Best Management Practices (BMPs) or Low Impact Development (LID) principles for the project, some guidelines should be followed in the planning, design, and construction of such systems. Such facilities, if improperly designed or implemented without consideration of the geotechnical aspects of site conditions, can contribute to flooding, saturation of bearing materials beneath site improvements, slope instability, and possible concentration and contribution of pollutants into the groundwater or storm drain and/or utility trench systems.

A key factor in these systems is the infiltration rate (sometimes referred to as the percolation rate) which can be ascribed to, or determined for, the earth materials within which these systems are installed. Additionally, the infiltration rate of the designed system (which may include gravel, sand, mulch/topsoil, or other amendments, etc.) will need to be considered. The project infiltration testing is very site specific, any changes to the location of the proposed OIRRS and/or estimated size of the OIRRS, may require additional infiltration testing. Locally, relatively impermeable residual soils include the underlying bedrock, which is anticipated to have a very low vertical infiltration rate.

The following geotechnical guidelines should be considered when designing onsite infiltration-runoff retention systems:

- The onsite soils fall into Hydrologic Soil Group (HSG) “D.” As such, a design infiltration rate of 0.025 inches/hour is assigned per NRCS soil type default design infiltration rates, should it be required.

- It is not good engineering practice to allow water to saturate soils, especially near slopes or improvements; however, the controlling agency/authority may now require this.

- Areas adjacent to, or within, the OIRRS that are subject to inundation should be properly protected against scouring, undermining, and erosion, in accordance with the recommendations of the design engineer.

- Should they be required, where infiltration systems are located near slopes or improvements, impermeable liners and subdrains should be used along the bottom of bioretention swales/basins located within the influence of such slopes and structures. Impermeable liners used in conjunction with bioretention basins should consist of a 30-mil polyvinyl chloride (PVC) membrane that is covered by a minimum of 12 inches of clean soil, free from rocks and debris, with a maximum 4:1 (h:v) slope inclination, or flatter, and meets the following minimum specifications:

    Specific Gravity (ASTM D792): 1.2 (g/cc, min.); Tensile (ASTM D882): 73 (lb/in-width, min); Elongation at Break (ASTM D882): 380 (%, min); Modulus (ASTM D882): 32 (lb/in-width, min.); and Tear Strength (ASTM D1004): 8 (lb/in, min); Seam Shear Strength (ASTM D882) 58.4 (lb/in, min); Seam Peel Strength (ASTM D882) 15 (lb/in, min).

- Subdrains for basins should consist of at least 4-inch diameter Schedule 40 or SDR 35 drain pipe with perforations oriented down. The drain pipe should be sleeved with a filter sock.

- Utility backfill within OIRRS should consist of a two-sack mix of slurry.

Final project plans (grading, precise grading, foundation, retaining wall, landscaping, etc.), should be reviewed by this office prior to construction, so that construction is in accordance with the conclusions and recommendations of this report. Based on our review, supplemental recommendations and/or further geotechnical studies may be warranted. It should be noted that structural and landscape plans were not available for review at this time.

PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS

Based on our field exploration, laboratory testing, and geotechnical engineering analysis, it is our opinion that the subject site is suitable for the proposed residential development from a geotechnical engineering and geologic viewpoint, provided that the recommendations presented in the following sections are incorporated into the design and construction phases of site development. The primary geotechnical concerns with respect to the proposed development and improvements are:

- Earth material characteristics and depth to competent bearing material below the existing grades.
- Perimeter conditions and planned improvements near the property boundary.
- On-going expansion and corrosion potentials of the onsite soils.
- Temporary slope stability.
- Erosiveness of site earth materials.
- Potential for perched water during and following site development.
- Regional seismic activity.

The recommendations presented herein consider these as well as other aspects of the site. The engineering analyses performed concerning site preparation and the recommendations presented herein have been completed using the information provided and obtained during our field work.

In the event that any significant changes are made to proposed site development, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the recommendations of this report verified or modified in writing by this office. Foundation design parameters are considered preliminary until the foundation design, layout, and structural loads are provided to this office for review.

1. Soil engineering, observation, and testing services should be provided during grading to aid the contractor in removing unsuitable soils and in his effort to compact the fill.

2. Geologic observations should be performed during any grading and foundation construction to verify and/or further evaluate geologic conditions. Although unlikely, if adverse geologic structures are encountered, supplemental recommendations and earthwork may be warranted.

3. All undocumented artificial fill, colluvium, and highly weathered granitic bedrock are considered unsuitable for the support of the planned settlement-sensitive improvements (i.e., the residential structure, walls, underground utilities, the driveway pavement, hardscape, etc.) and new planned fills. Unsuitable soils within the influence of planned settlement-sensitive improvements and planned fill should be removed to expose suitable granitic bedrock and then be reused as properly engineered fill. Based on the available subsurface data, remedial grading excavations are anticipated to extend to a depth of approximately 2 to 4 feet below the existing grades. However, variations should be anticipated and deeper remedial grading excavations cannot be precluded.

4. Current laboratory testing indicates that some of the onsite sandy soils exhibit expansion index values less than 21. However, the onsite clayey soils exhibit a plasticity Index (PI) of PI=32. As such, some of the site soils appear to meet the criteria for detrimentally expansive soils as defined in Section 1803.5.3 of the 2019 CBC (CBSC, 2019a).

   Residential building foundations within the influence of expansive soils should be designed and constructed in accordance with Sections 1808.6.1 or 1808.6.2 of the 2019 CBC. If post-grading soils are detrimentally expansive, foundation systems used for the mitigation of expansive soils typically incorporate the Post-Tension Institute (PTI) or Wire Reinforcement Institute (WRI) methodologies.

5. Laboratory testing indicates that a representative sample of the onsite soils is neutral with respect to soil acidity/alkalinity and is corrosive to exposed buried metals when in a moist state. Testing also indicates that the sample presents negligible sulfate exposure to concrete (Exposure Class S0 per Table 19.3.1.1 of American Concrete Institute [ACI] 318-14) and contains low concentrations of soluble chlorides. It should be noted that GSI does not consult in the field of corrosion engineering. Thus, the Client may obtain additional consultation from a qualified corrosion engineer based on the level of corrosion protection required for the project, as determined by the Client, the Project Architect, and the Project Structural Engineer.

6. Site soils are considered erosive. Surface drainage should be designed to eliminate the potential for concentrated surface flows. Positive surface drainage away from foundations and tops of slopes is recommended. Temporary erosion control measures should be implemented until vegetative covering is well established. The property owner will need to maintain proper surface drainage over the life of the development. This should be disclosed to all interested/affected parties.

7. No evidence of a high regional groundwater table nor perched water was observed during our subsurface exploration within the property. However, due to the nature of site earth materials, there is a potential for perched water to occur both during and following site development. This potential should be disclosed to all interested/affected parties. Should perched water conditions be encountered, this office could provide recommendations for mitigation. Typical mitigation includes subdrainage system, cut-off barriers, etc.

8. The removal and recompaction of potentially compressible soils below a 1:1 (h:v) plane projected down from the bottom, outside edge of planned settlement-sensitive improvements and fill along the perimeter of the site will likely be limited due to boundary restrictions. As such, any settlement-sensitive improvement located above a 1:1 (h:v) plane projected up from the bottom outboard edge of the remedial grading excavation at the property line would require deepened foundations below this plane, additional reinforcement, or would retain some potential for distress and therefore, a reduced service life. On a preliminary basis, any planned settlement-sensitive improvements located within a few feet from the subdivision boundary would require deepened foundations or additional reinforcement by means of ground improvement or specific structural design. This should be disclosed to all interested/affected parties.

9. On a preliminary basis, temporary slopes should be constructed in accordance with CAL-OSHA guidelines for Type “B” soils, provided water or seepage is not present. All temporary slopes should be evaluated by the geotechnical consultant, prior to worker entry. Should adverse conditions be identified, the slope may need to be laid back to a flatter gradient or require the use of shoring.

10. The seismicity-acceleration values provided herein should be considered during the design and construction of the proposed development.

11. General Earthwork and Grading Guidelines are provided at the end of this report as Appendix F. Specific recommendations are provided below.

EARTHWORK CONSTRUCTION RECOMMENDATIONS

General

All earthwork should conform to the guidelines presented in the 2019 CBC (CBSC, 2019), the requirements of the City of Vista, and the General Earthwork and Grading Guidelines presented in Appendix F, except where specifically superceded in the text of this report. Prior to earthwork, a GSI representative should be present at the preconstruction meeting to provide additional earthwork guidelines, if needed, and review the earthwork schedule. This office should be notified in advance of any fill placement, supplemental regrading of the site, or backfilling underground utility trenches and retaining walls after rough earthwork has been completed. This includes grading for driveway approaches, driveways, and exterior hardscape.

During earthwork construction, all site preparation and the general grading procedures of the contractor should be observed and the fill selectively tested by a representative(s) of GSI. If unusual or unexpected conditions are exposed in the field, they should be reviewed by this office and, if warranted, modified and/or additional recommendations will be offered. All applicable requirements of local and national construction and general industry safety orders, the Occupational Safety and Health Act (OSHA), and the Construction Safety Act should be met. It is the onsite general contractor and individual subcontractors responsibility to provide a safe working environment for our field staff who are onsite. GSI does not consult in the area of safety engineering.

Site Preparation

All existing improvements, vegetation and deleterious debris should be removed from the site prior to the start of construction if they are located in areas of proposed earthwork.

Any remaining cavities should be observed by the geotechnical consultant. Mitigation of cavities would likely include removing any potentially compressible soils to expose suitable bedrock and then backfilling the excavation with a controlled engineered fill or soils that have been moisture conditioned to optimum moisture content and compacted to at least 90 percent of the laboratory standard (ASTM D 1557).

Removal and Recompaction of Potentially Compressible Earth Materials

Potentially compressible undocumented fill, colluvium, and highly weathered granitic bedrock should be removed to expose suitable granitic bedrock. Following removal, these soils should be cleaned of any vegetation and deleterious debris, moisture conditioned to at least optimum moisture, and then be recompacted to at least 90 percent of the laboratory standard (per ASTM D 1557). Based on the available data, excavations necessary to remove unsuitable soils are anticipated to range up to approximately 2 to 4 feet across the site. The potential to encounter thicker sections of unsuitable soils that require deeper remedial grading excavations than stated above cannot be precluded and should be anticipated. Potentially compressible soils should be removed below a 1:1 (h:v) projection down from the bottom, outboard edge of any settlement-sensitive improvement or limits of planned fill. Remedial grading excavations should be observed by the geotechnical consultant prior to scarification and fill placement. Once observed and approved, the bottom of the remedial grading excavation should be scarified at least 6 to 8 inches, moisture conditioned to at least the soil's optimum moisture content, and then recompacted to a minimum 90 percent of the laboratory standard (ASTM D 1557). Based on the distribution of soils, including highly weathered bedrock, blending/mixing of any minor amounts of expansive soil should be performed during grading to reduce the overall expansive character of site soil.

Owing to the age of the existing development at the site, it is possible that underground structures (i.e., utilities, cisterns, seepage pits, etc.) may be encountered during remedial grading. This office should be informed if any underground structures are encountered during remedial earthwork. Based on the exposed conditions, this office would provide recommendations for earthwork mitigation.

Perimeter Conditions

General

It should be noted that the 2019 CBC (CBSC, 2019) indicates that the removal of unsuitable soils be performed across all areas to be graded, under the purview of the grading permit, not just within the influence of the residential structure. Relatively deep removals may also necessitate a special zone of consideration, on perimeter/confining areas. This zone would be approximately equal to the depth of removals, if removals cannot be performed onsite or offsite. In general, any planned improvement located above a 1:1 (h:v) projection up from the bottom, outboard edge of the remedial grading excavation at the site boundary would be affected by perimeter conditions. On a preliminary basis, any planned settlement-sensitive improvements located within about 2-4 feet of the site boundary would require deepened foundations, underpinning, or additional reinforcement by means of ground improvement or specific structural design, for perimeter conditions discussed above. Otherwise, these improvements may be subject to distress and a reduced service life, or even adversely affect offsite buildings/improvements. This will also require proper disclosure to all interested/affected parties should this condition exist at the conclusion of grading. The need for remedial measures for support of settlement-sensitive improvements near the site boundary should be further evaluated at the grading plan review stage.

Overexcavation

In order to provide uniform foundation and slab-on-grade floor support, mitigate water vapor transmission potential, and to facilitate trenching for foundations and underground utilities, it is recommended that the building pads be overexcavated (undercut) to a depth of at least 3 feet below pad grade, or 2 feet below the lowest bottom of the footing elevation (whichever is greater). When removals do not provide for the minimum fill thickness with a given building pad, the building pad shall be overexcavated as described above.

Overexcavation should be completed for a horizontal distance of at least 5 feet outside the perimeter foundation elements, including any exterior column footings. If there is a potential for the building layout or location to change, following site grading, the horizontal limits of overexcavation should be enlarged a sufficient distance to capture and extend a few feet beyond the perimeter foundation elements. Otherwise, additional remedial grading or other mitigation could be required during building foundation construction. The maximum to minimum fill thickness across the building pad should not exceed 3:1 (maximum:minimum). Prior to fill placement, the bottom of the overexcavation should observed by GSI, and then be scarified at least 6 to 8 inches, moisture conditioned to at least the soil's optimum moisture content, and then recompacted to a minimum 90 percent of the laboratory standard (ASTM D 1557).

Alternating Slot Excavations

Alternating "A", "B", and "C" slot excavations should be performed when completing remedial earthwork below a 1:1 (h:v) plane projected down from property lines, existing improvements, and/or the top-of-pipe elevation at a point located $\leq$5 horizontal feet from the center of existing, active underground utilities. The width of an open slot should be no greater than 6 feet. Multiple slots may be excavated simultaneously provided that open slots are separated by a 12-foot width of undisturbed soils or recompacted fill. Open slots should be observed by GSI prior to backfill.

Eastern Property Line

PLSA (2020) indicates a proposed private road to be located along the eastern property line, where an existing free-standing CMU wall occurs on the property line, and other minor improvements near the property line. Assuming the potential for relatively deep removals to occur within the eastern portion of the site, onsite excavations could potentially undermine the existing wall foundation system, thus increasing the potential for distress to existing offsite improvements. Mitigation of this potential distress would include, but not necessarily be limited to: construction in alternating sections/slots, and/or underpining/shoring the existing offsite structure.

Fill Placement

Following scarification of the bottom of the remedial grading excavation, the reused onsite soils and import (if necessary) should be placed in ±6- to ±8-inch lifts, cleaned of vegetation and debris, moisture conditioned to at least optimum moisture content, and compacted to achieve a minimum relative compaction of 90 percent of the laboratory standard (ASTM D 1557). Underground utility trench and retaining wall backfills should conform to similar placement standards. Any rock constituents greater than 12 inches in dimension should not be incorporated into fills placed within the building pads or within the footprints of retaining wall foundations. Rock constituents greater than 3 inches in dimension should not be incorporated into underground utility trench or retaining wall backfill materials. Underground utility providers may have stricter requirements for the placement of rock materials within their utility trenches.

Import Soils

If import fill is necessary, a sample of the soil import should be evaluated by this office prior to importing, in order to assure compatibility with the onsite soils and the recommendations presented in this report. If non-manufactured materials are used, environmental documentation for the export site should be provided for GSI review. At least three business days of lead time should be allowed by builders or contractors for proposed import submittals. This lead time will allow for environmental document review, particle-size analysis, laboratory standard, expansion testing, and blended import/native characteristics as deemed necessary. Import soils should be very low expansive (i.e., E.I. $\leq$ 20 with a P.I. $\leq$ 14). The use of subdrains at the bottom of the fill cap may be necessary, and may be subsequently recommended based on compatibility with onsite soils.

Graded Slopes

Significant graded slopes are not planned, nor anticipated for this project.

Temporary Slopes

Temporary slopes for excavations greater than 4 feet, but less than 20 feet in overall height should conform to CAL-OSHA and/or OSHA requirements for Type “B” soils, provided running sands, water, or seepage are not present. Temporary slopes, up to a maximum height of ±20 feet, may be excavated at a 1:1 (h:v) gradient, or flatter, provided groundwater and/or running sands are not exposed. Equipment traffic/storage or construction material, or soil stockpiles should not be within ‘H’ of any temporary slope where ‘H’ equals the height of the temporary slope. All temporary slopes should be observed by a licensed engineering geologist and/or geotechnical engineer prior to worker entry into the excavation. Based on the exposed field conditions, inclining temporary slopes to flatter gradients or the use of shoring may be necessary if adverse conditions are observed. If temporary slopes conflict with property boundaries, shoring or alternating slot excavations may be necessary. The need for shoring or alternating slot excavations could be further evaluated during the grading plan review stage.

Earthwork Balance (Shrinkage/Bulking)

The volume change of excavated materials upon compaction as engineered fill is anticipated to vary with material type and location. Based on the available data, the overall earthwork shrinkage and bulking may be approximated by using the following parameters:

Undocumented Artificial Fill/Quaternary Colluvium ...... 5% to 10% shrinkage
Bedrock
75% Earth/25% Rock (weathered bedrock) .... 8% shrinkage
50% Earth/50% Rock .... 5% shrinkage
25% Earth/75% Rock (unweathered bedrock) .... 12% bulking

It should be noted that the above factors are estimates only, based on preliminary data. Existing weathered bedrock may achieve higher shrinkage if organics or clay content is higher than anticipated, or if compaction averages more than 92 percent of the laboratory standard (ASTM D 1557). Final earthwork balance factors could vary. In this regard, grades could be adjusted up or down near the completion of grading in order to accommodate any yardage imbalance for the project.

PRELIMINARY RECOMMENDATIONS - FOUNDATIONS

General

Preliminary recommendations for foundation design and construction are provided in the following sections. These preliminary recommendations have been developed from our understanding of the currently planned site development, site observations, subsurface exploration, laboratory testing, and engineering analyses. Foundation design should be re-evaluated at the conclusion of site grading/remedial earthwork for the as-graded soil conditions. Although not anticipated, revisions to these recommendations may be necessary. In the event that the information concerning the proposed development plan is not correct, or any changes in the design, location or loading conditions of the proposed additions are made, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report are modified or approved in writing by this office.

The information and recommendations presented in this section are not meant to supercede design by the project structural engineer or civil engineer specializing in structural design. Upon request, GSI could provide additional input/consultation regarding soil parameters, as related to foundation design.

Expansive/Corrosive Soils

Tests performed on representative soil samples (in general accordance with ASTM D 4829) to evaluate soil expansion indicate very low (expansion index [E.I.] less than 21 evaluated) expansive soil conditions for silty sand material, with a plasticity index (P.I.) evaluated as

P.I. = 32 for the higher expansive soils onsite. As such, some of the site soils meet the criteria of expansive soils as defined in Section 1803.5.2 of the 2019 CBC. Foundation systems constructed within the influence of detrimentally expansive soils (i.e., E.I. > 20 and P.I. $\geq$ 15) will require specific design to resist expansive soil effects per Sections 1808.6.1 or 1808.6.2 of the 2019 CBC, and should be provided by the project structural engineer.

Reinforced concrete mix design for foundations, slab-on-grade floors, and pavements should conform to "Exposure Classes S0, W0, and C1" in Table 19.3.2.1 of ACI 318R-14, as concrete would likely be exposed to moisture.

Preliminary Foundation Design

The following foundation construction recommendations are presented as a minimum criteria from a soils engineering viewpoint. Site soils are expansive, as such, foundations will also require specific design by the structural engineer to mitigate expansive soil effects as required in Sections 1808.6.1 or 1808.6.2 of the 2019 CBC.

1. The foundation systems should be designed and constructed in accordance with guidelines presented in the 2019 CBC.

2. An allowable bearing value of 2,000 pounds per square foot (psf) may be used for the design of footings that maintain a minimum width of 12 inches and a minimum depth of 18 inches (below the lowest adjacent grade) and are founded entirely into properly compacted, engineered fill, or suitable fill. This value may be increased by 20 percent for each additional 12 inches in footing depth to a maximum value of 2,500 psf. These values may be increased by one-third when considering short duration seismic or wind loads. Isolated pad footings should have a minimum dimension of at least 24 inches square and a minimum embedment of 24 inches below the lowest adjacent grade into properly engineered fill. Foundation embedment depth excludes concrete slabs-on-grade, and/or slab underlayment. Foundations should not simultaneously bear on bedrock and engineered fill.

3. For foundations deriving passive resistance from engineered fill, a passive earth pressure may be computed as an equivalent fluid having a density of 250 pcf, with a maximum earth pressure of 2,500 psf.

4. The upper 6 inches of passive pressure should be neglected if not confined by slabs or pavement.

5. For lateral sliding resistance, a coefficient of friction of 0.35 pcf may be utilized for a concrete to soil contact, when multiplied by the dead load. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third.

6. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third.

7. All footing setbacks from slopes should comply with Figure 1808.7.1 of the 2019 CBC. GSI recommends a minimum horizontal setback distance of 7 feet as measured from the bottom, outboard edge of the footing to the slope face.

8. Footings for structures adjacent to retaining walls should be deepened so as to extend below a 1:1 projection from the heel of the wall. Alternatively, walls may be designed to accommodate structural loads from buildings or appurtenances as described in the "Retaining Wall" section of this report.

9. Provided that the earthwork and foundation recommendations in this reported are adhered foundations bearing on engineered fill should be minimally designed to accommodate a differential settlement of 1 inch over a 40-foot horizontal span (angular distortion = 1/480).

PRELIMINARY FOUNDATION CONSTRUCTION RECOMMENDATIONS

Current laboratory testing indicates that some onsite soils meet the criteria of detrimentally expansive soils as defined in Section 1803.5.3 of the 2019 CBC. The following foundation construction recommendations are presented as a minimum criteria from a soils engineering viewpoint. However, as some site soils are expansive, foundations may also require specific design by the structural engineer to mitigate expansive soil effects as required in Sections 1808.6.1 or 1808.6.2 of the 2019 CBC.

The following foundation construction recommendations are presented as a minimum criteria from a soils engineering viewpoint. The following foundation construction recommendations are intended to support planned improvements underlain by at least 4 feet of non-detrimentally expansive soils (i.e., E.I.<21 and P.I. <15). Should foundations be underlain by expansive soils with expansion indices exceeding 21 at depths of less than 7 feet, they will require specific design to mitigate expansive soil effects as required in Sections 1808.6.1 or 1808.6.2 of the 2019 CBC (CBSC, 2019).

1. Exterior and interior footings should be founded into engineered fill at a minimum depths of 12 inches (very low expansive soil), or 18 inches (low to medium expansive soil, or 24 inches for high expansive soils), below the lowest adjacent grade, and a minimum width of 12 or 15 inches, for the planned, one- or two-story floor load structure, respectively. Isolated, exterior column and panel pads, or wall footings, should be at least 24 inches, square, and founded at a minimum depth of 24 inches into properly engineered fill. All footings should be minimally reinforced with four No. 4 reinforcing bars, two placed near the top and two placed near the bottom of the footing. Reinforcement of pad footing should be provided by the projects structural engineer.

2. All interior and exterior column footings, and perimeter wall footings, should be tied together via grade beams in two directions. The grade beam should be at least 12 inches square in cross section, and should be provided with a minimum of one No. 4 reinforcing bar at the top, and one No. 4 reinforcing bar at the bottom of the grade beam. The base of the reinforced grade beam should be at the same elevation as the adjoining footings.

3. A grade beam, reinforced as previously recommended and at least 12 inches square, should be provided across large (garage) entrances. The base of the reinforced grade beam should be at the same elevation as the adjoining footings.

4. A minimum concrete slab-on-grade thickness of 5 inches is recommended. Recommendations for floor slab underlayment are presented in a later section of this report.

5. Concrete slabs should be reinforced with a minimum of No. 3 reinforcement bars placed at 18-inch on centers, in two horizontally perpendicular directions (i.e., long axis and short axis).

6. All slab reinforcement should be supported to ensure proper mid-slab height positioning during placement of the concrete. "Hooking" of reinforcement is not an acceptable method of positioning.

7. Specific slab subgrade pre-soaking is recommended for these soil conditions. Prior to the placement of underlayment sand and vapor retarder, GSI recommends that the slab subgrade materials be moisture conditioned to at least optimum moisture content to a minimum depth of 12 inches. Slab subgrade pre-soaking should be evaluated by the geotechnical consultant within 72 hours of the placement of the underlayment sand and vapor retarder.

8. Soils generated from footing excavations to be used onsite should be compacted to a minimum relative compaction of 90 percent of the laboratory standard (ASTM D 1557), whether the soils are to be placed inside the foundation perimeter or in the yard/right-of-way areas. This material must not alter positive drainage patterns that direct drainage away from the structural areas and toward the street.

9. Reinforced concrete mix design should conform to “Exposure Class S0 and C1” in Table 19.3.2.1 of ACI 318R-14.

Stiffened Slabs

All foundations supported by expansive soils (as defined per Section 1803.5.3 of the 2019 CBC), shall be in compliance with Section 1808.6 of the 2019 CBC (CBSC, 2019), and the findings of this report.

For a typical slab designed with interior ribs, or stiffeners, the slab should minimally be at least 5 inches thick. The ribs should be provided in both transverse and longitudinal directions. The interior rib spacing and depth should be provided by the project structural engineer. The perimeter beams, however, should be embedded at least 18 inches for medium expansion, and in consideration of the building type. The embedment depth should be measured downward from the lowest adjacent grade surface to the bottom of the beam.

Structural Mat Foundations - Design/Construction

The design of mat foundations should incorporate the vertical modulus of subgrade reaction. This value is a unit value for a 1-foot square footing and should be reduced in accordance with the following equation when used with the design of larger foundations. This assumes that the bearing soils will consist of engineered fills with an average relative compaction of 90 percent of the laboratory (ASTM D 1557), overlying dense formational earth materials.

$$K_R = K_S \left[\frac{B+1}{2B} \right]^2$$

where: K_S = unit subgrade modulus
K_R = reduced subgrade modulus
B = foundation width (in feet)

The modulus of subgrade reaction (K_S) and effective plasticity index (P.I.) to be used in mat foundation design for various expansive soil conditions are presented in the following table.

LOW EXPANSION (E.I. = 0-50)	MEDIUM EXPANSION (E.I. = 51-90)
K_S =100 pci/inch, P.I. <20	K_S =85 pci/inch, P.I.> 30

Reinforcement bar sizing and spacing for mat slab foundations should be provided by the structural engineer. Mat slabs may be uniform thickness foundations (UTF) or may incorporate the use of edge footings for moisture cut-off barriers as recommended herein for post-tension foundations. Edge footings should be a minimum of 6 inches thick. The bottom of the edge footing should be designed to resist tension, using reinforcement per the structural engineer. The need and arrangement of interior grade beams (stiffening beams) will be in accordance with the structural consultant's recommendations. The recommendations for a mat type of foundation assume that the soils below the slab are compacted fill overlying dense, unweathered bedrock materials. The parameters herein are to mitigate the effects of expansive soils and should be modified to mitigate the effects of the total and differential settlements reported earlier in this report. GSI recommends that the slab subgrade materials be moisture conditioned per recommendations presented in the previous section on general foundation construction.

In order to mitigate the effects from post-development perched water and to impede water vapor transmission, structural mats, shall be in accordance with Table 19.3.2.1 of the ACI (2014) per the 2019 CBC. Recommendations for slab underlayment and soil moisture transmission considerations are presented in a later section of this report.

Nuisance cracking may be lessened by the addition of engineered reinforcing fibers in the concrete and careful control of water/cement ratios. For below grade structures (garages, etc.) epoxy-coated reinforcing bars should be considered and are dependent on the structural consultant's waterproofing and corrosion specialists' recommendations.

Post Tension Slab Foundation Design/Construction

Post-tension (PT) foundations should be used to mitigate the damaging effects of expansive soils on the planned residential foundations and slab-on-grade floors if expansive soil conditions are encountered within 7 feet of finish grade. They may also be used for increased performance of foundations constructed on non-detrimentally expansive soils.

The PT foundation designer may elect to exceed these minimal recommendations to increase slab stiffness performance. PT design may be either ribbed or mat-type. The latter is also referred to as uniform thickness foundation (UTF). The use of a UTF is an alternative to the traditional ribbed-type. The UTF offers a reduction in grade beams (i.e., that method typically uses a single perimeter grade beam and possible "shovel" footings), but has a thicker slab than the ribbed-type.

The information and recommendations presented in this section are not meant to supercede design by a registered structural engineer or civil engineer qualified to perform post-tensioned design. PT foundations should be designed using sound engineering practice and be in accordance with local and 2019 CBC requirements. Upon request, GSI can provide additional data/consultation regarding soil parameters as related to post-tensioned foundation design.

From a soil expansion/shrinkage standpoint, a common contributing factor to distress of structures using post-tensioned slabs is a "dishing" or "arching" of the slabs. This is caused by the fluctuation of moisture content in the soils below the perimeter of the slab primarily due to onsite and offsite irrigation practices, climatic and seasonal changes, and the presence of expansive soils. When the soil environment surrounding the exterior of the slab has a higher moisture content than the area beneath the slab, moisture tends to migrate inward, underneath the slab edges to a distance beyond the slab edges referred to as the moisture variation distance. When this migration of water occurs, the volume of the soils beneath the slab edges expand and cause the slab edges to lift in response. This is referred to as an edge-lift condition. Conversely, when the outside soil environment is drier, the moisture transfer regime is reversed and the soils underneath the slab edges lose their moisture and shrink. This process leads to dropping of the slab at the edges, which leads to what is commonly referred to as the center lift condition. A well-designed, PT slab having sufficient stiffness and rigidity provides a resistance to excessive bending that results from non-uniform swelling and shrinking slab subgrade soils, particularly within the moisture variation distance, near the slab edges. Other mitigation techniques typically used in conjunction with post-tensioned slabs consist of a combination of specific soil pre-saturation and the construction of a perimeter "cut-off" wall grade beam. Soil pre-saturation consists of moisture conditioning the slab subgrade soils prior to the PT slab construction. This effectively reduces soil moisture migration from the area located outside the building toward the soils underlying the post-tension slab. Perimeter cut-off walls are thickened edges of the concrete slab that impedes both outward and inward soil moisture migration.

Slab Subgrade Pre-Soaking

Pre-moistening of the slab subgrade soil is recommended for these soil conditions. The moisture content of the subgrade soils should be equal to or greater than optimum moisture to a depth equivalent to the exterior footing depth in the slab areas (typically 12, 18, and 24 inches for very low to low, medium, and highly expansive soils, respectively). Pre-moistening and/or pre-soaking should be evaluated by the soils engineer 72 hours prior to vapor retarder placement. In summary:

EXPANSION INDEX	PAD SOIL MOISTURE	CONSTRUCTION METHOD	SOIL MOISTURE RETENTION
Very Low (0-20) (not anticipated)	Upper 12 inches of pad at or above soil optimum moisture	Wetting and/or reprocessing	Periodically wet or cover with plastic after trenching. Evaluation 72 hours prior to placement of concrete.
Low (21-50)	Upper 12 inches of pad soil moisture 2 percent over optimum	Wetting and/or reprocessing	Periodically wet or cover with plastic after trenching. Evaluation 72 hours prior to placement of concrete.
Medium (51-90)	Upper 18 inches of pad soil moisture 2 percent over optimum or 1.2 times optimum, whichever is greater.	Berm and flood <u>or</u> wetting and reprocessing	Periodically wet or cover with plastic after trenching. Evaluation 72 hours prior to placement of concrete.

Perimeter Cut-Off Walls

Perimeter cut-off walls should be 12, 18, and 24 inches deep for very low to low, medium, and high to very highly expansive soil conditions, respectively. The cut-off walls may be integrated into the slab design or independent of the slab. The cut-off walls should be a minimum of 6 inches thick. The bottom of the perimeter cut-off wall should be designed to resist tension, using cable or reinforcement per the structural engineer.

Post-Tensioned Foundation Design

The following recommendations for design of post-tensioned slabs have been prepared in general compliance with the requirements of the PTI (2014, 2013, and 2012).

Soil Support Parameters

The recommendations for soil support parameters have been provided based on the typical soil index properties for soils that are very low to high in expansion potential. The soil index properties are typically the upper bound values based on our experience and practice in the southern California area. The following table presents suggested minimum coefficients to be used in the Post-Tensioning Institute design method.

Thornthwaite Moisture Index	-20 inches/year
Correction Factor for Irrigation	20 inches/year
Depth to Constant Soil Suction	7 feet
Constant soil Suction (pf)	3.6
Moisture Velocity	0.7 inches/month
Plasticity Index (P.I.)	<15-50

The following table presents foundation design parameters for post-tensioned slab foundations relative to a specific range of soil expansion potential in accordance with the 2019 CBC and the PTI Method (PTI; 2014, 2013, 2012).

TABLE 1 - POST-TENSION FOUNDATION DESIGN		
DESIGN PARAMETER[(4)]	EXPANSION POTENTIAL	
	CATEGORY I VERY LOW TO LOW[(5)],(E.I. 0-50)	CATEGORY II MEDIUM[(5)] (E.I. 51-90)
e_m center lift	9.0 feet	8.7 feet
e_m edge lift	5.0 feet	4.5 feet
y_m center lift	0.4 inches	0.50 inches
y_m edge lift	0.7 inch	1.3 inch
Bearing Value [(1)]	1,500 psf [(1)]	1,000 psf [(2)]
Lateral Pressure	250 psf	250 psf

TABLE 1 - POST-TENSION FOUNDATION DESIGN		
DESIGN PARAMETER[4]	EXPANSION POTENTIAL	
	CATEGORY I VERY LOW TO LOW[5],(E.I. 0-50)	CATEGORY II MEDIUM[5] (E.I. 51-90)
Subgrade Modulus (k)	100 pci/inch	85 pci/inch
Minimum Perimeter Footing Embedment [3]	12 inches	18 inches

[1] Internal bearing values within the perimeter of the post-tension slab for very low to low expansive soil conditions may be increased to 2,000 psf for a minimum embedment of 12 inches, then by 20 percent for each additional foot of embedment to a maximum of 2,500 psf.
[2] For medium expansive soil conditions, internal bearing values within the perimeter of the post-tension slab may be increased to 2,000 psf for a minimum embedment of 12 inches, then by 20 percent for each additional foot of embedment to a maximum of 2,500 psf.
[3] As measured below the lowest adjacent compacted subgrade surface (not including slab underlayment layer thickness).
[4] Post-tension slab design should also be evaluated with respect to the potential differential settlements provided in this report.
[5] Category Criteria:
Category I Expansion Index < 50 (very low to low), and/or Max fill less than 25 feet thick, or fill differential less than 10 feet.
Category II Expansion Index 51-90 (Medium), and/or max fill less 25 feet thick, or fill differential less than 20 feet.

Deepened footings/edges around the slab perimeter must be used to minimize non-uniform surface moisture migration (from an outside source) beneath the slab. An edge depth of 12 inches should be considered a minimum. The bottom of the deepened footing/edge should be designed to resist tension, using cable or reinforcement per the structural engineer.

The parameters are considered minimums and may not be adequate to represent all expansive soils/drainage conditions such as adverse drainage and/or improper landscaping and maintenance. The above parameters are applicable provided the structure has positive drainage that is maintained away from the structure. In addition, no trees with significant root systems are to be planted within 15 feet of the perimeter of foundations. Therefore, it is important that information regarding drainage, site maintenance, trees, settlements, and effects of expansive soils be passed on to future all interested/affected parties. The values tabulated above may not be appropriate to account for possible differential settlement of the slab due to other factors, such as excessive settlements. If a stiffer slab is desired, alternative Post-Tensioning Institute ([PTI] third edition) parameters may be recommended.

Confirmation Testing for Final Foundation Design

Following the completion of site grading, the expansion index, plasticity index, subgrade modulus, and corrosion potential of soils exposed near finish grade should be re-evaluated. The results of the recommended testing would supercede these preliminary recommendations.

SOIL MOISTURE TRANSMISSION CONSIDERATIONS

GSI has evaluated the potential for vapor or water transmission through the concrete floor slab, in light of typical floor coverings and improvements. Please note that slab moisture emission rates range from about 2 to 27 lbs/24 hours/1,000 square feet from a typical slab (Kanare, 2005), while floor covering manufacturers generally recommend about 3 lbs/24 hours as an upper limit. The recommendations in this section are not intended to preclude the transmission of water or vapor through the foundation or slabs. Foundation systems and slabs shall not allow water or water vapor to enter into the structure so as to cause damage to another building component or to limit the installation of the type of flooring materials typically used for the particular application (State of California, 2021). These recommendations may be exceeded or supplemented by a water "proofing" specialist, project architect, or structural consultant. Thus, the client will need to evaluate the following in light of a cost vs. benefit analysis (owner expectations and repairs/replacement), along with disclosure to all interested/affected parties. It should also be noted that vapor transmission will occur in new slab-on-grade floors as a result of chemical reactions taking place within the curing concrete. Vapor transmission through concrete floor slabs as a result of concrete curing has the potential to adversely affect sensitive floor coverings depending on the thickness of the concrete floor slab and the duration of time between the placement of concrete, and the floor covering. It is possible that a slab moisture sealant may be needed prior to the placement of sensitive floor coverings if a thick slab-on-grade floor is used and the time frame between concrete and floor covering placement is relatively short.

Considering the E.I. test results presented herein, and known soil conditions in the region, the anticipated typical water vapor transmission rates, floor coverings, and improvements (to be chosen by the Client and/or project architect) that can tolerate vapor transmission rates without significant distress, the following alternatives are provided:

- Concrete slabs should be increased in thickness.
- Concrete slab underlayment should consist of a 15-mil vapor retarder, or equivalent, with all laps sealed per the 2019 CBC and the manufacturer's recommendation. The vapor retarder should comply with the ASTM E 1745 - Class A criteria, and be installed in accordance with ACI 302.1R-04 and ASTM E 1643.
- The 15-mil vapor retarder (ASTM E 1745 - Class A) shall be installed per the recommendations of the manufacturer, including <u>all</u> penetrations (i.e., pipe, ducting, rebar, etc.).
- Concrete slabs, including the garage areas, shall be underlain by 2 inches of clean, washed sand (SE $\geq$ 30) above a 15-mil vapor retarder (ASTM E-1745 - Class A, per Engineering Bulletin 119 [Kanare, 2005]) installed per the recommendations of the manufacturer, including all penetrations (i.e., pipe, ducting, rebar, etc.). The

manufacturer shall provide instructions for lap sealing, including minimum width of lap, method of sealing, and either supply or specify suitable products for lap sealing (ASTM E 1745), and per Code.

ACI 302.1R-04 (2004) states "If a cushion or sand layer is desired between the vapor retarder and the slab, care must be taken to protect the sand layer from taking on additional water from a source such as rain, curing, cutting, or cleaning. Wet cushion or sand layer has been directly linked in the past to significant lengthening of time required for a slab to reach an acceptable level of dryness for floor covering applications." Therefore, additional observation and/or testing will be necessary for the cushion or sand layer for moisture content, and relatively uniform thicknesses, prior to the placement of concrete.

- The vapor retarder shall be underlain by 2 inches of sand (SE $\geq$ 30) placed directly on the prepared, moisture conditioned, subgrade and should be sealed to provide a continuous retarder under the entire slab, as discussed above. As discussed previously, GSI indicated this layer of import sand may be eliminated below the vapor retarder, <u>if</u> laboratory testing indicates that the slab subgrade soil have a sand equivalent (SE) of 30 or greater.

- Concrete should have a maximum water/cement ratio of 0.50. This does not supercede Table 19.3.2.1 of ACI (2014) for corrosion or other corrosive requirements. Additional concrete mix design recommendations should be provided by the structural consultant and/or waterproofing specialist. Concrete finishing and workablity should be addressed by the structural consultant and a waterproofing specialist.

- Where slab water/cement ratios are as indicated herein, and/or admixtures used, the structural consultant should also make changes to the concrete in the grade beams and footings in kind, so that the concrete used in the foundation and slabs are designed and/or treated for more uniform moisture protection.

- The owner(s) should be specifically advised which areas are suitable for tile flooring, vinyl flooring, or other types of water/vapor-sensitive flooring and which are not suitable. In all planned floor areas, flooring shall be installed per the manufactures recommendations.

- Additional recommendations regarding water or vapor transmission should be provided by the architect/structural engineer/slab or foundation designer and should be consistent with the specified floor coverings indicated by the architect.

Regardless of the mitigation, some limited moisture/moisture vapor transmission through the slab should be anticipated. Construction crews may require special training for installation of certain product(s), as well as concrete finishing techniques. The use of specialized product(s) should be approved by the slab designer and water-proofing consultant. A technical representative of the flooring contractor should review the slab and moisture retarder plans and provide comment prior to the construction of the foundations or improvements. The vapor retarder contractor should have representatives onsite during the initial installation.

WALL DESIGN PARAMETERS

Conventional Retaining Walls

The design parameters provided below assume that either non expansive soils (typically Class 2 permeable filter material or Class 3 aggregate base) or native onsite materials (up to and including an E.I. of 35) are used to backfill any retaining walls. The type of backfill (i.e., select or native), should be specified by the wall designer, and clearly shown on the plans. Building walls, below grade, should be water-proofed. To reduce the potential for site retaining walls to suffer efflorescence staining, they may also be water-proofed. The foundation system for the proposed retaining walls should be designed in accordance with the recommendations presented in this and preceding sections of this report, as appropriate. Recommendations for specialty walls (i.e., crib, earthstone, geogrid, etc.) can be provided upon request, and would be based on site specific conditions.

Preliminary Retaining Wall Foundation Design

Preliminary foundation design for retaining walls should incorporate the following recommendations:

Minimum Footing Embedment - 18 inches below the lowest adjacent grade (excluding landscape layer [upper 6 inches]).

Minimum Footing Width - 24 inches.

Allowable Bearing Pressure - An allowable bearing pressure of 2,500 pcf may be used in the preliminary design of retaining wall foundations provided that the footing maintains a minimum width of 24 inches and extends at least 18 inches into approved engineered fill overlying dense formational materials (excluding the top 6 inches [landscape zone]). This pressure may be increased by one-third for short-term wind and/or seismic loads.

Passive Earth Pressure - A passive earth pressure of 250 pcf with a maximum earth pressure of 2,500 psf may be used in the preliminary design of retaining wall foundations provided the foundation is embedded into properly compacted silty to clayey sand fill.

Lateral Sliding Resistance - A coefficient of 0.25 pcf may be utilized for a concrete to soil contact when multiplied by the dead load. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third.

Backfill Soil Density - Soil densities ranging between 120 pcf and 125 pcf may be used in the design of retaining wall foundations. This assumes an average engineered fill compaction of at least 90 percent of the laboratory standard (ASTM D 1557).

Any retaining wall footings near the perimeter of the site will likely need to be deepened into relatively unweathered granitic bedrock for adequate vertical and lateral bearing support. All retaining wall footing setbacks from slopes should comply with Figure 1808.7.1 of the 2019 CBC. GSI recommends a minimum horizontal setback distance of 7 feet as measured from the bottom, outboard edge of the footing to the slope face.

Restrained Walls

Any retaining walls that will be restrained prior to placing and compacting backfill material or that have re-entrant or male corners, should be designed for an at-rest equivalent fluid pressure (EFP) of 55 pcf and 65 pcf for select and very low expansive native backfill, respectively. The design should include any applicable surcharge loading. For areas of male or re-entrant corners, the restrained wall design should extend a minimum distance of twice the height of the wall (2H) laterally from the corner.

Cantilevered Walls

The recommendations presented below are for cantilevered retaining walls up to 10 feet high. Design parameters for walls less than 3 feet in height may be superceded by County of San Diego regional standard design. Active earth pressure may be used for retaining wall design, provided the top of the wall is not restrained from minor deflections. An equivalent fluid pressure approach may be used to compute the horizontal pressure against the wall. Appropriate fluid unit weights are given below for specific slope gradients of the retained material. These <u>do not</u> include other superimposed loading conditions due to traffic, structures, seismic events or adverse geologic conditions. When wall configurations are finalized, the appropriate loading conditions for superimposed loads can be provided upon request.

For preliminary planning purposes, the structural consultant/wall designer should incorporate the surcharge of traffic on the back of retaining walls where vehicular traffic could occur within horizontal distance "H" from the back of the retaining wall (where "H" equals the wall height). The traffic surcharge may be taken as 100 psf/ft in the upper 5 feet of backfill for light truck and cars traffic. This does not include the surcharge of parked vehicles which should be evaluated at a higher surcharge to account for the effects of seismic loading. Equivalent fluid pressures for the design of cantilevered retaining walls are provided in the following table:

SURFACE SLOPE OF RETAINED MATERIAL (HORIZONTAL:VERTICAL)	EQUIVALENT FLUID WEIGHT P.C.F. (SELECT BACKFILL)[2]	EQUIVALENT FLUID WEIGHT P.C.F. (SELECT NATIVE BACKFILL)[3]
Level[1]	38	50
2 to 1	55	65

[1] Level backfill behind a retaining wall is defined as compacted earth materials, properly drained, without a slope for a distance of 2H behind the wall, where H is the height of the wall.
[2] SE $\geq$ 30, P.I. < 15, E.I. < 21, and $\leq$ 10% passing No. 200 sieve.
[3] E.I. = 0 to 50, SE $\geq$ 25, P.I. < 15, E.I. < 21, and $\leq$ 20% passing No. 200 sieve (may not be sufficiently present onsite).

Seismic Surcharge

For engineered retaining walls, GSI recommends that the walls be evaluated for a seismic surcharge (in general accordance with 2019 CBC requirements), should walls be within 6 feet of ingress/egress areas. The site walls in this category should maintain an overturning factor-of-safety (FOS) of approximately 1.25 when the seismic surcharge (increment), is applied. For restrained walls, the seismic surcharge should be applied as a uniform surcharge load from the bottom of the footing (excluding shear keys) to the top of the backfill at the heel of the wall footing. This seismic surcharge pressure (seismic increment) may be taken as 15H where "H" for retained walls is the dimension previously noted as the height of the backfill to the bottom of the footing. The resultant force should be applied at a distance 0.6 H up from the bottom of the footing. For the evaluation of the seismic surcharge, the bearing pressure may exceed the static value by one-third, considering the transient nature of this surcharge. For cantilevered walls the pressure should be an inverted triangular distribution using 15H. Please note this is for local wall stability only.

The 15H is derived from a Mononobe-Okabe solution for both restrained cantilever walls. This accounts for the increased lateral pressure due to shakedown or movement of the sand fill soil in the zone of influence from the wall or roughly a 45° - $\phi/2$ plane away from the back of the wall. The 15H seismic surcharge is derived from the formula:

$$P_h = \tfrac{3}{8} \bullet a_h \bullet \gamma_t H$$

Where: P_h = Seismic increment
a_h = Probabilistic horizontal site acceleration with a percentage of "g"

γ_t = total unit weight (115 to 125 pcf for site soils @ 90% relative compaction).

H = Height of the wall from the bottom of the footing or point of pile fixity.

Retaining Wall Backfill and Drainage

Positive drainage must be provided behind all retaining walls in the form of gravel wrapped in geofabric and outlets. A backdrain system is considered necessary for retaining walls that are 2 feet or greater in height. Details 1, 2, and 3, present the back drainage options discussed below. Backdrains should consist of a 4-inch diameter perforated PVC or ABS pipe encased in either Class 2 permeable filter material or ¾-inch to 1½-inch gravel wrapped in approved filter fabric (Mirafi 140 or equivalent). For low expansive backfill, the filter material should extend a minimum of 1 horizontal foot behind the base of the walls and upward at least 1 foot. For native backfill that has up to medium expansion potential, continuous Class 2 permeable drain materials should be used behind the wall. This material should be continuous (i.e., full height) behind the wall, and it should be constructed in accordance with the enclosed Detail 1 (Typical Retaining Wall Backfill and Drainage Detail). For limited access and confined areas, (panel) drainage behind the wall may be constructed in accordance with Detail 2 (Retaining Wall Backfill and Subdrain Detail Geotextile Drain). Materials with an E.I. potential of greater than 50 should not be used as backfill for retaining walls. For more onerous expansive situations, backfill and drainage behind the retaining wall should conform with Detail 3 (Retaining Wall And Subdrain Detail Clean Sand Backfill).

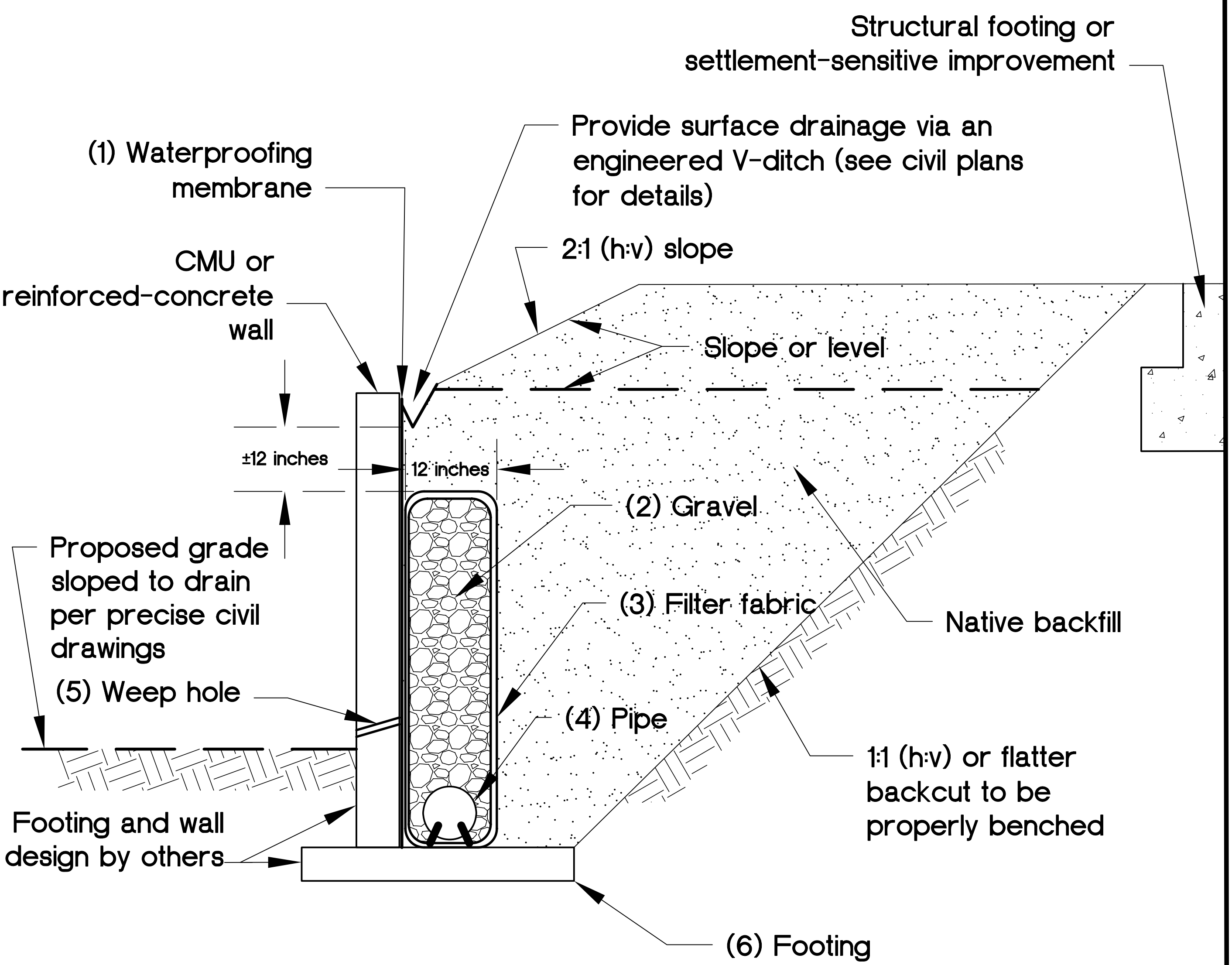
Drain outlets should consist of a 4-inch diameter solid PVC or ABS pipe spaced no greater than ±100 feet apart, with a minimum of two outlets, one on each end. The use of weep holes, only, in walls higher than 2 feet, is not recommended. The surface of the backfill should be sealed by pavement or the top 18 inches compacted with native soil (E.I. $\leq$50). Proper surface drainage should also be provided. For additional mitigation, consideration should be given to applying a water-proof membrane to the back of all retaining structures. The use of a waterstop should be considered for all concrete and masonry joints.

Wall/Retaining Wall Footing Transitions

Site walls are anticipated to be founded on footings designed in accordance with the recommendations in this report. Should wall footings transition from cut to fill, the civil designer may specify either:

a) A minimum of a 2-foot overexcavation and recompaction of cut materials for a distance of 2H, from the point of transition.

b) Increase of the amount of reinforcing steel and wall detailing (i.e., expansion joints or crack control joints) such that a angular distortion of 1/360 for a distance of 2H



(1) Waterproofing membrane.

(2) Gravel: Clean, crushed, $\frac{3}{4}$ to $1\frac{1}{2}$ inch.

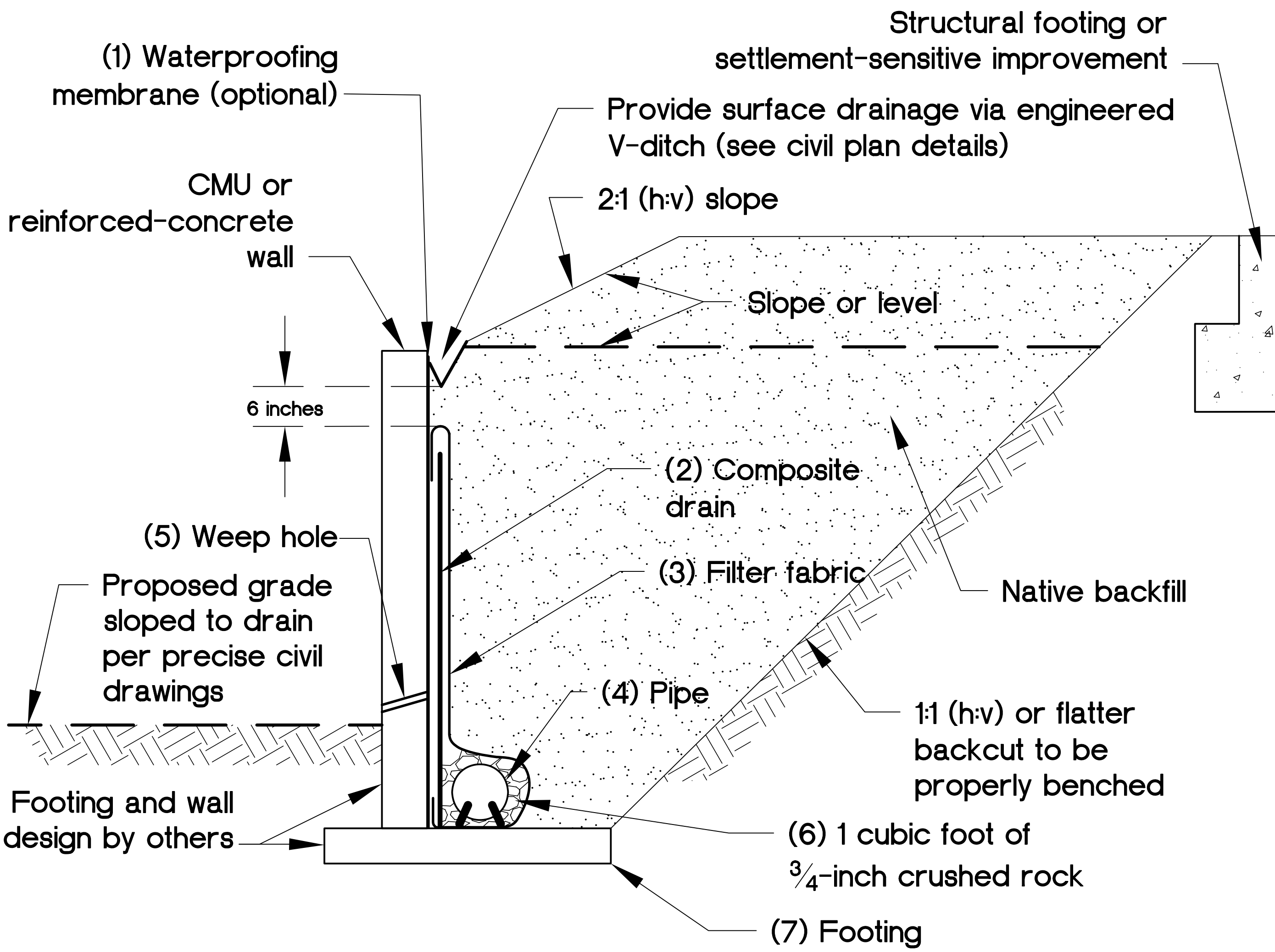
(3) Filter fabric: Mirafi 140N or approved equivalent.

(4) Pipe: 4-inch-diameter perforated PVC, Schedule 40, or approved alternative with minimum of 1 percent gradient sloped to suitable, approved outlet point (perforations down).

(5) Weep hole: Minimum 2-inch diameter placed at 20-foot centers along the wall and placed 3 inches above finished surface. Design civil engineer to provide drainage at toe of wall. No weep holes for below-grade walls.

(6) Footing: If bench is created behind the footing greater than the footing width, use level fill or cut natural earth materials. An additional "heel" drain will likely be required by geotechnical consultant.

GeoSoils, Inc.	RETAINING WALL DETAIL — ALTERNATIVE A	Detail 1



(1) Waterproofing membrane (optional): Liquid boot or approved mastic equivalent.

(2) Drain: Miradrain 6000 or J-drain 200 or equivalent for non-waterproofed walls; Miradrain 6200 or J-drain 200 or equivalent for waterproofed walls (all perforations down).

(3) Filter fabric: Mirafi 140N or approved equivalent; place fabric flap behind core.

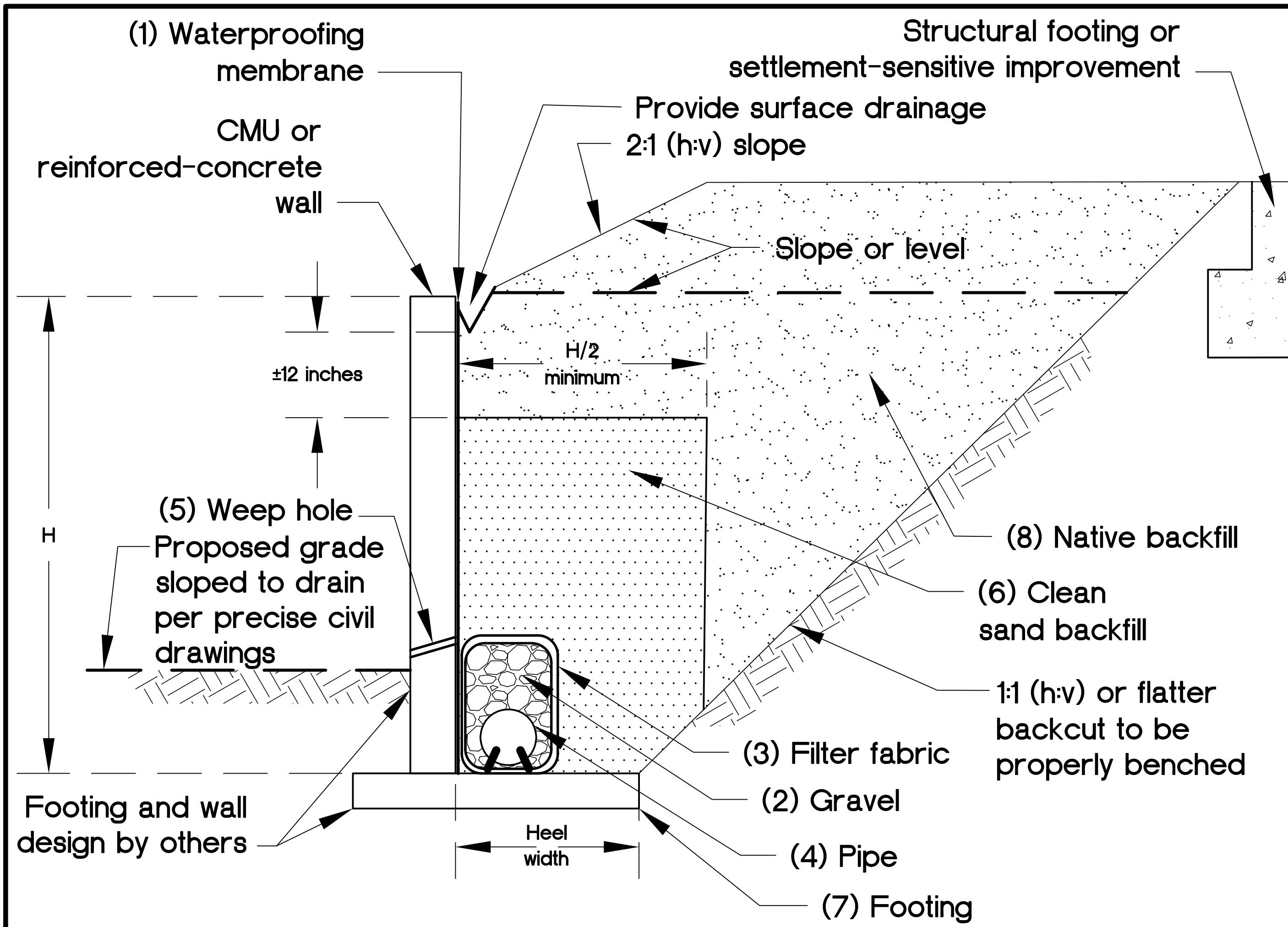
(4) Pipe: 4-inch-diameter perforated PVC, Schedule 40, or approved alternative with minimum of 1 percent gradient to proper outlet point (perforations down).

(5) Weep hole: Minimum 2-inch diameter placed at 20-foot centers along the wall and placed 3 inches above finished surface. Design civil engineer to provide drainage at toe of wall. No weep holes for below-grade walls.

(6) Gravel: Clean, crushed, 3/4 to 1½ inch.

(7) Footing: If bench is created behind the footing greater than the footing width, use level fill or cut natural earth materials. An additional "heel" drain will likely be required by geotechnical consultant.

GeoSoils, Inc.	RETAINING WALL DETAIL — ALTERNATIVE B	Detail 2



(1) Waterproofing membrane: Liquid boot or approved masticequivalent.

(2) Gravel: Clean, crushed, $^3/_4$ to $1^1/_2$ inch.

(3) Filter fabric: Mirafi 140N or approved equivalent.

(4) Pipe: 4-inch-diameter perforated PVC, Schedule 40, or approved alternative with minimum of 1 percent gradient to proper outlet point (perforations down).

(5) Weep hole: Minimum 2-inch diameter placed at 20-foot centers along the wall and placed 3 inches above finished surface. Design civil engineer to provide drainage at toe of wall. No weep holes for below-grade walls.

(6) Clean sand backfill: Must have sand equivalent value (S.E.) of 35 or greater; can be densified by water jetting upon approval by geotechnical engineer.

(7) Footing: If bench is created behind the footing greater than the footing width, use level fill or cut natural earth materials. An additional "heel" drain will likely be required by geotechnical consultant.

(8) Native backfill: If E.I. $<$21 and S.E. $\geq$35 then all sand requirements also may not be required and will be reviewed by the geotechnical consultant.

GeoSoils, Inc.	RETAINING WALL DETAIL — ALTERNATIVE C	Detail 3

on either side of the transition may be accommodated. Expansion joints should be placed no greater than 20 feet on-center, in accordance with the structural engineer's/wall designer's recommendations, regardless of whether or not transition conditions exist. Expansion joints should be sealed with a flexible, non-shrink grout.

c) Embed the footings entirely into native formational material (i.e., deepened footings).

If transitions from cut to fill transect the wall footing alignment at an angle of less than 45 degrees (plan view), then the designer should follow recommendation "a" (above) and until such transition is between 45 and 90 degrees to the wall alignment.

DRIVEWAY, FLATWORK, AND OTHER IMPROVEMENTS

Some of the soil materials on site may be expansive. The effects of expansive soils are cumulative, and typically occur over the lifetime of any improvements. On relatively level areas, when the soils are allowed to dry, the dessication and swelling process tends to cause heaving and distress to flatwork and other improvements. The resulting potential for distress to improvements may be reduced, but not totally eliminated. To that end, it is recommended that the Client should notify all interested/affected parties of this long-term potential for distress. To reduce the likelihood of distress, the following recommendations are presented for all exterior flatwork:

1. The subgrade area for concrete slabs should be compacted to achieve a minimum 90 percent relative compaction, and then be presoaked to 1 to 2 percentage points above (or 110 percent of) the soils' optimum moisture content, to a depth of 18 inches below subgrade elevation. If very low expansive soils are present, only optimum moisture content, or greater, is required and specific presoaking is not warranted. The moisture content of the subgrade should be proof tested within 72 hours prior to concrete placement.

2. Exterior concrete slabs should be cast over a non-yielding surface, consisting of a 4-inch layer of Class 3 base, crushed rock, gravel, or clean sand (or City of Vista minimum, whichever is greater), that should be compacted and level prior to placement of concrete. If very low expansive soils are present, the base, rock, gravel, or sand may be deleted. The layer or subgrade should be wet-down completely prior to placement of concrete, to minimize loss of concrete moisture to the surrounding earth materials.

3. Exterior slabs should be a minimum of 4 inches thick. Driveway slabs and approaches should additionally have a thickened edge (12 inches) adjacent to all landscape areas, to help impede infiltration of landscape water under the slab.

4. The use of transverse and longitudinal control joints are recommended to help control slab cracking due to concrete shrinkage or expansion. Two ways to mitigate such cracking are: a) add a sufficient amount of reinforcing steel, increasing tensile strength of the slab; and, b) provide an adequate amount of control and/or expansion joints to accommodate anticipated concrete shrinkage and expansion.

   In order to reduce the potential for unsightly cracks, slabs should be reinforced at mid-height with a minimum of No. 3 bars placed at 18 inches on center, in each direction. The exterior slabs should be scored or saw cut, ½ to ⅜ inches deep, often enough so that no section is greater than 10 feet by 10 feet. For sidewalks or narrow slabs, control joints should be provided at intervals of every 6 feet. The slabs should be separated from the foundations and sidewalks with expansion joint filler material.

5. No traffic should be allowed upon the newly poured concrete slabs until they have been properly cured to within 75 percent of design strength. Concrete compression strength should be a minimum of 2,500 psi.

6. Driveways, sidewalks, and patio slabs adjacent to the house should be separated from the house with thick expansion joint filler material. In areas directly adjacent to a continuous source of moisture (i.e., irrigation, planters, etc.), all joints should be additionally sealed with flexible mastic.

7. Planters and walls should not be tied to the house.

8. Overhang structures should be supported on the slabs, or structurally designed with continuous footings tied in at least two directions.

9. Any masonry landscape walls that are to be constructed throughout the property should be grouted and articulated in segments no more than 20 feet long. These segments should be keyed or doweled together.

10. Utilities should be enclosed within a closed utilidor (vault) or designed with flexible connections to accommodate differential settlement and expansive soil conditions.

11. Positive site drainage should be maintained at all times. Finish grade on the lots should provide a minimum of 1 to 2 percent fall to the street, as indicated herein. It should be kept in mind that drainage reversals could occur, including post-construction settlement, if relatively flat yard drainage gradients are not periodically maintained by the homeowner or homeowners association.

12. Air conditioning (A/C) units should be supported by slabs that are incorporated into the building foundation or constructed on a rigid slab with flexible couplings for

plumbing and electrical lines. A/C waste water lines should be drained to a suitable non-erosive outlet.

13. Shrinkage cracks could become excessive if proper finishing and curing practices are not followed. Finishing and curing practices should be performed per the Portland Cement Association Guidelines. Mix design should incorporate rate of curing for climate and time of year, sulfate content of soils, corrosion potential of soils, and fertilizers used on site.

PRELIMINARY ASPHALTIC CONCRETE PAVEMENT DESIGN RECOMMENDATIONS

General

The City of Vista may retain the authority to approve the final structural design sections after subgrade elevations and actual resistance values (R-values) have been obtained at the conclusion of earthwork. Based on an assumed R-value of 20, a review of City of Vista street design criteria (City of Vista, 2015), and for estimation and bidding purposes, the asphaltic concrete pavement section for the planned driveway, provided herein, should be considered for preliminary design. Typically, actual pavement sections will likely vary, therefore final pavement sections should be based on actual R-value testing performed following the backfill of underground utilities in the street right-of-way.

The preliminary pavement sections presented in the following table are based on the general Traffic Indices (T.I.), utilized by the City of Vista for residential local and cul-de-sac streets, and the guidelines presented in the latest revision to the California Department of Transportation "Highway Design Manual" seventh edition. Based on an assumed R-value of 20 and a T.I. value of 6.0 for cul-de-sac and local streets, the following preliminary asphaltic concrete pavement designs are presented. Based on the fine-grained nature of some of the onsite soils, an R-value of 20 was used in the analysis for reasonable conservatism.

STREET CLASSIFICATION	TRAFFIC INDEX (T.I.)(1)	STANDARD PAVEMENT DESIGNS		
		R-VALUE	AC* INCHES	CLASS 2 AGGREGATE BASE (2) INCHES
Cul-de-sac/Local	6.0	20	4.0	8.0

1 City of Vista (2015)
2 Assumed R-values for Class 2 aggregate base R=78 - Cal-Trans standard Class 2 Aggregate Base.

The preliminary pavement section provided above is intended as a minimum guideline. If thinner or highly variable pavement sections are constructed, increased maintenance and repair could be expected. If the ADT (average daily traffic) or ADTT (average daily truck traffic) increases beyond that intended, as reflected by the T.I. used for design, increased maintenance and repair could be required for the pavement section. Consideration should be given to the increased potential for distress from overuse of paved street areas by heavy equipment and/or construction related heavy traffic (e.g., concrete trucks, loaded supply trucks, etc.), particularly when the final section is not in place (i.e., topcoat). Best management construction practices should be followed at all times, especially during inclement weather.

PAVEMENT GRADING RECOMMENDATIONS

General

All section changes should be properly transitioned. If adverse conditions are encountered during the preparation of subgrade materials, special construction methods may need to be employed. A GSI representative should be present for the preparation of subgrade, aggregate base, and asphaltic concrete.

Subgrade

Within street and parking areas, all surficial deposits of loose soil material should be removed and recompacted as recommended. After the loose soils are removed, the bottom is to be scarified to a depth of at least 6 inches, moisture conditioned as necessary and compacted to 95 percent of the maximum laboratory density, as determined by ASTM D 1557.

Deleterious material, excessively wet or dry pockets, concentrated zones of oversized rock fragments, and any other unsuitable materials encountered during grading should be removed. The compacted fill material should then be brought to the elevation of the proposed subgrade for the pavement. The subgrade should be proof-rolled in order to promote a uniform firm and unyielding surface. All grading and fill placement should be observed by the project geotechnical consultant.

Aggregate Base

Compaction tests are required for the recommended aggregate base section. Minimum relative compaction required will be 95 percent of the laboratory maximum density as determined by ASTM D 1557. Base aggregate should be in accordance to the "Greenbook" crushed aggregate base rock (minimum R-value=78).

Paving

Prime coat may be omitted if all of the following conditions are met:

1. The asphalt pavement layer is placed within two weeks of completion of aggregate base and/or subbase course.

2. Traffic is not routed over completed base before paving

3. Construction is completed during the dry season of May through October.

4. The aggregate base is kept free of debris prior to placement of asphaltic concrete.

If construction is performed during the wet season of November through April, prime coat may be omitted if no rain occurs between completion of the aggregate base course and paving and the time between completion of aggregate base and paving is reduced to three days, provided the aggregate base is free of loose soil or debris. Where prime coat has been omitted and rain occurs, traffic is routed over the aggregate base course, or paving is delayed, measures shall be taken to restore the aggregate base course, and subgrade to conditions that will meet specifications as directed by the geotechnical consultant.

Drainage

Positive drainage should be provided for all surface water to drain towards the area swale, curb and gutter, or to an approved drainage channel. Positive site drainage should be maintained at all times. Water should not be allowed to pond or seep into the ground, such as from behind unprotected curbs, both during and after grading. If planters or landscaping are adjacent to paved areas, measures should be taken to minimize the potential for water to enter the pavement section, such as thickened edges, enclosed planters, etc. Also, best management construction practices should be strictly adhered to at all times to minimize the potential for distress during construction and roadway improvements.

PCC Cross Gutters

PCC cross gutters should be designed in accordance with San Diego Regional Standard Drawing (SDRSD) G-12.

Additional Considerations

To mitigate perched groundwater, consideration should be given to installation of subgrade separators (cut-offs) between pavement subgrade and landscape areas, although this is not a requirement from a geotechnical standpoint. Cut-offs, if used, should be 6 inches wide and at least 12 inches below the pavement subgrade contact or 12 inches below the crushed aggregate base rock, if utilized.

DEVELOPMENT CRITERIA

Slope Maintenance and Planting

Water has been shown to weaken the inherent strength of all earth materials. Slope stability is significantly reduced by overly wet conditions. Positive surface drainage away from slopes should be maintained and only the amount of irrigation necessary to sustain plant life should be provided for planted slopes. Over-watering should be avoided as it adversely affects site improvements, and causes perched groundwater conditions. Graded slopes constructed utilizing onsite materials would be erosive. Eroded debris may be minimized and surficial slope stability enhanced by establishing and maintaining a suitable vegetation cover soon after construction. Compaction to the face of fill slopes would tend to minimize short-term erosion until vegetation is established. Plants selected for landscaping should be light weight, deep rooted types that require little water and are capable of surviving the prevailing climate. Jute-type matting or other fibrous covers may aid in allowing the establishment of a sparse plant cover. Utilizing plants other than those recommended above will increase the potential for perched water, staining, mold, etc., to develop. A rodent control program to prevent burrowing should be implemented. Irrigation of natural (ungraded) slope areas is generally not recommended. These recommendations regarding plant type, irrigation practices, and rodent control should be provided to each homeowner. Over-steepening of slopes should be avoided during building construction activities and landscaping.

Drainage

Adequate surface drainage is a very important factor in reducing the likelihood of adverse performance of foundations, hardscape, and slopes. Surface drainage should be sufficient to mitigate ponding of water anywhere on the property, and especially near structures and tops of slopes. Surface drainage should be carefully taken into consideration during fine grading, landscaping, and building construction. Therefore, care should be taken that future landscaping or construction activities do not create adverse drainage conditions. Positive site drainage within the property should be provided and maintained at all times. Drainage should not flow uncontrolled down any descending slope. Water should be directed away from foundations and tops of slopes, and not allowed to pond and/or seep into the ground. In general, site drainage should conform to Section 1804.3 of the 2019 CBC. Consideration should be given to avoiding construction of planters adjacent to structures (buildings, pools, spas, etc.). Building pad drainage should be directed toward the street or other approved area(s). Although not a geotechnical requirement, roof gutters, down spouts, or other appropriate means may be utilized to control roof drainage. Down spouts, or drainage devices should outlet a minimum of 5 feet from structures or into a subsurface drainage system. Areas of seepage may develop due to irrigation or heavy rainfall, and should be anticipated. Minimizing irrigation will lessen this potential. If areas of seepage develop, recommendations for minimizing this effect could be provided upon request.

Erosion Control

Onsite earth materials have a moderate to high erosion potential. Consideration should be given to providing hay bales and silt fences for the temporary control of surface water, from a geotechnical viewpoint.

Landscape Maintenance

Only the amount of irrigation necessary to sustain plant life should be provided. Over-watering the landscape areas will adversely affect proposed site improvements. We would recommend that any proposed open-bottom planters adjacent to proposed structures be eliminated for a minimum distance of 10 feet. As an alternative, closed-bottom type planters could be utilized. An outlet placed in the bottom of the planter, could be installed to direct drainage away from structures or any exterior concrete flatwork. If planters are constructed adjacent to structures, the sides and bottom of the planter should be provided with a moisture barrier to prevent penetration of irrigation water into the subgrade. Provisions should be made to drain the excess irrigation water from the planters without saturating the subgrade below or adjacent to the planters. Graded slope areas should be planted with drought resistant vegetation. Consideration should be given to the type of vegetation chosen and their potential effect upon surface improvements (i.e., some trees will have an effect on concrete flatwork with their extensive root systems). From a geotechnical standpoint leaching is not recommended for establishing landscaping. If the surface soils are processed for the purpose of adding amendments, they should be recompacted to 90 percent minimum relative compaction.

Gutters and Downspouts

As previously discussed in the drainage section, the installation of gutters and downspouts should be considered to collect roof water that may otherwise infiltrate the soils adjacent to the structures. If utilized, the downspouts should be drained into PVC collector pipes or other non-erosive devices (e.g., paved swales or ditches; below grade, solid tight-lined PVC pipes; etc.), that will carry the water away from the house, to an appropriate outlet, in accordance with the recommendations of the design civil engineer. Downspouts and gutters are not a requirement; however, from a geotechnical viewpoint, provided that positive drainage is incorporated into project design (as discussed previously).

Subsurface and Surface Water

Subsurface and surface water are not anticipated to affect site development, provided that the recommendations contained in this report are incorporated into final design and construction and that prudent surface and subsurface drainage practices are incorporated into the construction plans. Perched groundwater conditions along zones of contrasting permeabilities may not be precluded from occurring in the future due to site irrigation, poor drainage conditions, or damaged utilities, and should be anticipated. Should perched groundwater conditions develop, this office could assess the affected area(s) and provide the appropriate recommendations to mitigate the observed groundwater conditions. Groundwater conditions may change with the introduction of irrigation, rainfall, or other factors.

Site Improvements

If in the future, any additional improvements (e.g., pools, spas, etc.) are planned for the site, recommendations concerning the geological or geotechnical aspects of design and construction of said improvements could be provided upon request. Pools and/or spas should not be constructed without specific design and construction recommendations from GSI, and this construction recommendation should be provided to all interested/affected parties. Rock fills may not be suitable for supporting pools/spa. This office should be notified in advance of any fill placement, grading of the site, or trench backfilling after rough grading has been completed. This includes any grading, utility trench and retaining wall backfills, flatwork, etc.

Tile Flooring

Tile flooring can crack, reflecting cracks in the concrete slab below the tile, although small cracks in a conventional slab may not be significant. Therefore, the designer should consider additional steel reinforcement for concrete slabs-on-grade where tile will be placed. The tile installer should consider installation methods that reduce possible cracking of the tile such as slipsheets. Slipsheets or a vinyl crack isolation membrane (approved by the Tile Council of America/Ceramic Tile Institute) are recommended between tile and concrete slabs on grade.

Additional Grading

This office should be notified in advance of any fill placement, supplemental regrading of the site, or trench backfilling after rough grading has been completed. This includes completion of grading in the street, driveway approaches, driveways, parking areas, and utility trench and retaining wall backfills.

Footing Trench Excavation

All footing excavations should be observed by a representative of this firm subsequent to trenching and prior to concrete form and reinforcement placement. The purpose of the observations is to evaluate that the excavations have been made into the recommended bearing material and to the minimum widths and depths recommended for construction. If loose or compressible materials are exposed within the footing excavation, a deeper footing or removal and recompaction of the subgrade materials would be recommended at that time. Footing trench spoil and any excess soils generated from utility trench excavations should be compacted to a minimum relative compaction of 90 percent, if not removed from the site.

Trenching/Temporary Construction Backcuts

Considering the nature of the onsite earth materials, it should be anticipated that caving or sloughing could be a factor in subsurface excavations and trenching. Shoring or excavating the trench walls/backcuts at the angle of repose (typically 25 to 45 degrees [except as specifically superceded within the text of this report]), should be anticipated. All excavations should be observed by an engineering geologist or soil engineer from GSI, prior to workers entering the excavation or trench, and minimally conform to CAL-OSHA, state, and local safety codes. Should adverse conditions exist, appropriate recommendations would be offered at that time. The above recommendations should be provided to any contractors and/or subcontractors, or homeowners, etc., that may perform such work.

Utility Trench Backfill

1. All interior utility trench backfill should be brought to at least 2 percent above optimum moisture content and then compacted to obtain a minimum relative compaction of 90 percent of the laboratory standard. As an alternative for shallow (12-inch to 18-inch) under-slab trenches, sand having a sand equivalent value of 30 or greater may be utilized and jetted or flooded into place. Observation, probing and testing should be provided to evaluate the desired results.

2. Exterior trenches adjacent to, and within areas extending below a 1:1 plane projected from the outside bottom edge of the footing, and all trenches beneath hardscape features and in slopes, should be compacted to at least 90 percent of the laboratory standard. Sand backfill, unless excavated from the trench, should not be used in these backfill areas. Compaction testing and observations, along with probing, should be accomplished to evaluate the desired results.

3. All trench excavations should conform to CAL-OSHA, state, and local safety codes.

4. Utilities crossing grade beams, perimeter beams, or footings should either pass below the footing or grade beam utilizing a hardened collar or foam spacer, or pass through the footing or grade beam in accordance with the recommendations of the structural engineer.

SUMMARY OF RECOMMENDATIONS REGARDING GEOTECHNICAL OBSERVATION AND TESTING

We recommend that observation and/or testing be performed by GSI at each of the following construction stages:

- During grading/recertification.

- During excavation.

- During placement of subdrains or other subdrainage devices, prior to placing fill and/or backfill.
- After excavation of building footings, retaining wall footings, and free standing walls footings, prior to the placement of reinforcing steel or concrete.

- Prior to pouring any slabs or flatwork, after presoaking/presaturation of building pads and other flatwork subgrade, before the placement of concrete, reinforcing steel, capillary break (i.e., sand, pea-gravel, etc.), or vapor retarders (i.e., visqueen, etc.).

- During retaining wall subdrain installation, prior to backfill placement.

- During placement of backfill for area drain, interior plumbing, underground utility trenches, and retaining wall backfill.

- During slope construction/repair.

- When any unusual soil conditions are encountered during any construction operations, subsequent to the issuance of this report.

- When any homeowner improvements, such as flatwork, spas, pools, walls, etc., are constructed, prior to construction.

- A report of geotechnical observation and testing should be provided at the conclusion of each of the above stages, in order to provide concise and clear documentation of site work, and/or to comply with code requirements.

OTHER DESIGN PROFESSIONALS/CONSULTANTS

The design civil engineer, structural engineer, post-tension designer, architect, landscape architect, wall designer, etc., should review the recommendations provided herein, incorporate those recommendations into all their respective plans, and by explicit reference, make this report part of their project plans. This report presents minimum design criteria for the design of slabs, foundations and other elements possibly applicable to the project. These criteria should not be considered as substitutes for actual designs by the structural engineer/designer. Please note that the recommendations contained herein are not intended to preclude the transmission of water or vapor through the slab or foundation. The structural engineer/foundation and/or slab designer should provide recommendations to not allow water or vapor to enter into the structure so as to cause damage to another building component, or so as to limit the installation of the type of flooring materials typically used for the particular application.

The structural engineer/designer should analyze actual soil-structure interaction and consider, as needed, bearing, expansive soil influence, and strength, stiffness and deflections in the various slab, foundation, and other elements in order to develop appropriate, design-specific details. As conditions dictate, it is possible that other influences will also have to be considered. The structural engineer/designer should consider all applicable codes and authoritative sources where needed. If analyses by the structural engineer/designer result in less critical details than are provided herein as minimums, the minimums presented herein should be adopted. It is considered likely that some, more restrictive details will be required.

If the structural engineer/designer has any questions or requires further assistance, they should not hesitate to call or otherwise transmit their requests to GSI. In order to mitigate potential distress, the foundation and/or improvement's designer should confirm to GSI and the governing agency, in writing, that the proposed foundations and/or improvements can tolerate the amount of differential settlement and/or expansion characteristics and other design criteria specified herein.

PLAN REVIEW

Final project plans (grading, precise grading, foundation, retaining wall, landscaping, etc.), should be reviewed by this office prior to construction, so that construction is in accordance with the conclusions and recommendations of this report. Based on our review, supplemental recommendations and/or further geotechnical studies may be warranted.

LIMITATIONS

The materials encountered on the project site and utilized for our analysis are believed representative of the area; however, soil and bedrock materials vary in character between excavations and natural outcrops or conditions exposed during mass grading. Site conditions may vary due to seasonal changes or other factors.

Inasmuch as our study is based upon our review and engineering analyses and laboratory data, the conclusions and recommendations are professional opinions. These opinions have been derived in accordance with current standards of practice, and no warranty, either express or implied, is given. Standards of practice are subject to change with time. GSI assumes no responsibility or liability for work or testing performed by others, or their inaction; or work performed when GSI is not requested to be onsite, to evaluate if our recommendations have been properly implemented. Use of this report constitutes an agreement and consent by the user to all the limitations outlined above, notwithstanding any other agreements that may be in place. In addition, this report may be subject to review by the controlling authorities. Thus, this report brings to completion our scope of services for this portion of the project. All samples will be disposed of after 30 days, unless specifically requested by the client, in writing.

APPENDIX A

REFERENCES

APPENDIX A

REFERENCES

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APPENDIX B

BORING LOGS

UNIFIED SOIL CLASSIFICATION SYSTEM					
Major Divisions			**Group Symbols**	**Typical Names**	
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels 50% or more of coarse fraction retained on No. 4 sieve	Clean Gravels	GW	Well-graded gravels and gravel-sand mixtures, little or no fines	
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines	
		Gravel with	GM	Silty gravels gravel-sand-silt mixtures	
			GC	Clayey gravels, gravel-sand-clay mixtures	
	Sands more than 50% of coarse fraction passes No. 4 sieve	Clean Sands	SW	Well-graded sands and gravelly sands, little or no fines	
			SP	Poorly graded sands and gravelly sands, little or no fines	
		Sands with Fines	SM	Silty sands, sand-silt mixtures	
			SC	Clayey sands, sand-clay mixtures	
Fine-Grained Soils 50% or more passes No. 200 sieve	Silts and Clays Liquid limit 50% or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands	
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			OL	Organic silts and organic silty clays of low plasticity	
	Silts and Clays Liquid limit greater than 50%		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts	
			CH	Inorganic clays of high plasticity, fat clays	
			OH	Organic clays of medium to high plasticity	
Highly Organic Soils			PT	Peat, mucic, and other highly organic soils	

CONSISTENCY OR RELATIVE DENSITY

CRITERIA

Standard Penetration Test

Penetration Resistance N (blows/ft)	Relative Density
0 - 4	Very loose
4 - 10	Loose
10 - 30	Medium
30 - 50	Dense
> 50	Very dense

Standard Penetration Test

Penetration Resistance N (blows/ft)	Consistency	Unconfined Compressive Strength (tons/ft^2)
<2	Very Soft	<0.25
2 - 4	Soft	0.25 - .050
4 - 8	Medium	0.50 - 1.00
8 - 15	Stiff	1.00 - 2.00
15 - 30	Very Stiff	2.00 - 4.00
>30	Hard	>4.00

3" 3/4" #4 #10 #40 #200 U.S. Standard Sieve

Unified Soil Classification	Cobbles	Gravel		Sand			Silt or Clay
		coarse	fine	coarse	medium	fine	

MOISTURE CONDITIONS

Dry	Absence of moisture: dusty, dry to the touch
Slightly Moist	Below optimum moisture content for compaction
Moist	Near optimum moisture content
Very Moist	Above optimum moisture content
Wet	Visible free water; below water table

MATERIAL QUANTITY

trace	0 - 5 %
few	5 - 10 %
little	10 - 25 %
some	25 - 45 %

OTHER SYMBOLS

C	Core Sample
S	SPT Sample
B	Bulk Sample
–	Groundwater
Qp	Pocket Penetrometer

BASIC LOG FORMAT:
Group name, Group symbol, (grain size), color, moisture, consistency or relative density. Additional comments: odor, presence of roots, mica, gypsum, coarse grained particles, etc.

EXAMPLE:
Sand (SP), fine to medium grained, brown, moist, loose, trace silt, little fine gravel, few cobbles up to 4" in size, some hair roots and rootlets.

GeoSoils, Inc.

BORING LOG

PROJECT: DJORDJEVICH
1205 Melrose Way

W.O. 8058-A-SC *BORING* HA-1 *SHEET* 1 *OF* 1

DATE EXCAVATED 2-16-21 *LOGGED BY:* MS *APPROX. ELEV.:* 368' MSL

SAMPLE METHOD: Hand Auger

Depth (ft.)	Sample: Bulk	Sample: Undisturbed	Sample: Blows/Ft.	USCS Symbol	Dry Unit Wt. (pcf)	Moisture (%)	Saturation (%)	Material Description
0								@ 0' Organic mulch.
	■			CH				**COLLUVIUM:** @ ½' SILTY CLAY, dark gray brown and dark olive brown, damp to moist, soft to medium stiff, low porosity.
	■			CL SM				**WEATHERED GRANITICS:** @ 2' Disintegrates to SILTY/SANDY CLAY, light olive brown and medium brown, damp, stiff; salt and pepper rock fragments, visible quartz grains. @ 2½' SILTY SAND, light yellowish brown to pale yellow, damp, medium dense to dense. @ 3' As per 2½; very dense, coarser rock fragments.
5								Total Depth = 3½', Practical Refusal No Groundwater or Caving Encountered Backfilled 2-16-21
10								
15								
20								
25								
30								

Standard Penetration Test
Undisturbed, Ring Sample
Groundwater
Seepage

GeoSoils, Inc.

BORING LOG

PROJECT: DJORDJEVICH
1205 Melrose Way

W.O. 8058-A-SC *BORING* HA-2 *SHEET* 1 *OF* 1

DATE EXCAVATED 2-16-21 *LOGGED BY:* MS *APPROX. ELEV.:* 363' MSL

SAMPLE METHOD: Hand Auger

Depth (ft.)	Sample: Bulk	Sample: Undisturbed	Sample: Blows/Ft.	USCS Symbol	Dry Unit Wt. (pcf)	Moisture (%)	Saturation (%)	Material Description
0				CH				**COLLUVIUM:** @ 0' SILTY CLAY, dark brown, reddish brown, and dark olive brown, dampt to moist, soft; moderate porosity. @ 1' As per 0'; reddish brown and gray brown, low porosity.
				CL				@ 1½' As per 1'; reddish brown with mixtures of gray brown, medium stiff to stiff. @ 2½' As per 1½'; dry to damp, stiff to very stiff. @ 3' As per 2½'; SANDY CLAY, reddish brown.
5				SC				**WEATHERED GRANITICS:** @ 4' Disintegrates to CLAYEY SAND, light reddish brown and gray, dry, dense to very stiff; granitic rock fragments.
								Total Depth = 5', Practical Refusal No Groundwater or Caving Encountered Backfilled 2-16-21
10								
15								
20								
25								
30								

Standard Penetration Test
Undisturbed, Ring Sample
Groundwater
Seepage

GeoSoils, Inc.

PLATE B-3

GeoSoils, Inc.

BORING LOG

PROJECT: DJORDJEVICH
1205 Melrose Way

W.O. 8058-A-SC BORING HA-3 SHEET 1 OF 1

DATE EXCAVATED 2-16-21 LOGGED BY: MS APPROX. ELEV.: 360' MSL

SAMPLE METHOD: Hand Auger & Hand Sampler

Depth (ft.)	Sample: Bulk	Sample: Undisturbed	Sample: Blows/Ft.	USCS Symbol	Dry Unit Wt. (pcf)	Moisture (%)	Saturation (%)	Material Description
0				SM				**COLLUVIUM:** @ 0' SILTY SAND, dark brown to dark olive brown, moist, medium dense; trace clay, fine to coarse grain sand, sporadic subangular gravels.
				CL				@ 1' SANDY CLAY, olive gray, moist, medium stiff.
				SM	113.4	13.5	75.1	**WEATHERED GRANITICS:** @ 1½' Disintegrates to SILTY SAND, dark reddish brown, moist, medium dense. @ 3' As per 1½'; reddish brown. @ 5' As per 3'; light reddish brown.
5								
								Total Depth = 6' No Groundwater or Caving Encountered Backfilled 2-16-21
10								
15								
20								
25								
30								

Standard Penetration Test
Undisturbed, Ring Sample
Groundwater
Seepage

GeoSoils, Inc.

BORING LOG

PROJECT: DJORDJEVICH
1205 Melrose Way

W.O. 8058-A-SC *BORING* HA-4 *SHEET* 1 *OF* 1

DATE EXCAVATED 2-16-21 *LOGGED BY:* MS *APPROX. ELEV.:* 358' MSL

SAMPLE METHOD: Hand Auger

Depth (ft.)	Sample: Bulk	Sample: Undisturbed	Sample: Blows/Ft.	USCS Symbol	Dry Unit Wt. (pcf)	Moisture (%)	Saturation (%)	Material Description
0				CH				**COLLUVIUM:** @ 0' SANDY CLAY, dark brown to dark reddish brown, moist, soft to medium stiff; fine to medium grain sand.
				CL SC				**WEATHERED GRANITICS:** @ 2½' Disintegrates to SANDY CLAY, reddish brown to light reddish brown, dry to damp, stiff; feisic rock fragments. @ 3' CLAYEY SAND, pale yellow to very light reddish brown, dry to damp, dense.
5								Total Depth = 4', Terminated Due to Time Constraint No Groundwater or Caving Encountered Backfilled 2-16-21
10								
15								
20								
25								
30								

Standard Penetration Test
Undisturbed, Ring Sample
Groundwater
Seepage

APPENDIX C

SEISMICITY DATA

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*                     *
*    Version 3.00     *
*                     *
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DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: 8058

DATE: 02-16-2021

JOB NAME: Zoran Djordjevich

CALCULATION NAME: Test Run Analysis

FAULT-DATA-FILE NAME: C:\Program Files\EQFAULT1\CGSFLTE.DAT

SITE COORDINATES:
   SITE LATITUDE: 33.1854
   SITE LONGITUDE: 117.2569

SEARCH RADIUS: 62.4 mi

ATTENUATION RELATION: 12) Bozorgnia Campbell Niazi (1999) Hor.-Soft Rock-Cor.
   UNCERTAINTY (M=Median, S=Sigma): S   Number of Sigmas: 1.0
   DISTANCE MEASURE: cdist
   SCOND: 0
   Basement Depth: .10 km   Campbell SSR: 1   Campbell SHR: 0
   COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: C:\Program Files\EQFAULT1\CGSFLTE.DAT

MINIMUM DEPTH VALUE (km): 3.0

EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

Page 1

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	PEAK SITE ACCEL. g	EST. SITE INTENSITY MOD.MERC.
ROSE CANYON	9.9(16.0)	7.2	0.407	X
NEWPORT-INGLEWOOD (Offshore)	10.3(16.6)	7.1	0.374	IX
ELSINORE (TEMECULA)	19.4(31.2)	6.8	0.172	VIII
ELSINORE (JULIAN)	19.4(31.3)	7.1	0.209	VIII
CORONADO BANK	25.9(41.7)	7.6	0.221	IX
ELSINORE (GLEN IVY)	32.1(51.7)	6.8	0.103	VII
SAN JOAQUIN HILLS	37.2(59.9)	6.6	0.109	VII
EARTHQUAKE VALLEY	39.1(62.9)	6.5	0.068	VI
PALOS VERDES	40.1(64.5)	7.3	0.115	VII
SAN JACINTO-ANZA	42.1(67.8)	7.2	0.102	VII
SAN JACINTO-SAN JACINTO VALLEY	43.1(69.4)	6.9	0.081	VII
SAN JACINTO-COYOTE CREEK	47.2(76.0)	6.6	0.060	VI
CHINO-CENTRAL AVE. (Elsinore)	47.7(76.7)	6.7	0.089	VII
NEWPORT-INGLEWOOD (L.A.Basin)	48.3(77.8)	7.1	0.082	VII
WHITTIER	51.5(82.9)	6.8	0.063	VI
ELSINORE (COYOTE MOUNTAIN)	54.0(86.9)	6.8	0.060	VI
SAN JACINTO-SAN BERNARDINO	57.5(92.5)	6.7	0.052	VI
SAN JACINTO - BORREGO	61.5(99.0)	6.6	0.045	VI
SAN ANDREAS - Whole M-1a	62.0(99.7)	8.0	0.123	VII
SAN ANDREAS - San Bernardino M-1	62.0(99.7)	7.5	0.085	VII
SAN ANDREAS - SB-Coach. M-1b-2	62.0(99.7)	7.7	0.098	VII
SAN ANDREAS - SB-Coach. M-2b	62.0(99.7)	7.7	0.098	VII
PUENTE HILLS BLIND THRUST	62.3(100.2)	7.1	0.090	VII

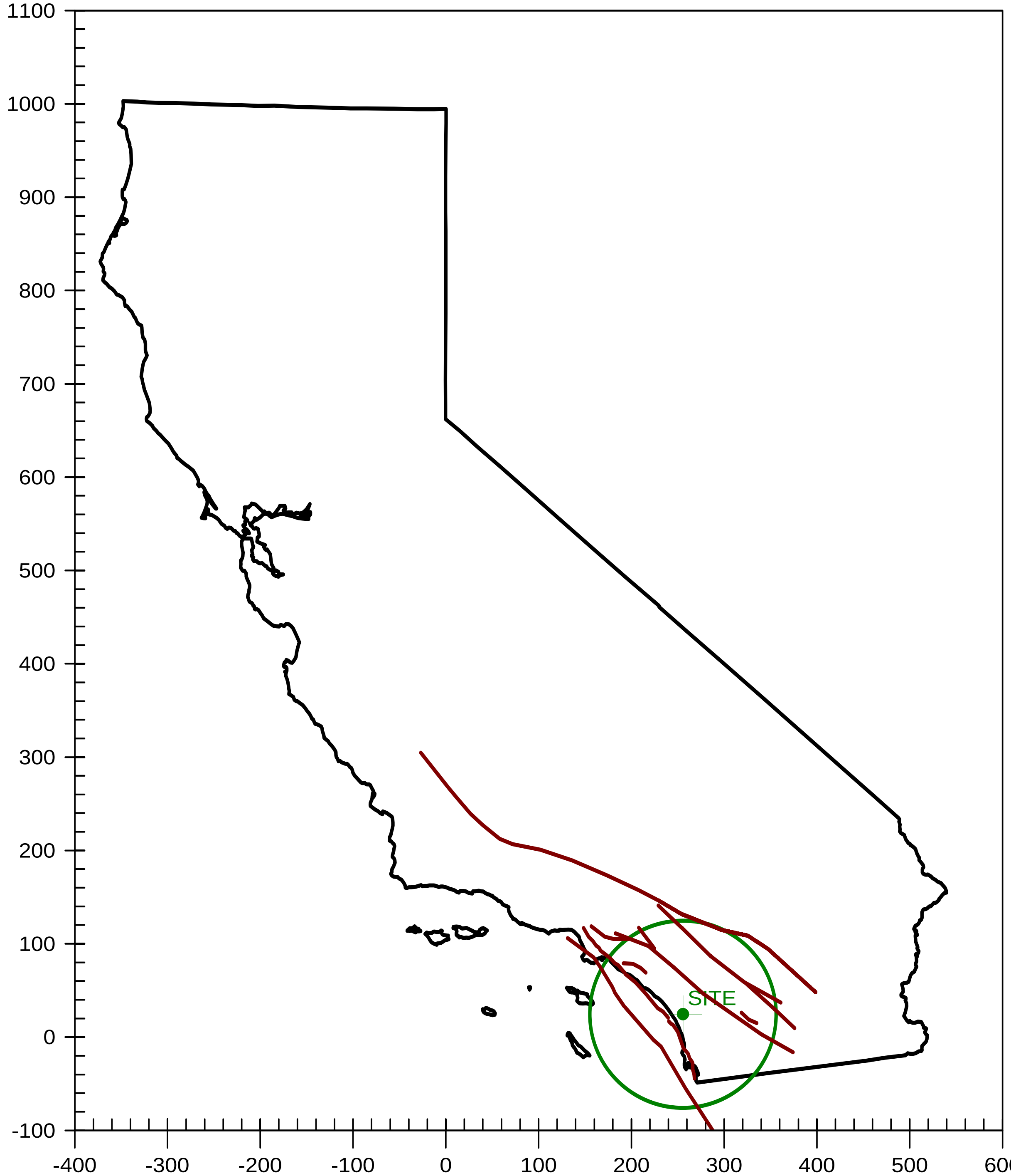
-END OF SEARCH- 23 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE ROSE CANYON FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 9.9 MILES (16.0 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.4066 g

CALIFORNIA FAULT MAP

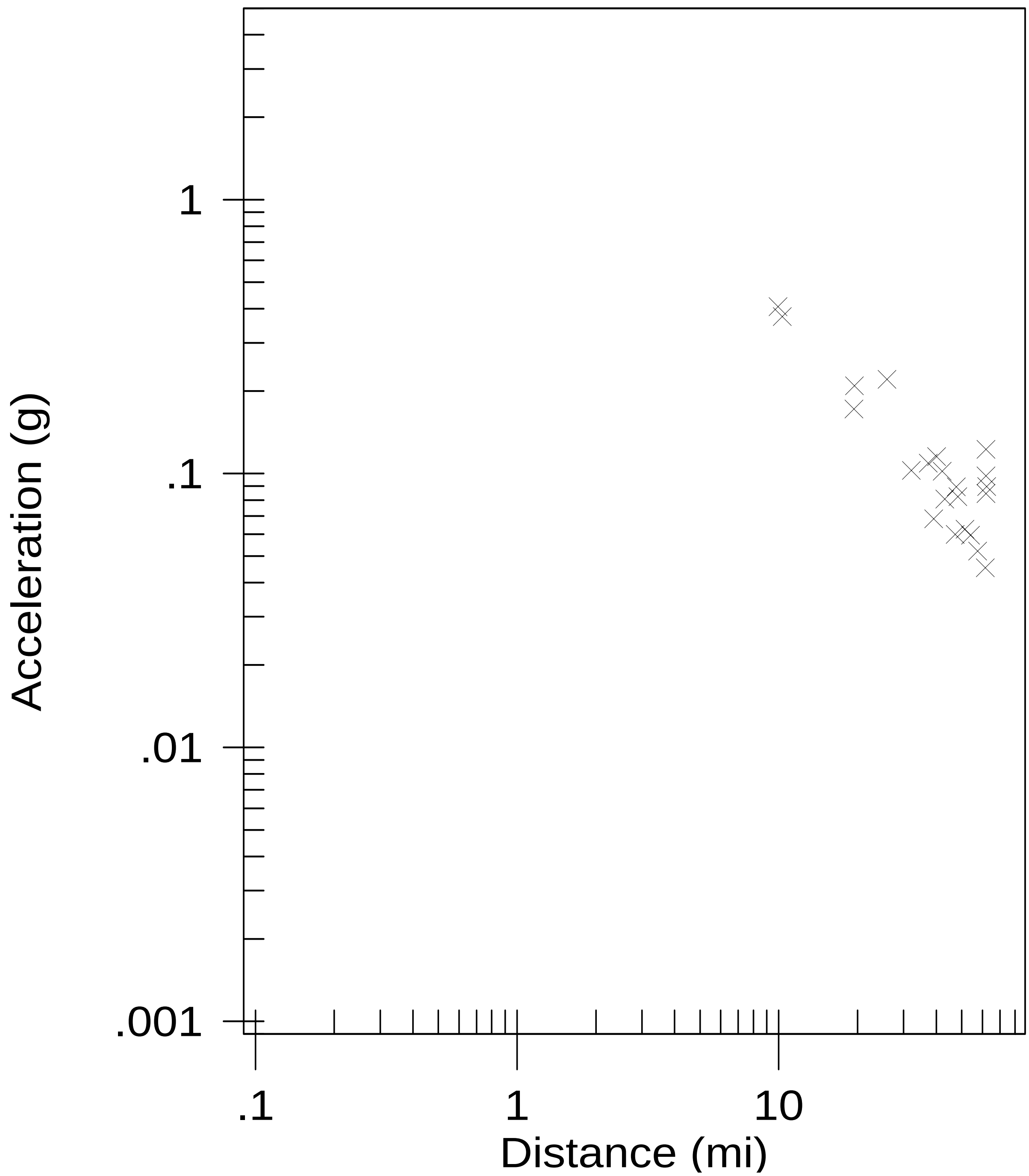
Zoran Djordjevich



W.O. 8058-A-SC
PLATE C-3

MAXIMUM EARTHQUAKES

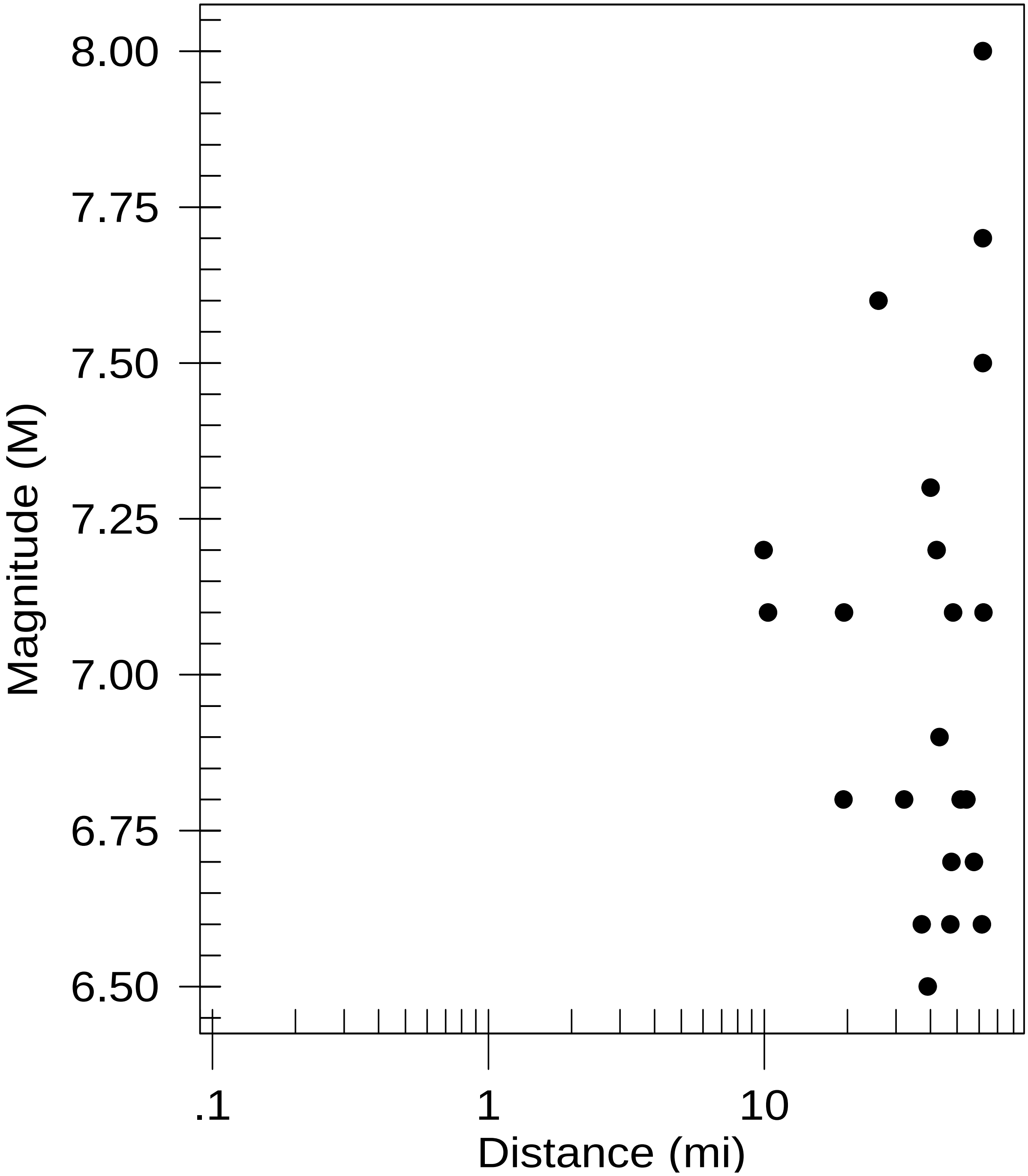
Zoran Djordjevich



W.O. 8058-A-SC
PLATE C-4

EARTHQUAKE MAGNITUDES & DISTANCES

Zoran Djordjevich



W.O. 8058-A-SC
PLATE C-5

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ESTIMATION OF
PEAK ACCELERATION FROM
CALIFORNIA EARTHQUAKE CATALOGS

JOB NUMBER: 8058

DATE: 02-16-2021

JOB NAME: Zoran Djordjevich

EARTHQUAKE-CATALOG-FILE NAME: ALLQUAKE.DAT

SITE COORDINATES:
SITE LATITUDE: 33.1854
SITE LONGITUDE: 117.2569

SEARCH DATES:
START DATE: 1800
END DATE: 2021

SEARCH RADIUS:
62.4 mi
100.4 km

ATTENUATION RELATION: 12) Bozorgnia Campbell Niazi (1999) Hor.-Soft Rock-Cor.
UNCERTAINTY (M=Median, S=Sigma): S Number of Sigmas: 1.0
ASSUMED SOURCE TYPE: SS [SS=Strike-slip, DS=Reverse-slip, BT=Blind-thrust]
SCOND: 0 Depth Source: A
Basement Depth: .10 km Campbell SSR: 1 Campbell SHR: 0
COMPUTE PEAK HORIZONTAL ACCELERATION

MINIMUM DEPTH VALUE (km): 3.0

EARTHQUAKE SEARCH RESULTS

Page 1

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	33.0000	117.3000	11/22/1800	2130 0.0	0.0	6.50	0.209	VIII	13.0(21.0)
MGI	33.0000	117.0000	09/21/1856	730 0.0	0.0	5.00	0.055	VI	19.6(31.6)
MGI	32.8000	117.1000	05/25/1803	0 0 0.0	0.0	5.00	0.038	V	28.1(45.2)
DMG	33.2000	116.7000	01/01/1920	235 0.0	0.0	5.00	0.033	V	32.2(51.8)
DMG	32.7000	117.2000	05/27/1862	20 0 0.0	0.0	5.90	0.054	VI	33.7(54.2)
T-A	32.6700	117.1700	12/00/1856	0 0 0.0	0.0	5.00	0.030	V	35.9(57.8)
T-A	32.6700	117.1700	05/24/1865	0 0 0.0	0.0	5.00	0.030	V	35.9(57.8)
T-A	32.6700	117.1700	10/21/1862	0 0 0.0	0.0	5.00	0.030	V	35.9(57.8)
DMG	33.7000	117.4000	04/11/1910	757 0.0	0.0	5.00	0.029	V	36.5(58.7)
DMG	33.7000	117.4000	05/15/1910	1547 0.0	0.0	6.00	0.053	VI	36.5(58.7)
DMG	33.7000	117.4000	05/13/1910	620 0.0	0.0	5.00	0.029	V	36.5(58.7)
DMG	32.8000	116.8000	10/23/1894	23 3 0.0	0.0	5.70	0.043	VI	37.5(60.4)
MGI	33.2000	116.6000	10/12/1920	1748 0.0	0.0	5.30	0.033	V	38.0(61.1)
DMG	33.6990	117.5110	05/31/1938	83455.4	10.0	5.50	0.037	V	38.4(61.7)
PAS	32.9710	117.8700	07/13/1986	1347 8.2	6.0	5.30	0.033	V	38.4(61.8)
DMG	33.7100	116.9250	09/23/1963	144152.6	16.5	5.00	0.026	V	41.0(65.9)
DMG	33.7500	117.0000	06/06/1918	2232 0.0	0.0	5.00	0.025	V	41.7(67.1)
DMG	33.7500	117.0000	04/21/1918	223225.0	0.0	6.80	0.078	VII	41.7(67.1)
DMG	33.8000	117.0000	12/25/1899	1225 0.0	0.0	6.40	0.055	VI	44.9(72.3)
GSP	33.5290	116.5720	06/12/2005	154146.5	14.0	5.20	0.026	V	46.1(74.1)
MGI	33.8000	117.6000	04/22/1918	2115 0.0	0.0	5.00	0.022	IV	46.8(75.3)
GSG	33.4200	116.4890	07/07/2010	235333.5	14.0	5.50	0.030	V	47.2(75.9)
PAS	33.5010	116.5130	02/25/1980	104738.5	13.6	5.50	0.029	V	48.1(77.4)
GSP	33.5080	116.5140	10/31/2001	075616.6	15.0	5.10	0.023	IV	48.3(77.7)
DMG	33.5000	116.5000	09/30/1916	211 0.0	0.0	5.00	0.022	IV	48.8(78.5)
DMG	33.0000	116.4330	06/04/1940	1035 8.3	0.0	5.10	0.022	IV	49.3(79.4)
DMG	33.9000	117.2000	12/19/1880	0 0 0.0	0.0	6.00	0.039	V	49.4(79.6)
DMG	33.5750	117.9830	03/11/1933	518 4.0	0.0	5.20	0.024	IV	49.8(80.1)
GSP	33.4315	116.4427	06/10/2016	080438.7	12.3	5.19	0.023	IV	50.0(80.4)
DMG	33.6170	117.9670	03/11/1933	154 7.8	0.0	6.30	0.046	VI	50.6(81.5)
DMG	33.6170	118.0170	03/14/1933	19 150.0	0.0	5.10	0.021	IV	53.0(85.3)
DMG	33.3430	116.3460	04/28/1969	232042.9	20.0	5.80	0.031	V	53.7(86.4)
DMG	34.0000	117.2500	07/23/1923	73026.0	0.0	6.25	0.040	V	56.2(90.5)
DMG	33.6830	118.0500	03/11/1933	658 3.0	0.0	5.50	0.024	V	57.2(92.0)
DMG	33.4000	116.3000	02/09/1890	12 6 0.0	0.0	6.30	0.040	V	57.2(92.0)
DMG	33.9500	116.8500	09/28/1946	719 9.0	0.0	5.00	0.018	IV	57.7(92.9)
MGI	34.0000	117.5000	12/16/1858	10 0 0.0	0.0	7.00	0.063	VI	58.0(93.3)
DMG	33.7000	118.0670	03/11/1933	51022.0	0.0	5.10	0.019	IV	58.7(94.4)
DMG	33.7000	118.0670	03/11/1933	85457.0	0.0	5.10	0.019	IV	58.7(94.4)
DMG	33.4080	116.2610	03/25/1937	1649 1.8	10.0	6.00	0.032	V	59.5(95.7)
GSG	33.9530	117.7610	07/29/2008	184215.7	14.0	5.30	0.020	IV	60.4(97.2)
DMG	33.2000	116.2000	05/28/1892	1115 0.0	0.0	6.30	0.037	V	61.1(98.3)
DMG	33.7500	118.0830	03/11/1933	323 0.0	0.0	5.00	0.017	IV	61.5(99.0)
DMG	33.7500	118.0830	03/11/1933	230 0.0	0.0	5.10	0.018	IV	61.5(99.0)
DMG	33.7500	118.0830	03/11/1933	910 0.0	0.0	5.10	0.018	IV	61.5(99.0)
DMG	33.7500	118.0830	03/13/1933	131828.0	0.0	5.30	0.020	IV	61.5(99.0)
DMG	33.7500	118.0830	03/11/1933	2 9 0.0	0.0	5.00	0.017	IV	61.5(99.0)
DMG	33.2830	116.1830	03/23/1954	41450.0	0.0	5.10	0.018	IV	62.4(100.4)
DMG	33.2830	116.1830	03/19/1954	95556.0	0.0	5.00	0.017	IV	62.4(100.4)

DMG	33.2830	116.1830	03/19/1954	102117.0	0.0	5.50	0.022	IV	62.4(100.4)
DMG	33.2830	116.1830	03/19/1954	95429.0	0.0	6.20	0.034	V	62.4(100.4)

****

-END OF SEARCH- 51 EARTHQUAKES FOUND WITHIN THE SPECIFIED SEARCH AREA.

TIME PERIOD OF SEARCH: 1800 TO 2021

LENGTH OF SEARCH TIME: 222 years

THE EARTHQUAKE CLOSEST TO THE SITE IS ABOUT 13.0 MILES (21.0 km) AWAY.

LARGEST EARTHQUAKE MAGNITUDE FOUND IN THE SEARCH RADIUS: 7.0

LARGEST EARTHQUAKE SITE ACCELERATION FROM THIS SEARCH: 0.209 g

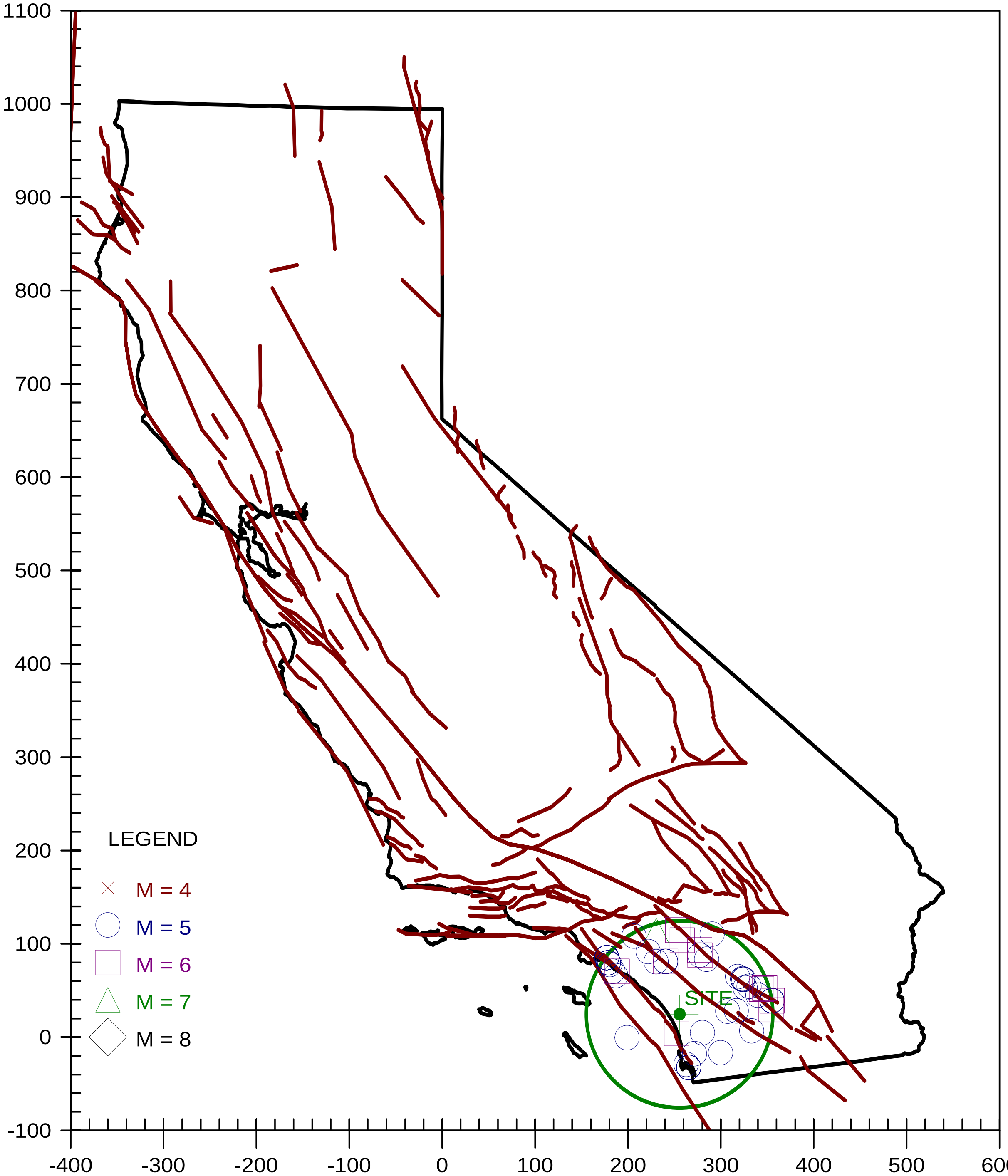
COEFFICIENTS FOR GUTENBERG & RICHTER RECURRENCE RELATION:
a-value= 0.818
b-value= 0.333
beta-value= 0.766

TABLE OF MAGNITUDES AND EXCEEDANCES:

Earthquake Magnitude	Number of Times Exceeded	Cumulative No. / Year
4.0	51	0.23077
4.5	51	0.23077
5.0	51	0.23077
5.5	20	0.09050
6.0	12	0.05430
6.5	3	0.01357
7.0	1	0.00452

EARTHQUAKE EPICENTER MAP

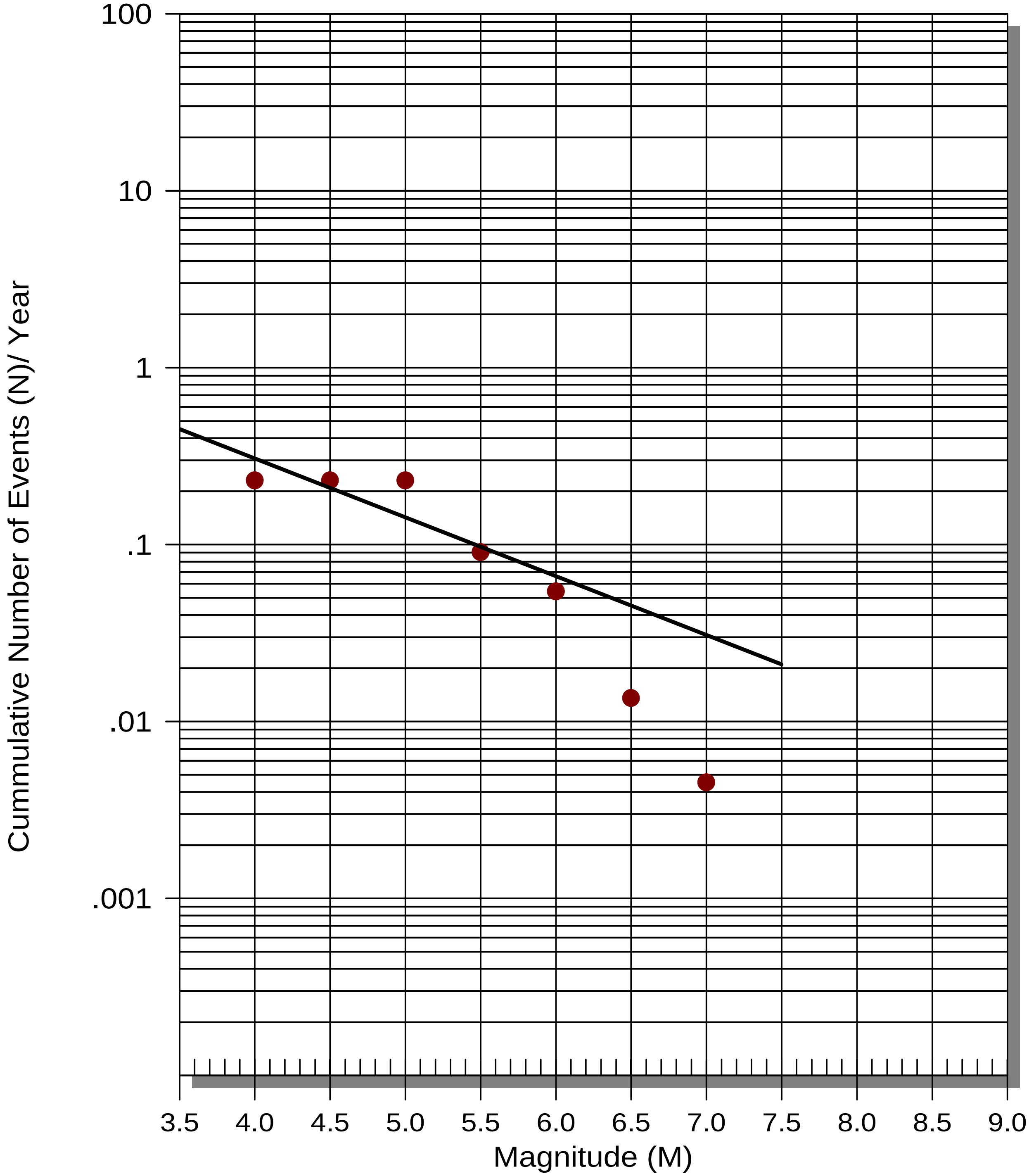
Zoran Djordjevich



W.O. 8058-A-SC
PLATE C-9

EARTHQUAKE RECURRENCE CURVE

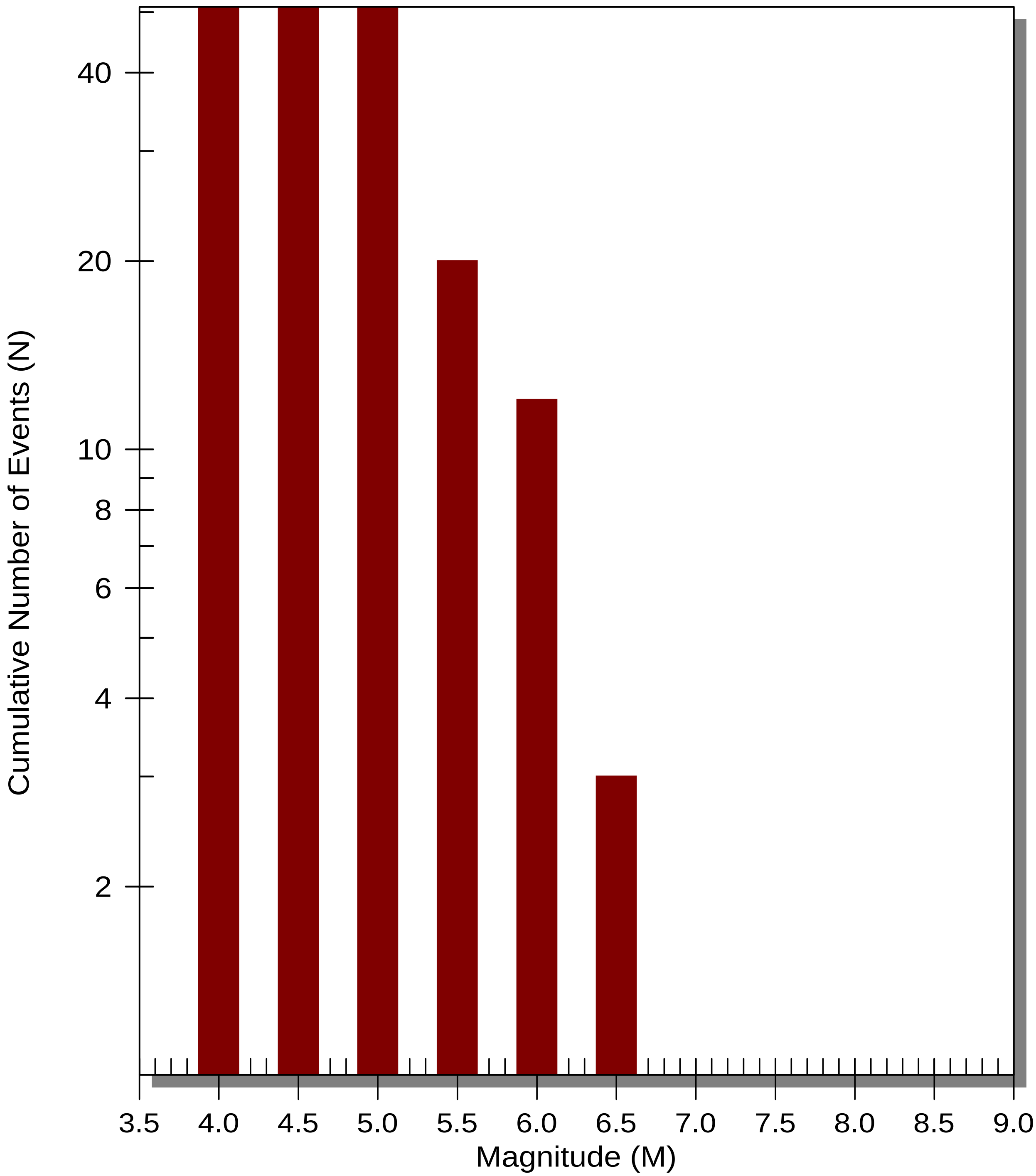
Zoran Djordjevich



W.O. 8058-A-SC
PLATE C-10

Number of Earthquakes (N) Above Magnitude (M)

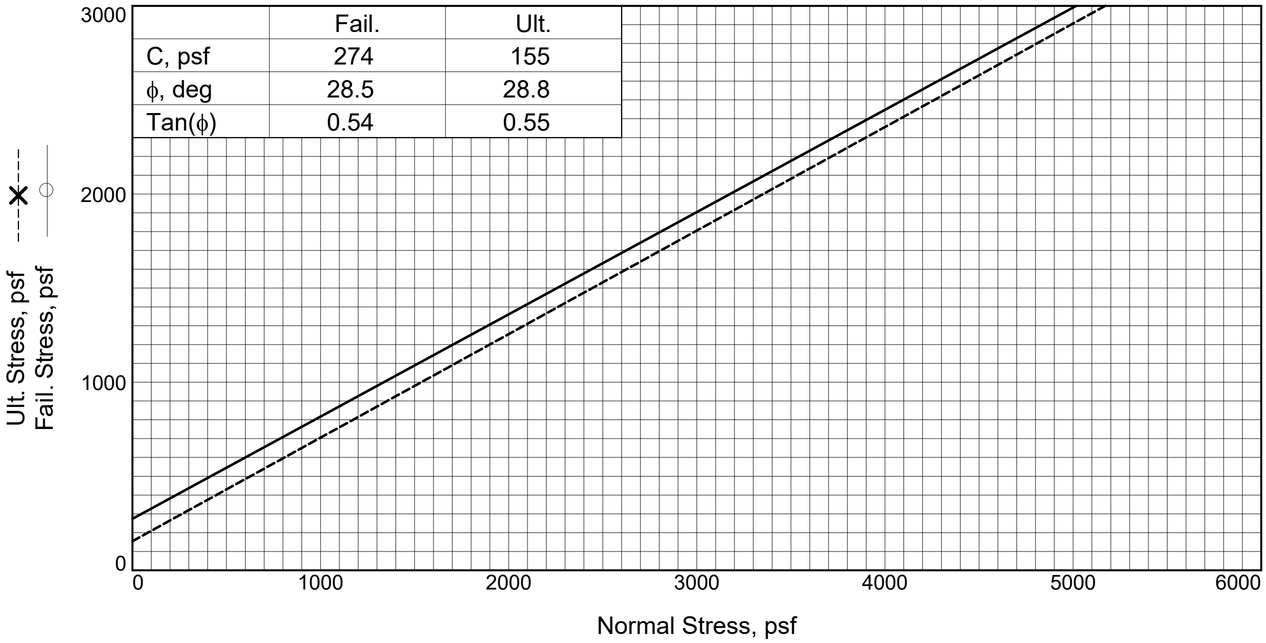
Zoran Djordjevich



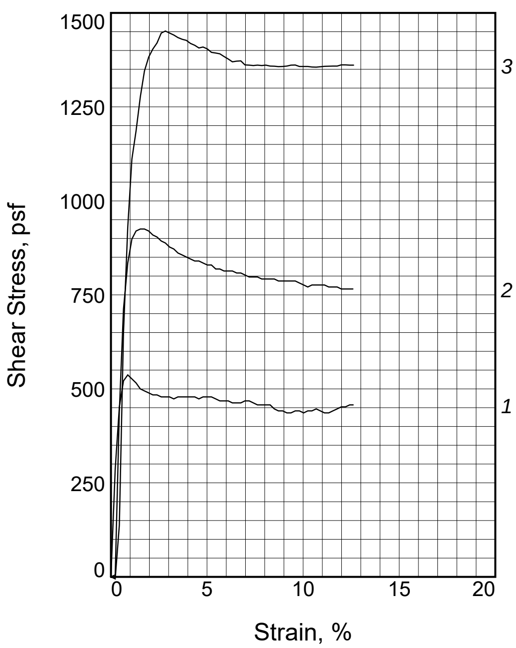
W.O. 8058-A-SC
PLATE C-11

APPENDIX D

LABORATORY DATA



	Fail.	Ult.
C, psf	274	155
ϕ, deg	28.5	28.8
Tan(ϕ)	0.54	0.55



	Sample No.	1	2	3
Initial	Water Content, %	10.4	10.4	10.4
	Dry Density, pcf	112.6	112.6	112.6
	Saturation, %	54.4	54.6	54.4
	Void Ratio	0.5253	0.5242	0.5253
	Diameter, in.	2.38	2.38	2.38
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	18.0	17.6	17.2
	Dry Density, pcf	112.8	113.3	113.5
	Saturation, %	94.8	93.8	92.4
	Void Ratio	0.5222	0.5151	0.5131
	Diameter, in.	2.38	2.38	2.38
	Height, in.	1.00	0.99	0.99
	Normal Stress, psf	550	1100	2200
	Fail. Stress, psf	537	925	1452
	Strain, %	0.9	1.7	2.8
	Ult. Stress, psf	447	776	1360
	Strain, %	8.5	10.0	7.8
	Strain rate, in./min.	0.001	0.001	0.001

Sample Type: Remolded
Description: Dark Brown Clayey Sand

Specific Gravity= 2.75
Remarks:

Plate D-1

Client: Zoran Djordjevich

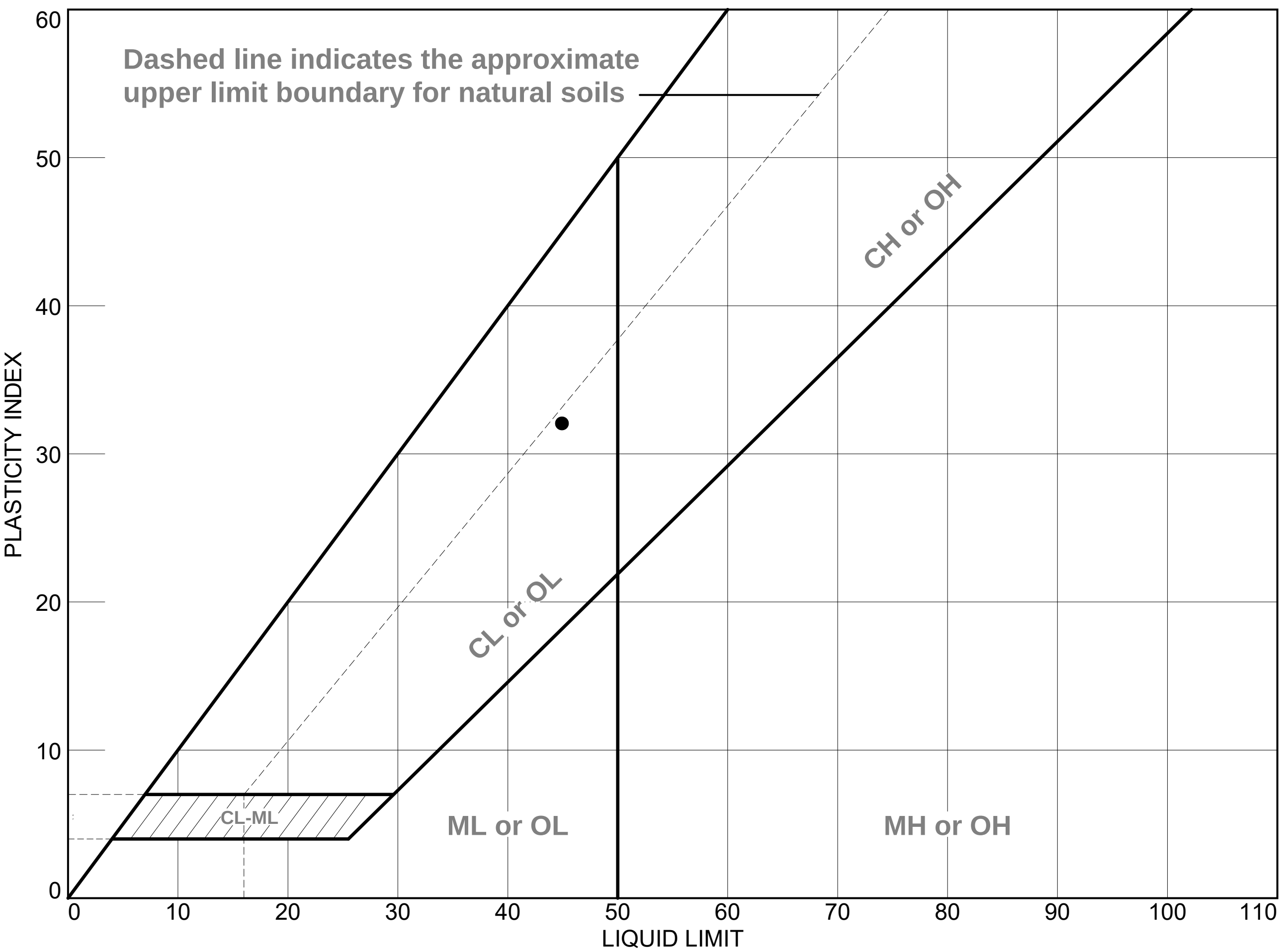
Project: 1205 Melrose Way

Source of Sample: B-2 **Depth:** 0-6
Sample Number: B-2/B-3
Proj. No.: 8058-A-SC **Date Sampled:**

GeoSoils, Inc.

Tested By: TR **Checked By:** TR

LIQUID AND PLASTIC LIMITS TEST REPORT



SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH	NATURAL WATER CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	USCS
●	B-2	B-2	0-4	-	13	45	32	CL

GeoSoils, Inc.

Client: Zoran Djordjevich
Project: 1205 Melrose Way

Project No.: 8058-A-SC **Plate** D-2

Tested By: TR **Checked By:** TR

APPENDIX E

STORM WATER BMP CHECKLISTS/FORMS

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

<table>
<tr><th colspan="3">Categorization of Infiltration Feasibility Condition</th><th>Worksheet C.4-1</th></tr>
<tr><td colspan="4"><u>Part 1 - Full Infiltration Feasibility Screening Criteria</u>

Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?

Note that it is not necessary to investigate each and every criterion in the worksheet if infiltration is precluded. Instead a letter of justification from a geotechnical professional familiar with the local conditions substantiating any geotechnical issues will be required.</td></tr>
<tr><td>Criteria</td><td>Screening Question</td><td>Yes</td><td>No</td></tr>
<tr><td>1</td><td>Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour? The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.</td><td></td><td>X</td></tr>
<tr><td colspan="4">Provide basis: The USDA indicates that the site is underlain by Bosanko Clay (BsD) and Placentia sandy loam (PeC2), which are noted to have infiltration rates varying from 0.00 to 0.06 inches/hour, and is categorized as Hydrologic Soil Group “D”. Furthermore, a reasonable design infiltration rate (without application of correction/ safety factors) of 0.025 inches/hour is indicated for Hydrologic Soil Group “D” soils, which is less than 0.50 inches/hour.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>2</td><td>Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.</td><td></td><td>X</td></tr>
<tr><td colspan="4">Provide basis: Given the fact that dense bedrock exists at relatively shallow depth at the site, storm water infiltration has the potential to create perched groundwater conditions that would migrate laterally, adversely affecting both onsite and offsite improvements, including underground utilities, and even slope stability.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
</table>

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

<table>
<tr><th colspan="4">Worksheet C.4.1 Page 2 of 4</th></tr>
<tr><th>Criteria</th><th>Screening Question</th><th>Yes</th><th>No</th></tr>
<tr><td>3</td><td>Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level? The response to this Screening Question shall be based on a comprehensible evaluation of the factors presented in Appendix C.3.</td><td>X</td><td></td></tr>
<tr><td colspan="4">Provide basis: Storm water infiltration could lead to perched groundwater conditions but measures can be incorporated into the proposed project for mitigation. Storm water pollutants such as leaking automotive fluids and brake dust are possible, however, subsurface exploration shows more than 10 feet of vertical separation between the infiltration surface elevation and the current groundwater table. Thus, there is low potential that storm water pollutants could impact groundwater quality.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>4</td><td>Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as a change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters? The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.</td><td>X</td><td></td></tr>
<tr><td colspan="4">Provide basis: The site is not located near a drainage course. Based on our geotechnical site exploration, groundwater appears to be greater than 50 feet below existing site grades, and likely at much lower elevations near sea level. Downstream water rights are considered a legal matter and typically do not fall within the purview of geotechnical engineering. However, GSI is not aware of any significant downstream water rights issues of concern on the adjoining properties. Given the slow soil infiltration rates onsite, infiltration should not significantly affect downstream water rights, from a geotechnical perspective.

Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.</td></tr>
<tr><td>Part 1 Result*</td><td colspan="2">In the answers to rows 1-4 are “Yes” a full infiltration design is potentially feasible. The feasibility screening category is Full Infiltration

If any answer from row 1-4 is “No”, infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a “full infiltration” design.
Proceed to Part 2</td><td>X Y</td></tr>
</table>

* To be completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by Agency/Jurisdictions to substantiate findings.

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

Worksheet C.4.1 Page 3 of 4			
Part 2 - Partial Infiltration vs. No Infiltration Feasibility Screening Criteria **Would infiltration of water in an appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?**			
Criteria	**Screening Question**	**Yes**	**No**
5	**Do soil and geologic conditions allow for infiltration in any appreciable rate or volume?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X
Provide basis: The USDA indicates that the site is underlain by Bosanko Clay (BsD) and Placentia sandy loam (PeC2), which are noted to have infiltration rates varying from 0.00 to 0.06 inches/hour, and is categorized as Hydrologic Soil Group "D". Furthermore, a reasonable design infiltration rate (without application of correction/ safety factors) of 0.025 inches/hour is indicated for Hydrologic Soil Group "D" soils, which is less than 0.50 inches/hour. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
6	**Can infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		X
Provide basis: Given the fact that dense bedrock exists at relatively shallow depth at the site, storm water infiltration has the potential to create perched groundwater conditions that would migrate laterally, adversely affecting both onsite and offsite improvements, including underground utilities, and even slope stability. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

Worksheet C.4.1 Page 4 of 4			
Criteria	**Screening Question**	**Yes**	**No**
7	**Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Storm water infiltration could lead to perched groundwater conditions but measures can be incorporated into the proposed project for mitigation. Storm water pollutants such as leaking automotive fluids and brake dust are possible, however, subsurface exploration shows more than 10 feet of vertical separation between the infiltration surface elevation and the current groundwater table. Thus, there is low potential that storm water pollutants could impact groundwater quality. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
8	**Can infiltration be allowed without violating downstream water rights?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: The site is not located near a drainage course. Based on our geotechnical site exploration, groundwater appears to be greater than 50 feet below existing site grades, and likely at much lower elevations near sea level. Downstream water rights are considered a legal matter and typically do not fall within the purview of geotechnical engineering. However, GSI is not aware of any significant downstream water rights issues of concern on the adjoining properties. Given the slow soil infiltration rates onsite, infiltration should not significantly affect downstream water rights, from a geotechnical perspective. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
Part 2 Result*	If all answers from row 5-8 are yes then partial infiltration design is potentially feasible. The feasibility screening category is **Partial Infiltration.** If any answer from row 5-8 is no, then infiltration of any volume is considered to be **infeasible** within the drainage area. The feasibility screening category is **No Infiltration.**		X Y

* To be completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by Agency/Jurisdictions to substantiate findings.

Worksheet D.5-1 : Factor of Safety and Design Infiltration Rate Worksheet

Factor of Safety and Design Infiltration Rate Worksheet			Worksheet D.5-1		
Factor Criteria		**Factor Description**	**Assigned Weight (w)**	**Factor Value (v)**	**Product (p) p = w x v**
A	Suitability Assessment	Soil assessment methods	0.25	3	0.75
		Predominant soil texture	0.25	3	0.75
		Site soil variability	0.25	2	0.50
		Depth to groundwater/impervious layer	0.25	1	0.25
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			2.25
B	Design	Level of pretreatment/expected sediment loads	0.5		
		Redundancy/resiliency	0.25		
		Compaction during construction	0.25		
		Design Safety Factor, $S_B = \Sigma p$			
Combined Safety Factor, $S_{total} = S_A \times S_B$					
Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias)					
Design Infiltration Rate, in/hr, $K_{design} = K_{observed} / S_{total}$				0.025 in/hr (NRCS default)	
Supporting Data					
Briefly describe infiltration test and provide reference to test forms: Infiltration rate per USDA and design infiltration rate per NRCS soil type default design infiltration rate.					

*Design Criteria has been left blank due to the fact that design plans for an infiltration basin have not been created yet.

APPENDIX F

GENERAL EARTHWORK, GRADING GUIDELINES AND PRELIMINARY CRITERIA

GENERAL EARTHWORK, GRADING GUIDELINES, AND PRELIMINARY CRITERIA

General

These guidelines present general procedures and requirements for earthwork and grading as shown on the approved grading plans, including preparation of areas to be filled, placement of fill, installation of subdrains, excavations, and appurtenant structures or flatwork. The recommendations contained in the geotechnical report are part of these earthwork and grading guidelines and would supercede the provisions contained hereafter in the case of conflict. Evaluations performed by the consultant during the course of grading may result in new or revised recommendations which could supercede these guidelines or the recommendations contained in the geotechnical report. Generalized details follow this text.

The contractor is responsible for the satisfactory completion of all earthwork in accordance with provisions of the project plans and specifications and latest adopted code. In the case of conflict, the most onerous provisions shall prevail. The project geotechnical engineer and engineering geologist (geotechnical consultant), and/or their representatives, should provide observation and testing services, and geotechnical consultation during the duration of the project.

EARTHWORK OBSERVATIONS AND TESTING

Geotechnical Consultant

Prior to the commencement of grading, a qualified geotechnical consultant (soil engineer and engineering geologist) should be employed for the purpose of observing earthwork procedures and testing the fills for general conformance with the recommendations of the geotechnical report(s), the approved grading plans, and applicable grading codes and ordinances.

The geotechnical consultant should provide testing and observation so that an evaluation may be made that the work is being accomplished as specified. It is the responsibility of the contractor to assist the consultants and keep them apprised of anticipated work schedules and changes, so that they may schedule their personnel accordingly.

All remedial removals, clean-outs, prepared ground to receive fill, key excavations, and subdrain installation should be observed and documented by the geotechnical consultant prior to placing any fill. It is the contractor's responsibility to notify the geotechnical consultant when such areas are ready for observation.

Laboratory and Field Tests

Maximum dry density tests to determine the degree of compaction should be performed in accordance with American Standard Testing Materials test method ASTM designation D-1557. Random or representative field compaction tests should be performed in accordance with test methods ASTM designation D-1556, D-2937 or D-2922, and D-3017, at intervals of approximately ±2 feet of fill height or approximately every 1,000 cubic yards placed. These criteria would vary depending on the soil conditions and the size of the project. The location and frequency of testing would be at the discretion of the geotechnical consultant.

Contractor's Responsibility

All clearing, site preparation, and earthwork performed on the project should be conducted by the contractor, with observation by a geotechnical consultant, and staged approval by the governing agencies, as applicable. It is the contractor's responsibility to prepare the ground surface to receive the fill, to the satisfaction of the geotechnical consultant, and to place, spread, moisture condition, mix, and compact the fill in accordance with the recommendations of the geotechnical consultant. The contractor should also remove all non-earth material considered unsatisfactory by the geotechnical consultant.

Notwithstanding the services provided by the geotechnical consultant, it is the sole responsibility of the contractor to provide adequate equipment and methods to accomplish the earthwork in strict accordance with applicable grading guidelines, latest adopted codes or agency ordinances, geotechnical report(s), and approved grading plans. Sufficient watering apparatus and compaction equipment should be provided by the contractor with due consideration for the fill material, rate of placement, and climatic conditions. If, in the opinion of the geotechnical consultant, unsatisfactory conditions such as questionable weather, excessive oversized rock or deleterious material, insufficient support equipment, etc., are resulting in a quality of work that is not acceptable, the consultant will inform the contractor, and the contractor is expected to rectify the conditions, and if necessary, stop work until conditions are satisfactory.

During construction, the contractor shall properly grade all surfaces to maintain good drainage and prevent ponding of water. The contractor shall take remedial measures to control surface water and to prevent erosion of graded areas until such time as permanent drainage and erosion control measures have been installed.

SITE PREPARATION

All major vegetation, including brush, trees, thick grasses, organic debris, and other deleterious material, should be removed and disposed of off-site. These removals must be concluded prior to placing fill. In-place existing fill, soil, alluvium, colluvium, or rock materials, as evaluated by the geotechnical consultant as being unsuitable, should be removed prior to any fill placement. Depending upon the soil conditions, these materials may be reused as compacted fills. Any materials incorporated as part of the compacted fills should be approved by the geotechnical consultant.

Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines, or other structures not located prior to grading, are to be removed or treated in a manner recommended by the geotechnical consultant. Soft, dry, spongy, highly fractured, or otherwise unsuitable ground, extending to such a depth that surface processing cannot adequately improve the condition, should be overexcavated down to firm ground and approved by the geotechnical consultant before compaction and filling operations continue. Overexcavated and processed soils, which have been properly mixed and moisture conditioned, should be re-compacted to the minimum relative compaction as specified in these guidelines.

Existing ground, which is determined to be satisfactory for support of the fills, should be scarified (ripped) to a minimum depth of 6 to 8 inches, or as directed by the geotechnical consultant. After the scarified ground is brought to optimum moisture content, or greater and mixed, the materials should be compacted as specified herein. If the scarified zone is greater than 6 to 8 inches in depth, it may be necessary to remove the excess and place the material in lifts restricted to about 6 to 8 inches in compacted thickness.

Existing ground which is not satisfactory to support compacted fill should be overexcavated as required in the geotechnical report, or by the on-site geotechnical consultant. Scarification, disc harrowing, or other acceptable forms of mixing should continue until the soils are broken down and free of large lumps or clods, until the working surface is reasonably uniform and free from ruts, hollows, hummocks, mounds, or other uneven features, which would inhibit compaction as described previously.

Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical [h:v]), the ground should be stepped or benched. The lowest bench, which will act as a key, should be a minimum of 15 feet wide and should be at least 2 feet deep into firm material, and approved by the geotechnical consultant. In fill-over-cut slope conditions, the recommended minimum width of the lowest bench or key is also 15 feet, with the key founded on firm material, as designated by the geotechnical consultant. As a general rule, unless specifically recommended otherwise by the geotechnical consultant, the minimum width of fill keys should be equal to ½ the height of the slope.

Standard benching is generally 4 feet (minimum) vertically, exposing firm, acceptable material. Benching may be used to remove unsuitable materials, although it is understood that the vertical height of the bench may exceed 4 feet. Pre-stripping may be considered for unsuitable materials in excess of 4 feet in thickness.

All areas to receive fill, including processed areas, removal areas, and the toes of fill benches, should be observed and approved by the geotechnical consultant prior to placement of fill. Fills may then be properly placed and compacted until design grades (elevations) are attained.

COMPACTED FILLS

Any earth materials imported or excavated on the property may be utilized in the fill provided that each material has been evaluated to be suitable by the geotechnical consultant. These materials should be free of roots, tree branches, other organic matter, or other deleterious materials. All unsuitable materials should be removed from the fill as directed by the geotechnical consultant. Soils of poor gradation, undesirable expansion potential, or substandard strength characteristics may be designated by the consultant as unsuitable and may require blending with other soils to serve as a satisfactory fill material.

Fill materials derived from benching operations should be dispersed throughout the fill area and blended with other approved material. Benching operations should not result in the benched material being placed only within a single equipment width away from the fill/bedrock contact.

Oversized materials defined as rock, or other irreducible materials, with a maximum dimension greater than 12 inches, should not be buried or placed in fills unless the location of materials and disposal methods are specifically approved by the geotechnical consultant. Oversized material should be taken offsite, or placed in accordance with recommendations of the geotechnical consultant in areas designated as suitable for rock disposal. GSI anticipates that soils to be utilized as fill material for the subject project may contain some rock. Appropriately, the need for rock disposal may be necessary during grading operations on the site. From a geotechnical standpoint, the depth of any rocks, rock fills, or rock blankets, should be a sufficient distance from finish grade. This depth is generally the same as any overexcavation due to cut-fill transitions in hard rock areas, and generally facilitates the excavation of structural footings and substructures. Should deeper excavations be proposed (i.e., deepened footings, utility trenching, swimming pools, spas, etc.), the developer may consider increasing the hold-down depth of any rocky fills to be placed, as appropriate. In addition, some agencies/jurisdictions mandate a specific hold-down depth for oversize materials placed in fills. The hold-down depth, and potential to encounter oversize rock, both within fills, and occurring in cut or natural areas, would need to be disclosed to all interested/affected parties. Once approved by the governing agency, the hold-down depth for oversized rock (i.e., greater than 12 inches) in fills on this project is provided as 10 feet, unless specified differently in the text of this report. The governing agency may require that these materials need to be deeper, crushed, or reduced to less than 12 inches in maximum dimension, at their discretion.

To facilitate future trenching, rock (or oversized material), should not be placed within the hold-down depth feet from finish grade, the range of foundation excavations, future utilities, or underground construction unless specifically approved by the governing agency, the geotechnical consultant, and/or the developer's representative.

If import material is required for grading, representative samples of the materials to be utilized as compacted fill should be analyzed in the laboratory by the geotechnical consultant to evaluate it's physical properties and suitability for use onsite. Such testing should be performed three (3) days prior to importation. If any material other than that previously tested is encountered during grading, an appropriate analysis of this material should be conducted by the geotechnical consultant as soon as possible.

Approved fill material should be placed in areas prepared to receive fill in near horizontal layers, that when compacted, should not exceed about 6 to 8 inches in thickness. The geotechnical consultant may approve thick lifts if testing indicates the grading procedures are such that adequate compaction is being achieved with lifts of greater thickness. Each layer should be spread evenly and blended to attain uniformity of material and moisture suitable for compaction.

Fill layers at a moisture content less than optimum should be watered and mixed, and wet fill layers should be aerated by scarification, or should be blended with drier material. Moisture conditioning, blending, and mixing of the fill layer should continue until the fill materials have a uniform moisture content at, or above, optimum moisture.

After each layer has been evenly spread, moisture conditioned, and mixed, it should be uniformly compacted to a minimum of 90 percent of the maximum density as evaluated by ASTM test designation D-1557, or as otherwise recommended by the geotechnical consultant. Compaction equipment should be adequately sized and should be specifically designed for soil compaction, or of proven reliability to efficiently achieve the specified degree of compaction.

Where tests indicate that the density of any layer of fill, or portion thereof, is below the required relative compaction, or improper moisture is in evidence, the particular layer or portion shall be re-worked until the required density and/or moisture content has been attained. No additional fill shall be placed in an area until the last placed lift of fill has been tested and found to meet the density and moisture requirements, and is approved by the geotechnical consultant.

In general, per the latest adopted version of the California Building Code (CBC), fill slopes should be designed and constructed at a gradient of 2:1 (h:v), or flatter. Compaction of slopes should be accomplished by over-building a minimum of 3 feet horizontally, and subsequently trimming back to the design slope configuration. Testing shall be performed as the fill is elevated to evaluate compaction as the fill core is being developed. Special efforts may be necessary to attain the specified compaction in the fill slope zone. Final slope shaping should be performed by trimming and removing loose materials with appropriate equipment. A final evaluation of fill slope compaction should be based on observation and/or testing of the finished slope face. Where compacted fill slopes are designed steeper than 2:1 (h:v), prior approval from the governing agency, specific material types, a higher minimum relative compaction, special reinforcement, and special grading procedures will be recommended.

If an alternative to over-building and cutting back the compacted fill slopes is selected, then special effort should be made to achieve the required compaction in the outer 10 feet of each lift of fill by undertaking the following:

1. An extra piece of equipment consisting of a heavy, short-shanked sheepsfoot should be used to roll (horizontal) parallel to the slopes continuously as fill is placed. The sheepsfoot roller should also be used to roll perpendicular to the

slopes, and extend out over the slope to provide adequate compaction to the face of the slope.

2. Loose fill should not be spilled out over the face of the slope as each lift is compacted. Any loose fill spilled over a previously completed slope face should be trimmed off or be subject to re-rolling.

3. Field compaction tests will be made in the outer (horizontal) ±2 to ±8 feet of the slope at appropriate vertical intervals, subsequent to compaction operations.

4. After completion of the slope, the slope face should be shaped with a small tractor and then re-rolled with a sheepsfoot to achieve compaction to near the slope face. Subsequent to testing to evaluate compaction, the slopes should be grid-rolled to achieve compaction to the slope face. Final testing should be used to evaluate compaction after grid rolling.

5. Where testing indicates less than adequate compaction, the contractor will be responsible to rip, water, mix, and recompact the slope material as necessary to achieve compaction. Additional testing should be performed to evaluate compaction.

SUBDRAIN INSTALLATION

Subdrains should be installed in approved ground in accordance with the approximate alignment and details indicated by the geotechnical consultant. Subdrain locations or materials should not be changed or modified without approval of the geotechnical consultant. The geotechnical consultant may recommend and direct changes in subdrain line, grade, and drain material in the field, pending exposed conditions. The location of constructed subdrains, especially the outlets, should be recorded/surveyed by the project civil engineer. Drainage at the subdrain outlets should be provided by the project civil engineer.

EXCAVATIONS

Excavations and cut slopes should be examined during grading by the geotechnical consultant. If directed by the geotechnical consultant, further excavations or overexcavation and refilling of cut areas should be performed, and/or remedial grading of cut slopes should be performed. When fill-over-cut slopes are to be graded, unless otherwise approved, the cut portion of the slope should be observed by the geotechnical consultant prior to placement of materials for construction of the fill portion of the slope. The geotechnical consultant should observe all cut slopes, and should be notified by the contractor when excavation of cut slopes commence.

If, during the course of grading, unforeseen adverse or potentially adverse geologic conditions are encountered, the geotechnical consultant should investigate, evaluate, and make appropriate recommendations for mitigation of these conditions. The need for cut slope buttressing or stabilizing should be based on in-grading evaluation by the geotechnical consultant, whether anticipated or not.

Unless otherwise specified in geotechnical and geological report(s), no cut slopes should be excavated higher or steeper than that allowed by the ordinances of controlling governmental agencies. Additionally, short-term stability of temporary cut slopes is the contractor's responsibility.

Erosion control and drainage devices should be designed by the project civil engineer and should be constructed in compliance with the ordinances of the controlling governmental agencies, and/or in accordance with the recommendations of the geotechnical consultant.

ROCK PLACEMENT GUIDELINES

Rock Disposal

We anticipate that soils to be utilized as fill material for the subject tract may contain rock. Appropriately, the need for rock disposal may be necessary during grading operations on the site. Generally, for the purpose of this report, the materials may be described as either 8 inches or less, greater than 8 and less than 36 inches, and greater than 36 inches. These three categories set the basic dimensions for where and how the materials are to be placed. Consideration should be given to evaluating anticipated oversize volume and comparing that to the available volume for oversize materials.

Materials 8 Inches in Diameter or Less

Since imported rock fragments along with the overburden materials are anticipated to be a part of the materials used in the grading of the site, a criteria is needed to facilitate the placement of these materials within guidelines which would be workable during the rough grading, post-grading improvements, and serve as acceptable compacted fill.

1. Fines and rock fragments 8 inches or less in diameter may be placed as compacted fill cap materials within the building pads, slopes, and street areas as described below. The rock fragments and fines should be brought to at least optimum moisture content and compacted to a minimum relative compaction of 90 percent of the laboratory standard (ASTM D 1557).

2. The purpose for the 8-inch diameter limits is to allow reasonable sized rock fragments into the fill under selected conditions (optimum moisture or above) surrounded with compacted fines. The 8-inch diameter size also allows a greater volume of the rock fragments to be handled during grading, while staying in

reasonable limits for later onsite excavation equipment (backhoes and trenchers) to excavate footings and utility lines.

3. Fill materials 8 inches or less in diameter should be placed, but not limited to, within the upper 10 feet of proposed fill pads, the upper 5 feet of overexcavated cut areas of cut/fill transition pads, and the entire street right-of-way width, including the proposed overexcavated areas and replacement fill areas, from the depth of the lowest utility to subgrade, or to a depth of 10 feet below finish grade. Overexcavation is discussed later in this report. Please note that some utility entities will require soil particles be restricted to significantly less than 8 inches in utility trench backfill, including 6 inch minus material for trenches less than 36 inches wide (current Greenbook edition), or more restrictive criteria, such as 3 inch minus material for water line backfill, per the Vista Irrigation District (VID, 2016), or any trench backfill within 12 inches of pavement subgrade (current Greenbook Edition). The civil designer and developer may consider using a more restrictive criteria for soil particle size in streets to reduce the potential for import and/or additional fill particle crushing.

Materials Greater Than 8 inches and Less Than 36 Inches in Diameter

1. During the process of bedrock excavation, a significant amount of rock fragments or constituents larger than 8 inches in diameter may be generated. These significant amounts of oversized materials between greater than 8 and less than 36 inches in diameter may be incorporated into the fills utilizing a series of rock blankets.

2. Each rock blanket should consist of rock fragments of approximately greater than 8 and less than 36 inches in diameter along with fines generated from the proposed cuts and overburden materials from removal areas. The blankets should be limited to 24 to 36 inches in thickness and should be placed with granular fines which are flooded into and around the rock fragments.

3. Rock blankets should be restricted to areas which are at least 1 foot below the lowest utility invert within the street right-of-way, 10 feet below finish grade on the proposed fill lots, and a minimum of 20 horizontal feet from any fill slope surface.

4. Compaction may be achieved by utilizing wheel rolling methods with scrapers and water trucks, track-walking by bulldozers, and sheepsfoot tampers.

5. Each rock blanket should be completed with its surface compacted prior to placement of any subsequent rock blanket or rock windrow.

Materials Greater Than 36 Inches in Diameter

1. Oversize rock greater than 36 inches in diameter should be placed in single rock windrows. The windrows should be at least 15 feet or an equipment width apart, whichever is greatest, and at least 10 feet below final grade.

2. The void spaces between rocks in windrows should be filled with the more granular soils by flooding them into place.

3. A minimum vertical distance of 3 feet between soil fill and rock lift should be maintained. Also, the windrows should be staggered from lift to lift. Rock windrows should not be placed closer than 20 feet from the face of fill slopes.

4. Larger rocks too difficult to be placed into windrows may be individually placed into a dozer trench. Each trench should be excavated into the compacted fill or dense natural ground a minimum of 1 foot deeper than the size of the rock to be buried. After the rocks are placed in the trench (not immediately adjacent to each other), granular fill material should be flooded into the trench to fill the voids.

5. The oversize rock trenches should be no closer together than 15 feet at a particular elevation and at least 20 feet from any slope face. Trenches at higher elevations should be staggered and there should be 4 feet of compacted fill between the top of one trench and the bottom of the next higher trench. Placement of rock into these trenches should be under the full-time inspection of the soils engineer.

6. Consideration should be given to using oversize materials in open space "green belt" areas that would be designated as non-structural fills.

COMPLETION

Observation, testing, and consultation by the geotechnical consultant should be conducted during the grading operations in order to state an opinion that all cut and fill areas are graded in accordance with the approved project specifications. After completion of grading, and after the geotechnical consultant has finished observations of the work, final reports should be submitted, and may be subject to review by the controlling governmental agencies. No further excavation or filling should be undertaken without prior notification of the geotechnical consultant or approved plans.

All finished cut and fill slopes should be protected from erosion and/or be planted in accordance with the project specifications and/or as recommended by a landscape architect. Such protection and/or planning should be undertaken as soon as practical after completion of grading.

PRELIMINARY OUTDOOR POOL/SPA DESIGN RECOMMENDATIONS

The following preliminary recommendations are provided for consideration in pool/spa design and planning. Actual recommendations should be provided by a qualified geotechnical consultant, based on site specific geotechnical conditions, including a subsurface investigation, differential settlement potential, expansive and corrosive soil potential, proximity of the proposed pool/spa to any slopes with regard to slope creep and lateral fill extension, as well as slope setbacks per Code, and geometry of the proposed improvements. Recommendations for pools/spas and/or deck flatwork underlain by expansive soils, or for areas with differential settlement greater than ¼-inch over 40 feet horizontally, will be more onerous than the preliminary recommendations presented below.

The 1:1 (h:v) influence zone of any nearby retaining wall site structures should be delineated on the project civil drawings with the pool/spa. This 1:1 (h:v) zone is defined as a plane up from the lower-most heel of the retaining structure, to the daylight grade of the nearby building pad or slope. If pools/spas or associated pool/spa improvements are constructed within this zone, they should be re-positioned (horizontally or vertically) so that they are supported by earth materials that are outside or below this 1:1 plane. If this is not possible given the area of the building pad, the owner should consider eliminating these improvements or allow for increased potential for lateral/vertical deformations and associated distress that may render these improvements unusable in the future, unless they are periodically repaired and maintained. The conditions and recommendations presented herein should be disclosed to all homeowners and any interested/affected parties.

General

1. The equivalent fluid pressure to be used for the pool/spa design should be 60 pounds per cubic foot (pcf) for pool/spa walls with level backfill, and 75 pcf for a 2:1 sloped backfill condition. In addition, backdrains should be provided behind pool/spa walls subjacent to slopes.

2. Passive earth pressure may be computed as an equivalent fluid having a density of 150 pcf, to a maximum lateral earth pressure of 1,000 pounds per square foot (psf).

3. An allowable coefficient of friction between soil and concrete of 0.30 may be used with the dead load forces.

4. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third.

5. Where pools/spas are planned near structures, appropriate surcharge loads need to be incorporated into design and construction by the pool/spa designer. This includes, but is not limited to landscape berms, decorative walls, footings, built-in barbeques, utility poles, etc.

6. All pool/spa walls should be designed as "free standing" and be capable of supporting the water in the pool/spa without soil support. The shape of pool/spa in cross section and plan view may affect the performance of the pool, from a geotechnical standpoint. Pools and spas should also be designed in accordance with the latest adopted Code. Minimally, the bottoms of the pools/spas, should maintain a distance H/3, where H is the height of the slope (in feet), from the slope face. This distance should not be less than 7 feet, nor need not be greater than 40 feet.

7. The soil beneath the pool/spa bottom should be uniformly moist with the same stiffness throughout. If a fill/cut transition occurs beneath the pool/spa bottom, the cut portion should be overexcavated to a minimum depth of 48 inches, and replaced with compacted fill, such that there is a uniform blanket that is a minimum of 48 inches below the pool/spa shell. If very low expansive soil is used for fill, the fill should be placed at a minimum of 95 percent relative compaction, at optimum moisture conditions. This requirement should be 90 percent relative compaction at over optimum moisture if the pool/spa is constructed within or near expansive soils. The potential for grading and/or re-grading of the pool/spa bottom, and attendant potential for shoring and/or slot excavation, needs to be considered during all aspects of pool/spa planning, design, and construction.

8. If the pool/spa is founded entirely in compacted fill placed during rough grading, the deepest portion of the pool/spa should correspond with the thickest fill on the lot.

9. Hydrostatic pressure relief valves should be incorporated into the pool and spa designs. A pool/spa under-drain system is also recommended, with an appropriate outlet for discharge.

10. All fittings and pipe joints, particularly fittings in the side of the pool or spa, should be properly sealed to prevent water from leaking into the adjacent soils materials, and be fitted with slip or expandible joints between connections transecting varying soil conditions.

11. An elastic expansion joint (flexible waterproof sealant) should be installed to prevent water from seeping into the soil at all deck joints.

12. A reinforced grade beam should be placed around skimmer inlets to provide support and mitigate cracking around the skimmer face.

13. In order to reduce unsightly cracking, deck slabs should minimally be 4 inches thick, and reinforced with No. 3 reinforcing bars at 18 inches on-center. All slab reinforcement should be supported to ensure proper mid-slab positioning during the placement of concrete. Wire mesh reinforcing is specifically not recommended. Deck slabs should not be tied to the pool/spa structure. Pre-moistening and/or

pre-soaking of the slab subgrade is recommended, to a depth of 12 inches (optimum moisture content), or 18 inches (120 percent of the soil's optimum moisture content, or 3 percent over optimum moisture content, whichever is greater), for very low to low, and medium expansive soils, respectively. This moisture content should be maintained in the subgrade soils during concrete placement to promote uniform curing of the concrete and minimize the development of unsightly shrinkage cracks. Slab underlayment should consist of a 1- to 2-inch leveling course of sand (S.E.>30) and a minimum of 4 to 6 inches of Class 2 base compacted to 90 percent. Deck slabs within the H/3 zone, where H is the height of the slope (in feet), will have an increased potential for distress relative to other areas outside of the H/3 zone. If distress is undesirable, improvements, deck slabs or flatwork should not be constructed closer than H/3 or 7 feet (whichever is greater) from the slope face, in order to reduce, but not eliminate, this potential.

14. Pool/spa bottom or deck slabs should be founded entirely on competent bedrock, or properly compacted fill. Fill should be compacted to achieve a minimum of 90 percent relative compaction, as discussed above. Prior to pouring concrete, subgrade soils below the pool/spa decking should be throughly watered to achieve a moisture content that is at least 2 percent above optimum moisture content, to a depth of at least 18 inches below the bottom of slabs. This moisture content should be maintained in the subgrade soils during concrete placement to promote uniform curing of the concrete and minimize the development of unsightly shrinkage cracks.

15. In order to reduce unsightly cracking, the outer edges of pool/spa decking to be bordered by landscaping, and the edges immediately adjacent to the pool/spa, should be underlain by an 8-inch wide concrete cutoff shoulder (thickened edge) extending to a depth of at least 12 inches below the bottoms of the slabs to mitigate excessive infiltration of water under the pool/spa deck. These thickened edges should be reinforced with two No. 4 bars, one at the top and one at the bottom. Deck slabs may be minimally reinforced with No. 3 reinforcing bars placed at 18 inches on-center, in both directions. All slab reinforcement should be supported on chairs to ensure proper mid-slab positioning during the placement of concrete.

16. Surface and shrinkage cracking of the finish slab may be reduced if a low slump and water-cement ratio are maintained during concrete placement. Concrete utilized should have a minimum compressive strength of 4,000 psi. Excessive water added to concrete prior to placement is likely to cause shrinkage cracking, and should be avoided. Some concrete shrinkage cracking, however, is unavoidable.

17. Joint and sawcut locations for the pool/spa deck should be determined by the design engineer and/or contractor. However, spacings should not exceed 6 feet on center.

18. Considering the nature of the onsite earth materials, it should be anticipated that

caving or sloughing could be a factor in subsurface excavations and trenching. Shoring or excavating the trench walls/backcuts at the angle of repose (typically 25 to 45 degrees), should be anticipated. All excavations should be observed by a representative of the geotechnical consultant, including the project geologist and/or geotechnical engineer, prior to workers entering the excavation or trench, and minimally conform to Cal/OSHA ("Type C" soils may be assumed), state, and local safety codes. Should adverse conditions exist, appropriate recommendations should be offered at that time by the geotechnical consultant. GSI does not consult in the area of safety engineering and the safety of the construction crew is the responsibility of the pool/spa builder.

19. It is imperative that adequate provisions for surface drainage are incorporated by the homeowners into their overall improvement scheme. Ponding water, ground saturation and flow over slope faces, are all situations which must be avoided to enhance long-term performance of the pool/spa and associated improvements, and reduce the likelihood of distress.

20. Regardless of the methods employed, once the pool/spa is filled with water, should it be emptied, there exists some potential that if emptied, significant distress may occur. Accordingly, once filled, the pool/spa should not be emptied unless evaluated by the geotechnical consultant and the pool/spa builder.

21. For pools/spas built within (all or part) of the Code setback and/or geotechnical setback, as indicated in the site geotechnical documents, special foundations are recommended to mitigate the affects of creep, lateral fill extension, expansive soils and settlement on the proposed pool/spa. Most municipalities or County reviewers do not consider these effects in pool/spa plan approvals. As such, where pools/spas are proposed on 20 feet or more of fill, medium or highly expansive soils, or rock fill with limited "cap soils" and built within Code setbacks, or within the influence of the creep zone, or lateral fill extension, the following should be considered during design and construction:

    OPTION A: Shallow foundations with or without overexcavation of the pool/spa "shell," such that the pool/spa is surrounded by 5 feet of very low to low expansive soils (without irreducible particles greater that 6 inches), and the pool/spa walls closer to the slope(s) are designed to be free standing. GSI recommends a pool/spa under-drain or blanket system (see attached Typical Pool/Spa Detail). The pool/spa builders and owner in this optional construction technique should be generally satisfied with pool/spa performance under this scenario; however, some settlement, tilting, cracking, and leakage of the pool/spa is likely over the life of the project.

    OPTION B: Pier supported pool/spa foundations with or without overexcavation of the pool/spa shell such that the pool/spa is surrounded by 5 feet of very low to low expansive soils (without irreducible particles greater than 6 inches), and the pool/spa walls closer to the slope(s) are designed to be free standing. The need for a pool/spa under-drain system may be installed for leak detection purposes. Piers that support the pool/spa should be a minimum of 12 inches in diameter and at a spacing to provide vertical and lateral support of the pool/spa, in accordance with the pool/spa designers recommendations current applicable Codes. The pool/spa builder and owner in this second scenario construction technique should be more satisfied with pool/spa performance. This construction will reduce settlement and creep effects on the pool/spa; however, it will not eliminate these potentials, nor make the pool/spa "leak-free."

22. The temperature of the water lines for spas and pools may affect the corrosion properties of site soils, thus, a corrosion specialist should be retained to review all spa and pool plans, and provide mitigative recommendations, as warranted. Concrete mix design should be reviewed by a qualified corrosion consultant and materials engineer.

23. All pool/spa utility trenches should be compacted to 90 percent of the laboratory standard, under the full-time observation and testing of a qualified geotechnical consultant. Utility trench bottoms should be sloped away from the primary structure on the property (typically the residence).

24. Pool and spa utility lines should not cross the primary structure's utility lines (i.e., not stacked, or sharing of trenches, etc.).

25. The pool/spa or associated utilities should not intercept, interrupt, or otherwise adversely impact any area drain, roof drain, or other drainage conveyances. If it is necessary to modify, move, or disrupt existing area drains, subdrains, or tightlines, then the design civil engineer should be consulted, and mitigative measures provided. Such measures should be further reviewed and approved by the geotechnical consultant, prior to proceeding with any further construction.

26. The geotechnical consultant should review and approve all aspects of pool/spa and flatwork design prior to construction. A design civil engineer should review all aspects of such design, including drainage and setback conditions. Prior to acceptance of the pool/spa construction, the project builder, geotechnical consultant and civil designer should evaluate the performance of the area drains and other site drainage pipes, following pool/spa construction.

27. All aspects of construction should be reviewed and approved by the geotechnical consultant, including during excavation, prior to the placement of any additional fill, prior to the placement of any reinforcement or pouring of any concrete.

28. Any changes in design or location of the pool/spa should be reviewed and approved by the geotechnical and design civil engineer prior to construction. Field

adjustments should not be allowed until written approval of the proposed field changes are obtained from the geotechnical and design civil engineer.

29. Disclosure should be made to homeowners and builders, contractors, and any interested/affected parties, that pools/spas built within about 15 feet of the top of a slope, and/or H/3, where H is the height of the slope (in feet), will experience some movement or tilting. While the pool/spa shell or coping may not necessarily crack, the levelness of the pool/spa will likely tilt toward the slope, and may not be esthetically pleasing. The same is true with decking, flatwork and other improvements in this zone.

30. Failure to adhere to the above recommendations will significantly increase the potential for distress to the pool/spa, flatwork, etc.

31. Local seismicity and/or the design earthquake will cause some distress to the pool/spa and decking or flatwork, possibly including total functional and economic loss.

32. The information and recommendations discussed above should be provided to any contractors and/or subcontractors, or homeowners, interested/affected parties, etc., that may perform or may be affected by such work.

JOB SAFETY

General

At GSI, getting the job done safely is of primary concern. The following is the company's safety considerations for use by all employees on multi-employer construction sites. On-ground personnel are at highest risk of injury, and possible fatality, on grading and construction projects. GSI recognizes that construction activities will vary on each site, and that site safety is the prime responsibility of the contractor; however, everyone must be safety conscious and responsible at all times. To achieve our goal of avoiding accidents, cooperation between the client, the contractor, and GSI personnel must be maintained.

In an effort to minimize risks associated with geotechnical testing and observation, the following precautions are to be implemented for the safety of field personnel on grading and construction projects:

Safety Meetings: GSI field personnel are directed to attend contractor's regularly scheduled and documented safety meetings.

Safety Vests: Safety vests are provided for, and are to be worn by GSI personnel, at all times, when they are working in the field.

Safety Flags: Two safety flags are provided to GSI field technicians; one is to be affixed to the vehicle when on site, the other is to be placed atop the spoil pile on all test pits.

Flashing Lights: All vehicles stationary in the grading area shall use rotating or flashing amber beacons, or strobe lights, on the vehicle during all field testing. While operating a vehicle in the grading area, the emergency flasher on the vehicle shall be activated.

In the event that the contractor's representative observes any of our personnel not following the above, we request that it be brought to the attention of our office.

Test Pits Location, Orientation, and Clearance

The technician is responsible for selecting test pit locations. A primary concern should be the technician's safety. Efforts will be made to coordinate locations with the grading contractor's authorized representative, and to select locations following or behind the established traffic pattern, preferably outside of current traffic. The contractor's authorized representative (supervisor, grade checker, dump man, operator, etc.) should direct excavation of the pit and safety during the test period. Of paramount concern should be the soil technician's safety, and obtaining enough tests to represent the fill.

Test pits should be excavated so that the spoil pile is placed away from oncoming traffic, whenever possible. The technician's vehicle is to be placed next to the test pit, opposite the spoil pile. This necessitates the fill be maintained in a driveable condition. Alternatively, the contractor may wish to park a piece of equipment in front of the test holes, particularly in small fill areas or those with limited access.

A zone of non-encroachment should be established for all test pits. No grading equipment should enter this zone during the testing procedure. The zone should extend approximately 50 feet outward from the center of the test pit. This zone is established for safety and to avoid excessive ground vibration, which typically decreases test results.

When taking slope tests, the technician should park the vehicle directly above or below the test location. If this is not possible, a prominent flag should be placed at the top of the slope. The contractor's representative should effectively keep all equipment at a safe operational distance (e.g., 50 feet) away from the slope during this testing.

The technician is directed to withdraw from the active portion of the fill as soon as possible following testing. The technician's vehicle should be parked at the perimeter of the fill in a highly visible location, well away from the equipment traffic pattern. The contractor should inform our personnel of all changes to haul roads, cut and fill areas or other factors that may affect site access and site safety.

In the event that the technician's safety is jeopardized or compromised as a result of the contractor's failure to comply with any of the above, the technician is required, by company policy, to immediately withdraw and notify his/her supervisor. The grading contractor's representative will be contacted in an effort to affect a solution. However, in the interim, no further testing will be performed until the situation is rectified. Any fill placed can be considered unacceptable and subject to reprocessing, recompaction, or removal.

In the event that the soil technician does not comply with the above or other established safety guidelines, we request that the contractor bring this to the technician's attention and notify this office. Effective communication and coordination between the contractor's representative and the soil technician is strongly encouraged in order to implement the above safety plan.

Trench and Vertical Excavation

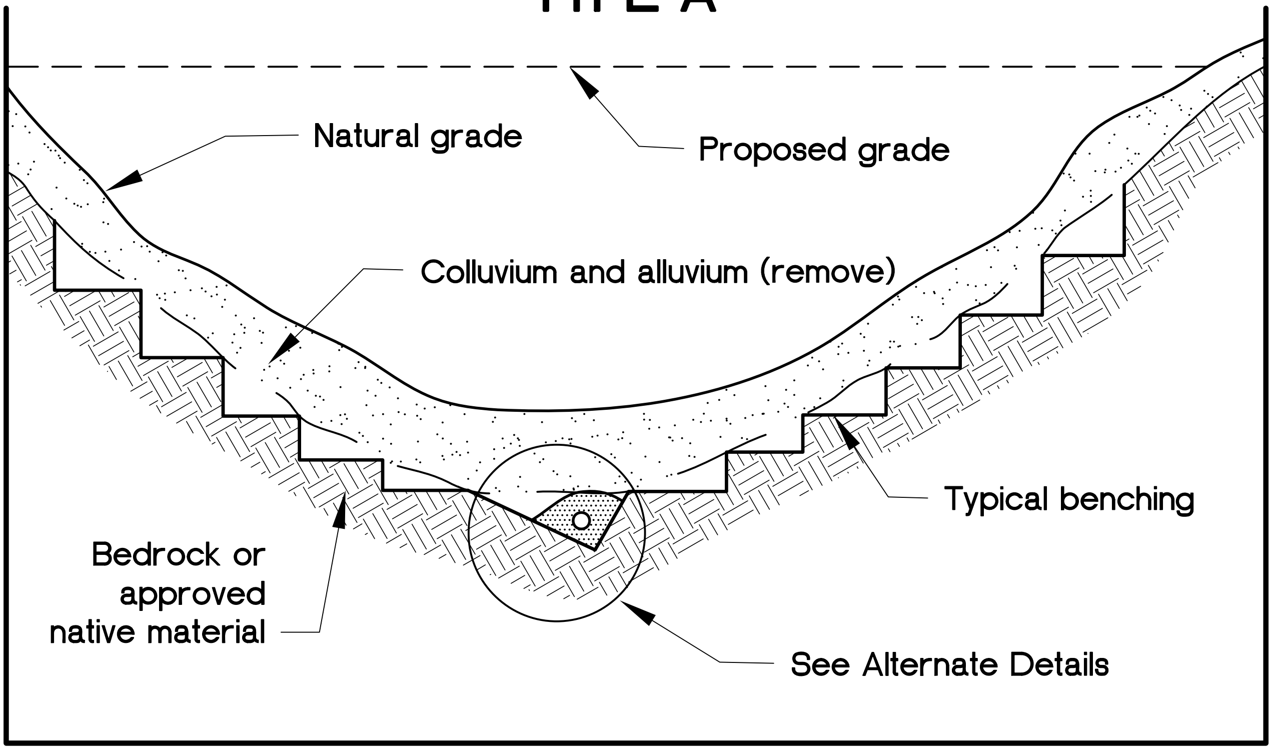
It is the contractor's responsibility to provide safe access into trenches where compaction testing is needed. Our personnel are directed not to enter any excavation or vertical cut which: 1) is 5 feet or deeper unless shored or laid back; 2) displays any evidence of instability, has any loose rock or other debris which could fall into the trench; or 3) displays any other evidence of any unsafe conditions regardless of depth.

All trench excavations or vertical cuts in excess of 5 feet deep, which any person enters, should be shored or laid back. Trench access should be provided in accordance with Cal/OSHA and/or state and local standards. Our personnel are directed not to enter any trench by being lowered or "riding down" on the equipment.

If the contractor fails to provide safe access to trenches for compaction testing, our company policy requires that the soil technician withdraw and notify his/her supervisor. The contractor's representative will be contacted in an effort to affect a solution. All backfill not tested due to safety concerns or other reasons could be subject to reprocessing and/or removal.

If GSI personnel become aware of anyone working beneath an unsafe trench wall or vertical excavation, we have a legal obligation to put the contractor and owner/developer on notice to immediately correct the situation. If corrective steps are not taken, GSI then has an obligation to notify Cal/OSHA and/or the proper controlling authorities.

TYPE A



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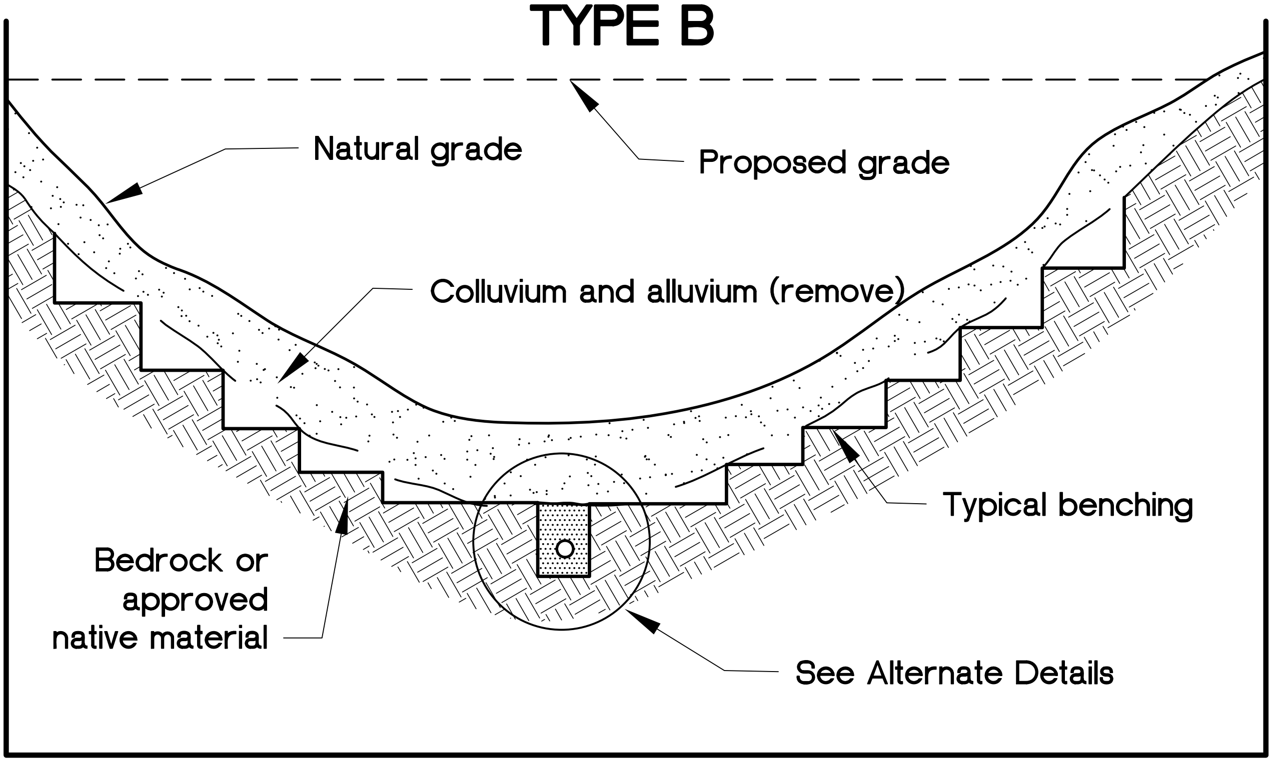
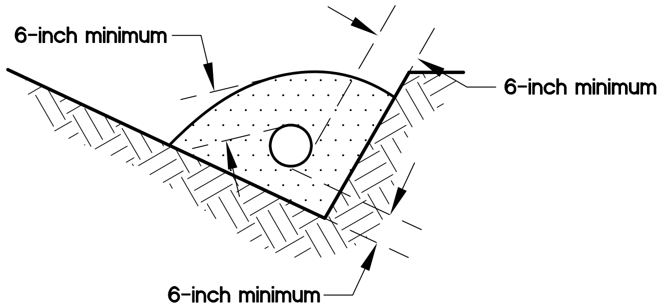
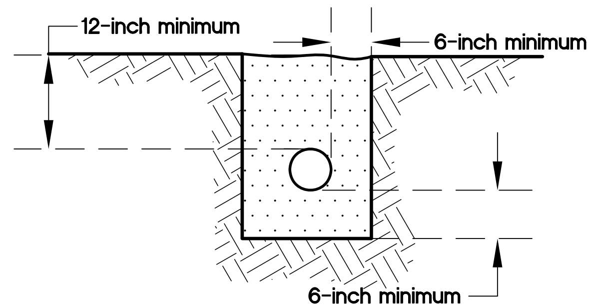


Selection of alternate subdrain details, location, and extent of subdrains should be evaluated by the geotechnical consultant during grading.

GeoSoils, Inc.	CANYON SUBDRAIN DETAIL	Plate F-1



A-1



B-1

Filter material: Minimum volume of 9 cubic feet per lineal foot of pipe.

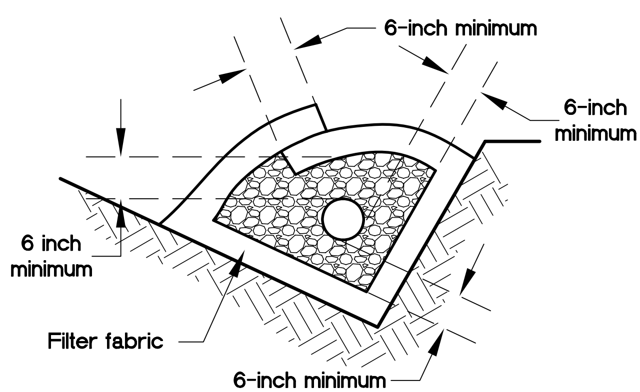
Perforated pipe: 6-inch-diameter ABS or PVC pipe or approved substitute with minimum 8 perforations (¼-inch diameter) per lineal foot in bottom half of pipe (ASTM D-2751, SDR-35, or ASTM D-1527, Schd. 40).

For continuous run in excess of 500 feet, use 8-inch-diameter pipe (ASTM D-3034, SDR-35, or ASTM D-1785, Schd. 40).

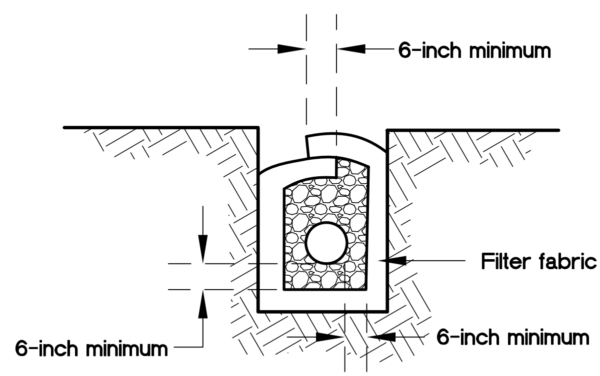
FILTER MATERIAL

Sieve Size	Percent Passing
1 inch	100
¾ inch	90-100
⅜ inch	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

ALTERNATE 1: PERFORATED PIPE AND FILTER MATERIAL



A-2

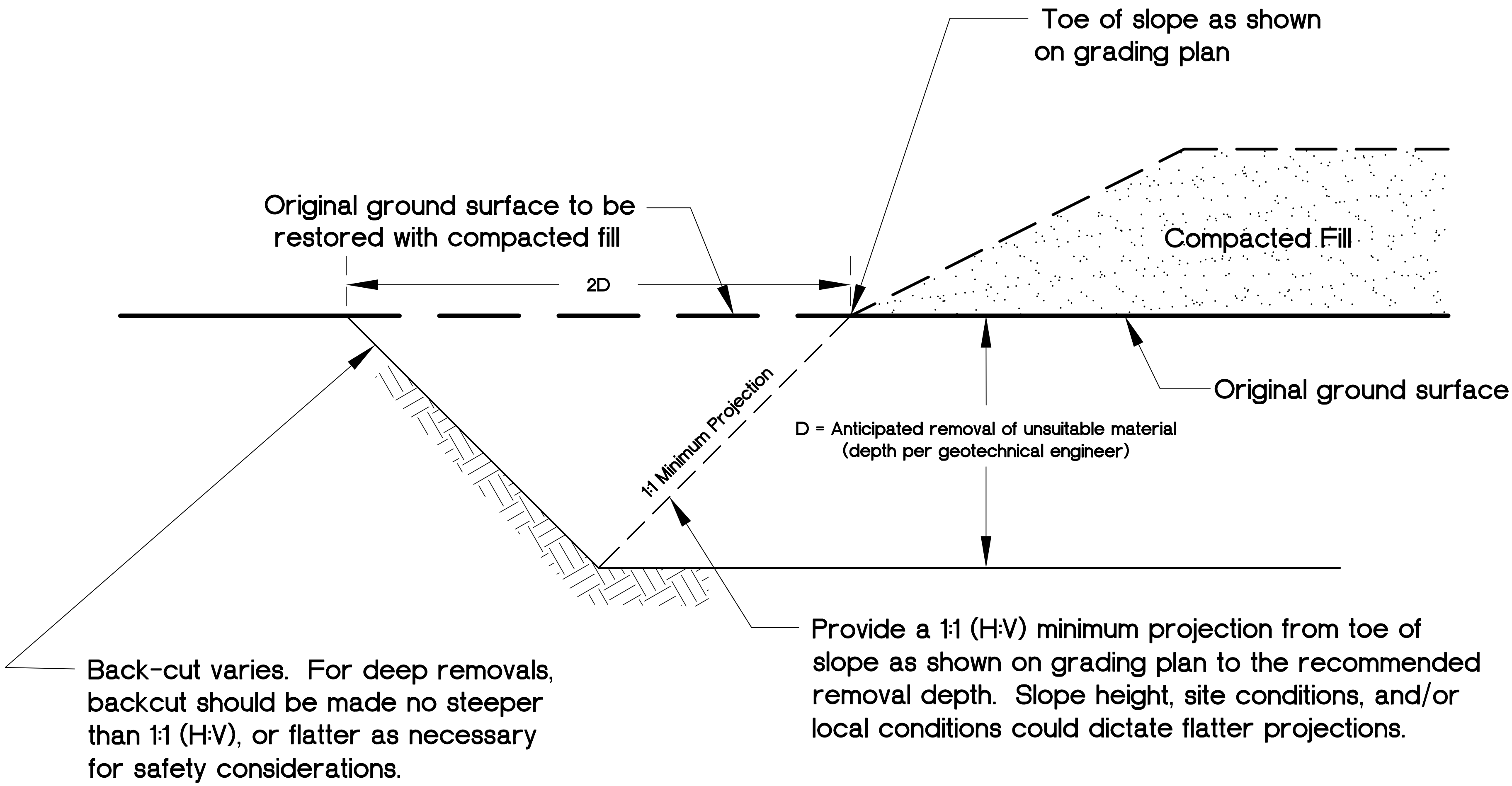


B-2

Gravel Material: 9 cubic feet per lineal foot.
Perforated Pipe: See Alternate 1
Gravel: Clean ¾-inch rock or approved substitute.
Filter Fabric: Mirafi 140 or approved substitute.

ALTERNATE 2: PERFORATED PIPE, GRAVEL, AND FILTER FABRIC

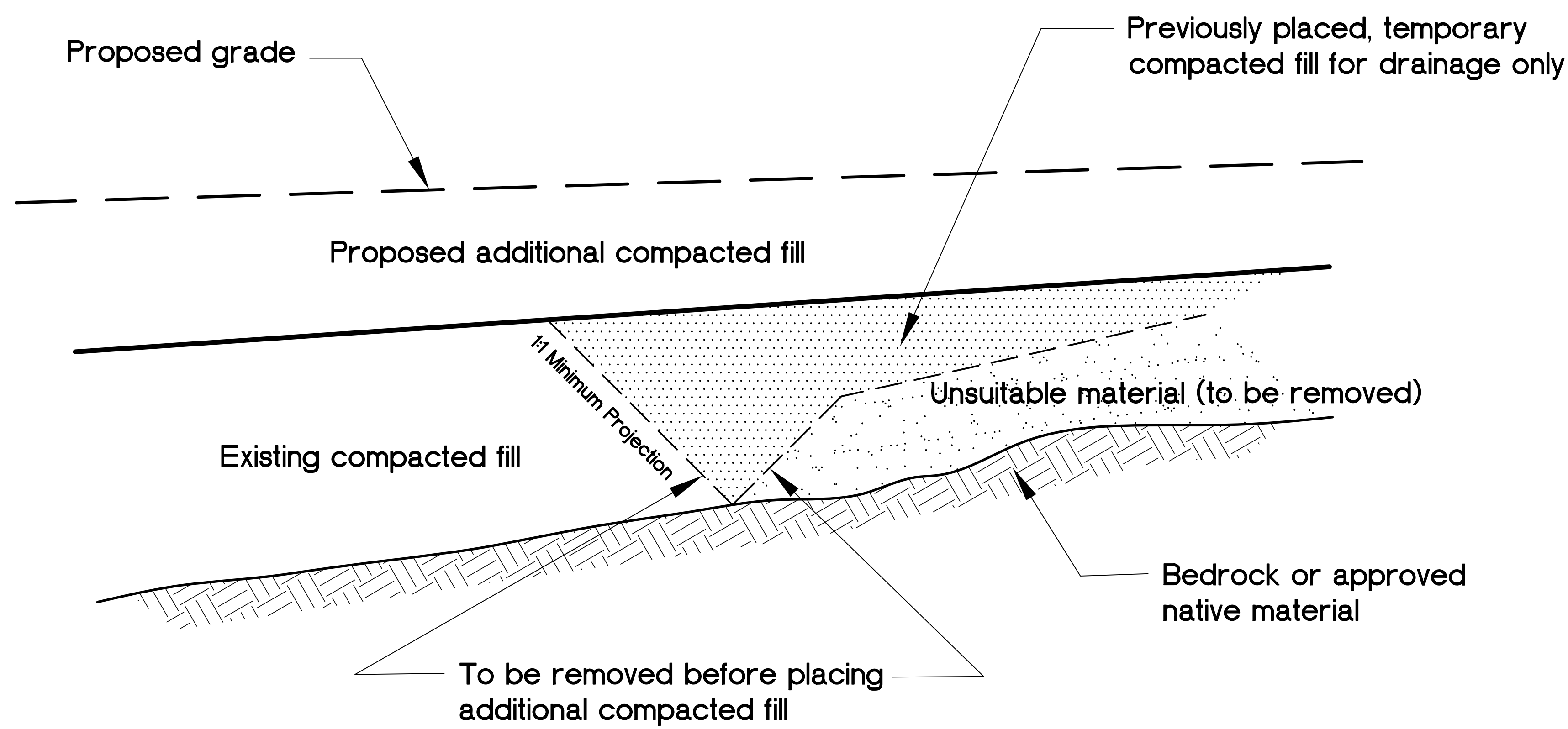
GeoSoils, Inc.	CANYON SUBDRAIN ALTERNATE DETAILS	Plate F-2



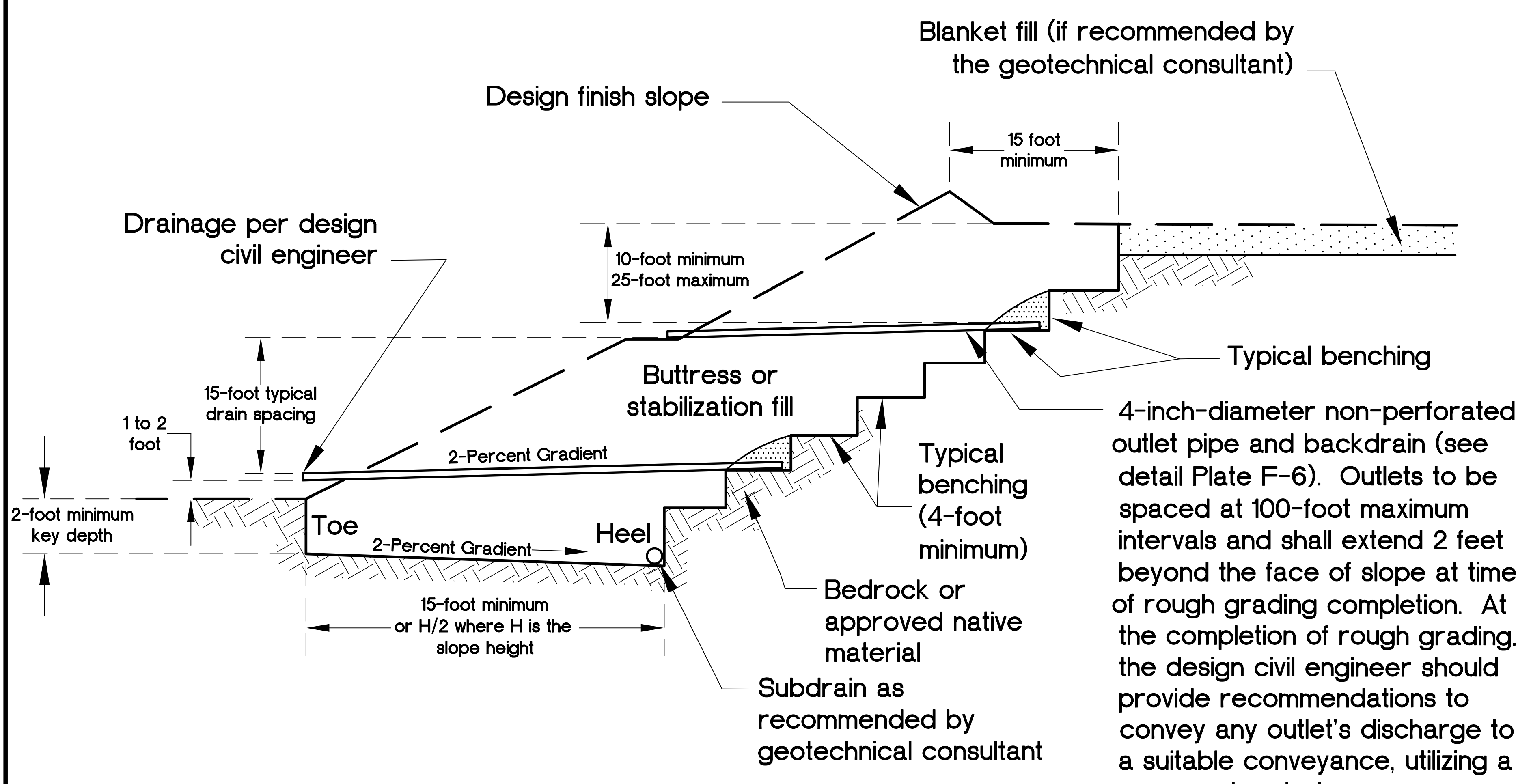
GeoSoils, Inc.

FILL SLOPE TOEING OUT ON FLAT ALLUVIATED CANYON DETAIL

Plate F-3



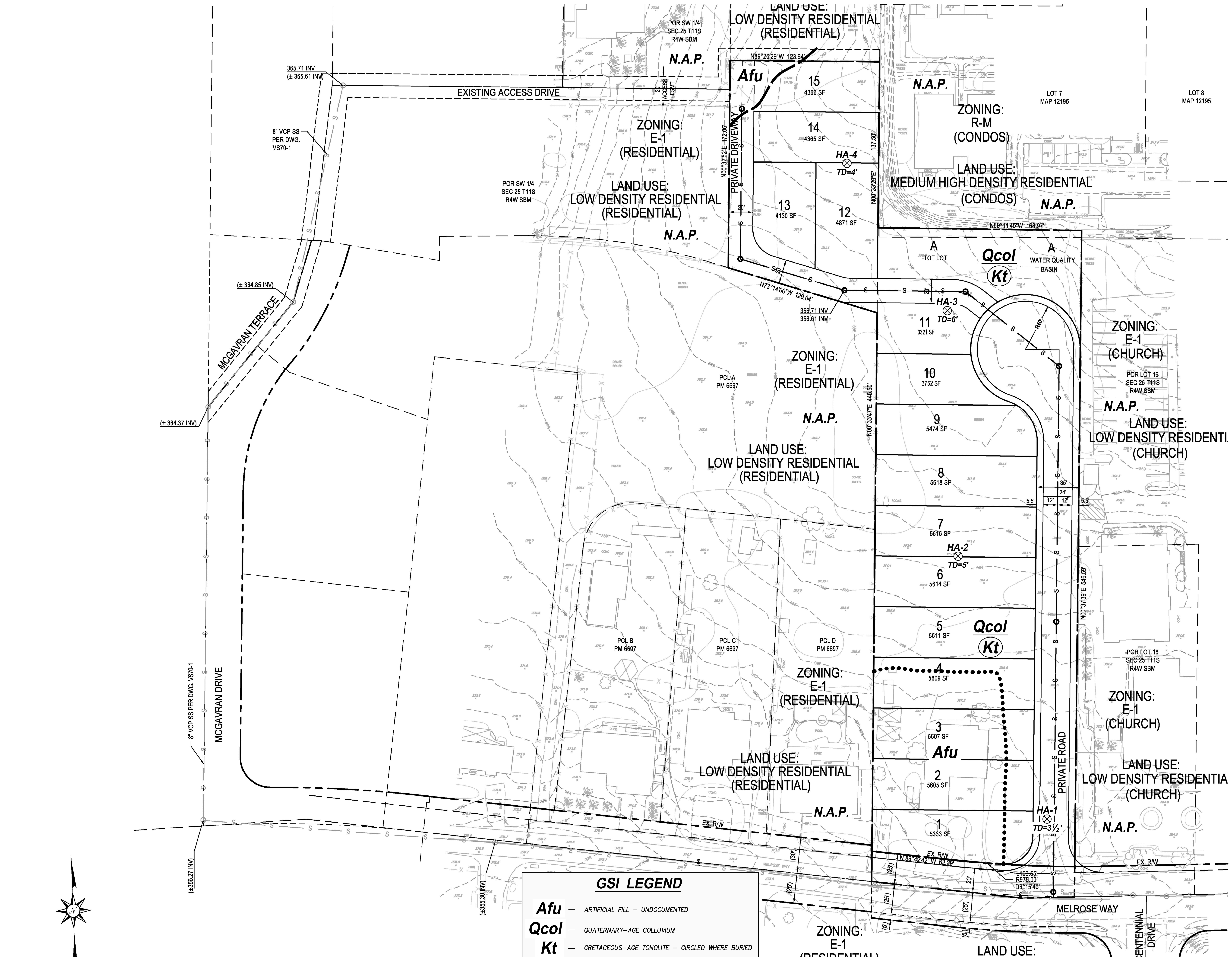
GeoSoils, Inc. | REMOVAL ADJACENT TO EXISTING FILL ADJOINING CANYON FILL DETAIL | Plate F-4

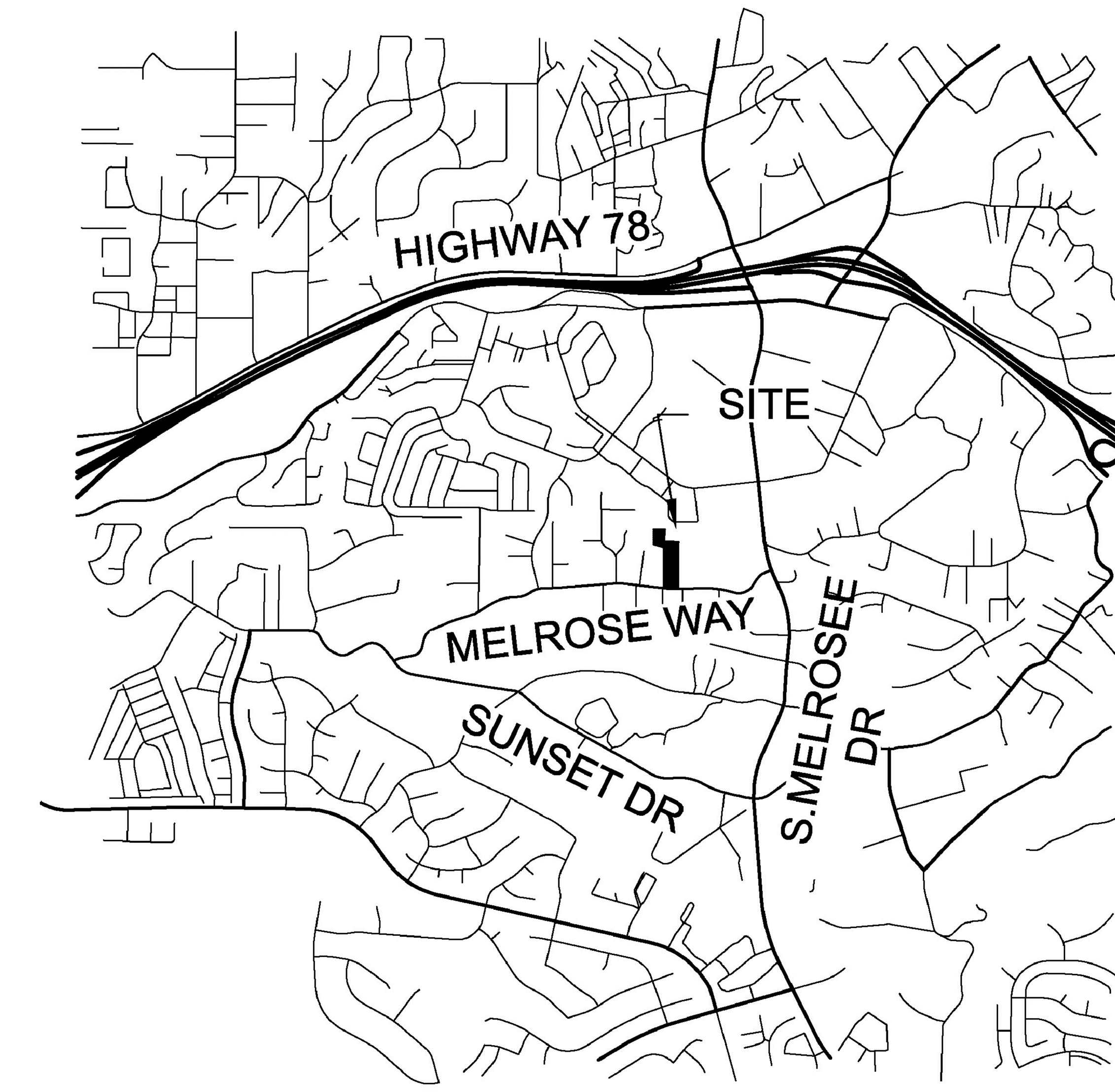


GeoSoils, Inc.

TYPICAL STABILIZATION / BUTTRESS FILL DETAIL

Plate F-5





VICINITY MAP

NOT TO SCALE

SITE INFO

APN: 166-184-10-00, 166-183-17-00

EXISTING ZONING: E-1 ESTATE RESIDENTIAL

PROPOSED ZONING: R-1

GROSS ACREAGE: 2.57 AC

NET ACREAGE: 2.22 AC

LAND USE

EXISTING USE: LOW DENSITY RESIDENTIAL (2 DU/AC)

PROPOSED USE: MEDIUM LOW DENSITY RESIDENTIAL (5 DU/AC)

TOTAL: 15 LOTS

PROPOSED DENSITY

DENSITY BONUS CALCULATION

2.57 GROSS ACRES - STREET = 2.22 NET ACRES

2.22 AC * 5 DU/AC = 11.10 DU'S

11.10 DU'S * 0.30 BONUS = 4 BONUS DU'S (rounded up)

TOTAL DU'S (11 + 4) = 15

AFFORDABLE CALCULATION

2.22 AC * 5 DU/AC = 11.10 DU'S

11.10 DU'S * 0.09 AFFORDABLE = 1 VERY LOW INCOME (rounded up)

TOTAL UNIT COUNT = 15 (1 VERY LOW INCOME)

LEGEND

RIGHT OF WAY LINE

LOT LINE

EASEMENT LINE

BUILDING SETBACK LINE

CENTERLINE

EXISTING 8" SEWER MAIN — S

PROPOSED 8" SEWER MAIN — S

CURB AND GUTTER

ALL LOCATIONS ARE APPROXIMATE

This document or efile is not a part of the Construction Documents and should not be relied upon as being an accurate depiction of design.

GSI LEGEND

Afu	— ARTIFICIAL FILL – UNDOCUMENTED
Qcol	— QUATERNARY-AGE COLLUVIUM
Kt	— CRETACEOUS-AGE TONOLITE – CIRCLED WHERE BURIED
HA-4 TD=6'	— APPROXIMATE LOCATION OF HAND-AUGER BORING
	— APPROXIMATE LOCATION OF GEOLOGIC CONTACT
	— APPROXIMATE LOCATION OF BURIED GEOLOGIC CONTACT
N.A.P.	— NOT A PART OF THIS STUDY

40' 20' 0 40' 80' 120'

SCALE: 1" = 40'

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1205 MELROSE WAY

PRE-APPLICATION EXHIBIT

PLSA JOB NO.3334

SCALE 1"=40'

09-01-2020

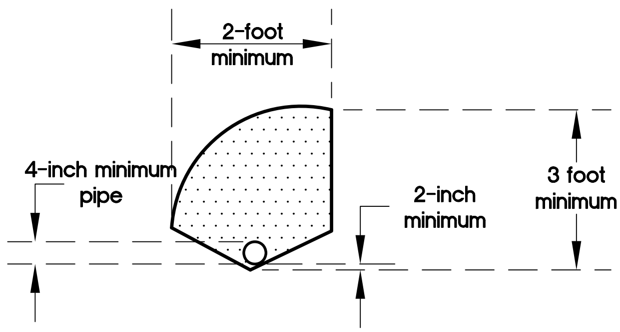
SHEET 1 OF 1

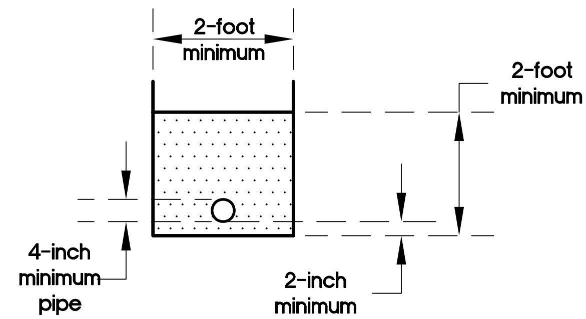
GeoSoils, Inc.

GEOTECHNICAL MAP

Figure 2

W.O. 8058-A-SC	DATE: 03/21	SCALE: 1" = 40'





Filter Material: Minimum of 5 cubic feet per lineal foot of pipe or 4 cubic feet per lineal feet of pipe when placed in square cut trench.

Alternative in Lieu of Filter Material: Gravel may be encased in approved filter fabric. Filter fabric shall be Mirafi 140 or equivalent. Filter fabric shall be lapped a minimum of 12 inches in all joints.

Minimum 4-Inch-Diameter Pipe: ABS-ASTM D-2751, SDR 35; or ASTM D-1527 Schedule 40, PVC-ASTM D-3034, SDR 35; or ASTM D-1785 Schedule 40 with a crushing strength of 1,000 pounds minimum, and a minimum of 8 uniformly-spaced perforations per foot of pipe. Must be installed with perforations down at bottom of pipe. Provide cap at upstream end of pipe. Slope at 2 percent to outlet pipe. Outlet pipe to be connected to subdrain pipe with tee or elbow.

Notes:
1. Trench for outlet pipes to be backfilled and compacted with onsite soil.
2. Backdrains and lateral drains shall be located at elevation of every bench drain. First drain located at elevation just above lower lot grade. Additional drains may be required at the discretion of the geotechnical consultant.

Filter Material shall be of the following specification or an approved equivalent.

Sieve Size	Percent Passing
1 inch	100
3/4 inch	90-100
3/8 inch	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

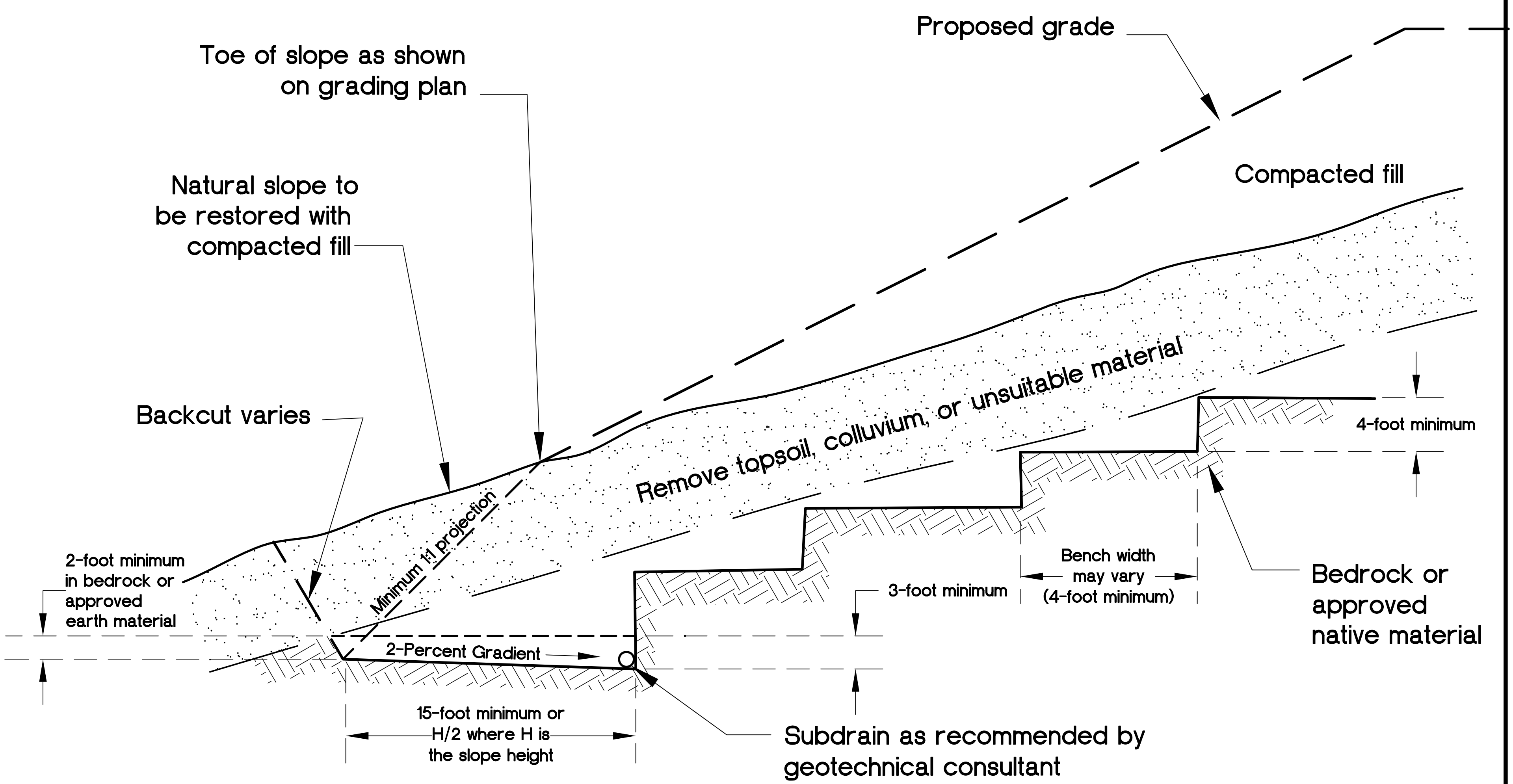
Gravel shall be of the following specification or an approved equivalent.

Sieve Size	Percent Passing
1½ inch	100
No. 4	50
No. 200	8

GeoSoils, Inc.

TYPICAL BUTTRESS SUBDRAIN DETAIL

Plate F-6

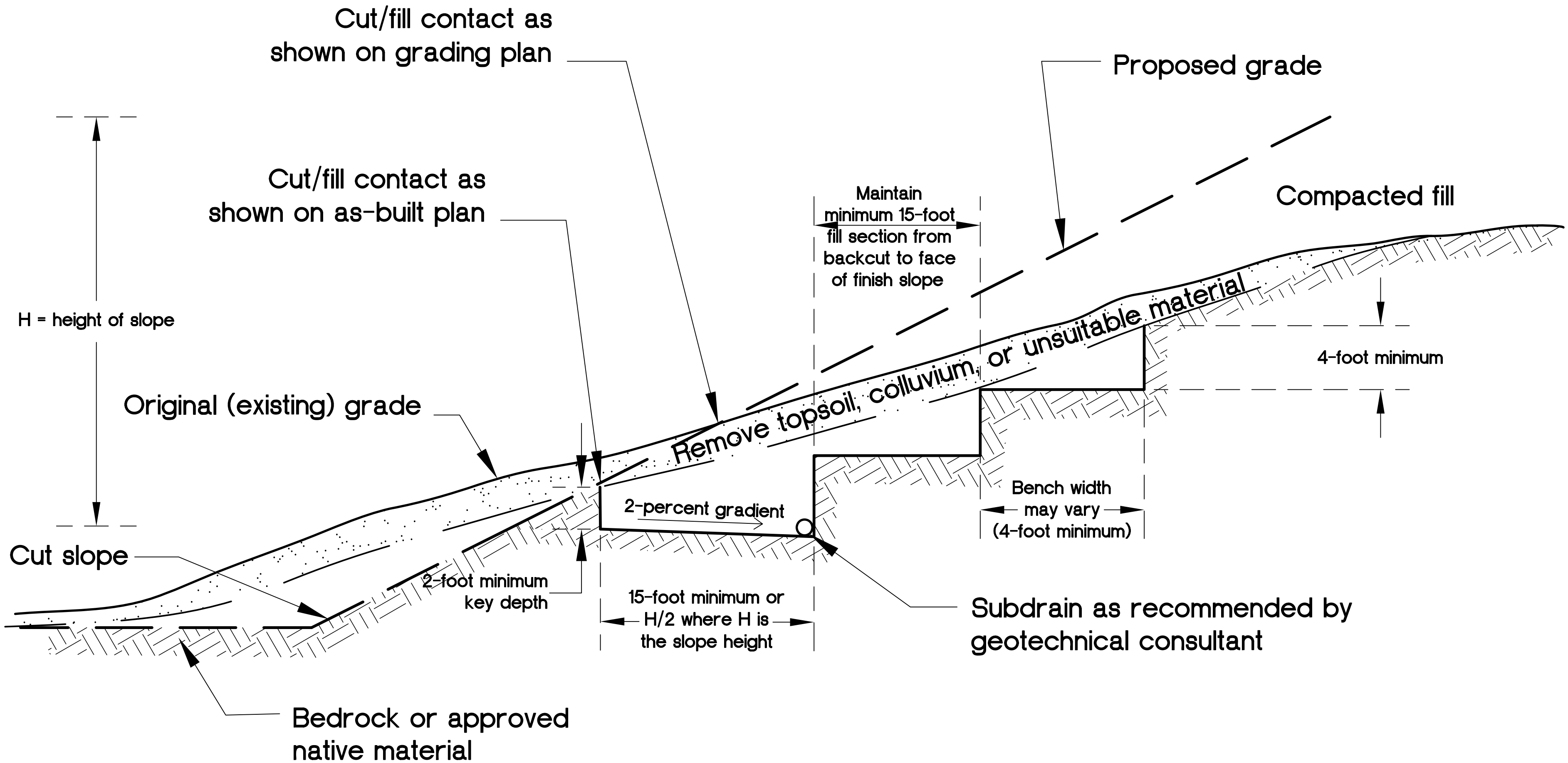


NOTES:

1. Where the natural slope approaches or exceeds the design slope ratio, special recommendations would be provided by the geotechnical consultant.

2. The need for and disposition of drains should be evaluated by the geotechnical consultant, based upon exposed conditions.

GeoSoils, Inc. | FILL OVER NATURAL (SIDEHILL FILL) DETAIL | Plate F-7

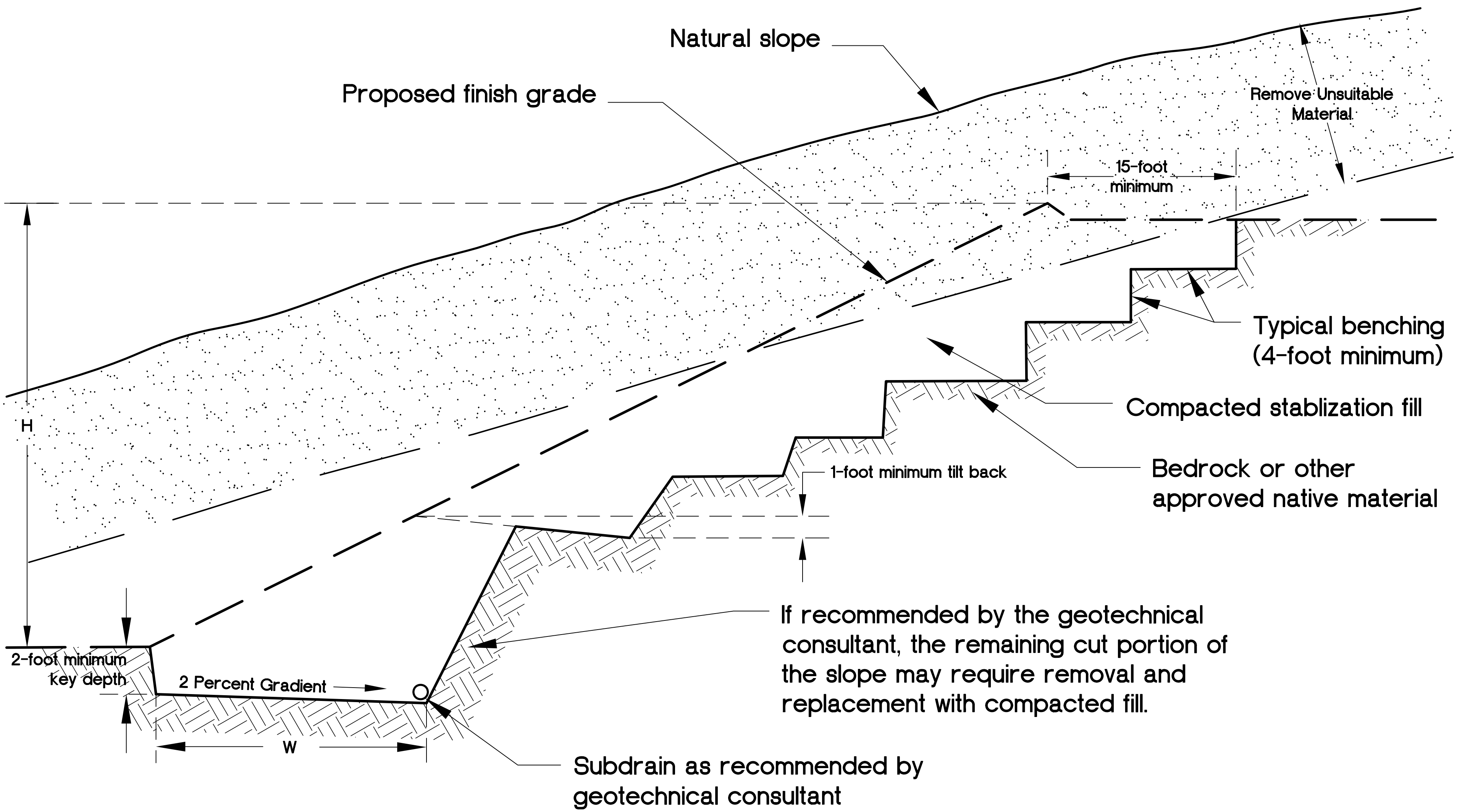


NOTE: The cut portion of the slope should be excavated and evaluated by the geotechnical consultant prior to construction of the fill portion.

GeoSoils, Inc.

FILL OVER CUT DETAIL

Plate F-8

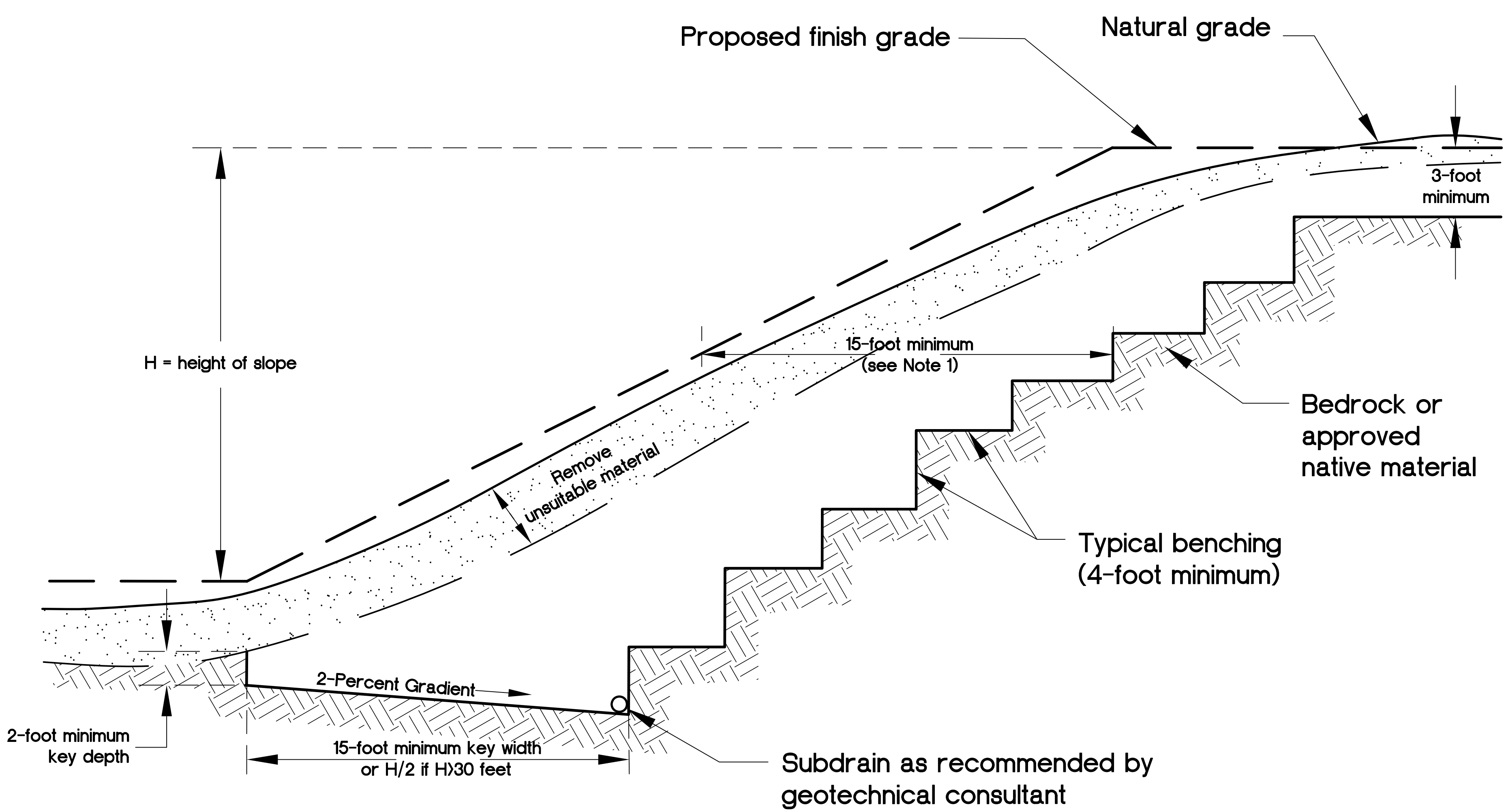


NOTES:

1. Subdrains may be required as specified by the geotechnical consultant.

2 W shall be equipment width (15 feet) for slope heights less than 25 feet. For slopes greater than 25 feet, W shall be evaluated by the geotechnical consultant. At no time, shall W be less than H/2, where H is the height of the slope.

GeoSoils, Inc.	STABLIZATION FILL FOR UNSTABLE MATERIAL EXPOSED IN CUT SLOPE DETAIL	Plate F-9

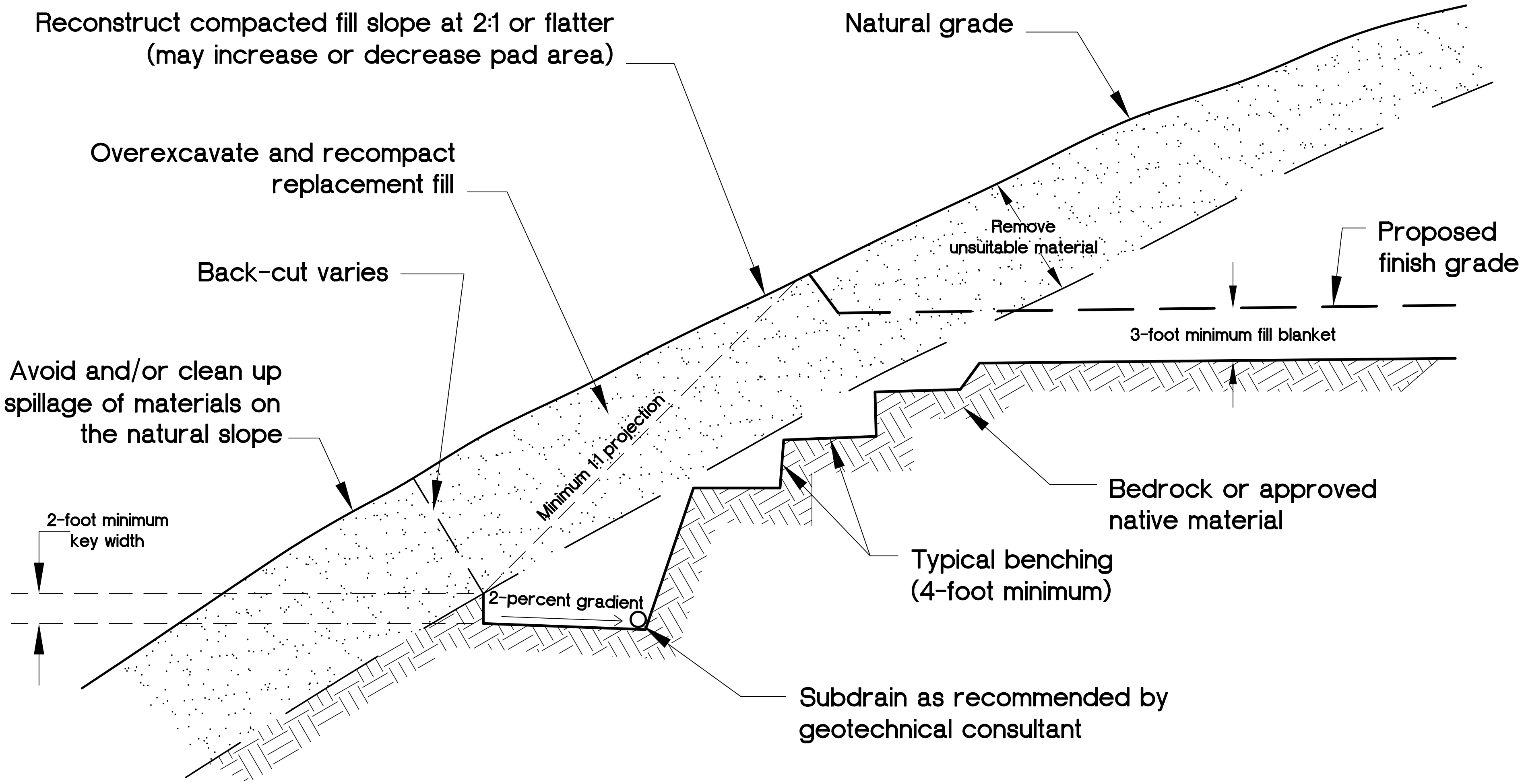


NOTES:
1. 15-foot minimum to be maintained from proposed finish slope face to backcut.
2. The need and disposition of drains will be evaluated by the geotechnical consultant based on field conditions.
3. Pad overexcavation and recompaction should be performed if evaluated to be necessary by the geotechnical consultant.

GeoSoils, Inc.

SKIN FILL OF NATURAL GROUND DETAIL

Plate F-10



NOTES:

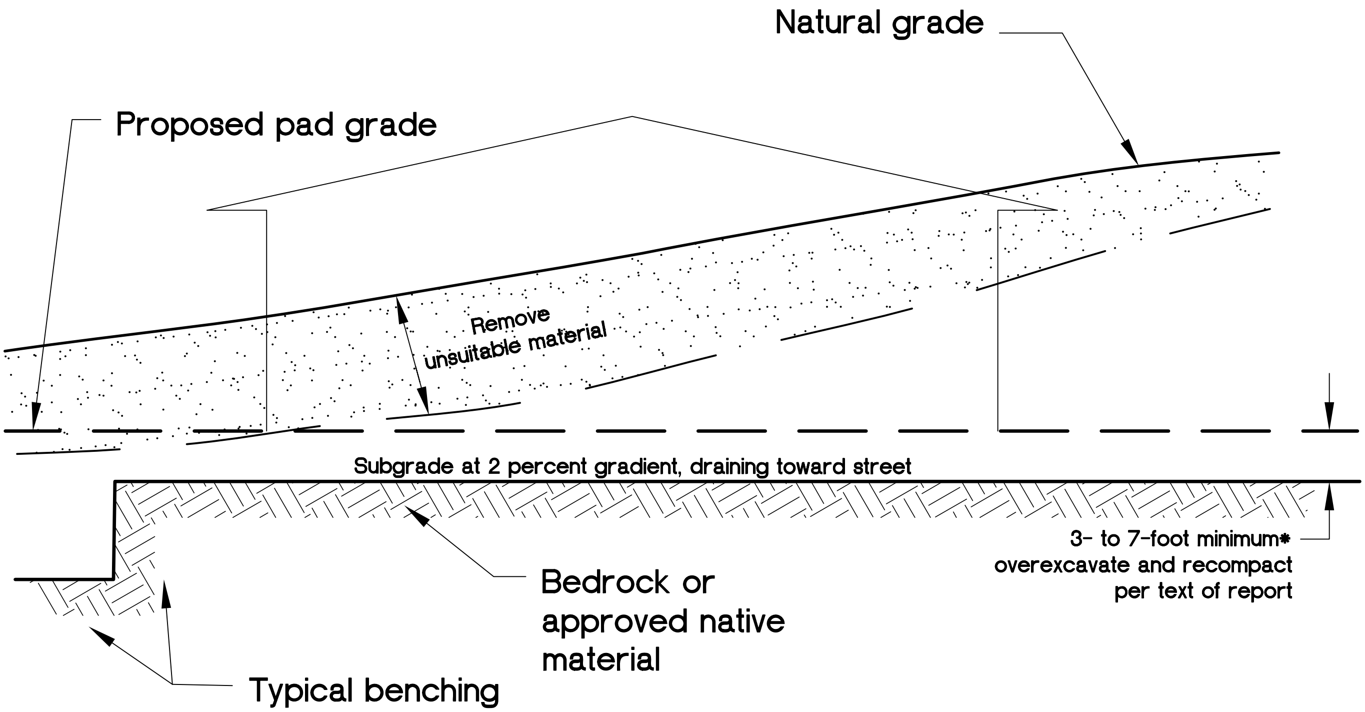
1. Subdrain and key width requirements will be evaluated based on exposed subsurface conditions and thickness of overburden.

2. Pad overexcavation and recompaction should be performed if evaluated necessary by the geotechnical consultant.

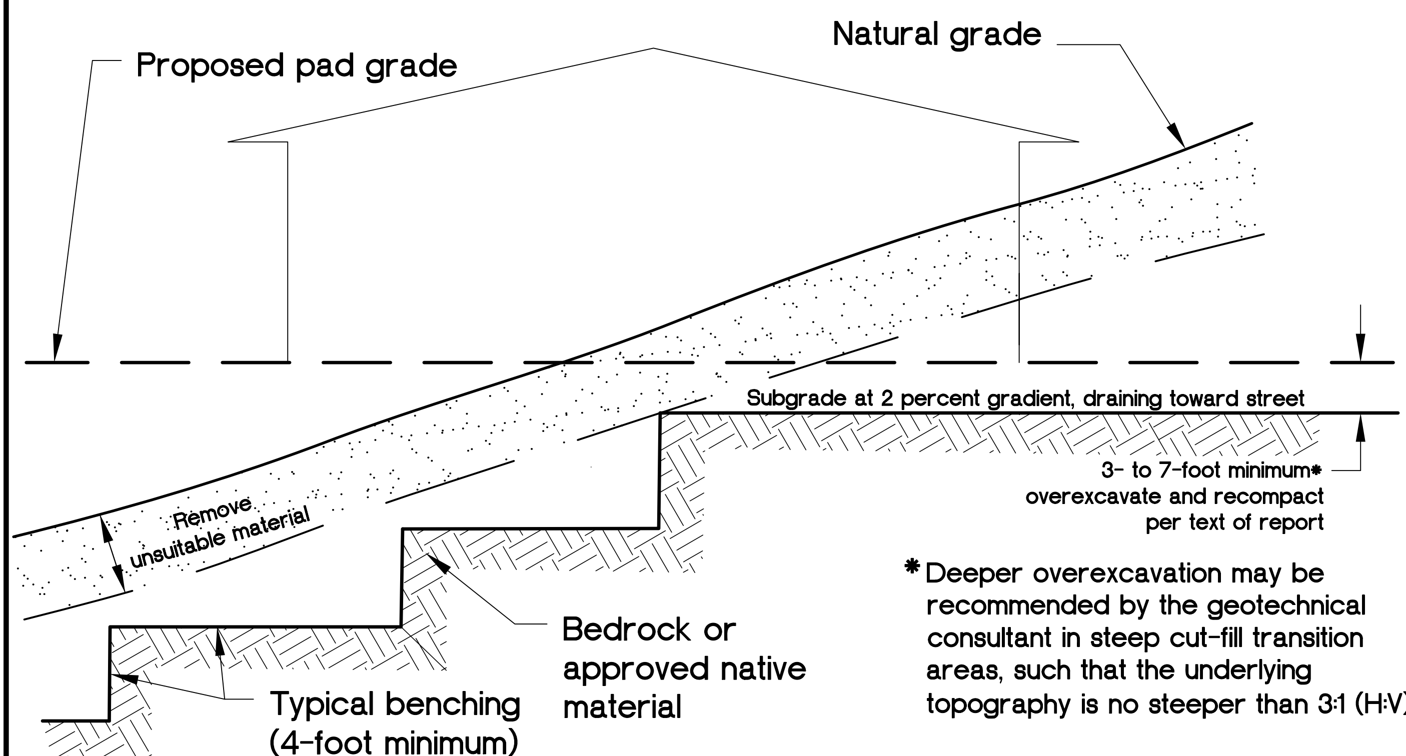
GeoSoils, Inc.

DAYLIGHT CUT LOT DETAIL

Plate F-11



CUT LOT OR MATERIAL-TYPE TRANSITION

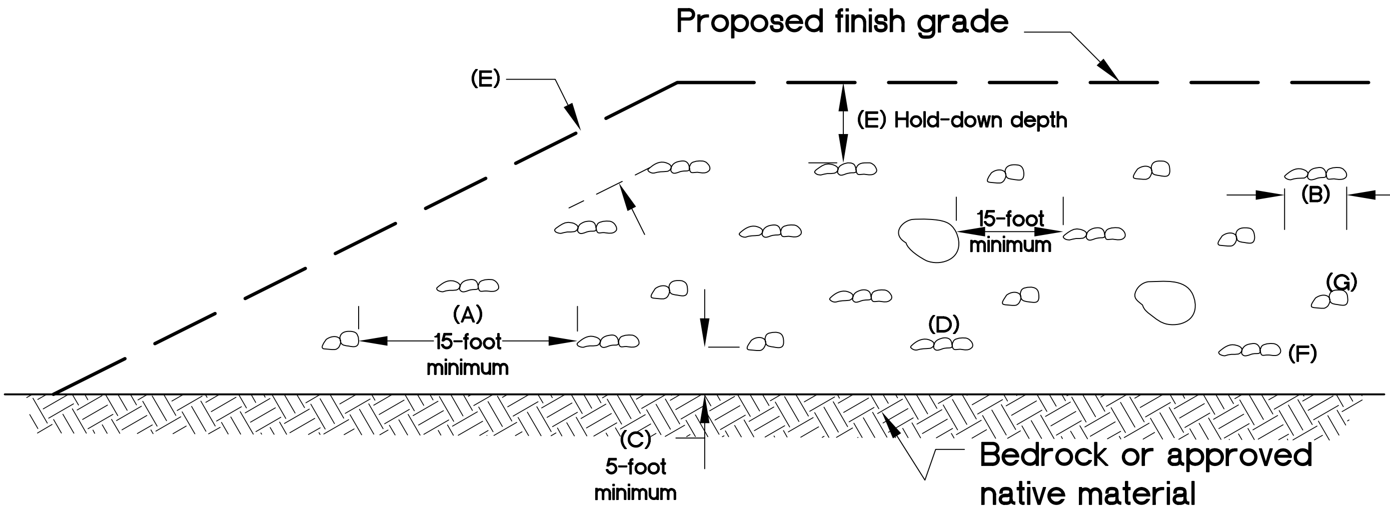


* Deeper overexcavation may be recommended by the geotechnical consultant in steep cut-fill transition areas, such that the underlying topography is no steeper than 3:1 (H:V)

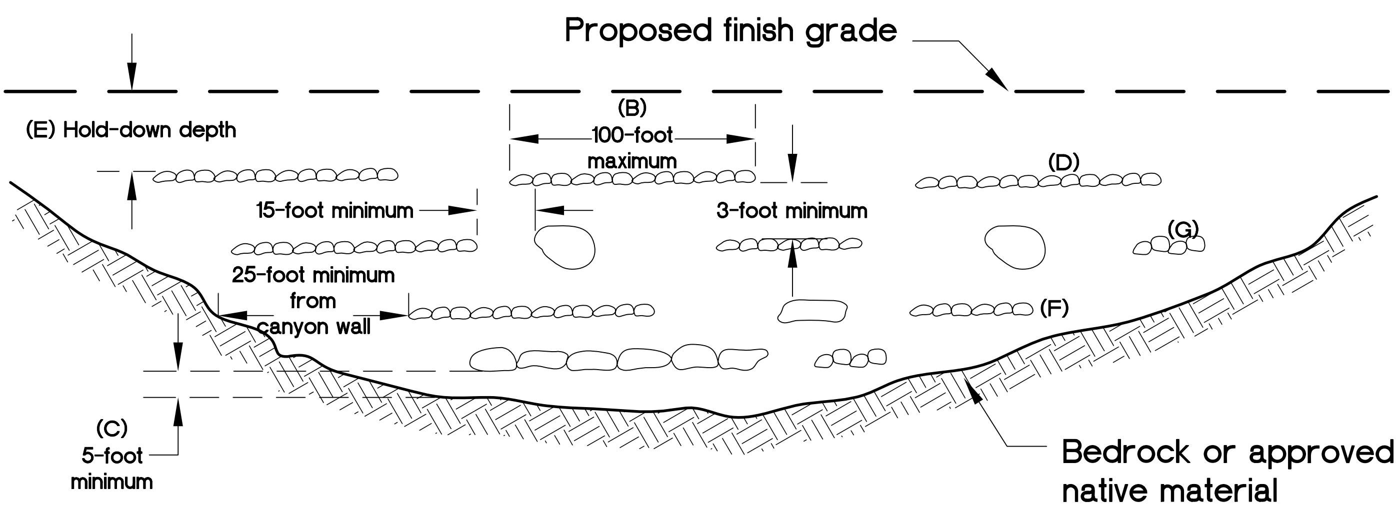
CUT-FILL LOT (DAYLIGHT TRANSITION)

GeoSoils, Inc.	TRANSITION LOT DETAILS	Plate F-12

VIEW NORMAL TO SLOPE FACE



VIEW PARALLEL TO SLOPE FACE



NOTES:

A. One equipment width or a minimum of 15 feet between rows (or windrows).

B. Height and width may vary depending on rock slze and type of equipment. Length of windrow shall be no greater than 100 feet.

C. If approved by the geotechnical consultant, windrows may be placed direclty on competent material or bedrock, provided adequate space is available for compaction.

D. Orientation of windrows may vary but should be as recommended by the geotechnical engineer and/or engineering geologist. Staggering of windrows is not necessary unless recommended.

E. Clear area for utility trenches, foundations, and swimming pools; Hold-down depth as specified in text of report, subject to governing agency approval.

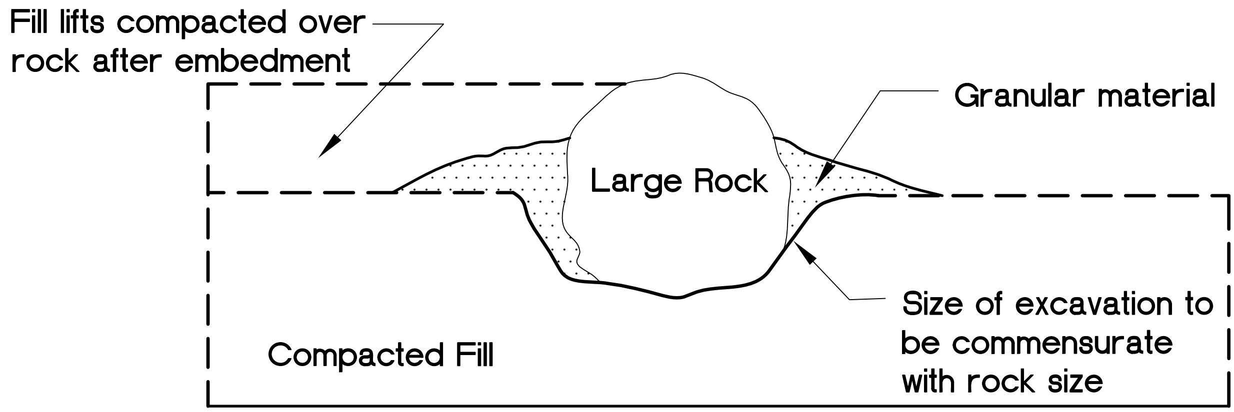
F. All fill over and around rock windrow shall be compacted to at least 90 percent relative compaction or as recommended.

G. After fill between windrows is placed and compacted, with the lift of fill covering windrow, windrow should be proof rolled with a D-9 dozer or equivalent.

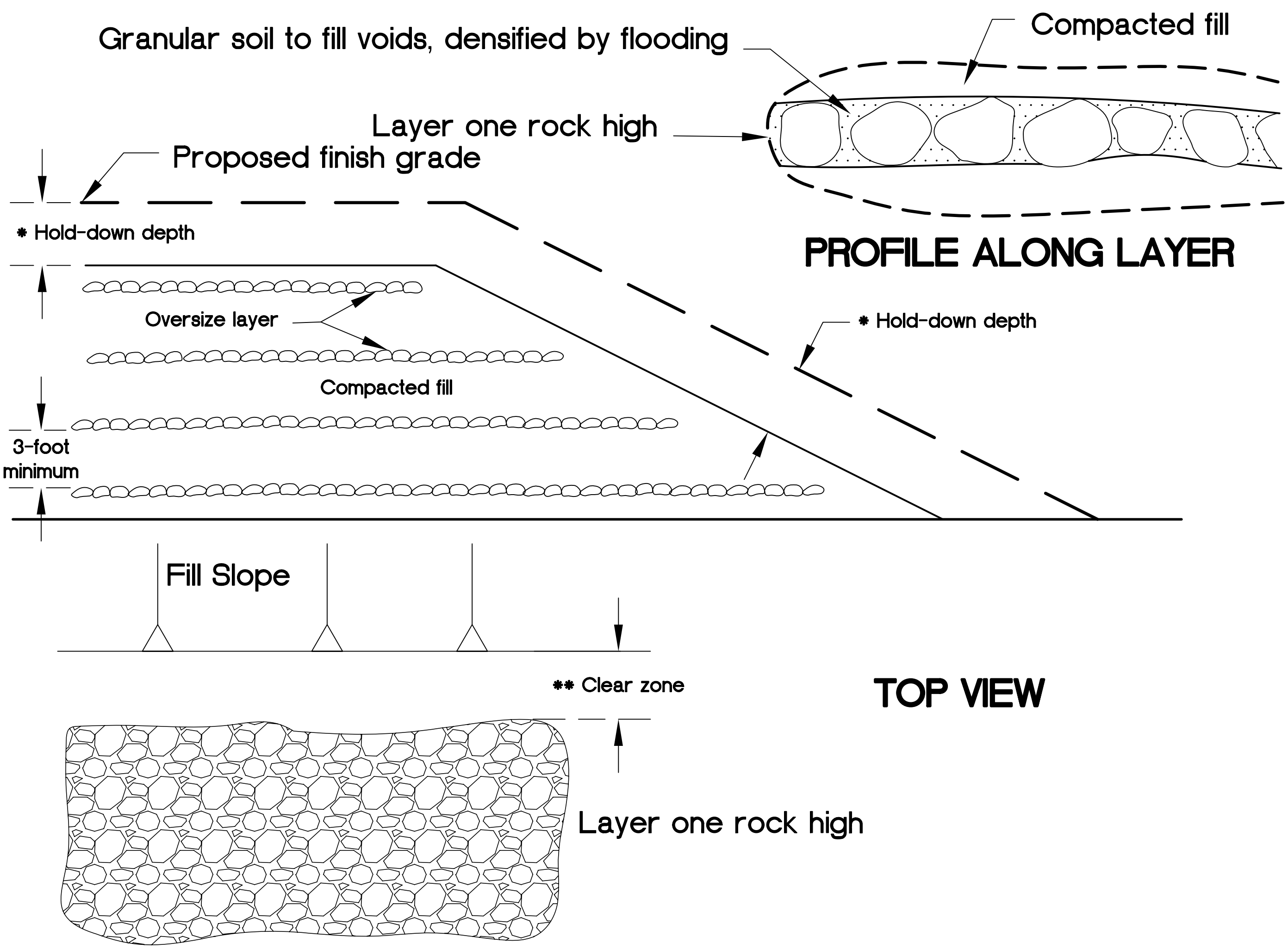
VIEWS ARE DIAGRAMMATIC ONLY AND MAY BE SUPERSEDED BY REPORT RECOMMENDATIONS OR CODE
ROCK SHOULD NOT TOUCH AND VOIDS SHOULD BE COMPLETELY FILLED

GeoSoils, Inc.	OVERSIZE ROCK DISPOSAL DETAIL	Plate F-13

ROCK DISPOSAL PITS



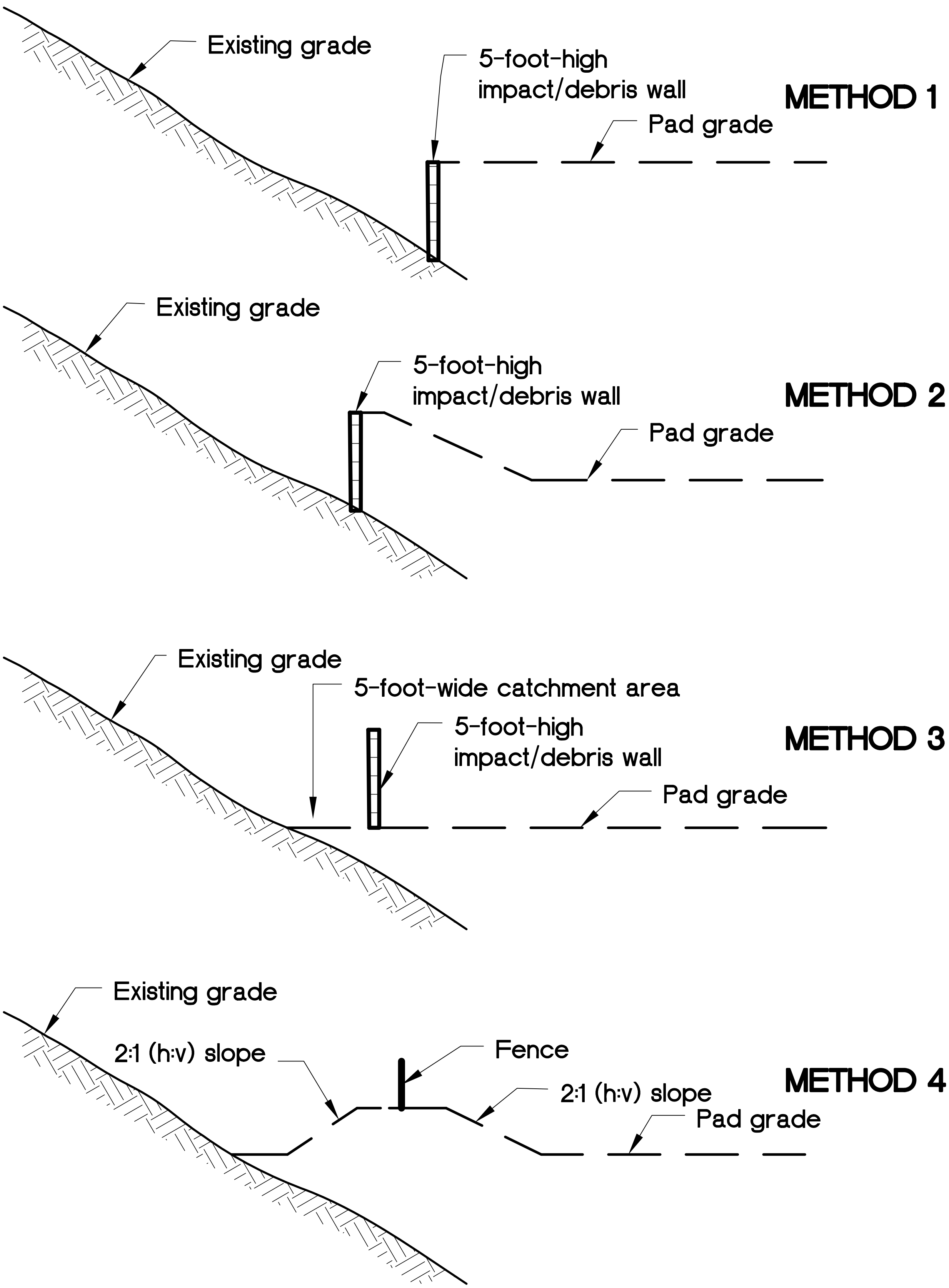
ROCK DISPOSAL LAYERS



* Hold-down depth or below lowest utility as specified in text of report, subject to governing agency approval.
** Clear zone for utility trenches, foundations, and swimming pools, as specified in text of report.

VIEWS ARE DIAGRAMMATIC ONLY AND MAY BE SUPERSEDED BY REPORT RECOMMENDATIONS OR CODE
ROCK SHOULD NOT TOUCH AND VOIDS SHOULD BE COMPLETELY FILLED IN

GeoSoils, Inc.	ROCK DISPOSAL DETAIL	Plate F-14

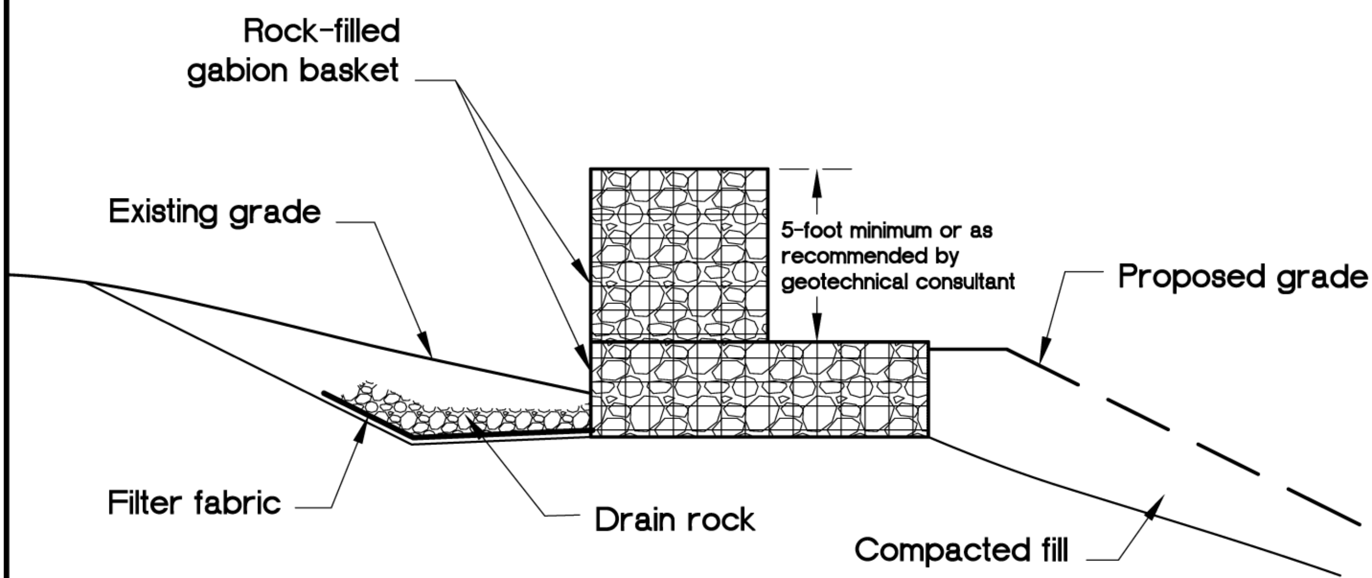


NOT TO SCALE

GeoSoils, Inc.

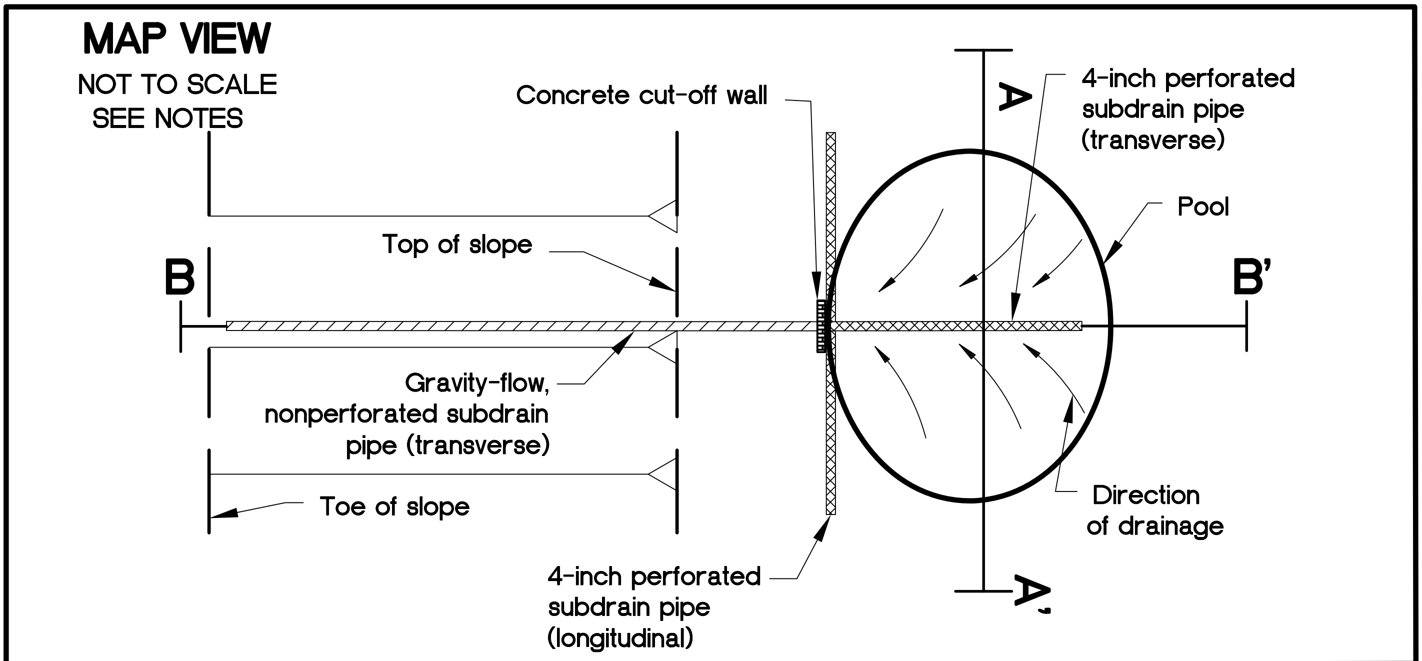
DEBRIS DEVICE CONTROL METHODS DETAIL

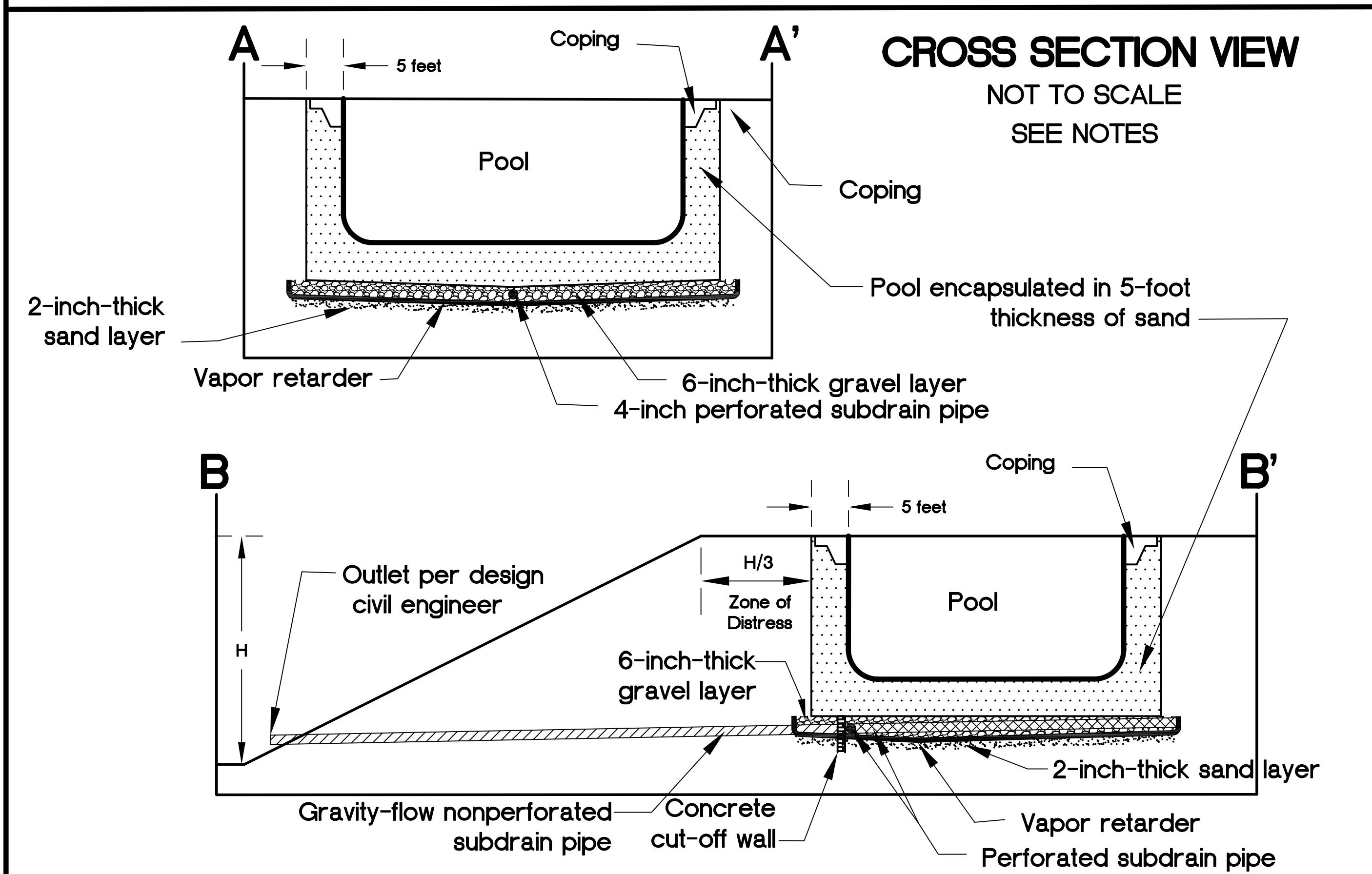
Plate F-15



Gabion impact or diversion wall should be constructed at the base of the ascending slope subject to rock fall. Walls need to be constructed with high segments that sustain impact and mitigate potential for overtopping, and low segment that provides channelization of sediments and debris to desired depositional area for subsequent clean-out. Additional subdrain may be recommended by geotechnical consultant.

From GSA, 1987





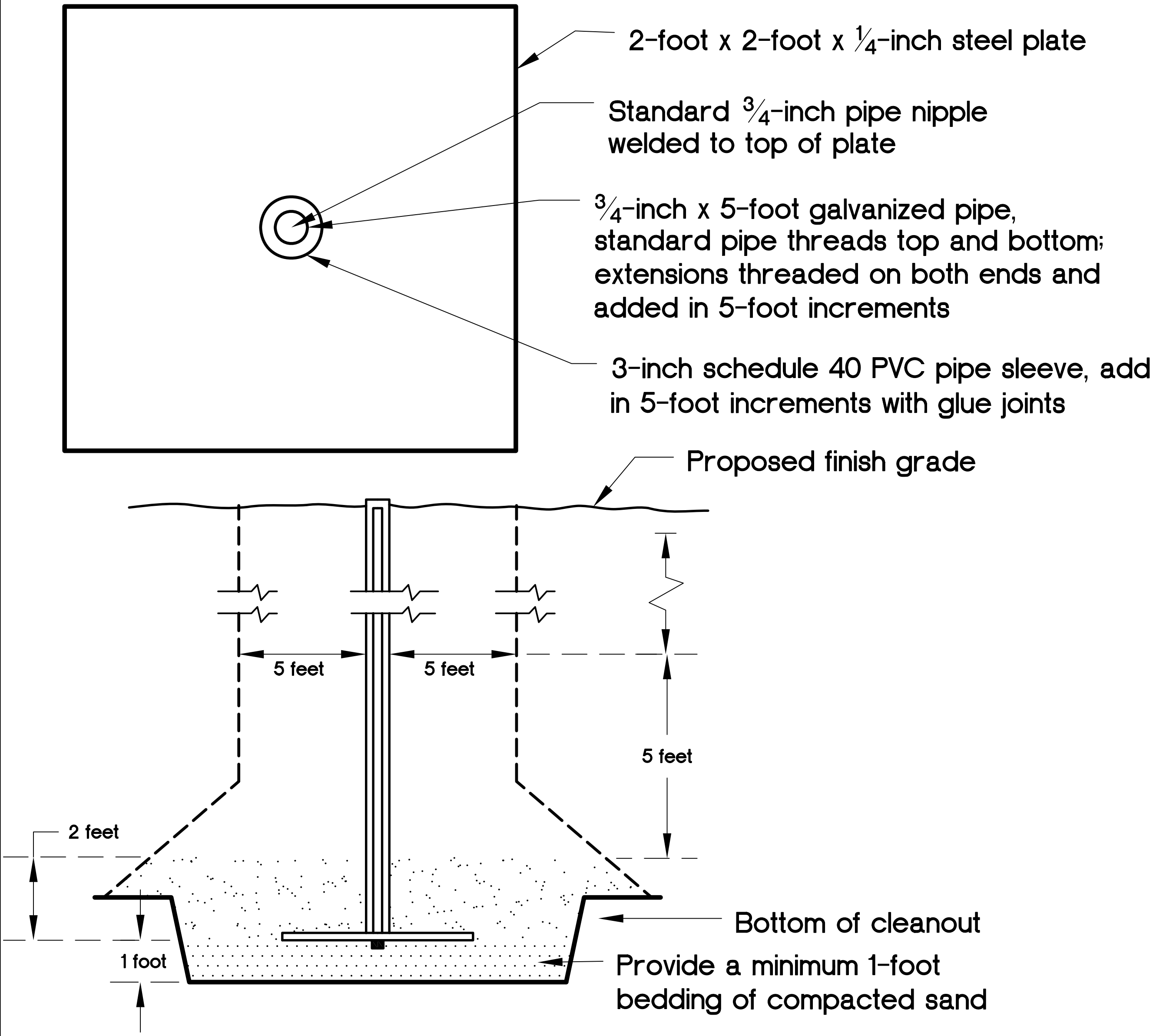
NOTES:

1. 6-inch-thick, clean gravel (3/4 to 1½ inch) sub-base encapsulated in Mirafi 140N or equivalent, underlain by a 15-mil vapor retarder, with 4-inch-diameter perforated pipe longitudinal connected to 4-inch-diameter perforated pipe transverse. Connect transverse pipe to 4-inch-diameter nonperforated pipe at low point and outlet or to sump pump area.
2. Pools on fills thicker than 20 feet should be constructed on deep foundations; otherwise, distress (tilting, cracking, etc.) should be expected.
3. Design does not apply to infinity-edge pools/spas.

GeoSoils, Inc.

TYPICAL POOL/SPA DETAIL

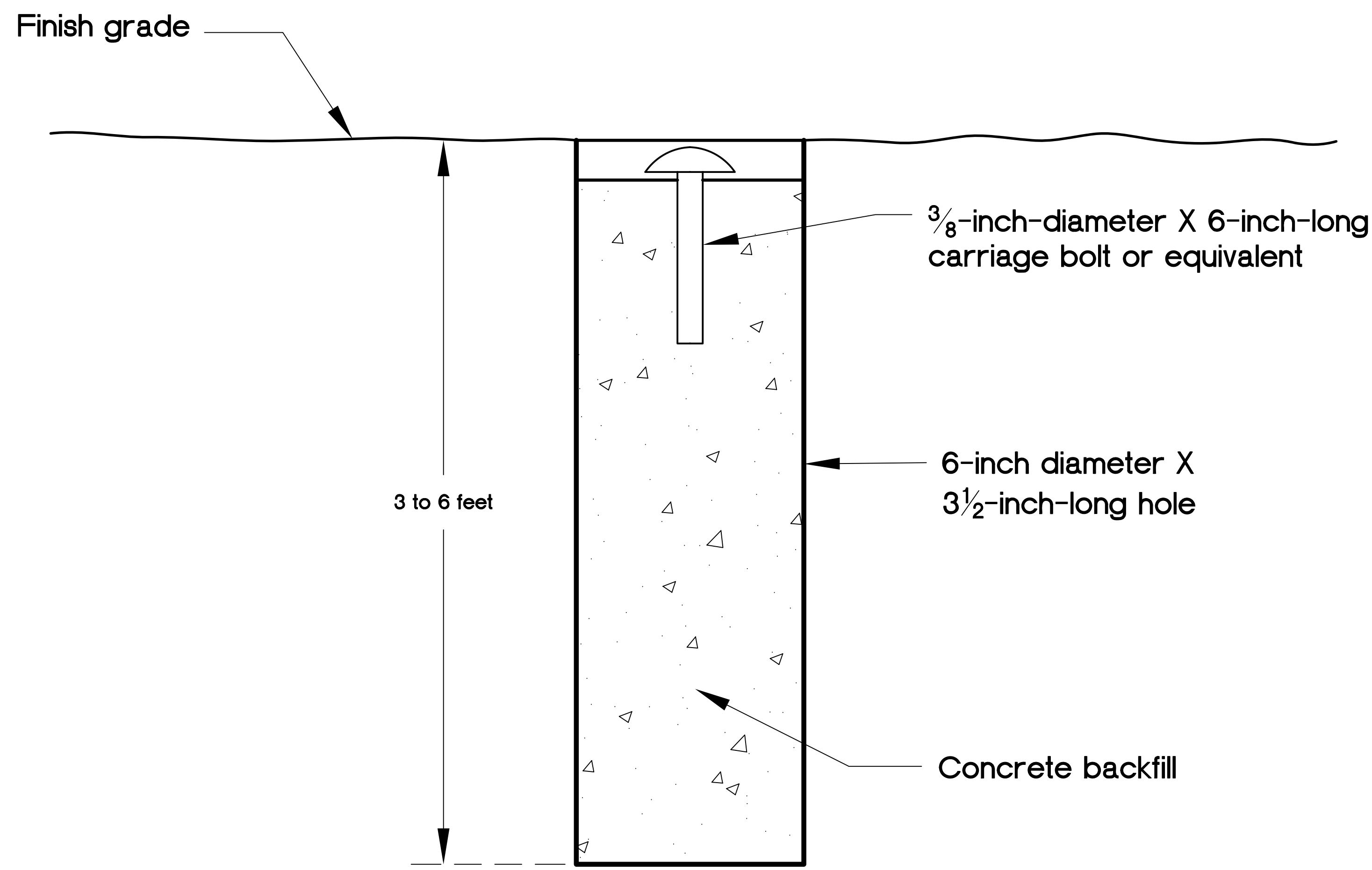
Plate F-17



NOTES:

1. Locations of settlement plates should be clearly marked and readily visible (red flagged) to equipment operators.
2. Contractor should maintain clearance of a 5-foot radius of plate base and withiin 5 feet (vertical) for heavy equipment. Fill within clearance area should be hand compacted to project specifications or compacted by alternative approved method by the geotechnical consultant (in writing, prior to construction).
3. After 5 feet (vertical) of fill is in place, contractor should maintain a 5-foot radius equipment clearance from riser.
4. Place and mechanically hand compact initial 2 feet of fill prior to establishing the initial reading.
5. In the event of damage to the settlement plate or extension resulting from equipment operating within the specified clearance area, contractor should immediately notify the geotechnical consultant and should be responsible for restoring the settlement plates to working order.
6. An alternate design and method of installation may be provided at the discretion of the geotechnical consultant.

GeoSoils, Inc. | SETTLEMENT PLATE AND RISER DETAIL | Plate F-18

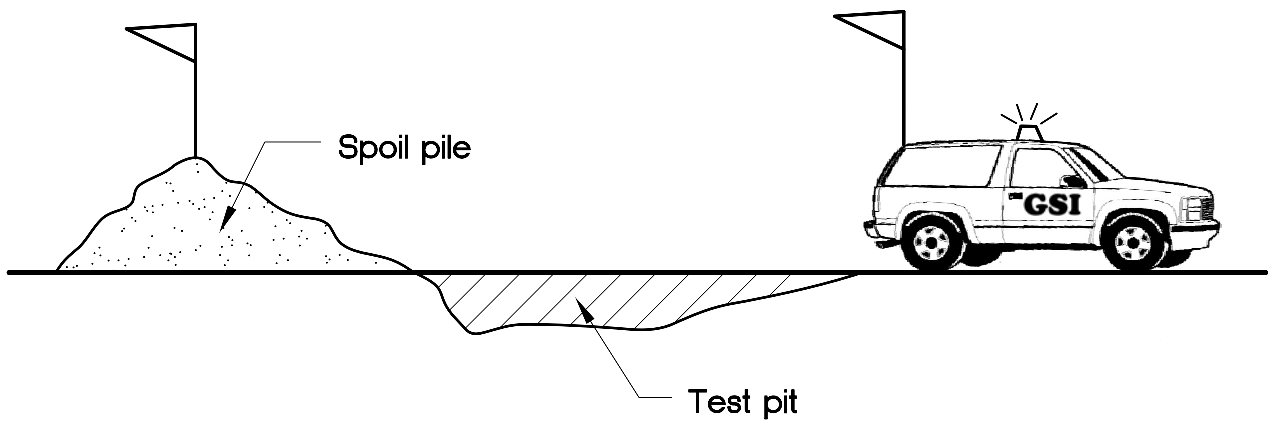


GeoSoils, Inc.

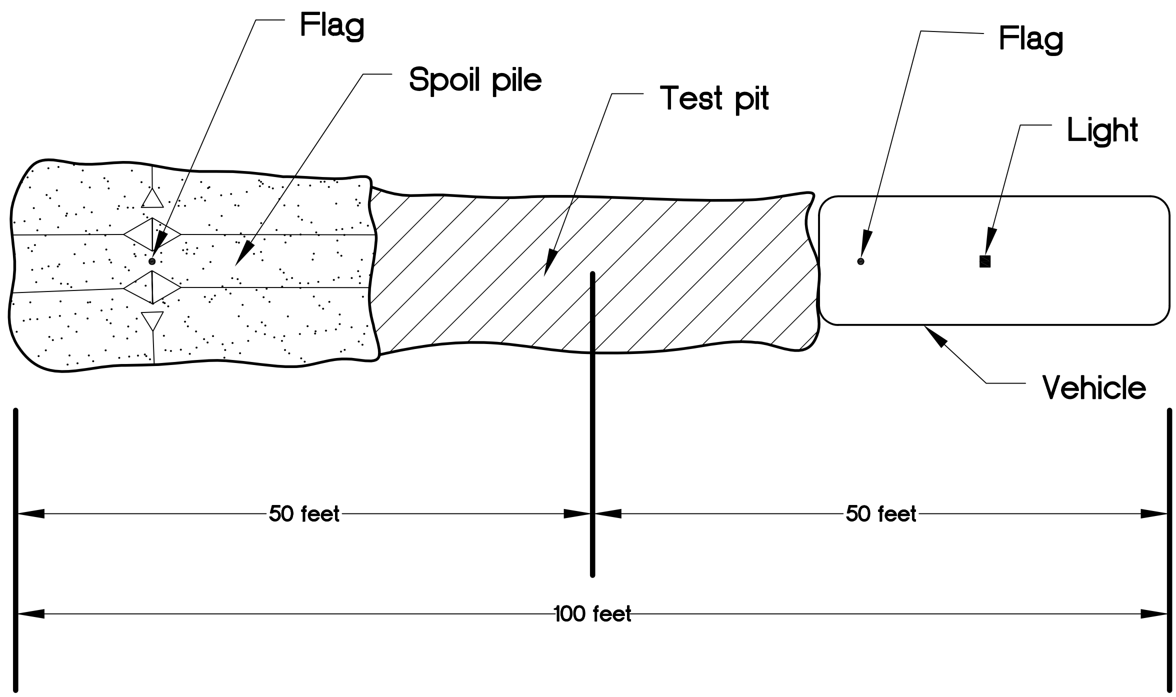
TYPICAL SURFACE SETTLEMENT MONUMENT

Plate F-19

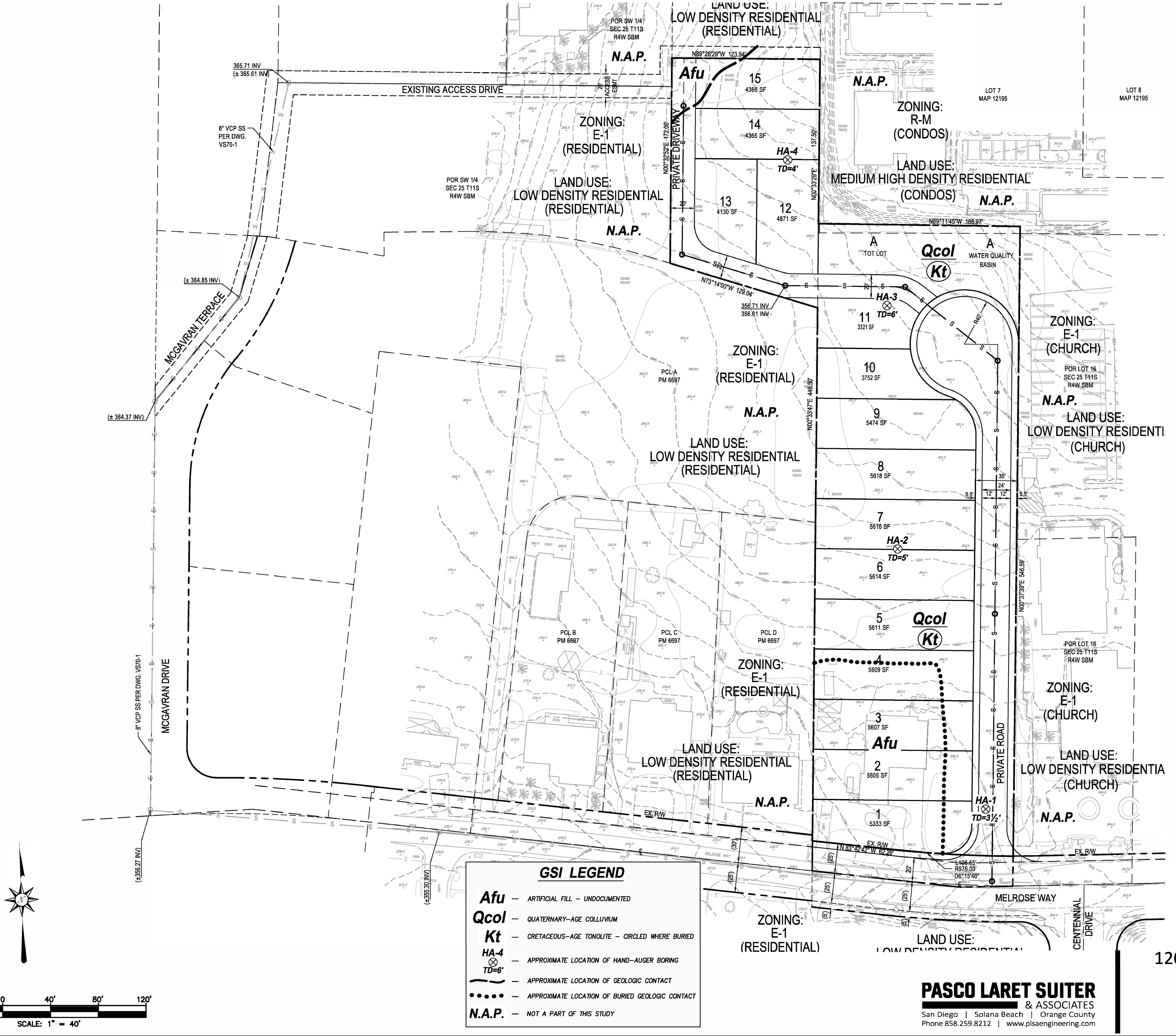
SIDE VIEW

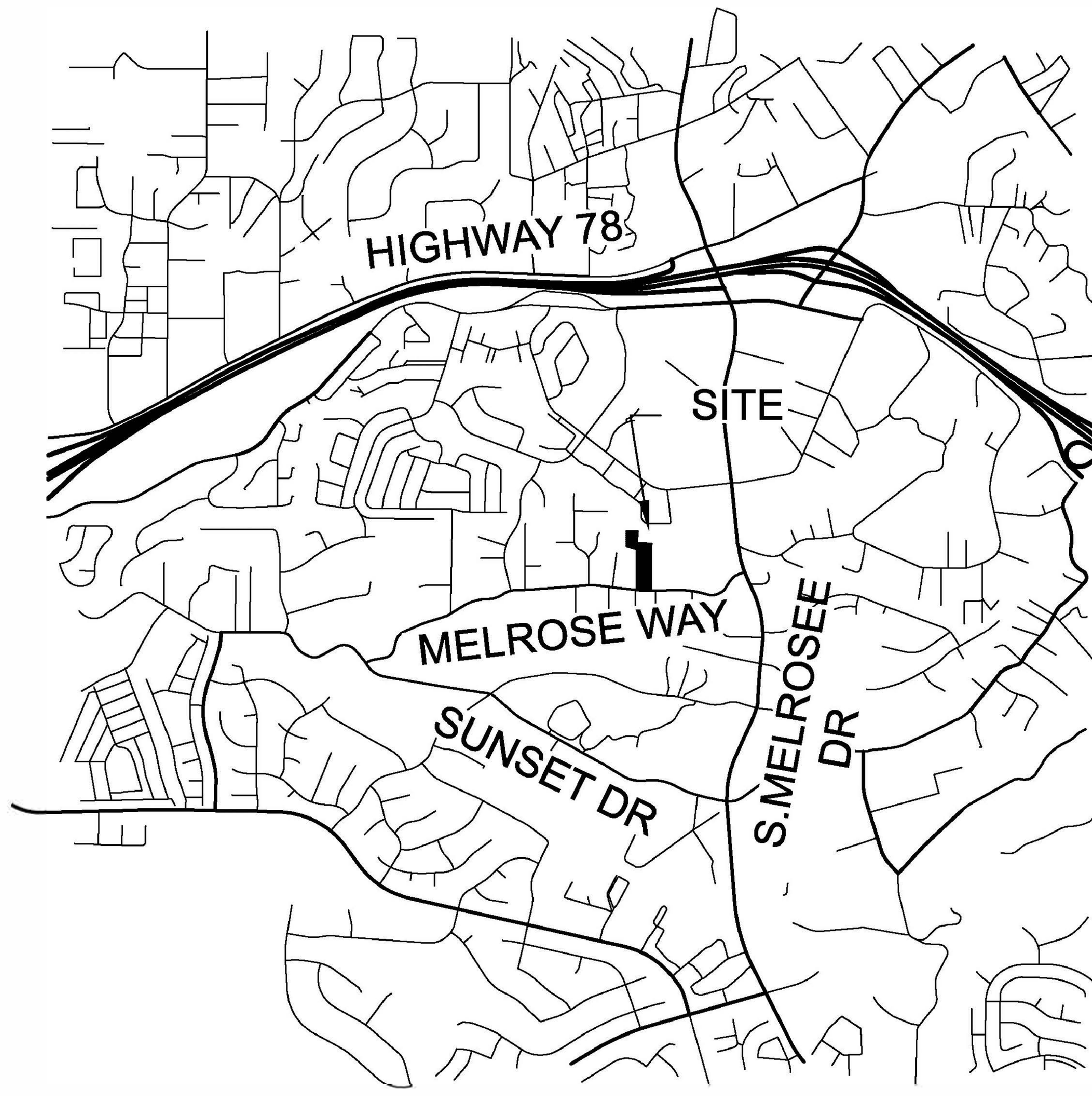


TOP VIEW



GeoSoils, Inc.	TEST PIT SAFETY DIAGRAM	Plate F-20





VICINITY MAP

NOT TO SCALE

SITE INFO

APN: 166-184-10-00, 166-183-17-00

EXISTING ZONING: E-1 ESTATE RESIDENTIAL

PROPOSED ZONING: R-1

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TOTAL DU'S (11 + 4) = 15

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TOTAL UNIT COUNT = 15 (1 VERY LOW INCOME)

LEGEND

RIGHT OF WAY LINE

LOT LINE

EASEMENT LINE

BUILDING SETBACK LINE

CENTERLINE

EXISTING 8" SEWER MAIN

PROPOSED 8" SEWER MAIN

CURB AND GUTTER

ALL LOCATIONS ARE APPROXIMATE

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1205 MELROSE WAY

PRE-APPLICATION EXHIBIT

PLSA JOB NO.3334
SCALE 1"=40'
09-01-2020
SHEET 1 OF 1

PASCO LARET SUITER & ASSOCIATES

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GeoSoils, Inc.

GEOTECHNICAL MAP

Plate 1

W.O. 8058-A-SC	DATE: 03/21	SCALE: 1" = 40'

HYDROLOGY STUDY

FOR

1205 MELROSE WAY
APN: 166-184-10-00, 166-183-17-00, 166-184-09-00

CITY OF VISTA, CA

PREPARED FOR:

Zoran Djordjevich
551 Lynwood Dr
Encinitas, CA 92024

PREPARED BY:
PASCO LARET SUITER & ASSOCIATES, INC.
27127 Calle Arroyo, Suite 1904
San Juan Capistrano, CA 92675
949-661-6695

Prepared: March 2021
Revised: June 2021
Revised: September 2021
Revised: January 2022

01-04-2021

William J. Suiter, RCE 68964 DATE

TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY

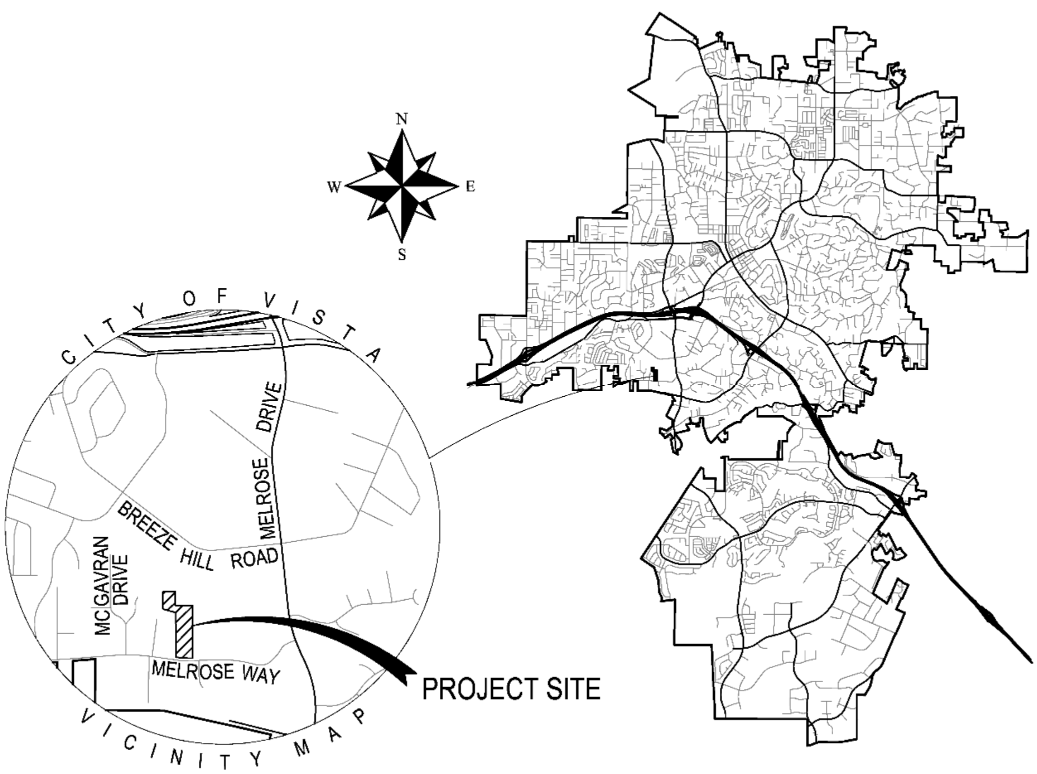
1.1 Introduction

This Hydrology Study for the proposed development has been prepared to analyze the hydrologic characteristics of the existing and proposed project site. This report presents both the methodology and the calculations used for determining the storm water runoff from the project site in the pre-developed (existing) conditions and the post-developed (proposed) conditions produced by the 100-year, 6-hour storm event. In addition, this report will propose the sizing of all necessary storm drain facilities and storm drain piping necessary for the storm drain system to safely convey the runoff from the 100-year rainfall event.

1.2 Existing Conditions

The subject property is located on Melrose Way in the City of Vista. The site is on the west side of Melrose Drive and approximately 1 mile South of CA-78 freeway.

Vicinity Map



The existing site has one single-family residence with an asphalt paved driveway. The remainder of the project site is undeveloped land. The site is surrounded by single-family residential homes to the west and south, a church to the east, and a condominium complex to the north.

The site is approximately 2.57-acres. In the existing condition, the northwesterly portion of the site sheet flows southwest to northeast to a concrete ditch on the adjacent property that runs along the property line and flows to the north (Node 160 on the Existing Condition Drainage Exhibit in Appendix C). The remaining portion of the site generally slopes from south to north toward the northeasterly corner to a concrete ditch on the adjacent property and flows to the east (Node 110 on the Existing Condition Drainage Exhibit in Appendix C). Both ditches ultimately drain to a storm drain that flows north and ultimately into existing storm drain infrastructure in Breeze Hill Rd that continues flowing to the north through the County Complex to Melrose Drive. The storm drain continues to flow northerly in Melrose Drive where it outfalls into Buena Vista Creek located north of Hacienda Drive. Buena Vista Creek outlets into Buena Vista Lagoon, and ultimately the Pacific Ocean.

There is no existing underground storm drain pipe available in Melrose Way in front of the project site. Per the City of Vista GIS Storm Water Atlas, the nearest underground storm drain system is located approximately 265’ east of the site on the adjacent property.

Per the United States Department of Agriculture Web Soil Survey, the project site is underlain with Hydrologic Soil Group D. Refer to Appendix A for soil information.

Area weighted runoff coefficients were calculated using the methodology described in section 3.2.1 of the San Diego County Hydrology Manual and Table 3-1 Runoff Coefficients for Urban Areas. Using the Rational Method Procedure outlined in the San Diego County Hydrology Manual, a peak flow rate was calculated for the existing condition 100-year, 6-hour storm event. For the existing condition, Node 110 and 160 peak flow rates for the 100-year, 6-hour storm were determined to be 3.49 cfs and 1.04 cfs for the project site, respectively. The adjacent westerly properties drain onto our project site at Node 205 and Node 220 with peak flow rates for the 100-year, 6-hour storm were determined to be 14.49 cfs and 12.75 cfs. The combined existing Q outleting to Node 110 with the addition of the adjacent westerly runon (Node 220) is 16.27 cfs. The combined existing Q outleting to Node 160 with the addition of the adjacent westerly runon (Node 205) is 15.53 cfs. (Refer to the existing condition hydrologic calculations included in section 3.1 of this report for detailed analysis.

1.3 Proposed Project

The project proposes to demolish the existing residence and associated hardscape improvements and construct 15 single-family detached residences, new private street, tot lot, curb & gutter, sidewalk, graded pads, drainage appurtenances, landscape, hardscape, associated utilities, and a biofiltration area designed for stormwater treatment, hydromodification management, and to mitigate for the 100-year 6-hour storm event.

Offsite improvements to Melrose way include removal and replacement of the half-width of asphalt, construction of curb & gutter and sidewalk along the property frontage. Additional gravel paving to be provided at the northwest corner to connect the property to the existing access drive and will be utilized for emergency vehicle access only.

In the proposed condition, onsite storm water runoff will be collected via curb inlets or grated inlets and flow through proposed storm drain pipes towards the proposed HMP Biofiltration basin (BMP). A majority of the site will ultimately drain to the northeast corner of the site and into BMP-1. BMP-1 will be designed with hydromodification flow control to discharge its treated flows and peak flows to a proposed storm drain outlet pipe which will discharge into an existing concrete ditch with a 3.83 cfs, as it does in the existing drainage condition (Node 165 on the Proposed Condition Drainage Exhibit). Refer to Appendix B for the 100-year storm event detention analysis.

The runon from the westerly properties will be captured in proposed brow ditches (Node 205 and Node 220 on the Proposed Condition Drainage Map) and bypassed via storm drain through the project site and ultimately outlet to the adjacent brow ditches (Node 230 – 14.26 cfs and Node 225 – 12.75 cfs).

Offsite drainage on Melrose Way will be collected via two tree wells. The tree wells are sized for the proposed widening and curb, gutter, & sidewalk and satisfy pollutant control treatment, hydromodification management, and volume retention requirements. For detailed calculations refer to the report titled "Priority Development Project Storm Water Quality Management Plan for 1205 Melrose Way, Vista, CA" dated March 2021, prepared by Pasco Laret Suiter & Associates.

The BMPs will provide hydromodification management flow control and storm water pollutant control to meet the requirements of the California Regional Water Quality Control Board San Diego Region municipal storm water permit (Order No. R9-2013-0001, referred to as MS4 Permit). For detailed pollutant control and HMP calculations refer to the report titled "Priority Development Project Storm Water Quality Management Plan for 1205 Melrose Way, Vista, CA" dated March 2021, prepared by Pasco Laret Suiter & Associates. The BMPs will also provide mitigation for the 100-year storm event peak discharge. Refer to Section 3.3, 3.4 and Appendix B of this report for detailed detention calculations.

Area weighted runoff coefficients were calculated using the methodology described in section 3.2.1 of the San Diego County Hydrology Manual and Table 3-1 Runoff Coefficients for Urban Areas. Using the Rational Method Procedure outlined in the San Diego County Hydrology Manual, a peak flow rate was calculated for the post-development 100-year, 6-hour storm event. For the proposed condition, the peak flow rate for the 100-year, 6-hour storm was determined to 3.83 cfs. Refer to the proposed hydrologic calculations included in Section 3.2 and 3.4 of this report for detailed analysis.

A self-mitigating slope located in the northeast corner of the site will drain toward an existing concrete ditch that flows north, as it does in the existing drainage condition.

Off-site drainage that flows on-site will be captured in proposed brow ditches, routed via storm drain piping through the site and have flows outlet to the two existing concrete ditches along the east sides of the property.

1.4 Conclusions

Based upon the analyses included in this report, the proposed HMP Biofiltration basin is sized to accommodate the increase in peak runoff in the proposed condition and is designed to meet the requirements of the MS4 Permit for both pollutant control and hydromodification management.

1.5 References

"San Diego County Hydrology Manual", revised June 2003, County of San Diego, Department of Public Works, Flood Control Section.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov.

2.0 METHODOLOGY

Pursuant to the San Diego County Hydrology Manual dated June 2003, the Rational Method is recommended for analyzing the runoff response from drainage areas up to approximately 1 square mile in size. The proposed project and associated watershed basins are less than 1 square mile, therefore the Rational Method was used to analyze the project's hydrologic characteristics in the existing and proposed conditions.

2.1 Rational Method

The Rational Method (RM) formula estimates the peak rate of runoff based on the variables of area, runoff coefficient, and rainfall intensity. The rainfall intensity (I) is equal to:

$$I = 7.44 \times P_6 \times D^{-0.645}$$

Where:

I = Intensity (in/hr)
P_6 = 6-hour precipitation (in)
D = duration (min – use Tc)

Using the Time of Concentration (Tc) is the time required for a given element of water that originates at the most remote point of the basin being analyzed to reach the point at which the runoff from the basin is being analyzed, the RM equation determines the storm water runoff rate (Q) for a given basin in terms of flow (typically in cubic feet per second (cfs). The RM equation is as follows:

$$Q = CIA$$

Where:

Q= flow (cfs)
C = runoff coefficient, ratio of rainfall that produces storm water runoff (runoff vs. infiltration/evaporation/absorption/etc)
I = average rainfall intensity for a duration equal to the Tc for the Area (in/hr)
A = drainage area contributing to the basin (ac)

The RM equation assumes that the storm event being analyzed delivers precipitation to the entire basin uniformly, and therefore the peak discharge rate will occur when a raindrop that falls at the most remote portion of the basin arrives at the point of analysis. The RM also assumes that the fraction of rainfall that becomes runoff or the runoff coefficient C is not affected by the storm intensity, I, or the precipitation zone number.

2.2 County of San Diego Criteria

The County of San Diego has developed its own tables, nomographs, and methodologies for analyzing storm water runoff for areas within the County. The County has also developed precipitation isopluvial contour maps that show even lines of rainfall anticipated from a given storm event (i.e. 100-year, 6-hour storm). The 100-year 6-hour storm event rainfall isopluvial map is included in Appendix A.

One of the variables of the RM equation is the runoff coefficient C which is dependent only upon land use and soil type. The County of San Diego has developed a table of Runoff Coefficients for Urban Areas to be applied to basins located within the County of San Diego. The table categorizes the land use, the associated development density (dwelling units per acre) and the percentage of impervious area. Each of the categories listed has an associated runoff coefficient C for each soil type class.

The County has also illustrated in detail the methodology for determining the time of concentration, in particular the initial time of concentration. The County has adopted the Federal Aviation Agency's (FAA) overland time of flow equation. This equation essentially limits the flow path length for the initial time of concentration to lengths of 100 feet or less, and is dependent on land use and slope.

2.3 AES Rational Method Computer Model

The Rational Method computer program developed by Advanced Engineering Software (AES) satisfies the County of San Diego design criteria, therefore it is the computer model used for this study. The AES hydrologic model is capable of creating independent node-link models of each interior drainage basin and linking these sub-models together at confluence points to determine peak flow rates. The program utilizes base information input by the user to perform calculations for up to 15 hydrologic processes. The required base information includes drainage basin area, storm water facility locations and sizes, land uses, flow patterns, and topographic elevations. The hydrologic conditions were analyzed in accordance with the 2003 County of San Diego Hydrology Manual criteria as follows:

Design Storm	100-year, 6-hour	
100-year, 6-hour Precipitation	3.1 inches	
Rainfall Intensity	Based on the 2003 County of San Diego Hydrology Manual criteria	
Runoff Coefficient*	Pervious D soil	C = 0.35
	Impervious D soil	C = 0.90
Soil Type	D	

*Weighted runoff coefficients were calculated where appropriate. Refer to Appendix A.

3.0 HYDROLOGIC ANALYSIS

Table 1 below summarizes the hydrologic calculations provided in Sections 3.1, 3.2 and 3.4.

Table 1: Summary of 100-Year Peak Discharge Rates

	Pre-Project			Post-Project		
	Discharge Node	Area (ac)	Q100 (cfs)	Discharge Node	Area (ac)	Q100 (cfs)
North Basin	160	0.5	1.04	175	0.05	0.10 (un-mitigated)
South Basin	110	2.0	3.49	165	2.5	3.83 (mitigated)

3.1 Existing Condition Hydrologic Model Output (100-Year Event)

```
************************************************************************

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                    2003,1985,1981 HYDROLOGY MANUAL
          (c) Copyright 1982-2016 Advanced Engineering Software (aes)
             Ver. 23.0 Release Date: 07/01/2016  License ID 1452

                         Analysis prepared by:

                    PASCO LARET SUITER & ASSOCIATES
       27127 Calle Arroyo, Suite 1904, San Juan Capistrano, CA 92675
                            ph 949.661.6695
                          plsaengineering.com

************************* DESCRIPTION OF STUDY *************************
* 1205 MELROSE WAY                                                     *
* 100-YR PRE-DEVELOPMENT                                               *
*                                                                      *
************************************************************************

  FILE NAME: 100PRE.DAT
  TIME/DATE OF STUDY: 13:21 08/31/2021
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.100
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
    HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
    WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)    (FT)   SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0    20.0    0.018/0.018/0.020  0.67    2.00 0.0313 0.167 0.0150
  2   12.0     1.0    0.020/0.020/0.020  0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 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    100.00 TO NODE    105.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 USER-SPECIFIED RUNOFF COEFFICIENT = .4100
 S.C.S. CURVE NUMBER (AMC II) =  82
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
 UPSTREAM ELEVATION(FEET) =    371.80
 DOWNSTREAM ELEVATION(FEET) =    368.40
 ELEVATION DIFFERENCE(FEET) =      3.40
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.499
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.897
 SUBAREA RUNOFF(CFS) =      0.31
 TOTAL AREA(ACRES) =      0.11   TOTAL RUNOFF(CFS) =      0.31

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    368.40  DOWNSTREAM(FEET) =    352.60
 CHANNEL LENGTH THRU SUBAREA(FEET) =   470.00   CHANNEL SLOPE =  0.0336
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.918
 USER-SPECIFIED RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  88
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.01
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.75
 AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   4.48
 Tc(MIN.) =   10.98
 SUBAREA AREA(ACRES) =     1.90       SUBAREA RUNOFF(CFS) =    3.27
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.353
 TOTAL AREA(ACRES) =       2.0        PEAK FLOW RATE(CFS) =       3.49

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   2.08
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =     545.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    155.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
```

USER-SPECIFIED RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) = 88
INITIAL SUBAREA FLOW-LENGTH(FEET) = 75.00
UPSTREAM ELEVATION(FEET) = 363.60
DOWNSTREAM ELEVATION(FEET) = 360.60
ELEVATION DIFFERENCE(FEET) = 3.00
SUBAREA OVERLAND TIME OF FLOW(MIN.) = 7.365
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 6.362
SUBAREA RUNOFF(CFS) = 0.27
TOTAL AREA(ACRES) = 0.12 TOTAL RUNOFF(CFS) = 0.27

****
FLOW PROCESS FROM NODE 155.00 TO NODE 160.00 IS CODE = 51

>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 360.60 DOWNSTREAM(FEET) = 354.40
CHANNEL LENGTH THRU SUBAREA(FEET) = 137.00 CHANNEL SLOPE = 0.0453
CHANNEL BASE(FEET) = 10.00 "Z" FACTOR = 20.000
MANNING'S FACTOR = 0.030 MAXIMUM DEPTH(FEET) = 2.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 5.523
USER-SPECIFIED RUNOFF COEFFICIENT = .3500
S.C.S. CURVE NUMBER (AMC II) = 88
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) = 0.68
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) = 1.27
AVERAGE FLOW DEPTH(FEET) = 0.05 TRAVEL TIME(MIN.) = 1.80
Tc(MIN.) = 9.17
SUBAREA AREA(ACRES) = 0.42 SUBAREA RUNOFF(CFS) = 0.81
AREA-AVERAGE RUNOFF COEFFICIENT = 0.350
TOTAL AREA(ACRES) = 0.5 PEAK FLOW RATE(CFS) = 1.04

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.06 FLOW VELOCITY(FEET/SEC.) = 1.61
LONGEST FLOWPATH FROM NODE 150.00 TO NODE 160.00 = 212.00 FEET.

****
FLOW PROCESS FROM NODE 180.00 TO NODE 185.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .4900
S.C.S. CURVE NUMBER (AMC II) = 88
INITIAL SUBAREA FLOW-LENGTH(FEET) = 75.00
UPSTREAM ELEVATION(FEET) = 372.30
DOWNSTREAM ELEVATION(FEET) = 369.20
ELEVATION DIFFERENCE(FEET) = 3.10

```
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.925
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.320
 SUBAREA RUNOFF(CFS) =      0.18
 TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.18

****************************************************************************
 FLOW PROCESS FROM NODE    185.00 TO NODE    190.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  369.20  DOWNSTREAM ELEVATION(FEET) =  364.90
 STREET LENGTH(FEET) =   125.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.36
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.16
   HALFSTREET FLOOD WIDTH(FEET) =    1.50
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.50
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.55
 STREET FLOW TRAVEL TIME(MIN.) =   0.60   Tc(MIN.) =    6.52
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.882
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .6400
 S.C.S. CURVE NUMBER (AMC II) =  88
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.582
 SUBAREA AREA(ACRES) =    0.08      SUBAREA RUNOFF(CFS) =    0.35
 TOTAL AREA(ACRES) =       0.1       PEAK FLOW RATE(CFS) =       0.52

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.16   HALFSTREET FLOOD WIDTH(FEET) =   1.50
 FLOW VELOCITY(FEET/SEC.) =  3.50   DEPTH*VELOCITY(FT*FT/SEC.) =   0.55
 LONGEST FLOWPATH FROM NODE    180.00 TO NODE    190.00 =     200.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    210.00 TO NODE    215.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==========================================================================
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =  88
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
 UPSTREAM ELEVATION(FEET) =    376.00
 DOWNSTREAM ELEVATION(FEET) =    375.00
 ELEVATION DIFFERENCE(FEET) =      1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.206
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.509
 SUBAREA RUNOFF(CFS) =      0.30
 TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.30

****************************************************************************
 FLOW PROCESS FROM NODE    215.00 TO NODE    220.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    375.00  DOWNSTREAM(FEET) =    361.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   577.00   CHANNEL SLOPE =  0.0239
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.731
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .5000
 S.C.S. CURVE NUMBER (AMC II) =  88
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.58
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.92
 AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   2.45
 Tc(MIN.) =   11.66
 SUBAREA AREA(ACRES) =     5.28       SUBAREA RUNOFF(CFS) =   12.49
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.499
 TOTAL AREA(ACRES) =       5.4        PEAK FLOW RATE(CFS) =      12.75

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   4.93
 LONGEST FLOWPATH FROM NODE    210.00 TO NODE    220.00 =     652.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    382.00  DOWNSTREAM(FEET) =    360.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =   322.00   CHANNEL SLOPE =  0.0658
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
```

MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   2.00
100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 4.544
*USER SPECIFIED(SUBAREA):
USER-SPECIFIED RUNOFF COEFFICIENT = .4800
S.C.S. CURVE NUMBER (AMC II) = 88
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =   13.87
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.13
AVERAGE FLOW DEPTH(FEET) =   0.15   TRAVEL TIME(MIN.) =   0.75
Tc(MIN.) =   12.41
SUBAREA AREA(ACRES) =   1.03   SUBAREA RUNOFF(CFS) =   2.25
AREA-AVERAGE RUNOFF COEFFICIENT = 0.496
TOTAL AREA(ACRES) =   6.4   PEAK FLOW RATE(CFS) =   14.49

END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) = 0.15   FLOW VELOCITY(FEET/SEC.) =   7.45
LONGEST FLOWPATH FROM NODE   210.00 TO NODE   205.00 =   974.00 FEET.
==
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)   =   6.4 TC(MIN.) =   12.41
PEAK FLOW RATE(CFS)   =   14.49
==
==
END OF RATIONAL METHOD ANALYSIS

3.2 Proposed Undetained Condition Hydrologic Model Output (100-Year Event)

****

RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
2003,1985,1981 HYDROLOGY MANUAL

Ver. 23.0 Release Date: 07/01/2016 License ID 1452

Analysis prepared by:

PASCO LARET SUITER & ASSOCIATES
535 NORTH HIGHWAY 101, STE A
SOLANA BEACH, CA 92075
858-259-8212

```
************************* DESCRIPTION OF STUDY *************************
* 1205 MELROSE WAY                                                     *
* 100-YR POST-DEVELOPMENT                                              *
*                                                                      *
************************************************************************

  FILE NAME: 100POST.DAT
  TIME/DATE OF STUDY: 11:02 09/02/2021
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.100
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
    HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
    WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  ================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020  0.67    2.00 0.0313 0.167 0.0150
  2   12.0      1.0    0.020/0.020/0.020  0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.50 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    100.00 TO NODE    105.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .3800
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
 UPSTREAM ELEVATION(FEET) =    371.80
 DOWNSTREAM ELEVATION(FEET) =    367.50
 ELEVATION DIFFERENCE(FEET) =      4.30
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.271
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.057
 SUBAREA RUNOFF(CFS) =      0.29
 TOTAL AREA(ACRES) =      0.11   TOTAL RUNOFF(CFS) =      0.29

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    110.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  367.50  DOWNSTREAM ELEVATION(FEET) =  360.50
 STREET LENGTH(FEET) =   537.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.97
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.27
   HALFSTREET FLOOD WIDTH(FEET) =    7.40
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.23
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.61
 STREET FLOW TRAVEL TIME(MIN.) =   4.02   Tc(MIN.) =   10.29
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.128
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .6300
```

```
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.615
 SUBAREA AREA(ACRES) =    1.67      SUBAREA RUNOFF(CFS) =    5.39
 TOTAL AREA(ACRES) =       1.8       PEAK FLOW RATE(CFS) =      5.61

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.92
 FLOW VELOCITY(FEET/SEC.) =  2.54   DEPTH*VELOCITY(FT*FT/SEC.) =   0.83
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    110.00 =     612.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    110.00 TO NODE    115.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   358.00  DOWNSTREAM(FEET) =   357.60
 FLOW LENGTH(FEET) =    12.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.90
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.61
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   10.31
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    115.00 =     624.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   10.31
 RAINFALL INTENSITY(INCH/HR) =   5.12
 TOTAL STREAM AREA(ACRES) =     1.78
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.61

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    125.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .6200
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    74.00
 UPSTREAM ELEVATION(FEET) =    364.00
 DOWNSTREAM ELEVATION(FEET) =    362.40
```

```
 ELEVATION DIFFERENCE(FEET) =      1.60
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.748
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.465
 SUBAREA RUNOFF(CFS) =      0.42
 TOTAL AREA(ACRES) =      0.09   TOTAL RUNOFF(CFS) =      0.42

****************************************************************************
 FLOW PROCESS FROM NODE    125.00 TO NODE    130.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  362.40  DOWNSTREAM ELEVATION(FEET) =  361.30
 STREET LENGTH(FEET) =   192.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.89
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.22
   HALFSTREET FLOOD WIDTH(FEET) =    4.88
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.26
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.28
 STREET FLOW TRAVEL TIME(MIN.) =   2.55   Tc(MIN.) =    8.30
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.892
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .8100
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.751
 SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.95
 TOTAL AREA(ACRES) =       0.3       PEAK FLOW RATE(CFS) =       1.28

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   5.99
 FLOW VELOCITY(FEET/SEC.) =  1.35   DEPTH*VELOCITY(FT*FT/SEC.) =   0.33
 LONGEST FLOWPATH FROM NODE    120.00 TO NODE    130.00 =     266.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    130.00 TO NODE    115.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   359.30  DOWNSTREAM(FEET) =   357.60
 FLOW LENGTH(FEET) =    19.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.04
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.28
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    8.33
 LONGEST FLOWPATH FROM NODE    120.00 TO NODE    115.00 =     285.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    115.00 TO NODE    115.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    8.33
 RAINFALL INTENSITY(INCH/HR) =   5.88
 TOTAL STREAM AREA(ACRES) =    0.29
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.28

 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1       5.61    10.31       5.121         1.78
    2       1.28     8.33       5.876         0.29

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1       5.81     8.33      5.876
    2       6.73    10.31      5.121

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       6.73   Tc(MIN.) =   10.31
 TOTAL AREA(ACRES) =        2.1
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    115.00 =     624.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    115.00 TO NODE    160.00 IS CODE =   1
----------------------------------------------------------------------------
```

```
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   10.31
 RAINFALL INTENSITY(INCH/HR) =   5.12
 TOTAL STREAM AREA(ACRES) =     2.07
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.73

****************************************************************************
 FLOW PROCESS FROM NODE    140.00 TO NODE    145.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .6200
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
 UPSTREAM ELEVATION(FEET) =    364.50
 DOWNSTREAM ELEVATION(FEET) =    362.50
 ELEVATION DIFFERENCE(FEET) =      2.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.396
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.776
 SUBAREA RUNOFF(CFS) =      0.53
 TOTAL AREA(ACRES) =      0.11   TOTAL RUNOFF(CFS) =      0.53

****************************************************************************
 FLOW PROCESS FROM NODE    145.00 TO NODE    150.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
==============================================================================
 UPSTREAM ELEVATION(FEET) =  362.50  DOWNSTREAM ELEVATION(FEET) =  362.10
 STREET LENGTH(FEET) =    77.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.95
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.23
```

```
   HALFSTREET FLOOD WIDTH(FEET) =    5.17
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.23
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.28
 STREET FLOW TRAVEL TIME(MIN.) =   1.05   Tc(MIN.) =    6.44
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.936
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .7500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.697
 SUBAREA AREA(ACRES) =    0.16      SUBAREA RUNOFF(CFS) =    0.83
 TOTAL AREA(ACRES) =       0.3       PEAK FLOW RATE(CFS) =       1.31

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   6.21
 FLOW VELOCITY(FEET/SEC.) =  1.29   DEPTH*VELOCITY(FT*FT/SEC.) =   0.32
 LONGEST FLOWPATH FROM NODE    140.00 TO NODE    150.00 =     152.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    150.00 TO NODE    155.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   360.10  DOWNSTREAM(FEET) =   357.60
 FLOW LENGTH(FEET) =   265.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.88
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.31
 PIPE TRAVEL TIME(MIN.) =   1.14    Tc(MIN.) =    7.58
 LONGEST FLOWPATH FROM NODE    140.00 TO NODE    155.00 =     417.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    155.00 TO NODE    160.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.58
 RAINFALL INTENSITY(INCH/HR) =   6.24
 TOTAL STREAM AREA(ACRES) =     0.27
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.31

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
```

```
    1       6.73    10.31       5.121         2.07
    3       1.31     7.58       6.245         0.27

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1       6.25     7.58      6.245
    2       7.80    10.31      5.121

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.80   Tc(MIN.) =   10.31
  TOTAL AREA(ACRES) =        3.7
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    160.00 =     624.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    160.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.121
  *USER SPECIFIED(SUBAREA):
  USER-SPECIFIED RUNOFF COEFFICIENT = .3600
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3592
  SUBAREA AREA(ACRES) =    0.16   SUBAREA RUNOFF(CFS) =    0.29
  TOTAL AREA(ACRES) =        3.8   TOTAL RUNOFF(CFS) =       7.80
  TC(MIN.) =   10.31
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    160.00 TO NODE    165.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   352.90  DOWNSTREAM(FEET) =   352.80
  FLOW LENGTH(FEET) =     7.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.19
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.80
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   10.33
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    165.00 =     631.00 FEET.

****************************************************************************
```

```
 FLOW PROCESS FROM NODE    170.00 TO NODE    175.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .2800
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    81.00
 UPSTREAM ELEVATION(FEET) =    364.50
 DOWNSTREAM ELEVATION(FEET) =    357.80
 ELEVATION DIFFERENCE(FEET) =      6.70
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.569
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.849
 SUBAREA RUNOFF(CFS) =      0.10
 TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
 FLOW PROCESS FROM NODE    180.00 TO NODE    185.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .8000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
 UPSTREAM ELEVATION(FEET) =    372.30
 DOWNSTREAM ELEVATION(FEET) =    369.10
 ELEVATION DIFFERENCE(FEET) =      3.20
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.883
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.33
 TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
 FLOW PROCESS FROM NODE    185.00 TO NODE    190.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
==============================================================================
 UPSTREAM ELEVATION(FEET) =  369.10  DOWNSTREAM ELEVATION(FEET) =  364.90
 STREET LENGTH(FEET) =   124.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 12.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   1.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020
```

```
 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.62
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.16
   HALFSTREET FLOOD WIDTH(FEET) =    1.50
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.47
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.54
 STREET FLOW TRAVEL TIME(MIN.) =   0.60   Tc(MIN.) =    3.48
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .8900
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.855
 SUBAREA AREA(ACRES) =    0.08      SUBAREA RUNOFF(CFS) =    0.58
 TOTAL AREA(ACRES) =       0.1       PEAK FLOW RATE(CFS) =       0.91

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.16   HALFSTREET FLOOD WIDTH(FEET) =   1.50
 FLOW VELOCITY(FEET/SEC.) =  3.47   DEPTH*VELOCITY(FT*FT/SEC.) =   0.54
 LONGEST FLOWPATH FROM NODE    180.00 TO NODE    190.00 =     199.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    210.00 TO NODE    215.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .4500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
 UPSTREAM ELEVATION(FEET) =    376.00
 DOWNSTREAM ELEVATION(FEET) =    375.00
 ELEVATION DIFFERENCE(FEET) =      1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.206
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.509
 SUBAREA RUNOFF(CFS) =      0.30
 TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.30

****************************************************************************
 FLOW PROCESS FROM NODE    215.00 TO NODE    220.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    375.00  DOWNSTREAM(FEET) =    361.20
 CHANNEL LENGTH THRU SUBAREA(FEET) =   577.00   CHANNEL SLOPE =  0.0239
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.731
 *USER SPECIFIED(SUBAREA):
 USER-SPECIFIED RUNOFF COEFFICIENT = .5000
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      6.58
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.92
 AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   2.45
 Tc(MIN.) =   11.66
 SUBAREA AREA(ACRES) =     5.28       SUBAREA RUNOFF(CFS) =   12.49
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.499
 TOTAL AREA(ACRES) =       5.4        PEAK FLOW RATE(CFS) =      12.75

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   4.93
 LONGEST FLOWPATH FROM NODE    210.00 TO NODE    220.00 =     652.00 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE    220.00 TO NODE    225.00 IS CODE =  31
------------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   362.50  DOWNSTREAM(FEET) =   352.80
 FLOW LENGTH(FEET) =   218.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  15.0 INCH PIPE IS  12.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.01
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.75
 PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   11.96
 LONGEST FLOWPATH FROM NODE    210.00 TO NODE    225.00 =     870.00 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE    200.00 TO NODE    205.00 IS CODE =  51
------------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    382.00  DOWNSTREAM(FEET) =    362.60
 CHANNEL LENGTH THRU SUBAREA(FEET) =   322.00   CHANNEL SLOPE =  0.0602
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =  20.000
 MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.473
 *USER SPECIFIED(SUBAREA):
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 USER-SPECIFIED RUNOFF COEFFICIENT = .4800
 S.C.S. CURVE NUMBER (AMC II) =   0
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.85
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.12
 AVERAGE FLOW DEPTH(FEET) =   0.15   TRAVEL TIME(MIN.) =   0.75
 Tc(MIN.) =   12.72
 SUBAREA AREA(ACRES) =     1.03       SUBAREA RUNOFF(CFS) =    2.21
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.496
 TOTAL AREA(ACRES) =       6.4        PEAK FLOW RATE(CFS) =      14.26

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   7.00
 LONGEST FLOWPATH FROM NODE    210.00 TO NODE    205.00 =    1192.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    205.00 TO NODE    230.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   359.10  DOWNSTREAM(FEET) =   354.50
 FLOW LENGTH(FEET) =   166.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.56
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.26
 PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   12.98
 LONGEST FLOWPATH FROM NODE    210.00 TO NODE    230.00 =    1358.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =       6.4  TC(MIN.) =     12.98
 PEAK FLOW RATE(CFS)   =     14.26
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

3.3 Detention Analysis (100-Year Event)

The HMP Biofiltration basin (BMP) provides pollutant control, hydromodification management flow control and mitigation of the 100-year storm event peak flow rate. The 100-year storm event detention analysis was performed using HydroCAD Stormwater Modeling software. The inflow runoff hydrographs to the BMPs were modeled using RatHydro which is a Rational Method Design Storm Hydrograph software that creates a hydrograph using the results of the Rational Method calculations. HydroCAD has the ability to route the 100-year 6-hour storm event inflow hydrograph through the BMP considering dynamic tailwater effects. Based on the BMP cross sectional geometry, stage storage and outlet structure data, HydroCAD calculates the detained peak flow rate and detained time to peak.

The BMP consists of a basin with 18 inches of engineered soil and Permavoid drainage system with a heigh of 38.4 inches. Runoff will be biofiltered through the engineered soil and Permavoid layers, collected within the Permavoid layer and directed to a catch basin located in the BMP where runoff will be mitigated via a small HMP orifice to comply with HMP requirements. In larger storm events, runoff not filtered through the engineered soil and Permavoid layers will be conveyed via an overflow outlet structure. Runoff conveyed via the outlet structure will bypass the small HMP orifice and be conveyed directly to the proposed storm drain discharge pipe. Refer to Appendix B for cross-sections of each BMP.

BMP-1 will discharge via proposed storm drain to the existing concrete brow ditch at the northeast corner of the project site.

For the proposed detained hydrologic analysis, the effects of the detention provided by BMP-1, was incorporated into the AES analysis. This was done by inserting the results from the HydroCAD analysis, detained peak flow rate and detained time to peak, into the proposed undetained condition AES model to create the proposed detained condition model. Refer to Section 3.4 for the detained AES output.

Based on the results of the HydroCAD analysis, mitigation for the 100-year storm event peak flow rate is provided, detaining the peak flow rate in the proposed condition to 3.83 cfs. With the north, un-mitigated basin area producing a peak flow rate of 0.10 cfs in the proposed condition, the combined peak flow rate of 3.9312 cfs is below the site's combined existing condition Q_{100} flow rate of 4.53 cfs (1.04 cfs for North Basin and 3.49 cfs for South Basin). Refer to Appendix B for the HydroCAD detention detailed output.

3.4 Proposed Detained Condition Hydrologic Model Output (100-Year Event)

RATIONAL METHOD HYDROGRAPH PROGRAM

RUN DATE 9/1/2021
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 10 MIN.
6 HOUR RAINFALL 3.1 INCHES
BASIN AREA 2.5 ACRES
RUNOFF COEFFICIENT 0.6246
PEAK DISCHARGE 7.98 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 10	DISCHARGE (CFS) = 0.3
TIME (MIN) = 20	DISCHARGE (CFS) = 0.3
TIME (MIN) = 30	DISCHARGE (CFS) = 0.3
TIME (MIN) = 40	DISCHARGE (CFS) = 0.3
TIME (MIN) = 50	DISCHARGE (CFS) = 0.3
TIME (MIN) = 60	DISCHARGE (CFS) = 0.3
TIME (MIN) = 70	DISCHARGE (CFS) = 0.3
TIME (MIN) = 80	DISCHARGE (CFS) = 0.4
TIME (MIN) = 90	DISCHARGE (CFS) = 0.4
TIME (MIN) = 100	DISCHARGE (CFS) = 0.4
TIME (MIN) = 110	DISCHARGE (CFS) = 0.4
TIME (MIN) = 120	DISCHARGE (CFS) = 0.4
TIME (MIN) = 130	DISCHARGE (CFS) = 0.5
TIME (MIN) = 140	DISCHARGE (CFS) = 0.5
TIME (MIN) = 150	DISCHARGE (CFS) = 0.5
TIME (MIN) = 160	DISCHARGE (CFS) = 0.5
TIME (MIN) = 170	DISCHARGE (CFS) = 0.6
TIME (MIN) = 180	DISCHARGE (CFS) = 0.6
TIME (MIN) = 190	DISCHARGE (CFS) = 0.7
TIME (MIN) = 200	DISCHARGE (CFS) = 0.8
TIME (MIN) = 210	DISCHARGE (CFS) = 1
TIME (MIN) = 220	DISCHARGE (CFS) = 1.1
TIME (MIN) = 230	DISCHARGE (CFS) = 1.6
TIME (MIN) = 240	DISCHARGE (CFS) = 2.5
TIME (MIN) = 250	DISCHARGE (CFS) = 7.98
TIME (MIN) = 260	DISCHARGE (CFS) = 1.3
TIME (MIN) = 270	DISCHARGE (CFS) = 0.9
TIME (MIN) = 280	DISCHARGE (CFS) = 0.7
TIME (MIN) = 290	DISCHARGE (CFS) = 0.6
TIME (MIN) = 300	DISCHARGE (CFS) = 0.5
TIME (MIN) = 310	DISCHARGE (CFS) = 0.4
TIME (MIN) = 320	DISCHARGE (CFS) = 0.4
TIME (MIN) = 330	DISCHARGE (CFS) = 0.4
TIME (MIN) = 340	DISCHARGE (CFS) = 0.3
TIME (MIN) = 350	DISCHARGE (CFS) = 0.3
TIME (MIN) = 360	DISCHARGE (CFS) = 0.3
TIME (MIN) = 370	DISCHARGE (CFS) = 0

3.5 Hydromodification Management

To satisfy the requirements of the MS4 Permit, a hydromodification management strategy has been developed for the project based on the Final Hydromodification Management Plan dated March 2011, (Final HMP). A continuous simulation model, the Environmental Protection Agency (EPA) Storm Water Management Model (SWMM) version 5.1, was selected to size mitigation measures. The SWMM model is capable of modeling hydromodification management facilities to mitigate the effects of increased runoff from the post-development conditions and use changes that may cause negative impacts (i.e. erosion) to downstream channels. For HMP calculations refer to the report titled "Priority Development Project Storm Water Quality Management Plan for 1205 Melrose Way" dated March 2021, prepared by Pasco Laret Suiter & Associates.

3.6 Storm Water Pollutant Control

To meet the requirements of the MS4 Permit, the HMP Biofiltration facility is designed to treat onsite storm water pollutants contained in the volume of runoff from a 24-hour, 85th percentile storm event by slowly infiltrating runoff through an engineered soil layer and Permavoid layer. For detailed pollutant control calculations refer to the report titled "Priority Development Project Storm Water Quality Management Plan for 1205 Melrose Way" dated March 2021, prepared by Pasco Laret Suiter & Associates.

4.0 HYDRAULIC METHODOLOGY

4.1 Normal Depth Calculation

A normal depth calculation was conducted for the existing brow ditch at POC-1 to determine if the adjacent existing brow ditch can handle the increase of peak flow in the proposed design condition. The depth in the brow ditch is 0.4 ft for the Post-Project Q100 at 3.83 cfs (mitigated). The existing depth of the brow ditch is 0.7 ft and therefore can handle the increase of peak flow. Refer to Appendix D for Brow Ditch Calculations.

APPENDIX A

Hydrology Support Material

1205 Melrose Way (3334)
8/31/2021

Pre-Project Drainage

Basin ID	Total Area (ac)	Soil D Impervious Area (sq-ft)	Soil D Pervious Area (sq-ft)	% Impervious	% Pervious	Weighted Runoff Coef C:
1.0	0.11	551	4147	11%	87%	0.41
1.1	1.92	4786	78,885	6%	94%	0.38
2.0	0.12	0	5214	0%	100%	0.35
2.1	0.42	0	18,341	0%	100%	0.35
4.0	0.05	604	1,527	28%	70%	0.49
4.1	0.08	1786	1791	51%	51%	0.64
5.0	0.12	819	4615	16%	88%	0.45
5.1	5.28	56939	173022	25%	75%	0.49
6.0	1.03	10829	34173	24%	76%	0.48
Total	9.13	1.75	7.39			

Runoff Coefficient Table	
Soil Type	D
Impervious	0.9
Pervious (LS)	0.35

1205 Melrose Way (3334)
8/31/2021

Post-Project Drainage

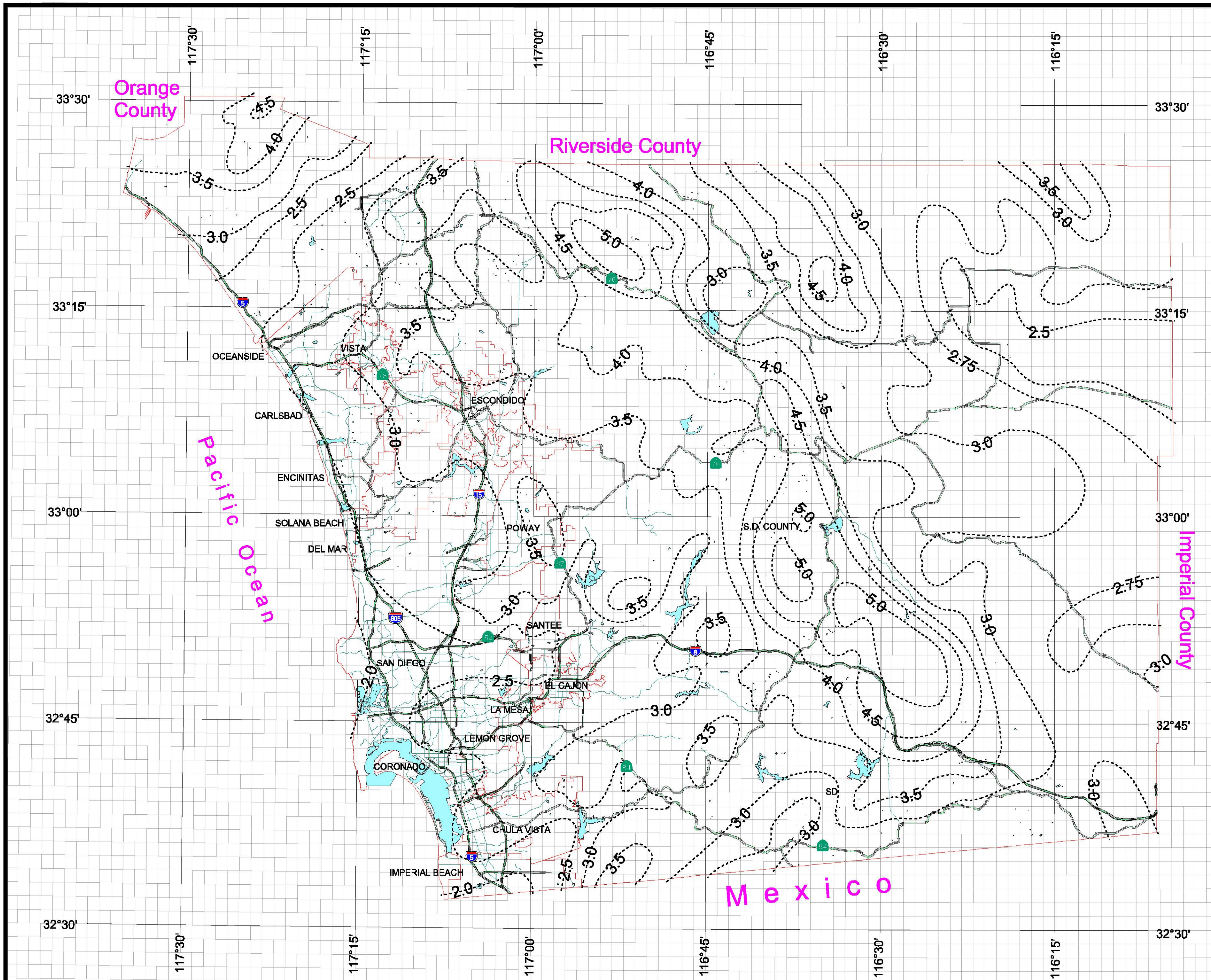
Basin ID	Total Area (ac)	Soil D Impervious Area (sq-ft)	Soil D Pervious Area (sq-ft)	% Impervious	% Pervious	Weighted Runoff Coef C:
1.0	0.11	151	4838	3%	101%	0.38
1.1	1.67	37312	35442	51%	49%	0.63
1.2	0.16	0	7119	0%	102%	0.36
2.0	0.09	1805	2274	46%	58%	0.62
2.1	0.20	7259	1591	83%	18%	0.81
3.0	0.11	2306	2552	48%	53%	0.62
3.1	0.16	5271	1436	76%	21%	0.75
3.2	0.05	0	1717	0%	79%	0.28
4.0	0.05	1820	312	84%	14%	0.80
4.1	0.08	3350	227	96%	7%	0.89
5.0	0.12	819	4615	16%	88%	0.45
5.1	5.28	56939	173022	25%	75%	0.49
6.0	1.03	10829	34173	24%	76%	0.48
Total	9.11	2.94	6.18			

J:\Active Jobs\3334 MELROSE WAY\CIVIL\REPORTS\HYDROLOGY\Appendix A - Hydrology Support\3334_drn_calcs.xlsx

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours



Isopluvial (inches)

N
W
E
S

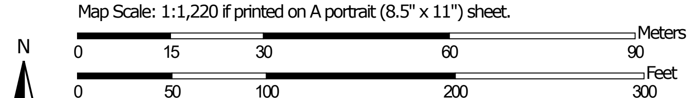
3 0 3 Miles

Department of Public Works
Geographic Information Services

We Have San Diego Covered!

Hydrologic Soil Group—San Diego County Area, California
(1205 Melrose Way)

Map Scale: 1:1,220 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 15, May 27, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 24, 2020—Feb 12, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BsD	Bosanko clay, 9 to 15 percent slopes	D	0.2	6.9%
PeC2	Placentia sandy loam, 5 to 9 percent slopes, eroded	D	2.5	93.1%
Totals for Area of Interest			**2.6**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

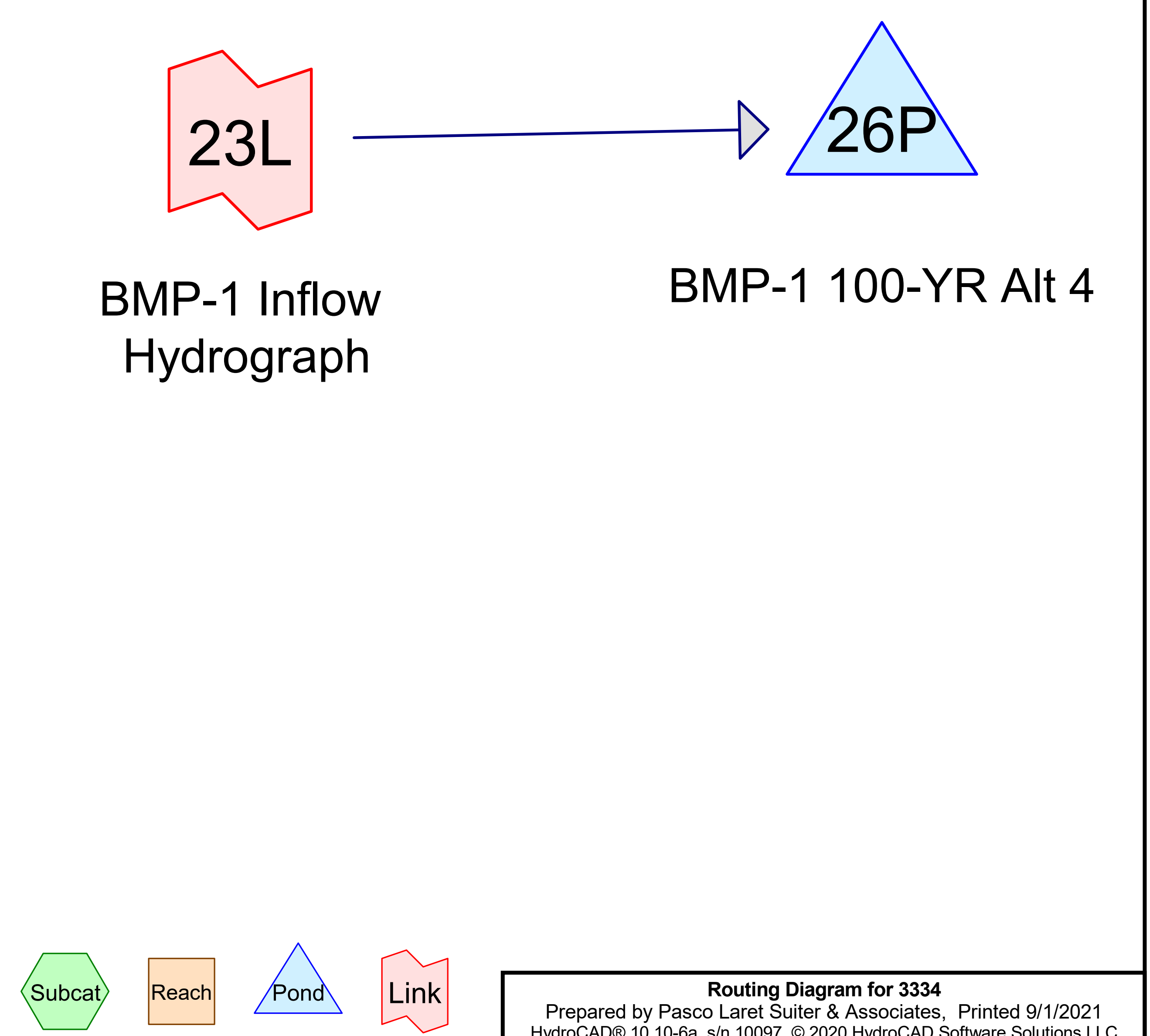
Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

APPENDIX B

Detention Support Material



Routing Diagram for 3334
Prepared by Pasco Laret Suiter & Associates, Printed 9/1/2021

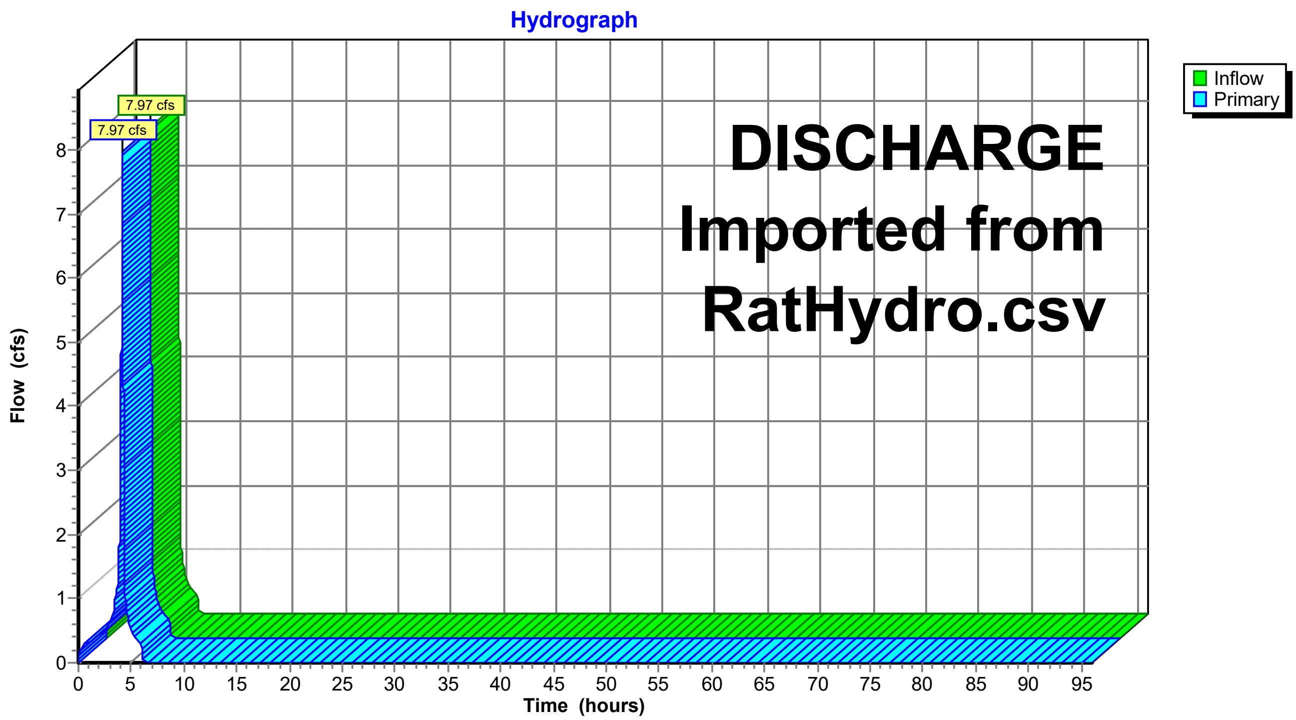
Summary for Link 23L: BMP-1 Inflow Hydrograph

Inflow = 7.97 cfs @ 4.17 hrs, Volume= 0.401 af
Primary = 7.97 cfs @ 4.17 hrs, Volume= 0.401 af, Atten= 0%, Lag= 0.0 min
Routed to Pond 26P : BMP-1 100-YR Alt 4

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.001 hrs

DISCHARGE Imported from RatHydro.csv

Link 23L: BMP-1 Inflow Hydrograph



Summary for Pond 26P: BMP-1 100-YR Alt 4

Inflow	=	7.97 cfs @	4.17 hrs, Volume=	0.401 af
Outflow	=	3.83 cfs @	4.27 hrs, Volume=	0.400 af, Atten= 52%, Lag= 6.2 min
Primary	=	3.83 cfs @	4.27 hrs, Volume=	0.400 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.001 hrs
Peak Elev= 101.65' @ 4.27 hrs Surf.Area= 2,993 sf Storage= 12,030 cf

Plug-Flow detention time= 674.7 min calculated for 0.400 af (100% of inflow)
Center-of-Mass det. time= 674.5 min (890.9 - 216.4)

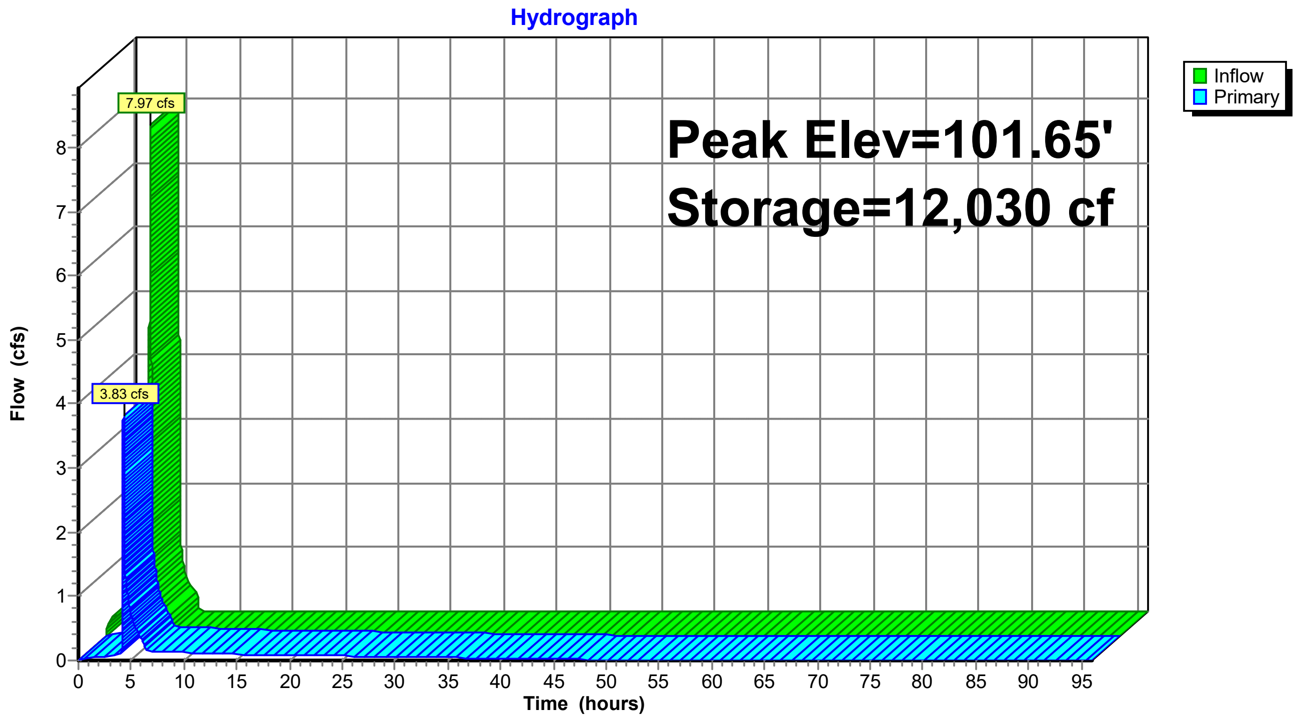
Volume	Invert	Avail.Storage	Storage Description
#1	95.30'	14,748 cf	**Biofiltration Basin (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
95.30	2,300	0.0	0	0	2,300
98.50	2,300	95.0	6,992	6,992	2,844
100.00	2,300	20.0	690	7,682	3,099
101.00	2,713	100.0	2,504	10,186	3,548
101.50	2,929	100.0	1,410	11,596	3,784
102.00	3,151	100.0	1,520	13,115	4,027
102.50	3,380	100.0	1,632	14,748	4,277

Device	Routing	Invert	Outlet Devices
#1	Primary	95.30'	**12.00" Round Outlet** L= 10.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 95.30' / 95.20' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	95.30'	**1.45" Vert. Orifice** C= 0.600 Limited to weir flow at low heads
#3	Device 1	101.00'	**6.00" W x 6.00" H Vert. Orifice X 2.00** C= 0.600 Limited to weir flow at low heads
#4	Device 1	101.50'	**36.00" x 36.00" Horiz. Grate** C= 0.600 in 36.00" x 36.00" Grate (100% open area) Limited to weir flow at low heads
#5	Device 2	95.30'	**5.000 in/hr Exfiltration over Surface area below 100.00'**

Primary OutFlow Max=3.83 cfs @ 4.27 hrs HW=101.65' (Free Discharge)
└─**1=Outlet** (Passes 3.83 cfs of 11.43 cfs potential flow)
  ├─**2=Orifice** (Orifice Controls 0.14 cfs @ 12.07 fps)
  │ └─**5=Exfiltration** (Passes 0.14 cfs of 0.27 cfs potential flow)
  ├─**3=Orifice** (Orifice Controls 1.49 cfs @ 2.98 fps)
  └─**4=Grate** (Weir Controls 2.20 cfs @ 1.25 fps)

Pond 26P: BMP-1 100-YR Alt 4



APPENDIX C

Existing and Proposed Condition Drainage Exhibits

MAJOR BASIN BOUNDARY		
MINOR BASIN BOUNDARY		
FLOW PATH		
HYDROLOGIC NODE ELEVATION AT NODE		NODE 160 ELEV (354.4)
HYDROLOGIC SUB-BASIN NUMBER HYDROLOGIC AREA (ACRES)		1.0 0.60
IMPERVIOUS AREA	0.17 AC (7,727 SF)	
PERVIOUS AREA	2.51 AC (109,061 SF)	
ADJACENT LOTS EXISTING IMPERVIOUS AREA		

EXISTING CONDITION DRAINAGE EXHIBIT

1205 MELROSE WAY
VISTA, CA
SCALE: 1' = 40'
DATE: AUGUST 2021
SHEET 1 OF 1

PASCO LARET SUITER & ASSOCIATES
San Diego | Solana Beach | Orange County
Phone 858.259.8212 | www.plsaengineering.com

PROPOSED CONDITION DRAINAGE EXHIBIT

1205 MELROSE WAY
VISTA, CA
SCALE: 1" = 40'
DATE: AUGUST 2021
SHEET 1 OF 1

PASCO LARET SUITER & ASSOCIATES
San Diego | Solana Beach | Orange County
Phone 858.259.8212 | www.plsaengineering.com

SAVE DATE: 09/02/21 ~ PLOT DATE: 09/02/21 ~ FILE NAME: J:\Active Jobs\3334 MELROSE WAY\CIVIL\REPORTS\HYDROLOGY\Appendix C - Pre and Post Maps\3334_EXH DRAINAGE_POST.dwg

APPENDIX D

Brow Ditch Calculations

Hydraulic Analysis Report

Project Data

Project Title: 3334 Melrose
Project Date: Monday, January 3, 2022

Channel Analysis: Existing Brow Ditch at POC-1

Input Parameters

Channel Type: Circular
Pipe Diameter: 3.0000 ft
Longitudinal Slope: 0.0500 ft/ft
Manning's n: 0.0190
Flow: 3.8300 cfs

Result Parameters

Depth: 0.3972 ft
Area of Flow: 0.5545 ft^2
Wetted Perimeter: 2.2344 ft
Hydraulic Radius: 0.2482 ft
Average Velocity: 6.9069 ft/s
Top Width: 2.0335 ft
Froude Number: 2.3309
Critical Depth: 0.6108 ft
Critical Velocity: 3.7094 ft/s
Critical Slope: 0.0085 ft/ft
Critical Top Width: 2.42 ft
Calculated Max Shear Stress: 1.2392 lb/ft^2
Calculated Avg Shear Stress: 0.7743 lb/ft^2

CONTENTS

ENGINEER OF WORK CERTIFICATION STATEMENT

Preparer's Certification

I hereby declare that I am the Engineer in Responsible Charge of design of storm water best management practices (BMPs) for this project, and that I have exercised responsible charge over the design of the BMPs as defined in Section 6703 of the Business and Professions Code, and that the design is consistent with the PDP requirements of the City of Vista BMP Design Manual, which is a design manual for compliance with local City and regional MS4 Permit (California Regional Water Quality Control Board San Diego Region Order No. R9-2015-0100) requirements for storm water management.

I have read and understand that the City Engineer has adopted minimum requirements for managing urban runoff, including storm water, from land development activities, as described in the BMP Design Manual. I certify that this PDP SWQMP has been completed to the best of my ability and accurately reflects the project being proposed and the applicable BMPs proposed to minimize the potentially negative impacts of this project's land development activities on water quality. I understand and acknowledge that the plan check review of this PDP SWQMP by the City Engineer is confined to a review and does not relieve me, as the Engineer in Responsible Charge of design of storm water BMPs for this project, of my responsibilities for project design.

SWQMP PREPARED BY:

William J. Suiter
Pasco Laret Suiter & Associates
27127 Calle Arroyo, Suite 1904
San Juan Capistrano, CA 92675
949-661-6695
jsuiter@plsaengineering.com
RCE 68964
12-31-23

Signature, PE License Number & Expiration Date

William Justin Suiter
Print Name

3/10/21
Date

REGISTERED PROFESSIONAL ENGINEER
WILLIAM J. SUITER
No. 68964
Exp. 12/31/23
CIVIL
STATE OF CALIFORNIA

PROJECT OWNER CERTIFICATION STATEMENT

Owners Certification

This PDP SWQMP has been prepared for Zoran Djordjevich by Pasco Laret Suiter & Associates. The PDP SWQMP is intended to comply with the PDP requirements of the City of Vista BMP Design Manual, which is a design manual for compliance with local City and regional MS4 Permit (California Regional Water Quality Control Board San Diego Region Order No. R9-2015-0100) requirements for storm water management.

The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan. Once the undersigned transfers its interests in the property, its successor-in-interest shall bear the aforementioned responsibility to implement the best management practices (BMPs) described within this plan, including ensuring on-going operation and maintenance of structural BMPs. A signed copy of this document shall be available on the subject property into perpetuity.

OWNER DETAILS:
Zoran Djordjevich

551 Lynwood Dr
Encinitas, CA 92024
(760) 497-8761
zokidjr@gmail.com

____
Project Owner's Signature

____
Print Name

____
Date

CITY OF VISTA STAFF REVIEW

Reviewed and Approved:	
City Staff Signature:	Date:

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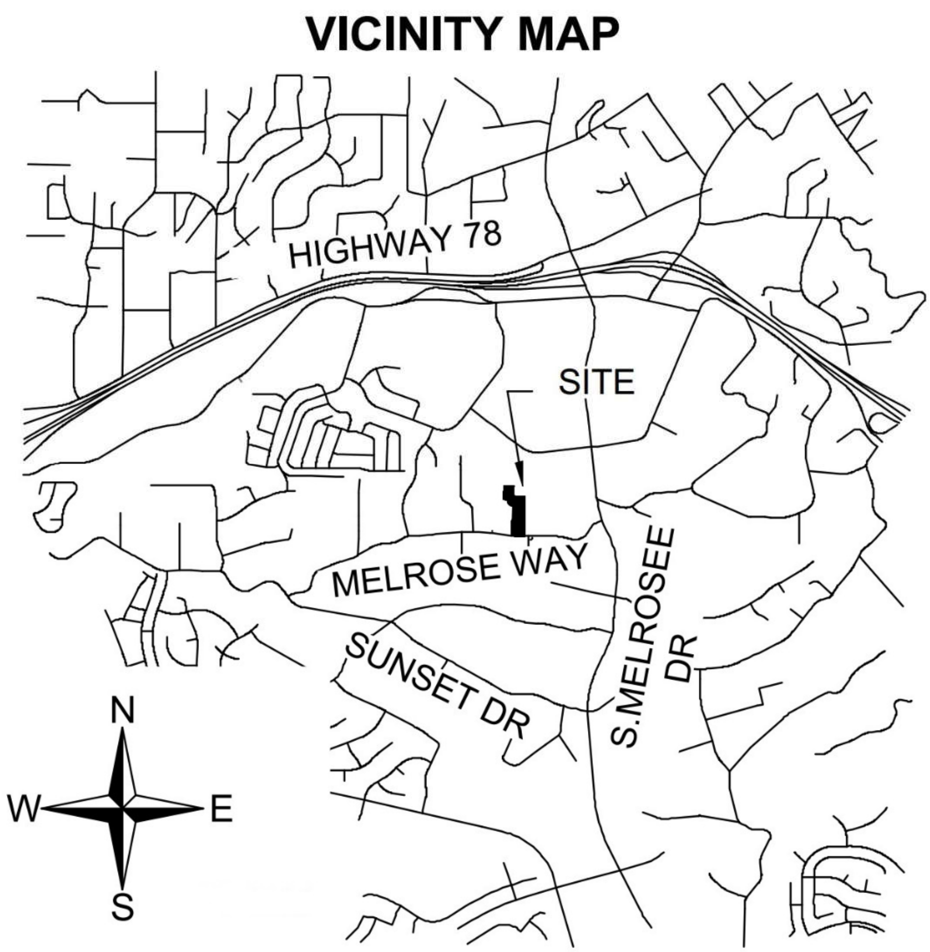
PROJECT VICINITY MAP

Project Name: 1205 Melrose Way
7
Permit Application Number: P21-0130

Insert Project Vicinity Map Below:



FORM 1 – PROJECT CATEGORY DETERMINATION CHECKLIST

This form is used to assess stormwater BMP requirements applicable to the proposed project. The form is available as a stand-alone fillable checklist on the City's website and a completed copy must be included with the final SWQMP submitted to the City. The form is available at:

http://www.cityofvista.com/services/city-departments/community-development/building-planning-permits-applications/land-development-autocad-templates/storm-water-forms

Project ID:

CHECKLIST FOR DETERMINATION OF PROJECT CATEGORY

Project Name: 1205 Melrose Way

Project Location:

APPLICABILITY OF PERMANENT, POST-CONSTRUCTION STORMWATER BMP REQUIREMENTS AND PROJECT TYPE DETERMINATION

Overview and Instructions

The City of Vista's (City's) Stormwater Management Program is regulated by the San Diego regional municipal stormwater permit (referred to as a Municipal Separate Storm Sewer System Permit). This permit requires that new development and redevelopment projects incorporate permanent stormwater Best Management Practices (BMPs) into the project design. The City of Vista's *BMP Design Manual* (formerly *SUSMP Manual*) discusses BMP requirements applicable to new development and redevelopment projects.

ALL STANDARD AND PRIORITY PROJECTS ARE REQUIRED TO INCORPORATE SITE DESIGN AND SOURCE CONTROL BMPS. Additional treatment control and hydromodification management BMP requirements apply to projects that meet specific criteria or thresholds. This checklist must be completed by the project applicant or proponent, and is used to determine if those additional BMPs are required.

Not all site improvements are considered "development projects" under the MS4 Permit.

Development projects are defined by the MS4 Permit as "construction, rehabilitation, redevelopment, or reconstruction of any public or private projects". Development projects are issued local permits to allow construction activities. To further clarify, this checklist applies only to new development or redevelopment activities and/or projects that have the potential to contact storm water and contribute an anthropogenic source of pollutants, or reduce the natural absorption and infiltration abilities of the land.

A project must be defined consistent with the California Environmental Quality Act (CEQA) definitions of "project."

CEQA requires that the project include "the whole of the action". "Whole of the Action" means the project may not be segmented or phased into small parts either onsite or offsite if the effect is to reduce the quantity of impervious area and fall below thresholds for applicability of storm water requirements. This requirement precludes "piece-mealing," which is the improper (and often artificial) separation of a project into smaller parts to avoid preparing Environmental Impact Report level documentation.

As indicated above, for the purposes of the *BMP Design Manual*, the "project" is the "whole of the action" which has the potential for adding or replacing or resulting in the addition or replacement of, roofs, pavement, or other impervious surfaces, thereby resulting in increased flows and storm water pollutants.

When defining the project, the following questions are considered:

- What are the project activities?
- Do they occur onsite or offsite?
- What are the limits of the project (project boundary)?
- What is the whole of the action associated with the project (i.e. what is the total amount of new or

replaced impervious area considering all of the collective project components through all phases of the project)?

- Are any facilities or agreements to build facilities offsite in conjunction with providing service to the project (street-widening, utilities)?

Responses to the checklist represent an initial assessment of the proposed project conditions and impacts. City staff will confirm this checklist based on assessment of the development application and/or project plans. Results of the checklist will classify a project as one of the following: Priority Development Project, Standard Project, or Non-development Project.

If additional information is needed while completing this checklist, please refer to the City's *BMP Design Manual*. Alternatively, contact City Land Development staff.

This Form is divided into 4 sections:

1. Post-Construction Stormwater Requirement Exemptions
2. Priority Development Project Determination
3. Special Consideration for Redevelopment Projects (50 Percent Rule)
4. Final Project Determination

SECTION 1 – POST CONSTRUCTION STORMWATER REQUIREMENT EXEMPTIONS	City of Vista BMP Design Manual	
This section will determine whether your project is exempt from post-construction BMP requirements and would be classified as a Non-Development Project. See section 1.3 of the City's *BMP Design Manual* for further discussion.	**YES**	**NO**
(a) Replacement of impervious surfaces that are part of a routine maintenance activity, such as (check yes if any apply): (i) Replacing roof material on an existing building (ii) Rebuilding a structure to original design after damage from earthquake, fire or similar disaster (iii) Restoring pavement or other surface materials affected by trenches from utility work (iv) Resurfacing existing roads and parking lots, including slurry, overlay and restriping (v) Routine replacement of damaged pavement, including full depth replacement, if the sole purpose is to repair the damage (vi) Constructing new sidewalk, pedestrian ramps or bike lanes on existing roads (within existing street right-of-way) (vii) Restoring a historic building to its original historic design (viii) Routine replacement of damaged pavement, such as pothole repair **Note**: Work that creates impervious surface outside of the existing impervious footprint is not considered routine maintenance.	☐	☒
(b) Repair or improvements to an existing building or structure that do not alter the size (check yes if any apply): (i) Plumbing, electrical and HVAC work (ii) Interior alterations including major interior remodels and tenant build-out within an existing commercial building (iii) Exterior alterations that do not change the general dimensions and structural framing of the building (does not include building additions or projects where the existing building is demolished)	☐	☒
If you answered **YES** to either category (a) or (b), your project is considered a Non-Development Project, and post construction BMP requirements do not apply. Please proceed to Section 4 and check the **Non-Development Project** box. If you answered **NO** to category (a) and (b), please proceed to Section 2.		

SECTION 2 – PRIORITY DEVELOPMENT PROJECT DETERMINATION	City of Vista BMP Design Manual	
This section determines whether your project is a **Priority Development Project (PDP)** or a **Standard Project.** See section 1.4 of the City's *BMP Design Manual* for further discussion. The following eight (8) types of projects are defined as **PDPs:**	**YES**	**NO**
(a) New development projects that create 10,000 square feet or more of impervious surfaces (collectively over the entire project site). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.	☒	☐
(b) Redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site on an existing site of 10,000 square feet or more of impervious surfaces). This includes commercial, industrial, residential, mixed-use, and public development projects on public or private land.	☐	☒
(c) New and redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface (collectively over the entire project site), and support one or more of the following uses: (i) Restaurants. This category is defined as a facility that sells prepared foods and drinks for consumption, including stationary lunch counters and refreshment stands selling prepared foods and drinks for immediate consumption (Standard Industrial Classification (SIC) code 5812). (ii) Hillside development projects. This category includes development on any natural slope that is twenty-five percent or greater. (iii) Parking lots. This category is defined as a land area or facility for the temporary parking or storage of motor vehicles used personally, for business, or for commerce. (iv) Streets, roads, highways, freeways, and driveways. This category is defined as any paved impervious surface used for the transportation of automobiles, trucks, motorcycles, and other vehicles.	☐	☒

(d) New or redevelopment projects that create and/or replace 2,500 square feet or more of impervious surface (collectively over the entire project site), and discharge directly to an Environmentally Sensitive Area (ESA). "Discharging directly to" includes flow that is conveyed overland a distance of 200 feet or less from the project to the ESA, or conveyed in a pipe or open channel any distance as an isolated flow from the project to the ESA (i.e. not commingled with flows from adjacent lands). **Note:** ESAs are areas that include but are not limited to all Clean Water Act Section 303(d) impaired water bodies; State Water Quality Protected Areas; water bodies designated with the RARE beneficial use by the State Water Board and San Diego Water Board; and any other equivalent environmentally sensitive areas which have been identified by the City. For projects adjacent to an ESA, but not discharging to an ESA, the 2,500 sq-ft threshold does not apply as long as the project does not physically disturb the ESA and the ESA is upstream of the project. There are no Areas of Special Biological Significance (ASBS) or State Water Quality Protected Areas in the City's jurisdiction. The ESAs within the City's boundaries which include 303(d)-listed impairments and RARE beneficial use designations are listed below: • Agua Hedionda Creek • Buena Creek • Buena Vista Creek • Loma Alta Creek	☐	☒
(e) New development projects, or redevelopment projects that create and/or replace 5,000 square feet or more of impervious surface, that support one or more of the following uses: (i) Automotive repair shops. This category is defined as a facility that is categorized in any one of the following SIC codes: 5013, 5014, 5541, 7532-7534, or 7536-7539. (ii) Retail gasoline outlets. This category includes Retail gasoline outlets that meet the following criteria: (a) 5,000 square feet or more or (b) a projected Average Daily Traffic of 100 or more vehicles per day.	☐	☒
(f) New or redevelopment projects that result in the disturbance of one or more acres of land and are expected to generate pollutants post construction. This means any activity that moves soils or substantially alters the pre-existing vegetated or man-made cover of any land. This includes, but is not limited to the following: (i) Grading, digging, cutting, scraping, stockpiling, pavement removal, and exterior construction; (ii) Substantial removal of vegetation where soils are disturbed including but not limited to removal by clearing or grubbing; or (iii) Any activity which bares soil or rock or involves streambed alterations or the diversion or piping of any watercourse.	☒	☐
If you answered **YES** to any of the categories above (a-f), your project is considered a PDP. Please proceed to section 3 and check the **Priority Development Project** Box in Section 4. If you answer **NO** to all categories, then your project is considered a Standard Project. Please proceed to Section 4 and check the **Standard Project Box**.		

SECTION 3 – SPECIAL CONSIDERATIONS FOR REDEVELOPMENT PROJECTS (50 PERCENT RULE)	City of Vista BMP Design Manual	
This section determines additional considerations required for **Redevelopment PDPs.** See section 1.7 of the City's *BMP Design Manual* for further discussion.	**YES**	**NO**
Will redevelopment result in the creation or replacement of impervious surface in an amount of more than 50 percent of the surface area of the previously existing development? See clarification on calculation of the ratio of impervious surface below. These requirements for managing storm water on an entire redevelopment project site are commonly referred to as the "50 Percent Rule". For the purpose of calculating the ratio, the surface area of the previously existing development shall be the area of <u>impervious surface</u> within the previously existing development. The following steps shall be followed to estimate the area that requires treatment to satisfy the MS4 Permit requirements: 1. How much total impervious area currently exists on the site? 2. How much existing impervious area will be replaced with new impervious area? 3. How much new impervious area will be created in areas that are pervious in the existing condition? 4. Total created and/or replaced impervious surface = Step 2 + Step 3. 5. **<u>50 Percent Rule Test</u>**: Is step 4 more than 50 Percent of Step 1? If yes, treat all impervious surface on the site (including existing impervious surface not being replaced or added). If no, then treat only Step 4 impervious surface and any area that comingles with created and/or replaced impervious surface area. <u>Note</u>: Step 2 and Step 3 must not overlap, as it is fundamentally not possible for a given area to be both "replaced" and "created" at the same time. Also activities that occur as routine maintenance (see Section 1 of this form) shall not be included in Step 2 and Step 3 calculation. For example, a 10,000 square foot development proposes replacement of 4,000 square feet of impervious area. The treated area is less than 50 percent of the total development area and only the 4,000 square foot area is required to be treated.	☐	☐
If you answered **YES**, then you must implement the PDP requirements for all impervious surfaces across the entire site. Please proceed to Section 4 and check the box under PDP indicating that the Project **Is a Redevelopment Project Subject to the 50 Percent Rule**. If you answered **NO,** then you are only required to treat impervious surfaces that are replaced or created. Please proceed to section 4 and check the box under PDP indicating this is **Not a Redevelopment Project Subject to the 50 Percent Rule**.		

BASED ON THE INFORMATION PROVIDED IN SECTIONS 1-3, THIS PROJECT IS DETERMINED TO BE A:

☒ **PRIORITY DEVELOPMENT PROJECT.** PRIORITY REQUIREMENTS APPLY AND A STORM WATER QUALITY MANAGEMENT PLAN (SWQMP) MUST BE SUBMITTED AT THE TIME OF APPLICATION.

- ☐ THIS **IS** A REDEVELOPMENT PROJECT SUBJECT TO THE 50 PERCENT RULE.
- ☒ THIS **IS NOT** A REDEVELOPEMNT PROJECT SUBJECT TO THE 50 PERCENT RULE.

☐ **STANDARD PROJECT.** STANDARD REQUIREMENTS APPLY AND APPLICABLE SECTIONS OF A STORM WATER QUALITY MANAGEMENT PLAN (SWQMP) MUST BE SUBMITTED AT THE TIME OF APPLICATION.

☐ **NON DEVELOPMENT PROJECT.**

Applicant Information and Signature Box

Address: 1205 Melrose Way	APN(s) 166-184-09 &10, 166-183-17
Applicant Name:	Applicant Title:
Applicant Signature:	Date:

City use only

Concur:	Yes	No
By:		
Date:		
Land Dev #:		

Supporting discussion for this checklist, as well as BMP requirements for Priority Development Projects and Standard Projects, is provided in the City of Vista *BMP Design Manual*.

FORM 2 – PROJECT OVERVIEW

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Project Name	1205 Melrose Way
Project Address	1205 Melrose Way Vista, CA 92081
Assessor's Parcel Number(s) (APN(s))	166-183-17, 166-184-09 & 166-184-10
Permit Application Number	P21-0130
Watershed *(select one checkbox; use webpage below to determine watershed)* http://www.cityofvista.com/services/city-departments/community-development/building-planning-permits-applications/land-development-autocad-templates/storm-water-forms	
San Luis Rey	☐ Lower San Luis Rey – Mission, 903.11
Carlsbad	☐ Loma Alta – Loma Alta, 904.10 ☐ Buena Vista – El Salto, 904.21 ☒ Buena Vista – Vista, 904.22 ☒ Agua Hedionda – Los Monos, 904.31 ☐ Agua Hedionda – Buena, 904.32 ☐ San Marcos – Batiquitos, 904.51
Parcel Area (total area of Assessor's Parcel(s) associated with the project)	2.67 Acres (116,243 Square Feet)
Area to be Disturbed by the Project (Project Area)	2.85 Acres (124,210 Square Feet)
Project Proposed Impervious Area (subset of Project Area)	1.36* Acres (59,386* Square Feet)
Project Proposed Pervious Area (subset of Project Area)	1.49** Acres (64,824** Square Feet)
NOTE: Proposed Impervious Area + Proposed Pervious Area = Area to be Disturbed by the Project. This may be less than the Parcel Area.	

* 51,837 sf impervious area on-site + 7,549 sf impervious area off-site = 59,386 sf total

** 59,503 sf pervious area on-site + 5,321 sf pervious area off-site = 64,824 sf total

Form 2, Page 2 of 11
DESCRIPTION OF EXISTING SITE CONDITIONS
Current Status of the Site (select all that apply and describe below): ☒ Existing development ☐ Previously graded but not built out ☐ Demolition completed without new construction ☐ Agricultural or other non-impervious use ☒ Vacant, undeveloped/natural Describe: An existing single-family home is located in the southwest corner of 166-184-10. The remaining portion of 166-184-10, all of 166-184-09 and 166-183-17 are un-developed/vacant land.
Existing Land Cover Includes (select all that apply and describe below): ☒ Vegetative Cover 2.493 Acres (108,613 Square Feet) ☐ Non-Vegetated Pervious Areas Acres (Square Feet) ☒ Impervious Areas 0.175 Acres (7,630 Square Feet) Describe: Existing single-family home is located in the southwest corner of 166-184-10 with associated hardscape. The remaining land is un-developed/vacant.
Underlying Soil belongs to Hydrologic Soil Group (select all that apply): ☐ NRCS Type A ☐ NRCS Type B ☐ NRCS Type C ☒ NRCS Type D
Approximate Depth to Groundwater (GW): ☐ GW Depth < 5 feet ☐ 5 feet < GW Depth < 10 feet ☐ 10 feet < GW Depth < 20 feet ☒ GW Depth > 20 feet Per project Geotechnical Study, no groundwater was encountered during their testing.

Existing Natural Hydrologic Features (select all that apply and describe in next section):

☐ Drainage ditch/Swale/Waterway
☐ Seeps
☐ Springs
☐ Wetlands
☒ None

Form 2, Page 3 of 11

DESCRIPTION OF EXISTING SITE DRAINAGE PATTERNS

How is storm water runoff conveyed from the site? At a minimum, this description should answer:

1. Is existing site drainage conveyance natural or improved storm drain (urbanized);
2. Is runoff from offsite conveyed through the site? If yes, quantify all offsite drainage areas, design flows, and locations where offsite flows enter the project site, and summarize how such flows are conveyed through the site;
3. Provide details regarding existing project site drainage conveyance network, including any existing storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural or constructed channels; and
4. Identify all discharge locations from the existing project site along with a summary of conveyance system size and capacity for each of the discharge locations. Provide summary of the pre-project drainage areas and design flows to each of the existing runoff discharge locations.

Describe existing site drainage patterns:

In the existing condition, the northwesterly portion of the site sheet flows southwest to northeast to a concrete ditch on the adjacent property that runs along the property line. The remaining portion of the site generally slopes from south to north toward the northeasterly corner to a concrete ditch on the adjacent property. Both ditches ultimately drain to a storm drain that flows north in existing storm drain infrastructure in Breeze Hill that flows north through the County Complex to Melrose Drive. It then flows north in Melrose Drive where it outfalls into Buena Vista Creek located north of Hacienda Drive. Buena Vista Creek outlets into Buena Vista Lagoon, and ultimately the Pacific Ocean.

Pre-project	Discharge Node	Area (ac)	Q100 (cfs)
North Basin	160	0.5	1.04
South Basin	110	2.0	3.49

Refer to the drainage report for the project titled “Hydrology Study for 1205 Melrose Way” prepared by Pasco Laret Suiter & Associates dated March 2021.

Form 2, Page 4 of 11
DESCRIPTION OF PROPOSED SITE DEVELOPMENT
Project Description / Proposed Land Use and/or Activities: The project proposes to demolish the existing residence and associated hardscape improvements and construct 15 single-family detached residences, a new private street, curb & gutter, sidewalk, graded pads, drainage appurtenances, landscape, hardscape, associated utilities, and a biofiltration area designed for stormwater treatment, hydromodification management, and to mitigate for the 100-year 6-hour storm event. Runon from the westerly adjacent properties drain onto the project site in the existing condition and will be captured in proposed brow ditches and bypass via storm drain through the project site. The storm drain will ultimately outlet to the existing brow ditches along the property boundary. Offsite improvements to Melrose Way include removal and replacement of the half-width of asphalt, construction of curb & gutter and sidewalk along the property frontage. Additional gravel paving to be provided at the northwest corner to connect the property to the existing access drive and will be utilized for emergency vehicle access only. Offsite improvement to the frontage on Melrose way requires additional site design BMPs to satisfy pollutant control treatment, hydromodification management, and volume retention requirements, therefore tree wells have been sized to meet the requirements. The proposed trees are located within DMA 2-1. Each tree well is a 30ft mature canopy diameter with a max soil depth of 36" and a minimum soil volume of 2cf per square foot of canopy projection for each tree, no underdrain, and provides 420 cf. Tree credit volume has been calculated per Appendix B.2.2.1 of the Storm Water Standards Manual. Volume retention compliance has been shown using Worksheet B.5-6. Refer to Attachment 1E for all applicable completed BMP Sizing Worksheets.
List/describe proposed impervious features of the project (e.g., buildings, roadways, parking lots, courtyards, athletic courts, other impervious features): Asphalt roadway, concrete driveways, sidewalk, and single-family residences.
List/describe proposed pervious features of the project (e.g., landscape areas): Landscape areas and biofiltration basin.

Does the project include grading and changes to site topography?

☐ Yes

☐ No

Describe:

Grading is proposed for the new access roads and pads for the homes. The project will be graded so that the site drains toward the proposed biofiltration basin.

Form 2, Page 5 of 11
DESCRIPTION OF PROPOSED SITE DRAINAGE PATTERNS

Does the project include changes to site drainage (e.g., installation of new storm water conveyance systems)?

☒ Yes
☐ No

If yes, provide details regarding the proposed project site drainage conveyance network, including storm drains, concrete channels, swales, detention facilities, storm water treatment facilities, natural or constructed channels, and the method for conveying offsite flows through or around the proposed project site. Identify all discharge locations from the proposed project site along with a summary of the conveyance system size and capacity for each of the discharge locations. Provide a summary of pre- and post-project drainage areas and design flows to each of the runoff discharge locations. Reference the drainage study for detailed calculations.

Describe proposed site drainage patterns:

The proposed residential lots and the proposed private streets and access roads will drain to proposed stormwater infrastructure that will outlet into the proposed biofiltration treatment basin. Stormwater will either be caught in a subdrain system, or overflow into the 36” grate inlet where it will all outlet to a proposed storm drain pipe that flows northwest to outlet into an existing concrete drainage ditch, as it does in the existing drainage condition.

A self-mitigating slope located in the northeast corner of the site will drain toward an existing concrete ditch that flows north, as it does in the in the existing drainage condition.

Off-site drainage from the west that flows on-site will be captured in proposed brow ditches and bypass via storm drain through the project site. The storm drain will ultimately outlet to the existing brow ditches along the property boundary.

	Pre-Project			Post-Project		
	Discharge Node	Area (ac)	Q100 (cfs)	Discharge Node	Area (ac)	Q100 (cfs)
North Basin	160	0.5	1.04	175	0.05	0.10 (un-mitigated)
South Basin	110	2.0	3.49	165	2.5	3.83 (mitigated)

Offsite improvement to the frontage on Melrose way requires additional site design BMPs to satisfy pollutant control treatment, hydromodification management, and volume retention requirements, therefore tree wells have been sized to meet the requirements. The proposed trees are located within DMA 2-1. Each tree well is a 30ft mature canopy diameter with a max soil depth of 36” and a minimum soil volume of 2cf per square foot of canopy projection for each tree, no underdrain, and provides 420 cf. Tree credit volume has been calculated per Appendix B.2.2.1 of the Storm Water Standards Manual. Volume retention compliance has been shown using Worksheet B.5-6. Refer to Attachment 1E for all applicable completed BMP Sizing Worksheets.

Refer to the drainage report for the project titled “Hydrology Study for 1205 Melrose Way” prepared by Pasco Laret Suiter & Associates dated March 2021.

Form 2, Page 6 of 11
POTENTIAL POLLUTANT SOURCE AREAS
Identify whether any of the following features, activities, and/or pollutant source areas will be present. Select all Pollutant Source Areas that apply and include them on the DMA Exhibit. Source control BMPs must be identified for each of these areas in Form 3 of this SWQMP: ☒ On-site storm drain inlets ☐ Sump pumps or French drains ☐ Interior or sub-surface parking garages ☒ Need for future indoor & structural pest control ☒ Landscape/outdoor pesticide use ☐ Pools, spas, ponds, decorative fountains, or other water features ☐ Food preparation and/or service ☒ Refuse/trash collection areas ☐ Industrial processes ☐ Outdoor storage of equipment, chemicals, or materials ☐ Vehicle and equipment cleaning ☐ Vehicle/equipment repair and maintenance ☐ Fuel dispensing areas ☐ Loading docks ☒ Fire sprinkler test and relief point ☒ Miscellaneous drain or wash down areas ☒ Plazas, sidewalks, and parking lots Describe:

Form 2, Page 7 of 11
IDENTIFICATION AND NARRATIVE OF RECEIVING WATER AND POLLUTANTS OF CONCERN
Describe flow path of storm water from the project site discharge location(s), through urban storm conveyance systems as applicable, to receiving creeks, rivers, and lagoons as applicable, and ultimate discharge to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable): The project site itself is located in the Agua Hedionda Hydrologic Area, however stormwater from the project drains to concrete ditches on the adjacent properties that both ultimately drain to a storm drain that flows north in existing storm drain infrastructure in Breeze Hill Rd that flows north through the County Complex to Melrose Drive. It then flows north in Melrose Drive where it outfalls into Buena Vista Creek located north of Hacienda Drive. Buena Vista Creek outlets into Buena Vista Lagoon, and ultimately the Pacific Ocean.
List any 303(d) impaired water bodies within the path of storm water from the project site to the Pacific Ocean (or bay, lagoon, lake or reservoir, as applicable), identify the pollutant(s)/stressor(s) causing impairment, and identify any TMDLs and/or Highest Priority Pollutants from the WQIP for the impaired water bodies:

303(d) Impaired Water Body	Pollutant(s)/Stressor(s)	TMDLs / WQIP Highest Priority Pollutant
Buena Vista Creek	Benthic Community Effects, Bifenthrin, Selenium, Toxicity	TMDL Required
Buena Vista Lagoon	Indicator Bacteria, Nutrients, Sedimentation/Siltation, Toxicity	TMDL Required

Identification of Project Site Pollutants*
***Identification of project site pollutants is only required if flow-thru treatment BMPs are implemented onsite in lieu of retention or biofiltration BMPs (note the project must also participate in an alternative compliance program unless prior lawful approval to meet earlier PDP requirements is demonstrated)**
Identify pollutants expected from the project site based on all proposed use(s) of the site (see BMP Design Manual Appendix B.6):

Pollutant	Not Applicable to the Project Site	Expected from the Project Site	Also a Receiving Water Pollutant of Concern
Sediment	☐	☐	☐
Nutrients	☐	☐	☐
Heavy Metals	☐	☐	☐
Organic Compounds	☐	☐	☐
Trash & Debris	☐	☐	☐
Oxygen Demanding Substances	☐	☐	☐
Oil & Grease	☐	☐	☐
Bacteria & Viruses	☐	☐	☐
Pesticides	☐	☐	☐

Form 2, Page 8 of 11
HYDROMODIFICATION MANAGEMENT REQUIREMENTS
Do hydromodification management requirements apply (see Section 1.6 of the BMP Design Manual; select one box and describe below)? ☒ Yes, hydromodification management flow control structural BMPs required. ☐ No, the project will discharge runoff directly to existing underground storm drains discharging directly to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean. ☐ No, the project will discharge runoff directly to conveyance channels whose bed and bank are concrete-lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean. ☐ No, the project will discharge runoff directly to an area identified as appropriate for an exemption by the WMAA for the watershed in which the project resides. Describe: The biofiltration area designed for stormwater treatment, hydromodification management, and to mitigate for the 100-year 6-hour storm event.

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CRITICAL COARSE SEDIMENT YIELD AREAS
**This section only required if hydromodification management requirements apply*
Based on the maps provided within the WMAA, do potential critical coarse sediment yield areas exist within the project drainage boundaries (select all that apply and describe below)? Additional signed and stamped reports must be provided to document any exemption from coarse sediment yield requirements. ☐ Yes ☒ No, No critical coarse sediment yield areas to be protected based on WMAA maps If yes, have any of the optional analyses presented in Section 6.2 of the BMP Design Manual been performed? ☐ 6.2.1 Verification of Geomorphic Landscape Units (GLUs) Onsite ☐6.2.2 Downstream Systems Sensitivity to Coarse Sediment ☐6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite ☐No optional analyses performed, the project will avoid critical coarse sediment yield areas identified based on WMAA maps If optional analyses were performed, what is the final result? ☐No critical coarse sediment yield areas to be protected based on verification of GLUs onsite ☐Critical coarse sediment yield areas exist but additional analysis has determined that protection is not required. Documentation attached in Attachment 2.B of the SWQMP. ☐Critical coarse sediment yield areas exist and require protection. The project will implement management measures described in Sections 6.2.4 and 6.2.5 as applicable, and the areas are identified on the SWQMP Exhibit. Describe:

Form 2, Page 10 of 11
FLOW CONTROL FOR POST-PROJECT RUNOFF
**This section only required if hydromodification management requirements apply*
List and describe point(s) of compliance for hydromodification management flow control (see Section 6.3.1). Identify each point of compliance for flow control on the Hydromodification Management Exhibit in Attachment 2A. There is one POC for the project, POC-1, located in the northeast corner of the project site and has a low flow threshold of 0.1Q2. Refer to the HMP exhibit located in Attachment 2a for the POC location. Stormwater from the project drains to concrete ditches on the adjacent properties that both ultimately drain to a storm drain that flows north in existing storm drain infrastructure in Breeze Hill Rd that flows north through the County Complex to Melrose Drive. It then flows north in Melrose Drive where it outfalls into Buena Vista Creek located north of Hacienda Drive. Buena Vista Creek outlets into Buena Vista Lagoon, and ultimately the Pacific Ocean. Has a geomorphic assessment been performed for the receiving channel(s)? ☒ No, the low flow threshold is 0.1Q2 (default low flow threshold) ☐ Yes, the result is the low flow threshold is 0.1Q2 ☐ Yes, the result is the low flow threshold is 0.3Q2 ☐ Yes, the result is the low flow threshold is 0.5Q2 If a geomorphic assessment has been performed, provide the report. Discussion / Additional Information: (optional)

Form 2, Page 11 of 11
OTHER SITE REQUIREMENTS AND CONSTRAINTS
When applicable, list other site requirements or constraints that will influence storm water management design, such as zoning requirements including setbacks and open space, or local codes governing minimum street width, sidewalk construction, allowable pavement types, and drainage requirements.
Optional Additional Information or Continuation of Previous Sections As Needed
This space provided for additional information or continuation of information from previous sections as needed.

FORM 3 – SOURCE CONTROL BMPS FOR ALL DEVELOPMENT PROJECTS

Page 1 of 4

PROJECT IDENTIFICATION & SOURCE CONTROLS			
Project Name: 1205 Melrose Way			
Permit Application Number P21-0130			
All development projects must implement source control BMPs SC-1 through SC-6, unless justification is provided by qualified design professional See Chapter 4 and Appendix E of the Model BMP Design Manual for information to implement source control BMPs shown in this checklist. Answer each category below pursuant to the following, and provide description. • "Yes" means the project will implement the source control BMP as described in Chapter 4 and/or Appendix E of the Model BMP Design Manual. • "No" means the BMP is applicable to the project but it is not feasible to implement. • "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project has no outdoor materials storage areas).			
Source Control Requirement	**Applied?**		
SC-1 Prevention of Illicit Discharges into the MS4	☒ Yes	☐ No	☐ N/A
Describe how source control will be implemented, or justify if not feasible: -Provide effective irrigation, dispersion of non-storm water discharges into landscape			
SC-2 Storm Drain Stenciling or Signage	☒ Yes	☐ No	☐ N/A
Describe how source control will be implemented, or justify if not feasible: -Site will provide prohibitive dumping placards and/or signage -Post signage at public access points to deter prohibitive dumping -Maintain legibility of placards and signage			
SC-3 Protect Outdoor Materials Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: -No outdoor storage areas proposed			
SC-4 Protect Materials Stored in Outdoor Work Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: -No outdoor work areas proposed			

Form 3, Page 2 of 4			
Source Control Requirement	**Applied?**		
SC-5 Protect Trash Storage Areas from Rainfall, Run-On, Runoff, and Wind Dispersal	☒ Yes	☐ No	☐ N/A
Describe how source control will be implemented, or justify if not feasible: - Trashcans will be stored in garages			
SC-6 Additional BMPs Based on Potential Sources of Runoff Pollutants (must answer for each source listed below)	**Applied?**		
a. On-site storm drain inlets	☒ Yes	☐ No	☐ N/A
Describe how source control will be implemented, or justify if not feasible: -Site will provide prohibitive dumping placards and/or signage and maintain legibility -Signage posted at public access points to deter prohibitive dumping			
b. Sump pumps or French drains	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: -No Sump pumps or French drains proposed			
c. Interior or sub-surface parking garages	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: -No parking garages proposed			
d. Need for future indoor & structural pest control	☒ Yes	☐ No	☐ N/A
Describe how source control will be implemented, or justify if not feasible: -Provide integrated pest management information to owners, lessees and operators.			
e. Landscape/outdoor pesticide use	☒ Yes	☐ No	☐ N/A
Describe how source control will be implemented, or justify if not feasible: -Landscaping will be designed to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to storm water pollution. -BMPs will be designed with plants that are tolerant of periodic saturated soil conditions.			

Form 3, Page 3 of 4			
Source Control Requirement	**Applied?**		
f. Pools, spas, ponds, decorative fountains, or other water features	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: -No water features proposed			
g. Food preparation and/or service	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: -No food preparation proposed.			
h. Refuse/trash collection areas	☒ Yes	☐ No	☐ N/A
Describe how source control will be implemented, or justify if not feasible: -Trash cans will be stored in proposed garages.			
i. Industrial processes	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: -No industrial processes proposed.			
j. Outdoor storage of equipment, chemicals, or materials	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: -No outdoor storage proposed.			
k. Vehicle and equipment cleaning	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: -No vehicle cleaning proposed.			
l. Vehicle/equipment repair and maintenance	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: -No vehicle cleaning proposed.			
m. Fuel dispensing areas	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: -No fuel dispensing areas proposed			

Form 3, Page 4 of 4			
n. Loading docks	☐ Yes	☐ No	☒ N/A
Describe how source control will be implemented, or justify if not feasible: -No loading docks proposed.			
o. Fire sprinkler test water and relief point	☒ Yes	☐ No	☐ N/A
Describe how source control will be implemented, or justify if not feasible: -Drain fire sprinkler test water to the sanitary sewer.			
p. Miscellaneous drain or wash down areas	☒ Yes	☐ No	☐ N/A
Describe how source control will be implemented, or justify if not feasible: -Condensate drain lines and roofing to drain to landscaped areas.			
q. Plaza, sidewalks, parking lots	☒ Yes	☐ No	☐ N/A
Describe how source control will be implemented, or justify if not feasible: -Sidewalks and driveways to be swept. Debris from pressure washing must be collected to prevent entry into the storm drain system. Washwater containing any cleaning agent or degreaser must be collected and discharged to the sanitary sewer and not discharged to a storm drain.			
Discussion / justification if SC-6 not implemented. Clearly identify which sources of runoff pollutants are discussed. Justification must be provided for <u>all</u> "No" answers shown above.			

FORM 4 – SITE DESIGN BMPS FOR ALL DEVELOPMENT PROJECTS

Page 1 of 2

PROJECT IDENTIFICATION			
Project Name: 1205 Merlose Way			
Permit Application Number P21-0130			
All development projects must implement site design BMPs SD-1 through SD-8, unless justification is provided by qualified design professional. See Chapter 4 and Appendix E of the Model BMP Design Manual for information to implement site design BMPs shown in this checklist. Answer each category below pursuant to the following, and provide description. • "Yes" means the project will implement the site design BMP as described in Chapter 4 and/or Appendix E of the Model BMP Design Manual. • "No" means the BMP is applicab2le to the project but it is not feasible to implement. • "N/A" means the BMP is not applicable at the project site because the project does not include the feature that is addressed by the BMP (e.g., the project site has no existing natural areas to conserve).			
Site Design Requirement	**Applied?**		
SD-1 Maintain Natural Drainage Pathways and Hydrologic Features	☒ Yes	☐ No	☐ N/A
Describe how site design will be implemented, or justify if not feasible: -Site drainage mimics the existing condition drainage patter and discharge points.			
SD-2 Conserve Natural Areas, Soils, and Vegetation	☐ Yes	☐ No	☒ N/A
Describe how site design will be implemented, or justify if not feasible:			
SD-3 Minimize Impervious Area	☒ Yes	☐ No	☐ N/A
Describe how site design will be implemented, or justify if not feasible: -Streets and sidewalks designed to mimium widths, provided public safety is not compromised.			
SD-4 Minimize Soil Compaction	☐ Yes	☐ No	☒ N/A
Describe how site design will be implemented, or justify if not feasible:			

Form 4, Page 2 of 2			
SD-5 Impervious Area Dispersion	☒ Yes	☐ No	☐ N/A
Describe how site design will be implemented, or justify if not feasible: -Roof drains designed to discharge to landscape. -Storm water biofiltration basin will effectively receive and treat runoff from impervious areas prior to discharging to the storm drain system.			
SD-6 Runoff Collection	☒ Yes	☐ No	☐ N/A
Describe how site design will be implemented, or justify if not feasible: -onsite runoff will be effectively collected, conveyed and discharged via proposed storm drain.			
SD-7 Landscaping with Native or Drought Tolerant Species	☒ Yes	☐ No	☐ N/A
Describe how site design will be implemented, or justify if not feasible: -Landscaping design shall consist of native and drought tolerant species.			
SD-8 Harvest and Use of Precipitation *Note: Worksheet B.3-1, "Harvest and Use Feasibility" must be included in this section of the SWQMP.*	☐Yes	☒ No	☐ N/A
Describe how site design will be implemented, or justify if not feasible: -Harvesting and using precipitation is not a feasible BMP to implement. See worksheet B.3-1 in attachment 1C.			

FORM 5 – STRUCTURAL POLLUTANT CONTROL AND HYDROMODIFICATION MANAGEMENT BMPS

PROJECT IDENTIFICATION
Project Name: 1205 Melrose Way
Permit Application Number P21-0130
PDP Structural BMPs
All PDPs must implement structural BMPs for storm water pollutant control (see Chapter 5 of the *BMP Design Manual*). Selection of PDP structural BMPs for storm water pollutant control must be based on the selection process described in Chapter 5. PDPs subject to hydromodification management requirements must also implement structural BMPs for flow control for hydromodification management (see Chapter 6 of the *BMP Design Manual*). Both storm water pollutant control and flow control for hydromodification management can be achieved within the same structural BMP(s). PDP structural BMPs must b27e verified by the local jurisdiction at the completion of construction. This may include requiring the project owner or project owner's representative and engineer of record to certify construction of the structural BMPs (see Section 1.12 of the *BMP Design Manual*). PDP structural BMPs must be maintained into perpetuity, and the local jurisdiction must confirm the maintenance (see Section 7 of the *BMP Design Manual*). Use this form to provide narrative description of the general strategy for structural BMP implementation at the project site in the box below. Then complete the PDP structural BMP summary information sheet (page 3 of this form) for each structural BMP within the project (copy the BMP summary information page as many times as needed to provide summary information for each individual structural BMP).
Describe the general strategy for structural BMP implementation at the site. This information must describe how the steps for selecting and designing storm water pollutant control BMPs presented in Section 5.1 of the *BMP Design Manual* were followed, and the results (type of BMP selected). For projects requiring hydromodification flow control BMPs, indicate whether pollutant control and flow control BMPs are integrated or separate structures. Note: Each structural pollutant control and hydromodification management BMP must be clearly identified on a site map (Attachment 1a), and described in supporting table (Attachment 1B). Step 1A: The DMAs draining to the structural BMPs are not self-mitigating, de-minimus, or self-retaining. Step 1B: There are no site design BMPs proposed for the project for which the runoff factor can be adjusted. Step 2: Harvest and use is not feasible. Refer to Attachment 1c. Step 3: Infiltration is not feasible. Refer to Attachment 1d. Step 3C: Biofiltration BMPs have been selected and sized per the design criteria to meet both pollutant control and hydromodification management flow control requirements.

FORM 6 – STORMWATER BMP MAINTENANCE MECHANISM

PROJECT IDENTIFICATION
Project Name: 1205 Melrose Way
Permit Application Number P21-0130
Maintenance Requirements
A stormwater structural BMP operations and maintenance plan must be prepared for PDPs. A template plan is available at: http://www.cityofvista.com/services/city-departments/community-development/building-planning-permits-applications/land-development-autocad-templates/storm-water-forms Has a stormwater structural BMP operations and maintenance plan been prepared? ☒ Yes, included with Attachment 3A ☐ No
All projects are required to maintain designed functionality of structural BMPs in perpetuity. Privately-owned projects must record a *Storm Drain Maintenance Agreement* with the County of San Diego Assessor's Office. A template *Storm Drain Maintenance Agreement* is available at: http://www.cityofvista.com/services/city-departments/community-development/building-planning-permits-applications/land-development-autocad-templates/storm-water-forms Has a Storm Drain Maintenance Agreement been submitted to the County? ☐ Yes, copy included with Attachment 3B ☒ No ☐ Not Applicable (e.g., city-owned property/project)

ATTACHMENT 1 – POLLUTANT CONTROLS: SUPPORT DOCUMENT AND CHECKLIST

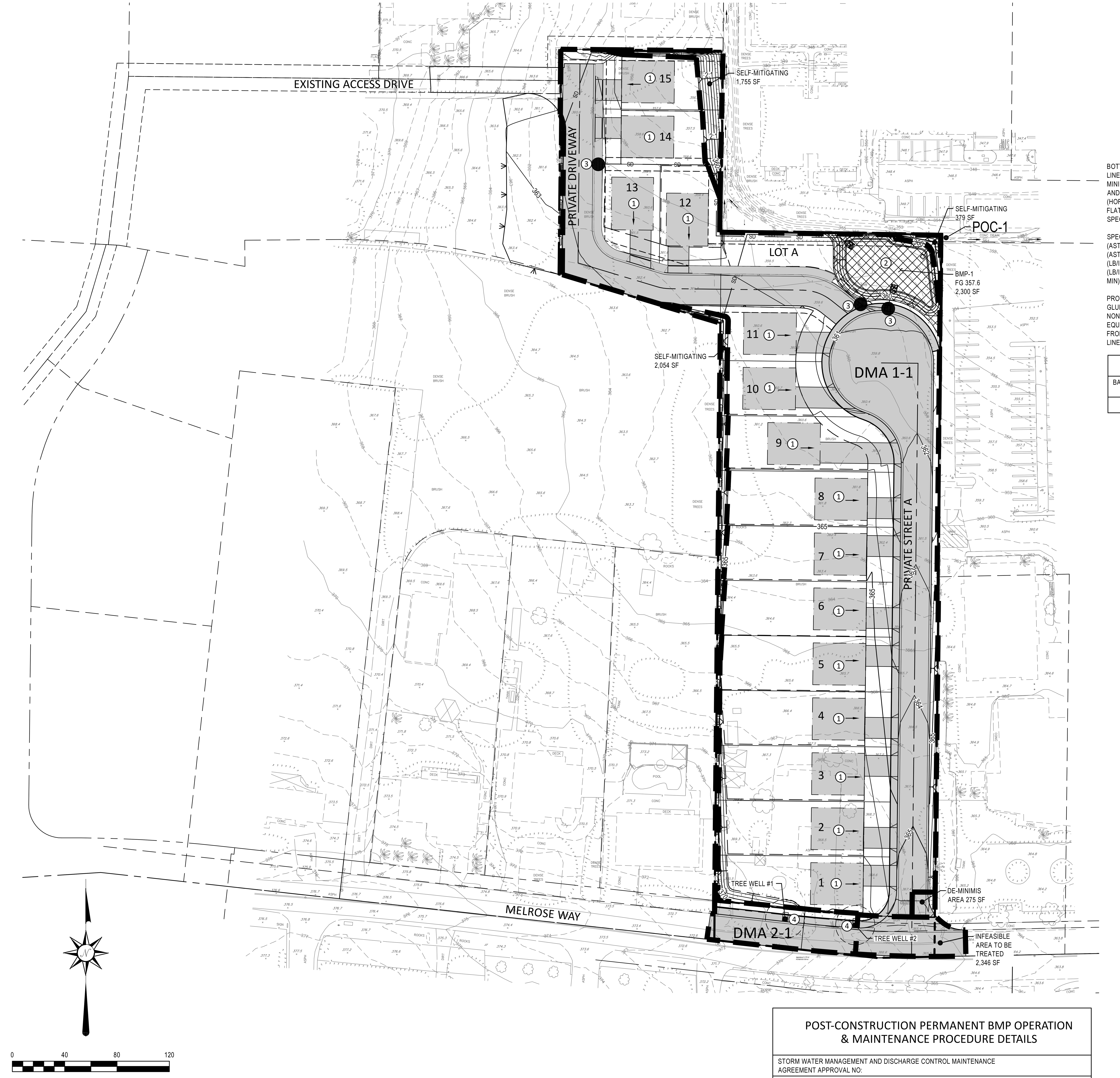
Each of the attachments indicated below should be considered for inclusion with the SWQMP. Use this checklist to indicate which attachments are included behind this coversheet.

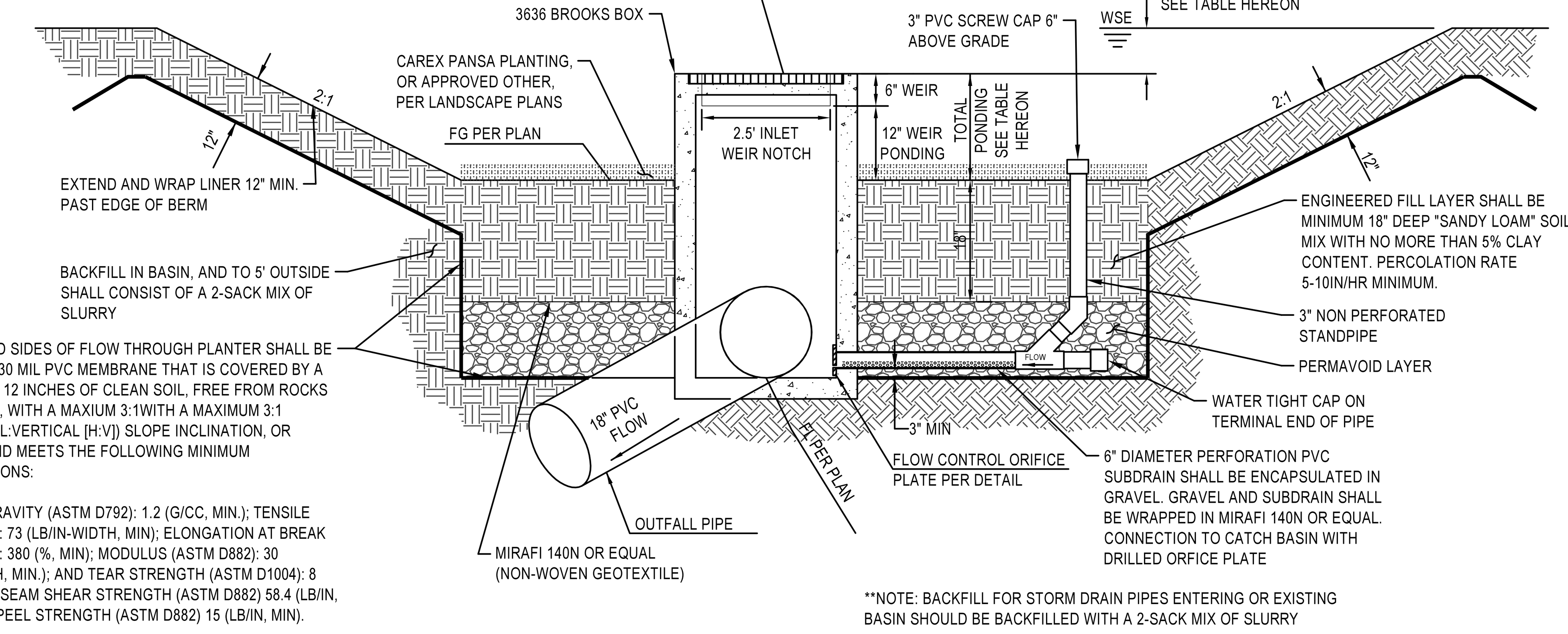
Attachment Sequence	Contents	Checklist
Attachment 1A	Drainage Management Area (DMA) Exhibit See DMA Exhibit Checklist on next page.	☒ Included
Attachment 1B	Tabular Summary of DMAs Showing DMA ID matching DMA Exhibit, DMA Area, DMA Type, and BMPs* *Provide table in this Attachment OR on DMA Exhibit in Attachment 1A	☒ Included on DMA Exhibit in Attachment 1A ☐ Included as Attachment 1B
Attachment 1C	Harvest and Use Feasibility Screening Checklist (Worksheet B.3-1) Refer to Appendix B.3-1 of the *BMP Design Manual*.	☒ Included ☐ Not included because the entire project will use Infiltration BMPs
Attachment 1D	Categorization of Infiltration Feasibility Condition (Worksheet C.4-1) Refer to Appendices C and D of the *BMP Design Manual*.	☒ Included ☐ Not included because the entire project will use Harvest and Use BMPs
Attachment 1E	Pollutant Control BMP Design Worksheets and Calculations Refer to Appendices B and E of the *BMP Design Manual* for structural pollutant control BMP design guidelines	☒ Included

ATTACHMENT 1A – DMA EXHIBIT CHECKLIST

For Attachment 1A, provide map(s) for the project site, titled "DMA Exhibit." The checklist below identifies minimum elements that must be included with the DMA Exhibit.

- ☐ Underlying hydrologic soil group
- ☐ Approximate depth to groundwater
- ☐ Existing natural hydrologic features (watercourses, seeps, springs, wetlands, etc.)
- ☐ Critical coarse sediment yield areas to be protected
- ☐ Existing topography and impervious areas
- ☐ Existing and proposed site drainage network and storm drain structures
- ☐ Proposed connections to offsite drainage
- ☐ Proposed demolition
- ☐ Proposed grading
- ☐ Proposed impervious features
- ☐ Proposed design features and surface treatments used to minimize imperviousness
- ☐ Drainage management area (DMA) boundaries
- ☐ DMA identification numbers (DMA ID)
- ☐ DMA areas (square footage or acreage)
- ☐ DMA type (Drains to BMP, Self-mitigating, De Minimis, or Self-retaining)
- ☐ Potential pollutant source areas and corresponding required source controls (see Form 2 and Form 3 of SWQMP, *BMP Design Manual* Chapter 4 and Appendix E.1)
- ☐ Proposed Structural BMPs (see Form 5 of SWQMP)



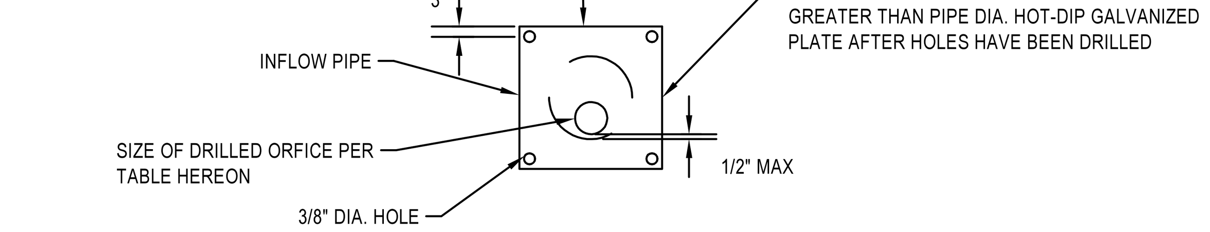


BOTTOM AND SIDES OF FLOW THROUGH PLANTER SHALL BE LINED WITH 30 MIL PVC MEMBRANE THAT IS COVERED BY A MINIMUM OF 12 INCHES OF CLEAN SOIL, FREE FROM ROCKS AND DEBRIS, WITH A MAXIUM 3:1WITH A MAXIMUM 3:1 (HORIZONTAL:VERTICAL [H:V]) SLOPE INCLINATION, OR FLATTER, AND MEETS THE FOLLOWING MINIMUM SPECIFICATIONS:

SPECIFIC GRAVITY (ASTM D792): 1.2 (G/CC, MIN.); TENSILE (ASTM D882): 73 (LB/IN-WIDTH, MIN); ELONGATION AT BREAK (ASTM D882): 380 (%, MIN); MODULUS (ASTM D882): 30 (LB/IN-WIDTH, MIN.); AND TEAR STRENGTH (ASTM D1004): 8 (LB/IN, MIN); SEAM SHEAR STRENGTH (ASTM D882) 58.4 (LB/IN, MIN); SEAM PEEL STRENGTH (ASTM D882) 15 (LB/IN, MIN).

PROVIDE 18-INCH OVERLAPPED, TAPED OR GLUED SEAMS AT ALL SEAMS. PLACE NON-WOVEN FILTER FABRIC (MIRAFI 140N OR EQUAL) ON EITHER SIDE OF PVC LINER TO PROTECT LINER FROM PUNCTURE ON ALL SIDES, "SANDWHICHING" THE PVC LINER WITH A FABRIC CUSHION.

**NOTE: BACKFILL FOR STORM DRAIN PIPES ENTERING OR EXISTING BASIN SHOULD BE BACKFILLED WITH A 2-SACK MIX OF SLURRY



FLOW CONTROL ORFICE PLATE

BIOFILTRATION BASIN TABLE

BASIN NO.	ENGINEERED SOIL LAYER	PERMAVOID LAYER	TOTAL PONDING	FREE BOARD	ORIFICE
1	18"	38.4"	12"	1.0'	1.5"

BIOFILTRATION BASIN DETAIL

N.T.S.

DMA DATA TABLE

DMA NO.	IMPERVIOUS AREA (S.F.)	PERVIOUS AREA (S.F.)	TOTAL AREA (S.F.)
1-1	53,174	52,620	105,794
2-1	5,171	537	5,708
SELF-MITIGATING	-----	-----	4,188 SF
DE-MINIMUS AREA	-----	-----	275 SF
INFEASIBLE TO TREAT	-----	-----	2,346 SF

GENERAL INFORMATION

PROJECT SITE IS LOCATED IN THE LOS MONOS H.S.A. (904.31) OF AGUA HEDIONDA CREEK H.A. OF CARLSBAD H.U., HOWEVER DRAINAGE FROM THE SITE ULTIMATELY DISCHARGES TO THE RECIEVING WATERS OF BUENA VISTA CREEK H.S.A. (904.22) OF BUENA VISTA CREEK H.A. OF CARLSBAD H.U.

POLUTTANTS OF CONCERN - BENTHIC COMMUNITY EFFECTS, BIFENTHRIN, SELENIUM, TOXICITY, INDICATOR BACTERIA, NUTRIENTS, AND SEDIMENTATION/SILTATION

LID SITE DESIGN BMP'S

1. BIOFILTRATION BASIN
2. ROOF DRAIN TO LANDSCAPING
3. MINIMIZE IMPERVIOUS SURFACES
4. PROTECT SLOPES AND CHANNELS
5. TREE WELLS

SOURCE CONTROL BMP'S

1. STORM DRAIN STENCILING
2. EMPLOY INTEGRATED PEST MANAGEMENT PRACTICES
3. EMPLOY EFFICIENT IRRIGATION AND DROUGHT TOLERANT LANDSCAPE DESIGN

SOIL INFORMATION

HYDROLOGIC SOIL GROUP: TYPE D

GROUND WATER INFORMATION

GROUND WATER WAS NOT ENCOUNTERED AT THE SITE. SEE REPORT PREPARED BY: GEOSOILS, INC
DATED: MARCH 5, 2021 W.O. 8058-A-SC

COARSE SEDIMENT YIELD

REFER TO ATTACHEMENT 2B OF THIS REPORT FOR CRITICAL COARSE SEDIMENT YIELD AREAS WITHIN THIS PROJECT SITE.

BMP NOTES

1. THESE BMPS AREA MANDATORY TO BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS OR THERE PLANS
2. NO CHANGES TO THE PROPOSED BMPS ON THIS SHEET WITHOUT PRIOR APPROVAL FORM THE CITY ENGINEERING DEPARTMENT
3. NO SUBSTITUTIONS TO THE MATERIAL TYPES OR PLANTING TYPES WITHOUT PRIOR APPROVAL FROM THE LAND DEVELOPMENT ENGINEER
4. NO OCCUPANCY WILL BE GRANTED UNTIL THE CITY INSPECTOR STAFF HAS INSPECTED THIS PROJECT FOR APPRORIATE BMP CONSTRUCTION AND INSTALLATION.

WATER QUALITY TECHNICAL REPOT

TITLE - PRIORITY DEVELOPMENT PROJECT STORM WATER QUALITY MANAGEMENT REPORT FOR 1205 MELROSE WAY
DATE - MARCH 2021
PREPARED BY - PASCO LARET SUITER & ASSOCIATES

MAINTENANCE AGREEMENT DOCUMENT

TITLE -
DATE -
PREPARED BY -

OPERATIONS AND MAINTENANCE PLAN

TITLE - STORM WATER OPERATIONS & MAINTENANCE PLAN FOR 1205 MELROSE WAY
DATE - MARCH 2021
PREPARED BY - PASCO LARET SUITER & ASSOCIATES

RESPONSIBLE PARTY INFORMATION

ZORAN DJORDJEVICH

551 LYNWOOD DRIVE

ENCINITAS, CA 92024

LEGEND

DESCRIPTION	SYMBOL
LOT NUMBER	10
DRAINAGE DIRECTION	→
DRAINAGE MANAGEMENT AREA	▬ ▬
TYPE-B CURB INLET	
BROOKS BOX	□
RIP RAP	

BMP ID #	BMP TYPE	SYMBOL	QUANTITY	DETAIL PLAN SET SHEET NO.	DETAIL NO.	HORIZONTAL DATUM: NAD 83		CONSTRUCTION CONFIRMATION
						NORTHING	EASTING	
1	ROOF DRAIN TO LANDSCAPING		30 (TWO PER PAD)					
2	BIOFILTRATION AREA		1					
3	STORM DRAIN STENCILING	●	3					
4	TREE WELL		2					

POST-CONSTRUCTION PERMANENT BMP OPERATION & MAINTENANCE PROCEDURE DETAILS

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT APPROVAL NO:

O&M RESPONSBILE PARTY DESIGNEE: PACIFIC INTERNATIONAL INVESTMENTS, INC

BMP DESCRIPTION	INSPECTION FREQUENCY	MAINTENANCE FREQUENCY	MAINTENANCE METHOD	QUANTITY	SHEET NUMBER(S)
EDUCATION PROGRAM (SOURCE CONTROL)	ANNUAL	AS NEEDED	EMPLOYEE EDUCATION PROGRAM	N/A	N/A
SIGNAGE & STENCILING	ANNUAL	AS NEEDED	REPAIR AND/OR REPLACE AS NECESSARY	3	N/A
BIOFILTRATION BASIN	ANNUAL	AS NEEDED	MOWING AND DEBRIS COLLECTION AS NECESSARY. REPAIR AS NEEDED	1	N/A
TREE WELL	MONTHLY	AS NEEDED	INSPECT TREE HEALTH & REPAIR/REPLACE AS NECCESSARY	2	N/A

DMA EXHIBIT

1205 MELROSE WAY
VISTA, CA
SCALE: 1' = 40'
DATE: AUGUST 2021
SHEET 1 OF 1

PASCO LARET SUITER & ASSOCIATES
San Diego | Solana Beach | Orange County
Phone 858.259.8212 | www.plsaengineering.com

ATTACHMENT 1c

Harvest and Use Feasibility Screening			**Worksheet B.3-1**
1. Is there a demand for harvested water (check all that apply) at the project site that is reliably present during the wet season? √ Toilet and urinal flushing √ Landscape irrigation Other:______________			
2. If there is a demand; estimate the anticipated average wet season demand over a period of 36 hours. Guidance for planning level demand calculations for toilet/urinal flushing and landscape irrigation is provided in Section B.3.2. <u>Toilet/Urinal Flushing</u> (9.3 gal/person-day) x (0.13368 cuft/gal) x (1.5 days) = 1.86 cuft/person-36hr Assume (3 people per house x 15 houses) x (1.86 cuft/person-36 hr) = **84 cuft/36hr** <u>Landscape Irrigation</u> (1.37 ac irrigated) x (1470 gal/ac-36hr) x (0.13368 cuft/gal) = **270 cuft/36hr** **Total = 84 cuft + 270 cuft = 354 cuft**			
3. Calculate the DCV using worksheet B-2.1. **DCV = 3,404 cuft**			
3a. Is the 36-hour demand greater than or equal to the DCV? Yes / √ No	3b. Is the 36-hour demand greater than 0.25DCV but less than the full DCV? Yes / √ No	3c. Is the 36-hour demand less than 0.25DCV? **√ Yes**	
Harvest and use appears to be feasible. Conduct more detailed evaluation and sizing calculations to confirm that DCV can be used at an adequate rate to meet drawdown criteria.	Harvest and use may be feasible. Conduct more detailed evaluation and sizing calculations to determine feasibility. Harvest and use may only be able to be used for a portion of the site, or (optionally) the storage may need to be upsized to meet long term capture targets while draining in longer than 36 hours.	**√ Harvest and use is considered to be infeasible.**	

ATTACHMENT 1d

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

Categorization of Infiltration Feasibility Condition		**Worksheet C.4-1**	
Part 1 - Full Infiltration Feasibility Screening Criteria **Would infiltration of the full design volume be feasible from a physical perspective without any undesirable consequences that cannot be reasonably mitigated?** **Note that it is not necessary to investigate each and every criterion in the worksheet if infiltration is precluded. Instead a letter of justification from a geotechnical professional familiar with the local conditions substantiating any geotechnical issues will be required.**			
Criteria	**Screening Question**	**Yes**	**No**
1	**Is the estimated reliable infiltration rate below proposed facility locations greater than 0.5 inches per hour?** The response to this Screening Question must be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X
Provide basis: The USDA indicates that the site is underlain by Bosanko Clay (BsD) and Placentia sandy loam (PeC2), which are noted to have infiltration rates varying from 0.00 to 0.06 inches/hour, and is categorized as Hydrologic Soil Group “D”. Furthermore, a reasonable design infiltration rate (without application of correction/ safety factors) of 0.025 inches/hour is indicated for Hydrologic Soil Group “D” soils, which is less than 0.50 inches/hour. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
2	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		X
Provide basis: Given the fact that dense bedrock exists at relatively shallow depth at the site, storm water infiltration has the potential to create perched groundwater conditions that would migrate laterally, adversely affecting both onsite and offsite improvements, including underground utilities, and even slope stability. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

Worksheet C.4.1 Page 2 of 4			
Criteria	**Screening Question**	**Yes**	**No**
3	**Can infiltration greater than 0.5 inches per hour be allowed without increasing risk of groundwater contamination (shallow water table, storm water pollutants or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensible evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Storm water infiltration could lead to perched groundwater conditions but measures can be incorporated into the proposed project for mitigation. Storm water pollutants such as leaking automotive fluids and brake dust are possible, however, subsurface exploration shows more than 10 feet of vertical separation between the infiltration surface elevation and the current groundwater table. Thus, there is low potential that storm water pollutants could impact groundwater quality. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
4	**Can infiltration greater than 0.5 inches per hour be allowed without causing potential water balance issues such as a change of seasonality of ephemeral streams or increased discharge of contaminated groundwater to surface waters?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: The site is not located near a drainage course. Based on our geotechnical site exploration, groundwater appears to be greater than 50 feet below existing site grades, and likely at much lower elevations near sea level. Downstream water rights are considered a legal matter and typically do not fall within the purview of geotechnical engineering. However, GSI is not aware of any significant downstream water rights issues of concern on the adjoining properties. Given the slow soil infiltration rates onsite, infiltration should not significantly affect downstream water rights, from a geotechnical perspective. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
Part 1 Result*	In the answers to rows 1-4 are "**Yes**" a full infiltration design is potentially feasible. The feasibility screening category is **Full Infiltration** If any answer from row 1-4 is "**No**", infiltration may be possible to some extent but would not generally be feasible or desirable to achieve a "full infiltration" design. Proceed to Part 2		X Y

* To be completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by Agency/Jurisdictions to substantiate findings.

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

Worksheet C.4.1 Page 3 of 4			
Part 2 - Partial Infiltration vs. No Infiltration Feasibility Screening Criteria **Would infiltration of water in an appreciable amount be physically feasible without any negative consequences that cannot be reasonably mitigated?**			
Criteria	**Screening Question**	**Yes**	**No**
5	**Do soil and geologic conditions allow for infiltration in any appreciable rate or volume?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2 and Appendix D.		X
Provide basis: The USDA indicates that the site is underlain by Bosanko Clay (BsD) and Placentia sandy loam (PeC2), which are noted to have infiltration rates varying from 0.00 to 0.06 inches/hour, and is categorized as Hydrologic Soil Group "D". Furthermore, a reasonable design infiltration rate (without application of correction/ safety factors) of 0.025 inches/hour is indicated for Hydrologic Soil Group "D" soils, which is less than 0.50 inches/hour. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
6	**Can infiltration in any appreciable quantity be allowed without increasing risk of geotechnical hazards (slope stability, groundwater mounding, utilities, or other factors) that cannot be mitigated to an acceptable level?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.2.		X
Provide basis: Given the fact that dense bedrock exists at relatively shallow depth at the site, storm water infiltration has the potential to create perched groundwater conditions that would migrate laterally, adversely affecting both onsite and offsite improvements, including underground utilities, and even slope stability. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			

Worksheet C.4-1: Categorization of Infiltration Feasibility Condition

Worksheet C.4.1 Page 4 of 4			
Criteria	**Screening Question**	**Yes**	**No**
7	**Can Infiltration in any appreciable quantity be allowed without posing significant risk for groundwater related concerns (shallow water table, storm water pollutants or other factors)?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: Storm water infiltration could lead to perched groundwater conditions but measures can be incorporated into the proposed project for mitigation. Storm water pollutants such as leaking automotive fluids and brake dust are possible, however, subsurface exploration shows more than 10 feet of vertical separation between the infiltration surface elevation and the current groundwater table. Thus, there is low potential that storm water pollutants could impact groundwater quality. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
8	**Can infiltration be allowed without violating downstream water rights?** The response to this Screening Question shall be based on a comprehensive evaluation of the factors presented in Appendix C.3.	X	
Provide basis: The site is not located near a drainage course. Based on our geotechnical site exploration, groundwater appears to be greater than 50 feet below existing site grades, and likely at much lower elevations near sea level. Downstream water rights are considered a legal matter and typically do not fall within the purview of geotechnical engineering. However, GSI is not aware of any significant downstream water rights issues of concern on the adjoining properties. Given the slow soil infiltration rates onsite, infiltration should not significantly affect downstream water rights, from a geotechnical perspective. Summarize findings of studies; provide reference to studies, calculations, maps, data sources, etc. Provide narrative discussion of study/data source applicability.			
Part 2 Result*	If all answers from row 5-8 are yes then partial infiltration design is potentially feasible. The feasibility screening category is **Partial Infiltration.** If any answer from row 5-8 is no, then infiltration of any volume is considered to be **infeasible** within the drainage area. The feasibility screening category is **No Infiltration.**		X Y

* To be completed using gathered site information and best professional judgement considering the definition of MEP in the MS4 Permit. Additional testing and/or studies may be required by Agency/Jurisdictions to substantiate findings.

ATTACHMENT 1e

Worksheet B.2-1. DCV

DMA 1-1

Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.65	inches
2	Area tributary to BMP (s)	A=	2.43	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1) * See calculation below	C=	0.59	unitless
4	Street trees volume reduction	TCV=	0	cubic-feet
5	Rain barrels volume reduction (1 cubic foot=7.48 gallons)	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	3404	cubic-feet

	Area (sq ft)	Runoff Factor	A x RF	Weighted RF
Impervious	51837	0.9	46653	
Landscape	53957	0.3	16187	
Pavers	0	0.1	0	
Total	105794		62840	0.59

DMA 2-1 - Tree Well #1

Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.65	inches
2	Area tributary to BMP (s)	A=	0.07	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1) * See calculation below	C=	0.84	unitless
4	Street trees volume reduction	TCV=	0	cubic-feet
5	Rain barrels volume reduction (1 cubic foot=7.48 gallons)	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	133	cubic-feet

	Area (sq ft)	Runoff Factor	A x RF	Weighted RF
Impervious	2636	0.9	2372	
Landscape	274	0.3	82	
Pavers	0	0.1	0	
Total	2910		2455	0.84

HMP Tree Well Multiplier per County BMPDM (D soil, 36" soil depth)	3.17	
DCV x Tree Well Multiplier	421	cf
30-ft Diameter Mature Canopy Tree provides	420	cf

DMA 2-1 - Tree Well #2

Design Capture Volume		Worksheet B-2.1		
1	85th percentile 24-hr storm depth from Figure B.1-1	d=	0.65	inches
2	Area tributary to BMP (s)	A=	0.06	acres
3	Area weighted runoff factor (estimate using Appendix B.1.1 and B.2.1) * See calculation below	C=	0.84	unitless
4	Street trees volume reduction	TCV=	0	cubic-feet
5	Rain barrels volume reduction (1 cubic foot=7.48 gallons)	RCV=	0	cubic-feet
6	Calculate DCV = (3630 x C x d x A) – TCV - RCV	DCV=	128	cubic-feet

	Area (sq ft)	Runoff Factor	A x RF	Weighted RF
Impervious	2535	0.9	2282	
Landscape	263	0.3	79	
Pavers	0	0.1	0	
Total	2798		2360	0.84

HMP Tree Well Multiplier per County BMPDM (D soil, 36" soil depth)	3.17	
DCV x Tree Well Multiplier	405	cf
30-ft Diameter Mature Canopy Tree provides	420	cf

ATTACHMENT 2 – HYDROMODIFICATION MANAGEMENT CONTROLS: SUPPORT DOCUMENTATION & CHECKLIST

☐ Check this box if this attachment is empty because the project is exempt from PDP hydromodification management requirements.

Each of the attachments indicated below should be considered for inclusion with the SWQMP. Use this checklist to indicate which attachments are included behind this coversheet.

Attachment Sequence	Contents	Checklist
Attachment 2A	Hydromodification Management Exhibit	☒ Included See Hydromodification Management Exhibit Checklist on the back of this Attachment cover sheet.
Attachment 2B	Management of Critical Coarse Sediment Yield Areas See Section 6.2 of the *BMP Design Manual*.	☒ Exhibit showing project drainage boundaries marked on WMAA Critical Coarse Sediment Yield Area Map Analyses, as applicable, for Critical Coarse Sediment Yield Area Determination, per *BMP Design Manual:* ☐ 6.2.1 Verification of Geomorphic Landscape Units Onsite ☐ 6.2.2 Downstream Systems Sensitivity to Coarse Sediment ☐ 6.2.3 Optional Additional Analysis of Potential Critical Coarse Sediment Yield Areas Onsite
Attachment 2C	Geomorphic Assessment of Receiving Channels See Section 6.3.4 of the *BMP Design Manual*.	☒ Not performed ☐ Included ☐ Submitted as separate stand-alone document
Attachment 2D	Flow Control Facility Design, including Structural BMP Drawdown Calculations and Overflow Design Summary See Chapter 6 and Appendix G of the *BMP Design Manual*	☒ Included ☐ Submitted as separate stand-alone document
Attachment 2E	Vector Control Plan	☐ Included ☒ Not required because BMPs will drain in less than 96 hours

BMP-1

Worksheet B.5-1: Simple Sizing Method for Biofiltration BMPs			
1	Remaining DCV After implementing retention BMPs	3404.0	cu-ft
Partial Retention			
2	Infiltration rate from Worksheet D.5-1 if partial infiltration is feasible	0.00	in/hr
3	Allowable drawdown time for aggregate storage below the underdrain	36	hours
4	Depth of runoff that can be infiltrated [Line 2 x Line 3]	0.00	inches
5	Aggregate pore space	0.95	in/in
6	Required depth of gravel below the underdrain [Line 4 / Line 5]	0.00	inches
7	Assumed surface area of the biofiltration BMP	2300.0	sq-ft
8	Media retained pore storage	0.1	in/in
9	Volume retained pore storage	345.00	cu-ft
10	DCV that requires biofiltration [Line 1 - Line 9]	3059.0	cu-ft
BMP Parameters			
11	Surface Ponding [6 inch minimum, 12 inch maximum]	12.0	inches
12	Media Thickness [18 in Min], also add mulch layer thicknes to this line	18	inches
13	Aggregate Storage above underdrain invert (12 inches typical) - Use 0 inches for sizing if the aggregate is not over the entire bottom surface area	38.4	inches
14	Freely drained pore storage	0.2	in/in
15	Media filtration rate to be used for sizing (5 in/hr. with no outlet control; if the filtration rate is controlled by the outlet, use the outlet controlled rate which will be less than 5 in/hr.)	2.634	in/hr
Baseline Calculations			
16	Allowable Routing Time for sizing	6	hours
17	Depth filtered during storm [Line 15 x Line 16]	16	inches
18	Depth of Detention Storage [Line 11 + (Line 12 x Line 14) + (Line 13 x Line 5)]	52.08	inches
19	Total Depth Treated [Line 17 + Line 18]	67.88	inches
Option 1 - Biofilter 1.5 times the DCV			
20	Required biofiltered volume [1.5 x Line 10]	4589	cu-ft
21	Required Footprint [Line 20 / Line 19] x 12	811.1	sq-ft
Option 2 - Store 0.75 of remaining DCV in pores and poding			
22	Required Storage (surface + pores) Volume [0.75 x Line 10]	2294	cu-ft
23	Required Footprint [Line 22 / Line 18] x 12	529	sq-ft
Footprint of the BMP			
24	Area draining to the BMP	105794	sq-ft
25	Adjusted Runoff Factor for drainage area (Refer to Appendix B.1 and B.2)	0.59	
26	BMP Footprint Sizing Factor (Default 0.03 or an alternative minimum footprint sizing factor from Worksheet B.5-2, Line 11)	0.03	
27	Minimum BMP Footprint [Line 24 x Line 25 x Line 26]	1873	sq-ft
28	Footprint of the BMP = Maximum (Minimum(Line 21, Line 23), Line 27)	1873	sq-ft

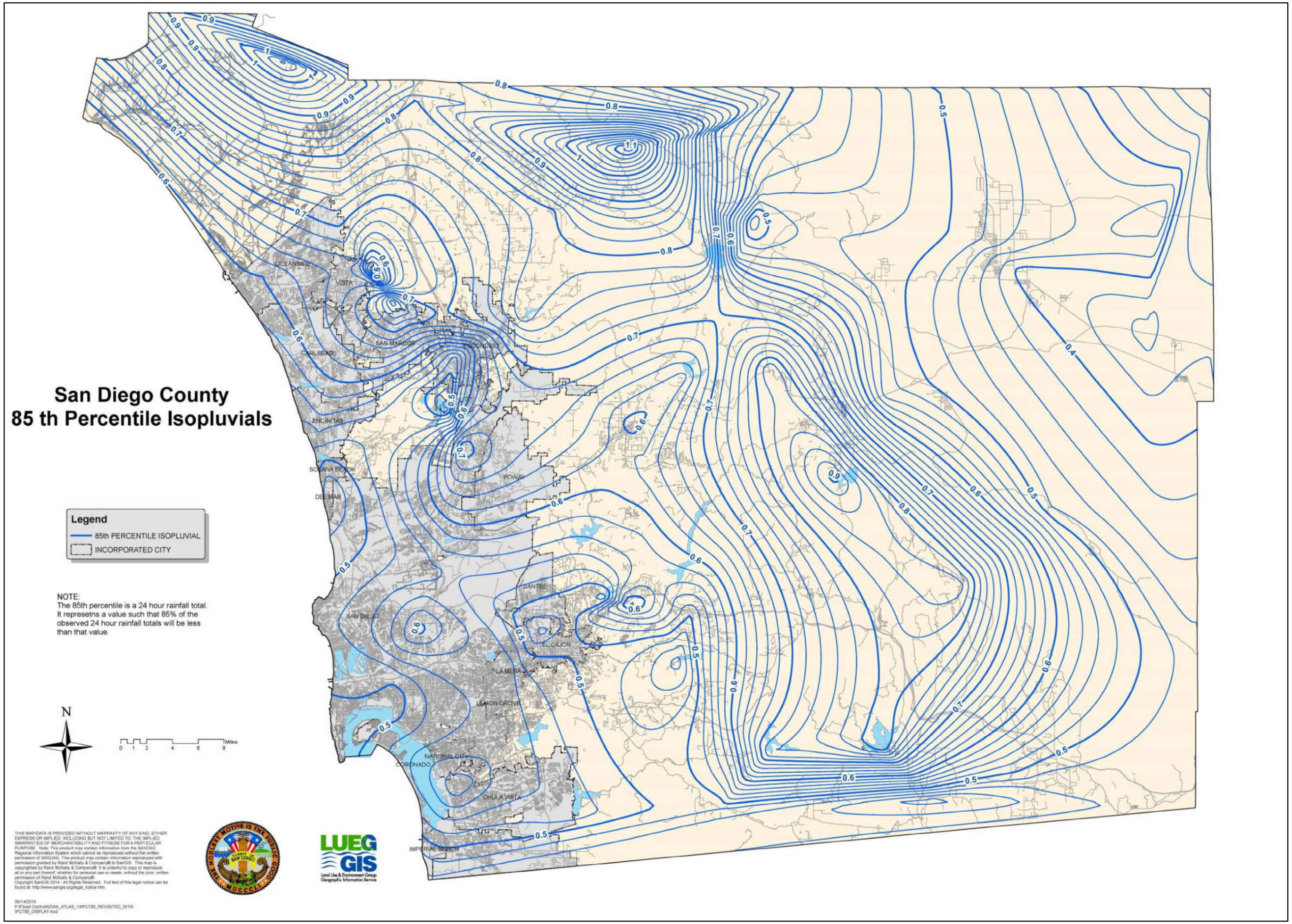


Figure B.1-1: 85th Percentile 24-hour Isopluvial Map

ATTACHMENT 2A – HYDROMODIFICATION MANAGEMENT EXHIBIT

For Attachment 2A, provide map(s) for the project site, titled "Hydromodification Management Exhibit." The checklist below identifies minimum elements that must be included with the exhibit.

☐ Underlying hydrologic soil group

☐ Approximate depth to groundwater

☐ Existing natural hydrologic features (watercourses, seeps, springs, wetlands, etc.)

☐ Critical coarse sediment yield areas to be protected

☐ Existing topography and impervious areas

☐ Existing and proposed site drainage network and storm drain structures

☐ Proposed connections to offsite drainage

☐ Proposed demolition

☐ Proposed grading

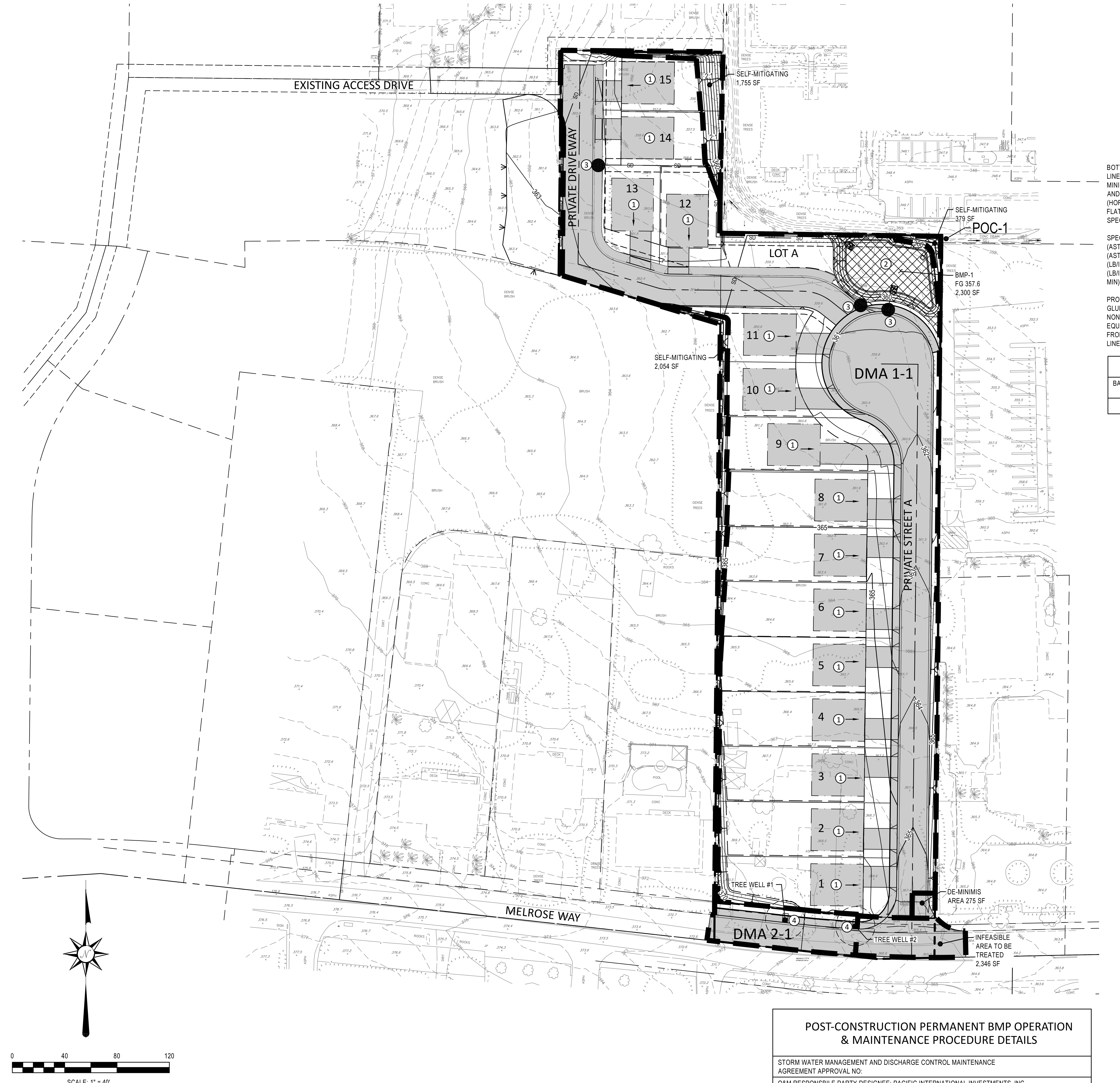
☐ Proposed impervious features

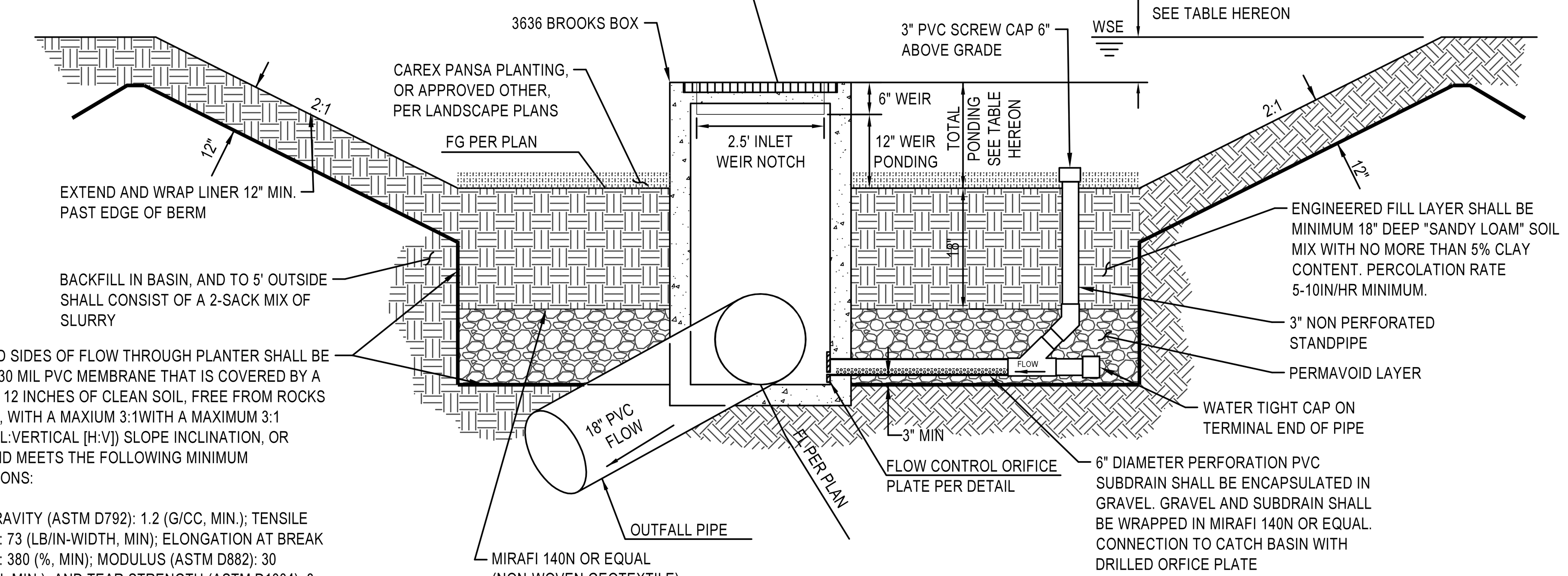
☐ Proposed design features and surface treatments used to minimize imperviousness

☐ Points of Compliance for hydromodification management

☐ Existing and proposed drainage boundary and drainage area to each Point of Compliance (when necessary, create separate exhibits for pre-development and post-project conditions)

☐ Structural BMPs for hydromodification management (location, type, and size)





BOTTOM AND SIDES OF FLOW THROUGH PLANTER SHALL BE LINED WITH 30 MIL PVC MEMBRANE THAT IS COVERED BY A MINIMUM OF 12 INCHES OF CLEAN SOIL, FREE FROM ROCKS AND DEBRIS, WITH A MAXIUM 3:1WITH A MAXIMUM 3:1 (HORIZONTAL:VERTICAL [H:V]) SLOPE INCLINATION, OR FLATTER, AND MEETS THE FOLLOWING MINIMUM SPECIFICATIONS:

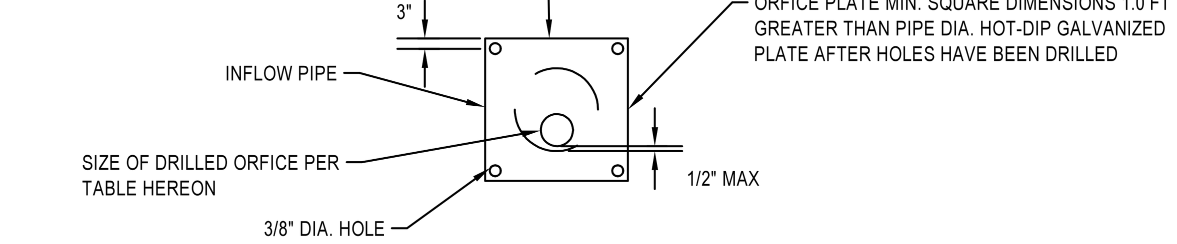
SPECIFIC GRAVITY (ASTM D792): 1.2 (G/CC, MIN.); TENSILE (ASTM D882): 73 (LB/IN-WIDTH, MIN); ELONGATION AT BREAK (ASTM D882): 380 (%, MIN); MODULUS (ASTM D882): 30 (LB/IN-WIDTH, MIN.); AND TEAR STRENGTH (ASTM D1004): 8 (LB/IN, MIN); SEAM SHEAR STRENGTH (ASTM D882) 58.4 (LB/IN, MIN); SEAM PEEL STRENGTH (ASTM D882) 15 (LB/IN, MIN).

PROVIDE 18-INCH OVERLAPPED, TAPED OR GLUED SEAMS AT ALL SEAMS. PLACE NON-WOVEN FILTER FABRIC (MIRAFI 140N OR EQUAL) ON EITHER SIDE OF PVC LINER TO PROTECT LINER FROM PUNCTURE ON ALL SIDES, "SANDWHICHING" THE PVC LINER WITH A FABRIC CUSHION.

**NOTE: BACKFILL FOR STORM DRAIN PIPES ENTERING OR EXISTING BASIN SHOULD BE BACKFILLED WITH A 2-SACK MIX OF SLURRY

BIOFILTRATION BASIN TABLE

BASIN NO.	ENGINEERED SOIL LAYER	PERMAVOID LAYER	TOTAL PONDING	FREE BOARD	ORIFICE
1	18"	38.4"	12"	1.0'	1.5"



FLOW CONTROL ORFICE PLATE

BIOFILTRATION BASIN DETAIL

N.T.S.

DMA DATA TABLE

DMA NO.	IMPERVIOUS AREA (S.F.)	PERVIOUS AREA (S.F.)	TOTAL AREA (S.F.)
1-1	53,174	52,620	105,794
2-1	5,171	537	5,708
SELF-MITIGATING	-----	-----	4,188 SF
DE-MINIMUS AREA	-----	-----	275 SF
INFEASIBLE TO TREAT	-----	-----	2,346 SF

GENERAL INFORMATION

PROJECT SITE IS LOCATED IN THE LOS MONOS H.S.A. (904.31) OF AGUA HEDIONDA CREEK H.A. OF CARLSBAD H.U., HOWEVER DRAINAGE FROM THE SITE ULTIMATELY DISCHARGES TO THE RECIEVING WATERS OF BUENA VISTA CREEK H.S.A. (904.22) OF BUENA VISTA CREEK H.A. OF CARLSBAD H.U.

POLUTTANTS OF CONCERN - BENTHIC COMMUNITY EFFECTS, BIFENTHRIN, SELENIUM, TOXICITY, INDICATOR BACTERIA, NUTRIENTS, AND SEDIMENTATION/SILTATION

LID SITE DESIGN BMP'S

1. BIOFILTRATION BASIN
2. ROOF DRAIN TO LANDSCAPING
3. MINIMIZE IMPERVIOUS SURFACES
4. PROTECT SLOPES AND CHANNELS
5. TREE WELLS

SOURCE CONTROL BMP'S

1. STORM DRAIN STENCILING
2. EMPLOY INTEGRATED PEST MANAGEMENT PRACTICES
3. EMPLOY EFFICIENT IRRIGATION AND DROUGHT TOLERANT LANDSCAPE DESIGN

SOIL INFORMATION

HYDROLOGIC SOIL GROUP: TYPE D

GROUND WATER INFORMATION

GROUND WATER WAS NOT ENCOUNTERED AT THE SITE. SEE REPORT PREPARED BY: GEOSOILS, INC
DATED: MARCH 5, 2021 W.O. 8058-A-SC

COARSE SEDIMENT YIELD

REFER TO ATTACHEMENT 2B OF THIS REPORT FOR CRITICAL COARSE SEDIMENT YIELD AREAS WITHIN THIS PROJECT SITE.

BMP NOTES

1. THESE BMPS AREA MANDATORY TO BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS OR THERE PLANS
2. NO CHANGES TO THE PROPOSED BMPS ON THIS SHEET WITHOUT PRIOR APPROVAL FORM THE CITY ENGINEERING DEPARTMENT
3. NO SUBSTITUTIONS TO THE MATERIAL TYPES OR PLANTING TYPES WITHOUT PRIOR APPROVAL FROM THE LAND DEVELOPMENT ENGINEER
4. NO OCCUPANCY WILL BE GRANTED UNTIL THE CITY INSPECTOR STAFF HAS INSPECTED THIS PROJECT FOR APPRORIATE BMP CONSTRUCTION AND INSTALLATION.

WATER QUALITY TECHNICAL REPOT

TITLE - PRIORITY DEVELOPMENT PROJECT STORM WATER QUALITY MANAGEMENT REPORT FOR 1205 MELROSE WAY
DATE - MARCH 2021
PREPARED BY - PASCO LARET SUITER & ASSOCIATES

MAINTENANCE AGREEMENT DOCUMENT

TITLE -
DATE -
PREPARED BY -

OPERATIONS AND MAINTENANCE PLAN

TITLE - STORM WATER OPERATIONS & MAINTENANCE PLAN FOR 1205 MELROSE WAY
DATE - MARCH 2021
PREPARED BY - PASCO LARET SUITER & ASSOCIATES

RESPONSIBLE PARTY INFORMATION

ZORAN DJORDJEVICH

551 LYNWOOD DRIVE

ENCINITAS, CA 92024

LEGEND

DESCRIPTION	SYMBOL
LOT NUMBER	10
DRAINAGE DIRECTION	→
DRAINAGE MANAGEMENT AREA	▬ ▬
TYPE-B CURB INLET	
BROOKS BOX	□
RIP RAP	

BMP ID #	BMP TYPE	SYMBOL	QUANTITY	DETAIL PLAN SET SHEET NO.	DETAIL NO.	HORIZONTAL DATUM: NAD 83 NORTHING	EASTING	CONSTRUCTION CONFIRMATION
1	ROOF DRAIN TO LANDSCAPING		30 (TWO PER PAD)					
2	BIOFILTRATION AREA		1					
3	STORM DRAIN STENCILING	●	3					
4	TREE WELL		2					

POST-CONSTRUCTION PERMANENT BMP OPERATION & MAINTENANCE PROCEDURE DETAILS

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT APPROVAL NO:

O&M RESPONSBILE PARTY DESIGNEE: PACIFIC INTERNATIONAL INVESTMENTS, INC

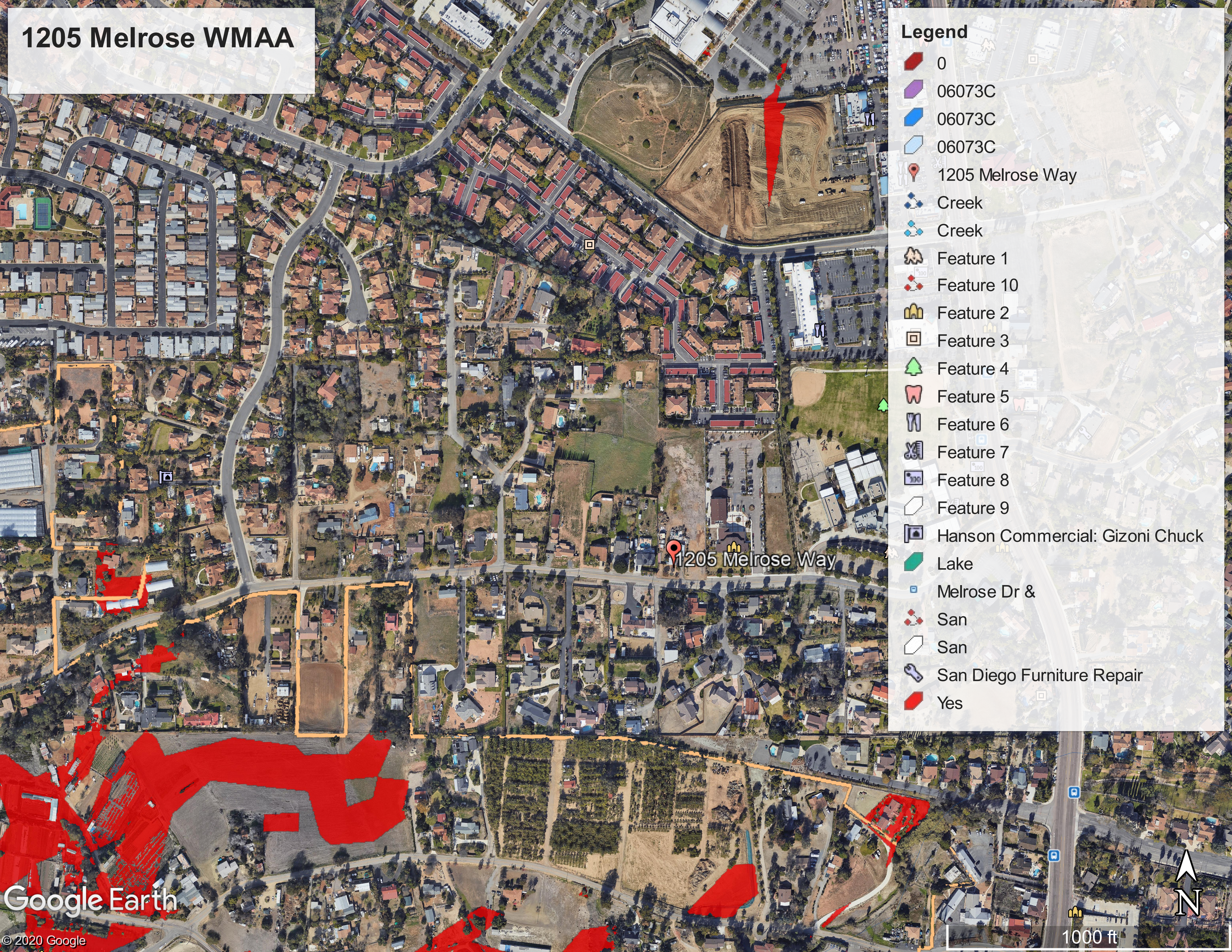
BMP DESCRIPTION	INSPECTION FREQUENCY	MAINTENANCE FREQUENCY	MAINTENANCE METHOD	QUANTITY	SHEET NUMBER(S)
EDUCATION PROGRAM (SOURCE CONTROL)	ANNUAL	AS NEEDED	EMPLOYEE EDUCATION PROGRAM	N/A	N/A
SIGNAGE & STENCILING	ANNUAL	AS NEEDED	REPAIR AND/OR REPLACE AS NECESSARY	3	N/A
BIOFILTRATION BASIN	ANNUAL	AS NEEDED	MOWING AND DEBRIS COLLECTION AS NECESSARY. REPAIR AS NEEDED	1	N/A
TREE WELL	MONTHLY	AS NEEDED	INSPECT TREE HEALTH & REPAIR/REPLACE AS NECCESSARY	2	N/A

DMA EXHIBIT

1205 MELROSE WAY
VISTA, CA
SCALE: 1' = 40'
DATE: AUGUST 2021
SHEET 1 OF 1

PASCO LARET SUITER & ASSOCIATES
San Diego | Solana Beach | Orange County
Phone 858.259.8212 | www.plsaengineering.com

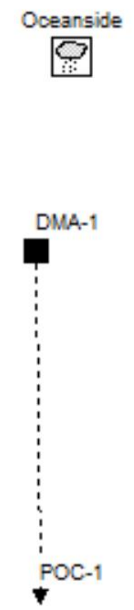
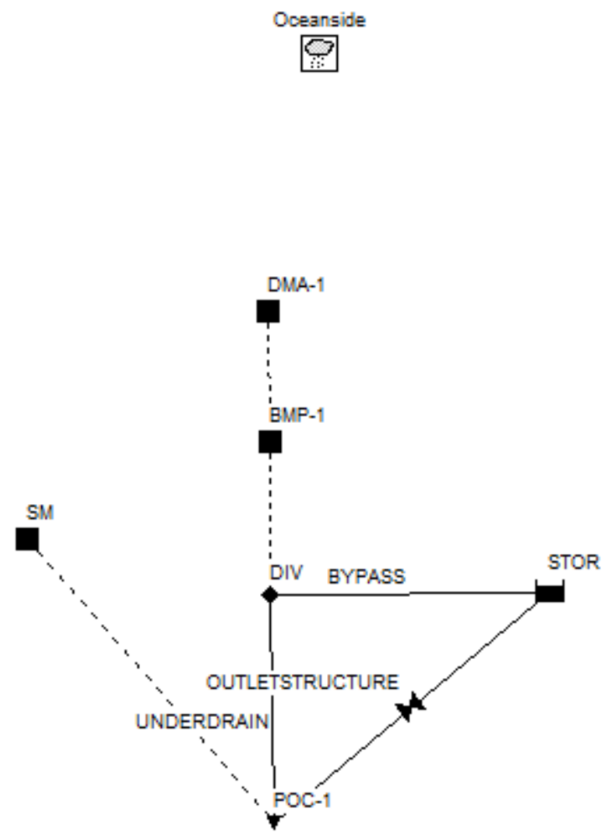
ATTACHMENT 2b


1205 Melrose WMAA
Legend
0
06073C
06073C
06073C
1205 Melrose Way
Creek
Creek
Feature 1
Feature 10
Feature 2
Feature 3
Feature 4
Feature 5
Feature 6
Feature 7
Feature 8
Feature 9
Hanson Commercial: Gizoni Chuck
Lake
Melrose Dr &
San
San
San Diego Furniture Repair
Yes
1205 Melrose Way
Google Earth
© 2020 Google
1000 ft
N

ATTACHMENT 2d

3334 Melrose
9/1/2021

SWMM MODEL SCHEMATICS

PRE-PROJECT MODEL	POST-PROJECT MODEL
	

3334 Melrose
9/1/2021

POC-1

PRE-PROJECT

DMA	N-perv	Area (ac)	Width (Area/Flow Length) (ft)	% Slope	% Impervious	% C Soils	% D Soils	Weighted Infiltration (in/hr):	Weighted Suction Head (in):	Weighted Initial Deficit:
DMA-1	0.06	2.53	163	3.0%	0%	0%	100%	0.025	9.000	0.330
	Total:	**2.53**								

POST-PROJECT

DMA	N-perv	Area (ac)	Width (Area/Flow Length) (ft)	% Slope	% Impervious	% C Soils	% D Soils	Weighted Infiltration (in/hr):	Weighted Suction Head (in):	Weighted Initial Deficit:
DMA-1	0.06	2.377	1954	1.0%	51%	0%	100%	0.019	9.000	0.330
BMP-1	0.06	0.0528	58	0.0%	0.0%	0%	100%	0.025	9.000	0.330
SM	0.06	0.096	418	50.0%	0.0%	0%	100%	0.019	9.000	0.330
	Total:	**2.53**								

Infiltration:		
D	0.025	in/hr

Suction Head:		
D	9	in

Initial Deficit:	
D	0.33

POC-1

```
[TITLE]
;;Project Title/Notes
3334 Melrose
Pre-Project Condition

[OPTIONS]
;;Option             Value
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           08/28/1951
START_TIME           05:00:00
REPORT_START_DATE    08/28/1951
REPORT_START_TIME    05:00:00
END_DATE             05/23/2008
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.557
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
MONTHLY          .06    .08    .11    .15    .17    .19    .19    .18    .15    .11    .08    .06
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
```

POC-1

```
;;-------------- --------- ------ ------ ----------
Oceanside        INTENSITY 1:00     1.0      TIMESERIES Oceanside

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- ----------------
DMA-1            Oceanside        poc-1            2.53     0        163      3        0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
DMA-1            0.012      0.06       0.05       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    Ksat       IMD
;;-------------- ---------- ---------- ----------
DMA-1            9          0.025      0.33

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
;Basin 1
POC-1            0          FREE                        NO

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
Oceanside        FILE "J:\ACTIVE JOBS\3334 MELROSE WAY\CIVIL\REPORTS\SWQMP\SWMM\Rain Data\oceanside.dat"

[REPORT]
;;Reporting Options
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
POC-1            687.023            2569.975

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[Polygons]
```

POC-1

```
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
DMA-1            636.132            5750.636

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Oceanside        1000.000           7500.000
```

POC-1

```
[TITLE]
;;Project Title/Notes
3334 Melrose
Post-Project Condition

[OPTIONS]
;;Option             Value
FLOW_UNITS           CFS
INFILTRATION         GREEN_AMPT
FLOW_ROUTING         KINWAVE
LINK_OFFSETS         DEPTH
MIN_SLOPE            0
ALLOW_PONDING        NO
SKIP_STEADY_STATE    NO

START_DATE           08/28/1951
START_TIME           05:00:00
REPORT_START_DATE    08/28/1951
REPORT_START_TIME    05:00:00
END_DATE             05/23/2008
END_TIME             23:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          01:00:00
WET_STEP             00:15:00
DRY_STEP             04:00:00
ROUTING_STEP         0:01:00
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0.75
LENGTHENING_STEP     0
MIN_SURFAREA         12.557
MAX_TRIALS           8
HEAD_TOLERANCE       0.005
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
MINIMUM_STEP         0.5
THREADS              1

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
MONTHLY          .06    .08    .11    .15    .17    .19    .19    .18    .15    .11    .08    .06
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
```

POC-1

```
;;-------------- --------- ------ ------ ----------
Oceanside        INTENSITY 1:00     1.0      TIMESERIES Oceanside

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack
;;-------------- ---------------- ---------------- -------- -------- -------- -------- -------- ----------------
DMA-1            Oceanside        BMP-1            2.377    51       1954     1        0
BMP-1            Oceanside        DIV              0.0528   0        58       0        0
SM               Oceanside        POC-1            0.096    0        418      50       0

[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
DMA-1            0.012      0.06       0.05       0.1        25         OUTLET
BMP-1            0.012      0.06       0.05       0.1        25         OUTLET
SM               0.012      0.06       0.05       0.1        25         OUTLET

[INFILTRATION]
;;Subcatchment   Suction    Ksat       IMD
;;-------------- ---------- ---------- ----------
DMA-1            9          0.019      0.33
BMP-1            9          0.025      0.33
SM               9          0.019      0.33

[LID_CONTROLS]
;;Name           Type/Layer Parameters
;;-------------- ---------- ----------
BMP-1            BC
BMP-1            SURFACE    12         0          0          0          5
BMP-1            SOIL       18         0.4        0.2        0.1        5          5          1.5
BMP-1            STORAGE    38.4       0.99       0          0
BMP-1            DRAIN      0.3017     0.5        0          6          0          0

[LID_USAGE]
;;Subcatchment   LID Process      Number  Area       Width      InitSat    FromImp    ToPerv     RptFile                  DrainTo
FromPerv
;;-------------- ---------------- ------- ---------- ---------- ---------- ---------- ---------- ------------------------ ------------
---- ----------
BMP-1            BMP-1            1       2299.97    0          0          100        0          *                        *
0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
;Basin 1
POC-1            0          FREE                        NO

[DIVIDERS]
;;Name           Elevation  Diverted Link    Type       Parameters
;;-------------- ---------- ---------------- ---------- ----------
DIV              0          BYPASS           CUTOFF     0.131      0          0          0          0
```

POC-1

```
[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape      Curve Name/Params            N/A      Fevap    Psi      Ksat     IMD
;;-------------- -------- ---------- ----------- ---------- ---------------------------- -------- --------          -------- --------
STOR             0        1.5        0          TABULAR    STOR                         0        0

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset   OutOffset  InitFlow   MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ---------- ----------
BYPASS           DIV              STOR             400        0.01       0          0          0          0
UNDERDRAIN       DIV              POC-1            100        0.013      0          0          0          0

[OUTLETS]
;;Name           From Node        To Node          Offset     Type            QTable/Qcoeff    Qexpon     Gated
;;-------------- ---------------- ---------------- ---------- --------------- ---------------- ---------- --------
OUTLETSTRUCTURE  STOR             POC-1            0          TABULAR/DEPTH   OUTLET                      NO

[XSECTIONS]
;;Link           Shape        Geom1            Geom2      Geom3      Geom4      Barrels    Culvert
;;-------------- ------------ ---------------- ---------- ---------- ---------- ---------- ----------
BYPASS           DUMMY        0                0          0          0          1
UNDERDRAIN       DUMMY        0                0          0          0          1

[CURVES]
;;Name           Type       X-Value    Y-Value
;;-------------- ---------- ---------- ----------
OUTLET           Rating     0          0
OUTLET                      0.05       0.04
OUTLET                      0.1        0.1
OUTLET                      0.15       0.19
OUTLET                      0.2        0.29
OUTLET                      0.25       0.4
OUTLET                      0.3        0.53
OUTLET                      0.35       0.66
OUTLET                      0.4        0.81
OUTLET                      0.45       0.97
OUTLET                      0.5        1.13
OUTLET                      0.55       1.71
OUTLET                      0.6        2.63
OUTLET                      0.65       3.78
OUTLET                      0.7        5.1
OUTLET                      0.75       6.59
OUTLET                      0.8        8.22
OUTLET                      0.85       9.98
OUTLET                      0.9        11.68
OUTLET                      0.95       11.72
OUTLET                      1          11.77
OUTLET                      1.05       11.82
OUTLET                      1.1        11.86
OUTLET                      1.15       11.91
OUTLET                      1.2        11.96
```

POC-1

```
OUTLET                       1.25       12.01
OUTLET                       1.3        12.05
OUTLET                       1.35       12.1
OUTLET                       1.4        12.14
OUTLET                       1.45       12.19
OUTLET                       1.5        12.24
;
STOR             Storage    0          2713
STOR                        1.5        3380

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
Oceanside        FILE "J:\ACTIVE JOBS\3334 MELROSE WAY\CIVIL\REPORTS\SWQMP\SWMM\Rain Data\oceanside.dat"

[REPORT]
;;Reporting Options
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS 0.000 0.000 10000.000 10000.000
Units      None

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
POC-1            687.023            2569.975
DIV              668.246            4037.017
STOR             2445.227           4048.055

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------

[Polygons]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
DMA-1            646.172            5869.184
BMP-1            668.246            5019.324
SM               -886.598           4402.062

[SYMBOLS]
;;Gage           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
Oceanside        1000.000           7500.000
```

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)
--------------------------------------------------------------

3334 Melrose
Pre-Project Condition


*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... NO
  Water Quality .......... NO
Infiltration Method ...... GREEN_AMPT
Starting Date ............ 08/28/1951 05:00:00
Ending Date .............. 05/23/2008 23:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 04:00:00


**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Total Precipitation ......       142.331       675.090
Evaporation Loss .........         5.220        24.757
Infiltration Loss ........       111.843       530.483
Surface Runoff ...........        27.735       131.549
Final Storage ............         0.000         0.001
Continuity Error (%) .....        -1.733


**************************        Volume        Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------     ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......        27.735         9.038
Groundwater Inflow .......         0.000         0.000
```

```
RDII Inflow ..............         0.000          0.000
External Inflow ..........         0.000          0.000
External Outflow .........        27.735          9.038
Flooding Loss ............         0.000          0.000
Evaporation Loss .........         0.000          0.000
Exfiltration Loss ........         0.000          0.000
Initial Stored Volume ....         0.000          0.000
Final Stored Volume ......         0.000          0.000
Continuity Error (%) .....         0.000
```

```
***************************
Subcatchment Runoff Summary
***************************
```

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Imperv Runoff in	Perv Runoff in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
DMA-1	675.09	0.00	24.76	530.48	0.00	131.55	131.55	9.04	2.77	0.195

```
Analysis begun on:  Wed Sep  1 13:06:55 2021
Analysis ended on:  Wed Sep  1 13:07:32 2021
Total elapsed time: 00:00:37
```

```
EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.013)
--------------------------------------------------------------

3334 Melrose
Post-Project Condition

WARNING 04: minimum elevation drop used for Conduit BYPASS
WARNING 04: minimum elevation drop used for Conduit UNDERDRAIN

*********************************************************
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
*********************************************************

****************
Analysis Options
****************
Flow Units ............... CFS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... GREEN_AMPT
Flow Routing Method ...... KINWAVE
Starting Date ............ 08/28/1951 05:00:00
Ending Date .............. 05/23/2008 23:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 01:00:00
Wet Time Step ............ 00:15:00
Dry Time Step ............ 04:00:00
Routing Time Step ........ 60.00 sec


**************************        Volume         Depth
Runoff Quantity Continuity     acre-feet        inches
**************************     ---------       -------
Initial LID Storage ......         0.008         0.038
Total Precipitation ......       142.095       675.090
Evaporation Loss .........        16.340        77.631
Infiltration Loss ........        50.122       238.128
Surface Runoff ...........         9.079        43.135
LID Drainage .............        68.585       325.848
Final Storage ............         0.016         0.075
Continuity Error (%) .....        -1.435


**************************        Volume        Volume
Flow Routing Continuity        acre-feet      10^6 gal
**************************     ---------     ---------
```

```
Dry Weather Inflow .......         0.000          0.000
Wet Weather Inflow .......        77.665         25.308
Groundwater Inflow .......         0.000          0.000
RDII Inflow ..............         0.000          0.000
External Inflow ..........         0.000          0.000
External Outflow .........        77.655         25.305
Flooding Loss ............         0.000          0.000
Evaporation Loss .........         0.000          0.000
Exfiltration Loss ........         0.000          0.000
Initial Stored Volume ....         0.000          0.000
Final Stored Volume ......         0.000          0.000
Continuity Error (%) .....         0.012
```

```
********************************
Highest Flow Instability Indexes
********************************
All links are stable.
```

```
*************************
Routing Time Step Summary
*************************
Minimum Time Step           :    60.00 sec
Average Time Step           :    60.00 sec
Maximum Time Step           :    60.00 sec
Percent in Steady State     :     0.00
Average Iterations per Step :     1.00
Percent Not Converging      :     0.00
```

```
***************************
Subcatchment Runoff Summary
***************************
```

Subcatchment	Total Precip in	Total Runon in	Total Evap in	Total Infil in	Imperv Runoff in	Perv Runoff in	Total Runoff in	Total Runoff 10^6 gal	Peak Runoff CFS	Runoff Coeff
DMA-1	675.09	0.00	61.78	234.03	299.27	89.71	388.98	25.11	2.78	0.576
BMP-1	675.09	17511.15	892.35	0.00	0.00	0.00	17292.81	24.79	2.79	0.951
SM	675.09	0.00	21.99	470.68	0.00	197.04	197.04	0.51	0.11	0.292

```
***********************
LID Performance Summary
***********************
```

Subcatchment	LID Control	Total Inflow in	Evap Loss in	Infil Loss in	Surface Outflow in	Drain Outflow in	Initial Storage in	Final Storage in	Continuity Error %
BMP-1	BMP-1	18186.24	892.38	0.00	1705.27	15588.17	1.80	2.66	-0.00

```
  ******************
  Node Depth Summary
  ******************

  ---------------------------------------------------------------------------------
                                 Average  Maximum  Maximum  Time of Max    Reported
                                   Depth    Depth      HGL   Occurrence   Max Depth
  Node                 Type         Feet     Feet     Feet  days hr:min        Feet
  ---------------------------------------------------------------------------------
  POC-1                OUTFALL      0.00     0.00     0.00     0  00:00        0.00
  DIV                  DIVIDER      0.00     0.00     0.00     0  00:00        0.00
  STOR                 STORAGE      0.00     0.60     0.60  18857  12:16        0.60


  *******************
  Node Inflow Summary
  *******************

  -------------------------------------------------------------------------------------------------
                                  Maximum  Maximum                  Lateral       Total        Flow
                                  Lateral    Total  Time of Max      Inflow      Inflow     Balance
                                   Inflow   Inflow   Occurrence      Volume      Volume       Error
  Node                 Type           CFS      CFS  days hr:min    10^6 gal    10^6 gal     Percent
  -------------------------------------------------------------------------------------------------
  POC-1                OUTFALL       0.11     2.86  18857  12:01       0.514        25.3       0.000
  DIV                  DIVIDER       2.79     2.79  18857  12:16        24.8        24.8       0.000
  STOR                 STORAGE       0.00     2.66  18857  12:16           0        2.25       0.134


  *********************
  Node Flooding Summary
  *********************

  No nodes were flooded.


  **********************
  Storage Volume Summary
  **********************

  --------------------------------------------------------------------------------------------------
                         Average     Avg  Evap Exfil       Maximum    Max    Time of Max    Maximum
                          Volume    Pcnt  Pcnt  Pcnt        Volume   Pcnt     Occurrence    Outflow
  Storage Unit          1000 ft3    Full  Loss  Loss      1000 ft3   Full    days hr:min        CFS
  --------------------------------------------------------------------------------------------------
  STOR                     0.001       0     0     0         1.712     37    18857  12:16       2.66


  ***********************
  Outfall Loading Summary
  ***********************

  -----------------------------------------------------------
                         Flow       Avg       Max       Total
```

Outfall Node	Freq Pcnt	Flow CFS	Flow CFS	Volume 10^6 gal
POC-1	4.08	0.05	2.86	25.303
System	4.08	0.05	2.86	25.303

****
Link Flow Summary
****

Link	Type	Maximum |Flow| CFS	Time of Max Occurrence days hr:min	Maximum |Veloc| ft/sec	Max/ Full Flow	Max/ Full Depth
BYPASS	DUMMY	2.66	18857 12:16			
UNDERDRAIN	DUMMY	0.13	9626 09:48			
OUTLETSTRUCTURE	DUMMY	2.66	18857 12:16			

****
Conduit Surcharge Summary
****

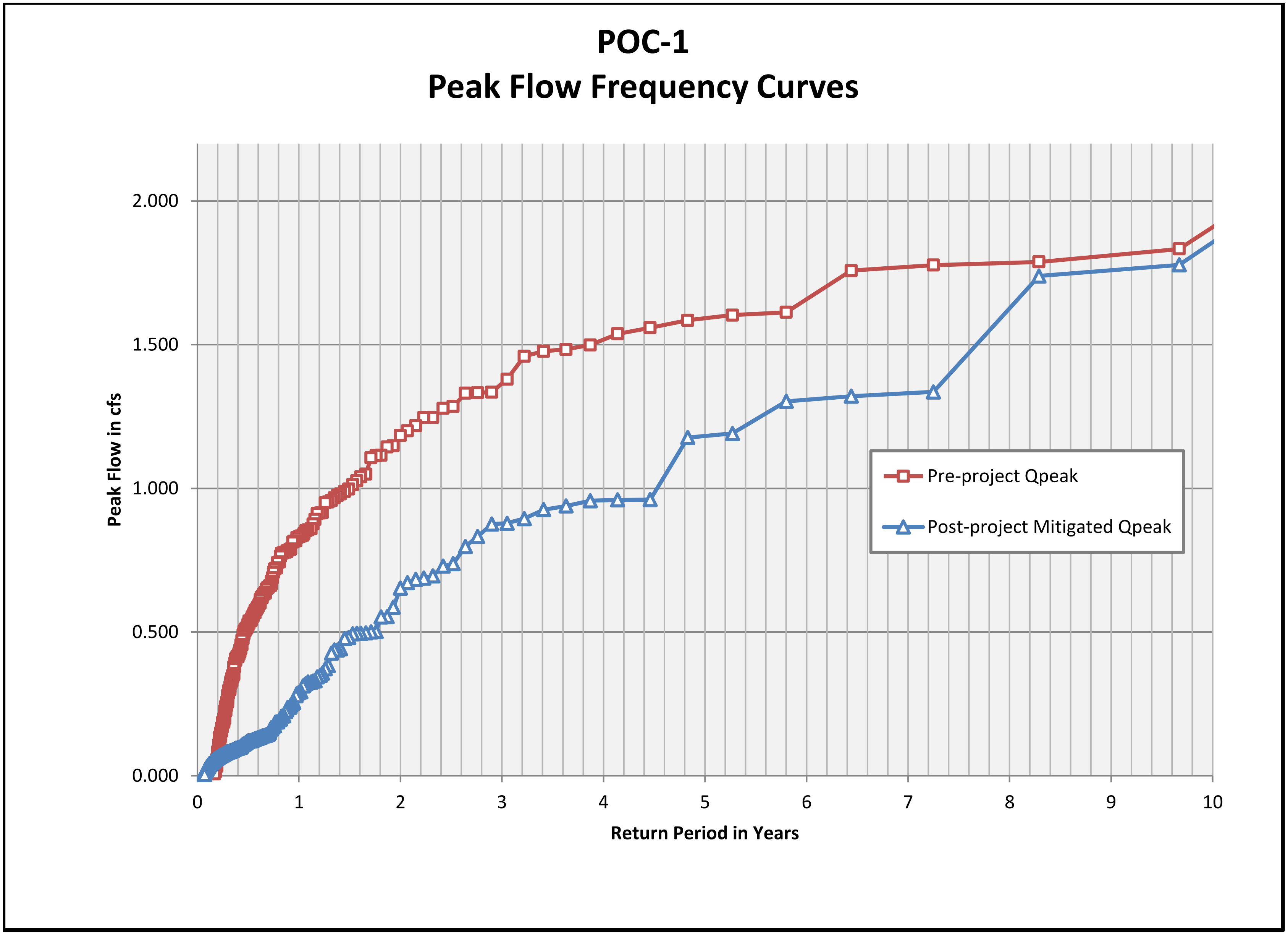
No conduits were surcharged.

Analysis begun on: Wed Sep 1 13:18:12 2021
Analysis ended on: Wed Sep 1 13:19:05 2021
Total elapsed time: 00:00:53

POC-1

Peak Flow Frequency Summary

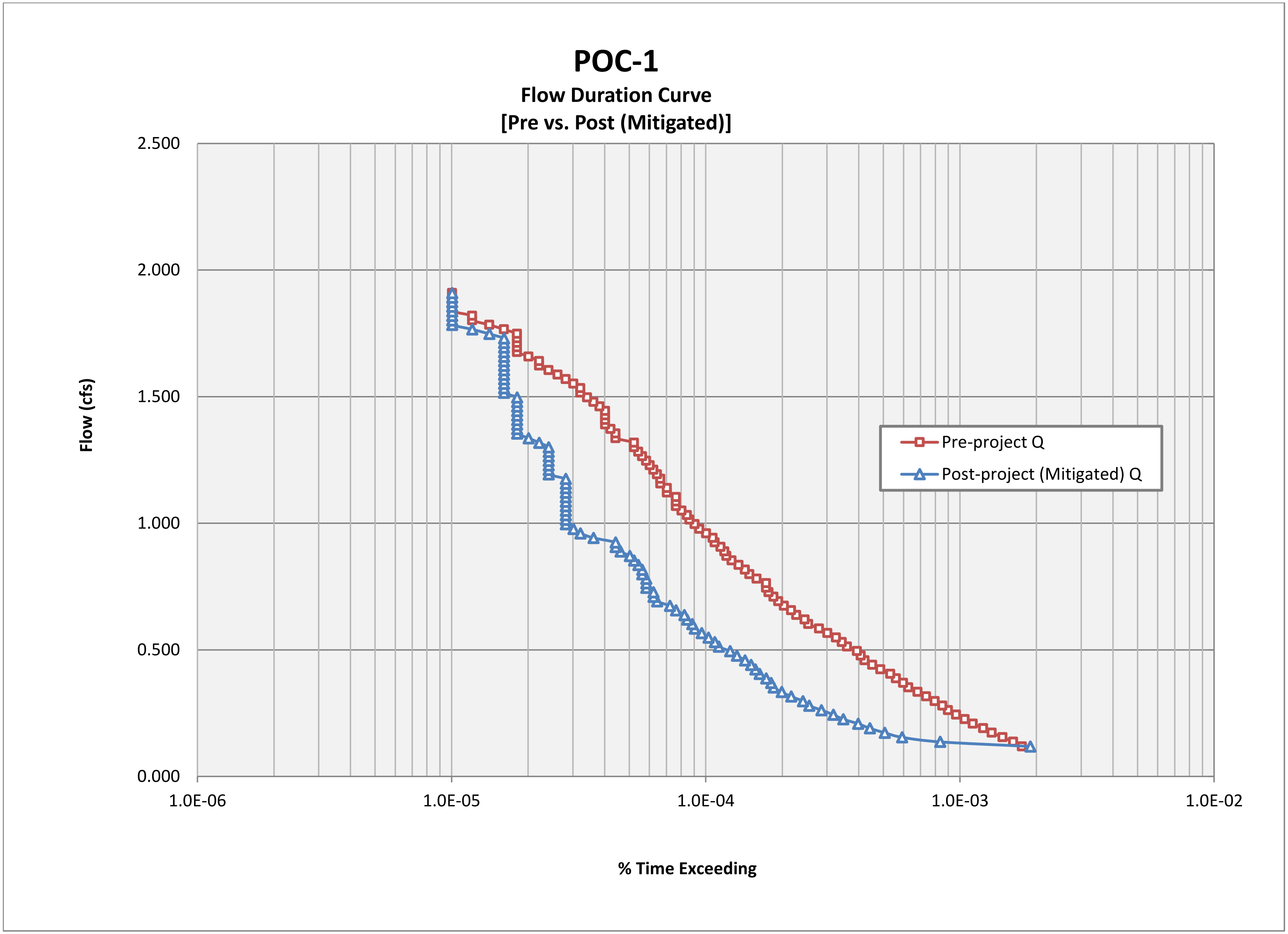
Return Period	Pre-project Qpeak (cfs)	Post-project - Mitigated Q (cfs)
LF = 0.1xQ2	0.118	0.065
2-year	1.184	0.653
5-year	1.592	1.182
10-year	1.909	1.857


POC-1
Peak Flow Frequency Curves
Peak Flow in cfs
2.000
1.500
1.000
0.500
0.000
0
1
2
3
4
5
6
7
8
9
10
Return Period in Years
Pre-project Qpeak
Post-project Mitigated Qpeak

Low-flow Threshold:	10%		POC-1
0.1xQ2 (Pre):	0.118	cfs	
Q10 (Pre):	1.909	cfs	
Ordinate #:	100		
Incremental Q (Pre):	0.01791	cfs	
Total Hourly Data:	497370	hours	The proposed BMP: PASSED

Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
0	0.118	873	1.76E-03	942	1.89E-03	108%	Pass
1	0.136	806	1.62E-03	416	8.36E-04	52%	Pass
2	0.154	733	1.47E-03	295	5.93E-04	40%	Pass
3	0.172	664	1.34E-03	252	5.07E-04	38%	Pass
4	0.190	615	1.24E-03	220	4.42E-04	36%	Pass
5	0.208	560	1.13E-03	198	3.98E-04	35%	Pass
6	0.226	520	1.05E-03	173	3.48E-04	33%	Pass
7	0.244	481	9.67E-04	158	3.18E-04	33%	Pass
8	0.262	447	8.99E-04	142	2.86E-04	32%	Pass
9	0.280	425	8.54E-04	127	2.55E-04	30%	Pass
10	0.297	396	7.96E-04	120	2.41E-04	30%	Pass
11	0.315	367	7.38E-04	108	2.17E-04	29%	Pass
12	0.333	339	6.82E-04	99	1.99E-04	29%	Pass
13	0.351	312	6.27E-04	92	1.85E-04	29%	Pass
14	0.369	298	5.99E-04	90	1.81E-04	30%	Pass
15	0.387	279	5.61E-04	86	1.73E-04	31%	Pass
16	0.405	265	5.33E-04	81	1.63E-04	31%	Pass
17	0.423	242	4.87E-04	78	1.57E-04	32%	Pass
18	0.441	225	4.52E-04	75	1.51E-04	33%	Pass
19	0.459	210	4.22E-04	71	1.43E-04	34%	Pass
20	0.477	203	4.08E-04	66	1.33E-04	33%	Pass
21	0.494	196	3.94E-04	62	1.25E-04	32%	Pass
22	0.512	179	3.60E-04	56	1.13E-04	31%	Pass
23	0.530	171	3.44E-04	54	1.09E-04	32%	Pass
24	0.548	162	3.26E-04	51	1.03E-04	31%	Pass
25	0.566	150	3.02E-04	48	9.65E-05	32%	Pass
26	0.584	139	2.79E-04	45	9.05E-05	32%	Pass
27	0.602	126	2.53E-04	44	8.85E-05	35%	Pass
28	0.620	122	2.45E-04	42	8.44E-05	34%	Pass
29	0.638	113	2.27E-04	41	8.24E-05	36%	Pass
30	0.656	108	2.17E-04	38	7.64E-05	35%	Pass
31	0.673	101	2.03E-04	36	7.24E-05	36%	Pass
32	0.691	96	1.93E-04	32	6.43E-05	33%	Pass
33	0.709	92	1.85E-04	31	6.23E-05	34%	Pass
34	0.727	88	1.77E-04	31	6.23E-05	35%	Pass
35	0.745	86	1.73E-04	29	5.83E-05	34%	Pass
36	0.763	86	1.73E-04	29	5.83E-05	34%	Pass
37	0.781	79	1.59E-04	29	5.83E-05	37%	Pass
38	0.799	74	1.49E-04	28	5.63E-05	38%	Pass
39	0.817	71	1.43E-04	28	5.63E-05	39%	Pass
40	0.835	67	1.35E-04	27	5.43E-05	40%	Pass
41	0.853	63	1.27E-04	26	5.23E-05	41%	Pass
42	0.870	60	1.21E-04	25	5.03E-05	42%	Pass
43	0.888	59	1.19E-04	23	4.62E-05	39%	Pass
44	0.906	57	1.15E-04	22	4.42E-05	39%	Pass
45	0.924	54	1.09E-04	22	4.42E-05	41%	Pass
46	0.942	53	1.07E-04	18	3.62E-05	34%	Pass
47	0.960	50	1.01E-04	16	3.22E-05	32%	Pass
48	0.978	47	9.45E-05	15	3.02E-05	32%	Pass
49	0.996	45	9.05E-05	14	2.81E-05	31%	Pass
50	1.014	43	8.65E-05	14	2.81E-05	33%	Pass
51	1.032	42	8.44E-05	14	2.81E-05	33%	Pass
52	1.049	40	8.04E-05	14	2.81E-05	35%	Pass
53	1.067	38	7.64E-05	14	2.81E-05	37%	Pass
54	1.085	38	7.64E-05	14	2.81E-05	37%	Pass

Interval	Pre-project Flow (cfs)	Pre-project Hours	Pre-project % Time Exceeding	Post-project Hours	Post-project % Time Exceeding	Percentage	Pass/Fail
55	1.103	38	7.64E-05	14	2.81E-05	37%	Pass
56	1.121	35	7.04E-05	14	2.81E-05	40%	Pass
57	1.139	35	7.04E-05	14	2.81E-05	40%	Pass
58	1.157	33	6.63E-05	14	2.81E-05	42%	Pass
59	1.175	33	6.63E-05	14	2.81E-05	42%	Pass
60	1.193	32	6.43E-05	12	2.41E-05	38%	Pass
61	1.211	31	6.23E-05	12	2.41E-05	39%	Pass
62	1.229	30	6.03E-05	12	2.41E-05	40%	Pass
63	1.246	29	5.83E-05	12	2.41E-05	41%	Pass
64	1.264	28	5.63E-05	12	2.41E-05	43%	Pass
65	1.282	27	5.43E-05	12	2.41E-05	44%	Pass
66	1.300	26	5.23E-05	12	2.41E-05	46%	Pass
67	1.318	26	5.23E-05	11	2.21E-05	42%	Pass
68	1.336	22	4.42E-05	10	2.01E-05	45%	Pass
69	1.354	22	4.42E-05	9	1.81E-05	41%	Pass
70	1.372	21	4.22E-05	9	1.81E-05	43%	Pass
71	1.390	20	4.02E-05	9	1.81E-05	45%	Pass
72	1.408	20	4.02E-05	9	1.81E-05	45%	Pass
73	1.425	20	4.02E-05	9	1.81E-05	45%	Pass
74	1.443	20	4.02E-05	9	1.81E-05	45%	Pass
75	1.461	19	3.82E-05	9	1.81E-05	47%	Pass
76	1.479	18	3.62E-05	9	1.81E-05	50%	Pass
77	1.497	17	3.42E-05	9	1.81E-05	53%	Pass
78	1.515	16	3.22E-05	8	1.61E-05	50%	Pass
79	1.533	16	3.22E-05	8	1.61E-05	50%	Pass
80	1.551	15	3.02E-05	8	1.61E-05	53%	Pass
81	1.569	14	2.81E-05	8	1.61E-05	57%	Pass
82	1.587	13	2.61E-05	8	1.61E-05	62%	Pass
83	1.605	12	2.41E-05	8	1.61E-05	67%	Pass
84	1.622	11	2.21E-05	8	1.61E-05	73%	Pass
85	1.640	11	2.21E-05	8	1.61E-05	73%	Pass
86	1.658	10	2.01E-05	8	1.61E-05	80%	Pass
87	1.676	9	1.81E-05	8	1.61E-05	89%	Pass
88	1.694	9	1.81E-05	8	1.61E-05	89%	Pass
89	1.712	9	1.81E-05	8	1.61E-05	89%	Pass
90	1.730	9	1.81E-05	8	1.61E-05	89%	Pass
91	1.748	9	1.81E-05	7	1.41E-05	78%	Pass
92	1.766	8	1.61E-05	6	1.21E-05	75%	Pass
93	1.784	7	1.41E-05	5	1.01E-05	71%	Pass
94	1.801	6	1.21E-05	5	1.01E-05	83%	Pass
95	1.819	6	1.21E-05	5	1.01E-05	83%	Pass
96	1.837	5	1.01E-05	5	1.01E-05	100%	Pass
97	1.855	5	1.01E-05	5	1.01E-05	100%	Pass
98	1.873	5	1.01E-05	5	1.01E-05	100%	Pass
99	1.891	5	1.01E-05	5	1.01E-05	100%	Pass
100	1.909	5	1.01E-05	5	1.01E-05	100%	Pass


POC-1
Flow Duration Curve
[Pre vs. Post (Mitigated)]
Flow (cfs)
2.500
2.000
1.500
1.000
0.500
0.000
1.0E-06
1.0E-05
1.0E-04
1.0E-03
1.0E-02
% Time Exceeding
Pre-project Q
Post-project (Mitigated) Q

POC-1

SWMM Model Flow Coefficient Calculation and Effective Ponding Depth Calculation

BMP-1

PARAMETER	**ABBREV.**	**Bio-Retention Cell LID BMP**	
Ponding Depth	PD	12	in
Bioretention Soil Layer	S	18	in
Permavoid Layer	G	38.4	in
TOTAL		5.7	ft
		68	in
Orifice Coefficient	c_g	0.6	--
Low Flow Orifice Diameter	D	1.45	in
Drain exponent	n	0.5	--
Flow Rate (volumetric)	Q	0.131	cfs
Ponding Depth Surface Area	A_{PD}	2300	ft^2
Bioretention Surface Area	$A_{S,} A_G$	2300	ft^2
	$A_{S,} A_G$	0.0528	ac
Porosity of Bioretention Soil	n	0.40	-
Flow Rate (per unit area)	q	6.157	in/hr
Effective Ponding Depth	PD_{eff}	**12.00**	in
Flow Coefficient	C	**0.3017**	--

Summary for Pond 25P: BMP-1 STOR

Volume	Invert	Avail.Storage	Storage Description
#1	101.00'	4,562 cf	**Biofiltration Basin (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
101.00	2,713	0.0	0	0	2,713
101.50	2,929	100.0	1,410	1,410	2,949
102.00	3,151	100.0	1,520	2,930	3,191
102.50	3,380	100.0	1,632	4,562	3,442

Device	Routing	Invert	Outlet Devices
#1	Primary	95.30'	**12.00" Round Outlet** L= 10.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 95.30' / 95.20' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	101.00'	**6.00" W x 6.00" H Vert. Orifice X 2.00** C= 0.600 Limited to weir flow at low heads
#3	Device 1	101.50'	**36.00" x 36.00" Horiz. Grate** C= 0.600 in 36.00" x 36.00" Grate (100% open area) Limited to weir flow at low heads

Stage-Discharge for Pond 25P: BMP-1 STOR

Elevation (feet)	Primary (cfs)
101.00	0.00
101.05	0.04
101.10	0.10
101.15	0.19
101.20	0.29
101.25	0.40
101.30	0.53
101.35	0.66
101.40	0.81
101.45	0.97
101.50	1.13
101.55	1.71
101.60	2.63
101.65	3.78
101.70	5.10
101.75	6.59
101.80	8.22
101.85	9.98
101.90	11.68
101.95	11.72
102.00	11.77
102.05	11.82
102.10	11.86
102.15	11.91
102.20	11.96
102.25	12.01
102.30	12.05
102.35	12.10
102.40	12.14
102.45	12.19
102.50	**12.24**

Drawdown Calculation for BMP-1

Project Name: Melrose

Project No: 3334

Surface Drawdown Time:	4.9	**hr**
Surface Area	**2300**	**sq ft**
Underdrain Orifice Diameter: in	**1.45**	in
C:	**0.6**	
Surface Ponding (to invert of lowest surface discharge opening in outlet structure):	**1**	ft
Amended Soil Depth:	**1.5**	ft
Permavoid Depth:	**3.2**	ft
Orifice Q =	**0.131**	cfs
Effective Depth	52.08	in
Infiltration controlled by soil	5.000	in/hr
Infiltration controlled by orifice	2.462	in/hr

Manning's *n* Values for Overland Flow[1]

The BMP Design Manuals within the County of San Diego allow for a land surface description other than short prairie grass to be used for hydromodification BMP design only if documentation provided is consistent with Table A.6 of the SWMM 5 User's Manual.

In January 2016, the EPA released the SWMM Reference Manual Volume I – Hydrology (SWMM Hydrology Reference Manual). The SWMM Hydrology Reference Manual complements the SWMM 5 User's Manual by providing an in-depth description of the program's hydrologic components. Table 3-5 of the SWMM Hydrology Reference Manual expounds upon Table A.6 of the SWMM 5 User's Manual by providing Manning's *n* values for additional overland flow surfaces. Therefore, in order to provide SWMM users with a wider range of land surfaces suitable for local application and to provide Copermittees with confidence in the design parameters, we recommend using the values published by Yen and Chow in Table 3-5 of the EPA SWMM Reference Manual Volume I – Hydrology. The values are provided in the table below:

Overland Surface	**Manning value (*n*)**
Smooth asphalt pavement	0.010
Smooth impervious surface	0.011
Tar and sand pavement	0.012
Concrete pavement	0.014
Rough impervious surface	0.015
Smooth bare packed soil	0.017
Moderate bare packed soil	0.025
Rough bare packed soil	0.032
Gravel soil	0.025
Mowed poor grass	0.030
Average grass, closely clipped sod	0.040
Pasture	0.040
Timberland	0.060
Dense grass	0.060
Shrubs and bushes	0.080
Land Use	
Business	0.014
Semibusiness	0.022
Industrial	0.020
Dense residential	0.025
Suburban residential	0.030
Parks and lawns	0.040

[1]Content summarized from *Improving Accuracy in Continuous Simulation Modeling: Guidance for Selecting Pervious Overland Flow Manning's n Values in the San Diego Region* (TRWE, 2016).


117° 15' 29" W
117° 15' 22" W
33° 11' 11" N
33° 11' 3" N
475940
475970
476000
476030
476060
476090
476120
3671990
3671960
3671930
3671900
3671870
3671840
3671810
3671780
3671750
PeC2
BsD
Melrose Way
Soil Map may not be valid at this scale.
Map Scale: 1:1,220 if printed on A portrait (8.5" x 11") sheet.
Meters
0 15 30 60 90
Feet
0 50 100 200 300
N
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 15, May 27, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 24, 2020—Feb 12, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BsD	Bosanko clay, 9 to 15 percent slopes	D	0.2	6.9%
PeC2	Placentia sandy loam, 5 to 9 percent slopes, eroded	D	2.5	93.1%
Totals for Area of Interest			**2.6**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

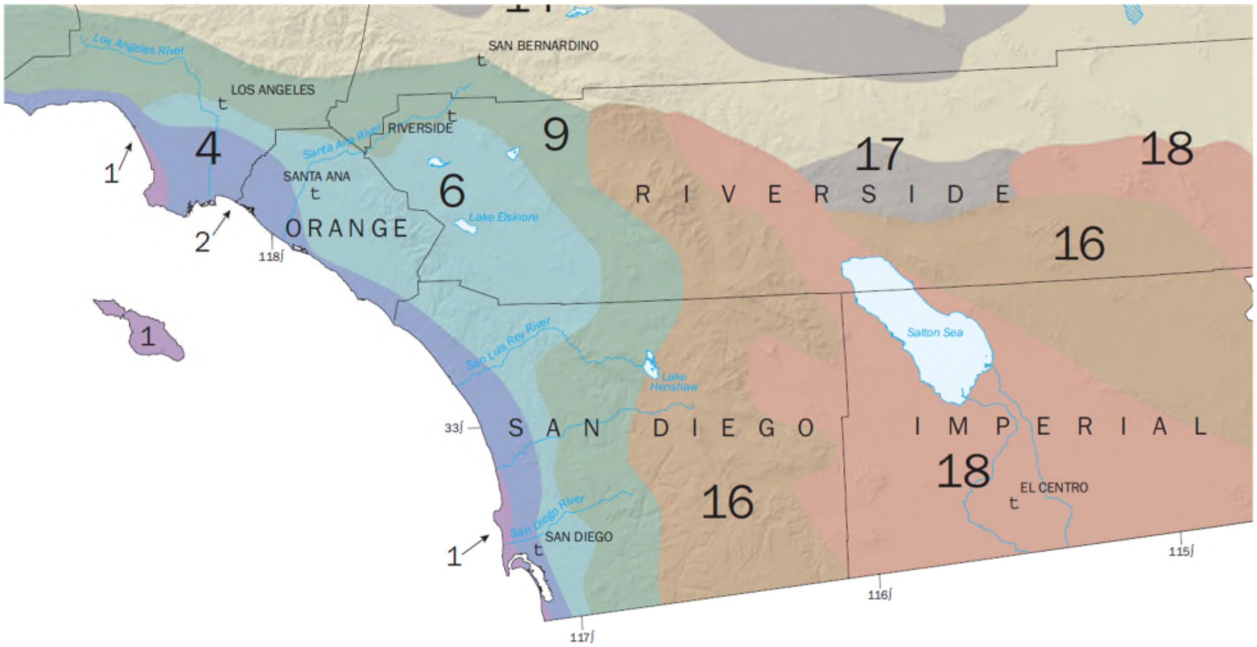


Figure G.1-2: California Irrigation Management Information System "Reference Evapotranspiration Zones"

Table G.1-1: Monthly Average Reference Evapotranspiration by ETo Zone (inches/month and inches/day) for use in SWMM Models for Hydromodification Management Studies in San Diego County CIMIS Zones 1, 4, 6, 9, and 16 (See CIMIS ETo Zone Map)

	January	February	March	April	May	June	July	August	September	October	November	December
Zone	in/month	in/month	in/month	in/month	in/month	in/month	in/month	in/month	in/month	in/month	in/month	in/month
1	0.93	1.4	2.48	3.3	4.03	4.5	4.65	4.03	3.3	2.48	1.2	0.62
4	1.86	2.24	3.41	4.5	5.27	5.7	5.89	5.58	4.5	3.41	2.4	1.86
6	1.86	2.24	3.41	4.8	5.58	6.3	6.51	6.2	4.8	3.72	2.4	1.86
9	2.17	2.8	4.03	5.1	5.89	6.6	7.44	6.82	5.7	4.03	2.7	1.86
16	1.55	2.52	4.03	5.7	7.75	8.7	9.3	8.37	6.3	4.34	2.4	1.55
	January	February	March	April	May	June	July	August	September	October	November	December
Days	31	28	31	30	31	30	31	31	30	31	30	31
Zone	in/day	in/day	in/day	in/day	in/day	in/day	in/day	in/day	in/day	in/day	in/day	in/day
1	0.030	0.050	0.080	0.110	0.130	0.150	0.150	0.130	0.110	0.080	0.040	0.020
4	0.060	0.080	0.110	0.150	0.170	0.190	0.190	0.180	0.150	0.110	0.080	0.060
6	0.060	0.080	0.110	0.160	0.180	0.210	0.210	0.200	0.160	0.120	0.080	0.060
9	0.070	0.100	0.130	0.170	0.190	0.220	0.240	0.220	0.190	0.130	0.090	0.060
16	0.050	0.090	0.130	0.190	0.250	0.290	0.300	0.270	0.210	0.140	0.080	0.050

ATTACHMENT 3 - BMP MAINTENANCE INFORMATION

Each of the attachments indicated below should be considered for inclusion with the SWQMP. Use this checklist to indicate which attachments are included behind this coversheet.

Attachment Sequence	Contents	Checklist
Attachment 3A	Structural BMP Operations and Maintenance Plan	☐ Included See Structural BMP Maintenance Information Checklist on the back of this Attachment cover sheet.
Attachment 3B	Draft Maintenance Agreement	☐ Included ☐ Not Applicable

ATTACHMENT 3A – MAINTENANCE PLAN REQUIREMENTS

For Attachment 3A, provide a BMP operation and maintenance plan (O&M Plan). The checklist below identifies minimum elements to be included with the O&M Plan. An O&M Plan template is available at:

http://www.cityofvista.com/services/city-departments/community-development/building-planning-permits-applications/land-development-autocad-templates/storm-water-forms

☐ Specific maintenance indicators and actions for proposed structural BMP(s). This shall be based on Section 7.7 of the *BMP Design Manual* and enhanced to reflect actual proposed components of the structural BMP(s)

☐ Use of O&M Plan template, or plan of equivalent content

Storm Water Operations & Maintenance Plan
for
1205 Melrose Way

1205 Melrose Way
Vista, CA
APN 166-184-10-00, 166-183-17-00, 184-184-09

PREPARED FOR:
Zoran Djordjevich
Encinitas, CA 92024

Prepared: March 2021
Revised: June 2021

W. Justin Suiter, RCE 68964 DATE

TABLE OF CONTENTS

1.0 OPERATION AND MAINTENANCE PLAN – RESPONSIBLE PARTY

This Operation and Maintenance (O&M) Plan addresses the requirements for the implementation of long-term operation and maintenance associated with the proposed permanent storm water BMPs constructed for 1205 Melrose Way approved by the City of Vista. For specific discussion on the selection of BMPs refer to the City of Vista approved Storm Water Quality Management Plan (SWQMP) for the project.

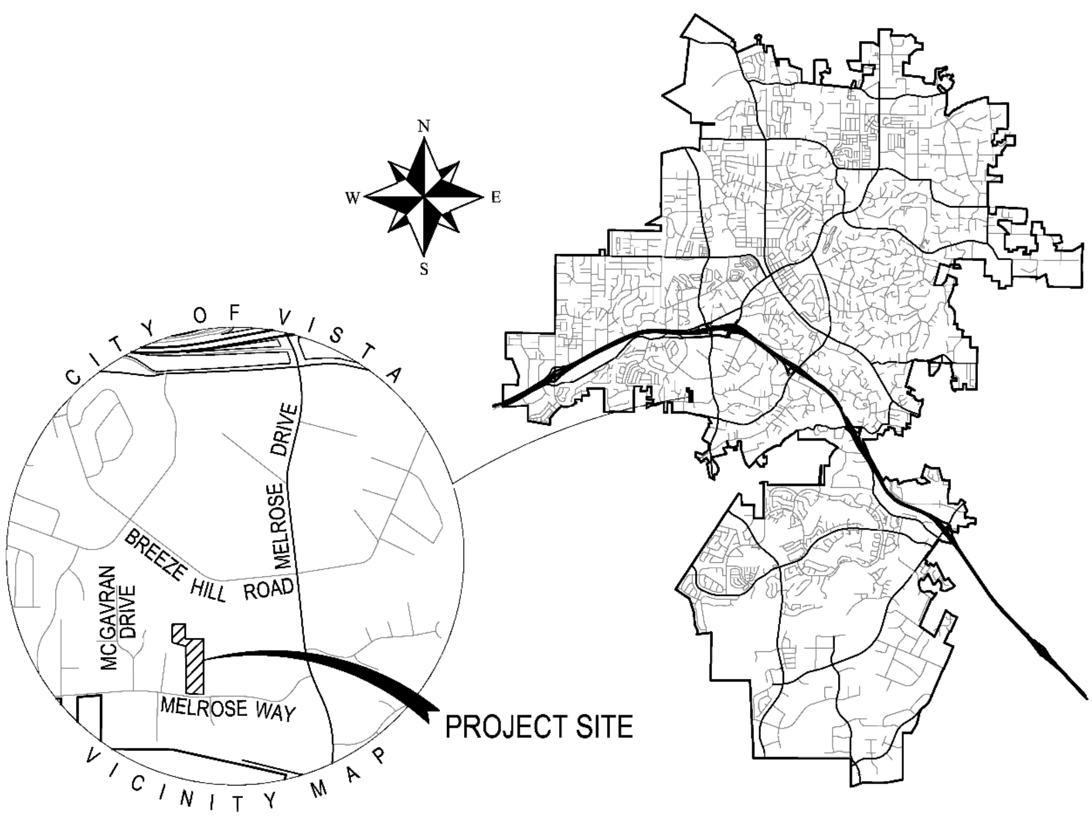
The responsible party for the long-term Operation and Maintenance of the onsite BMPs is the future HOA.

2.0 Project Site Summary

The subject property is located at 1205 Melrose Way in the City of Vista. The site is on the west side of Melrose Drive and approximately 1 mile South of the CA-78 freeway. The site is approximately 2.57-acres. In the existing condition, the northwesterly portion of the site sheet flows southwest to northeast to a concrete ditch on the adjacent property that runs along the property line. The remaining portion of the site generally slopes south to the northeasterly corner to a concrete ditch on the adjacent property that ultimately drains to a storm drain main that runs north towards Breeze Hill Road.

The site is APN 166-184-10-00, 166-183-17-00, 166-184-09-00

2.1 Vicinity Map:



2.2 Project Description:

The project is classified as a “Priority Development Project”. Therefore, it is subject to local storm water quality and hydromodification management requirements.

The project consists of a single-family residential subdivision. The subdivision will include 15 residential lots, open space lot, private street and driveway, and drainage improvements including a biofiltration basin BMP designed to provide pollutant control and hydromodification management flow control for the project’s onsite storm water runoff to satisfy the local requirements. It is the intent of the developer that at subdivision buildout, the storm water biofiltration basin will be constructed on the open space lot and will be maintained by the future HOA.

Offsite improvements along Melrose Way that includes remove and replacement of the half-width of asphalt, construction of curb & gutter and sidewalk along the property frontage. There are two proposed tree wells to provide pollutant control treatment, hydromodification management, and volume retention requirements that will be maintained by the future HOA.

The project area consists of hydrologic soil group D. The project will not have slopes steeper than 2:1. All slopes will include slope protection for construction and post- construction.

2.3 Storm Water Mitigation Site Plan

Refer to Appendix A for the Storm Water Mitigation Site Plan.

2.4 Existing and Proposed Drainage Pattern and Storm Drain System

In the existing condition, the northwesterly portion of the site sheet flows southwest to northeast to a concrete ditch on the adjacent property that runs along the property line. The remaining portion of the site generally slopes south to the northeasterly corner to a concrete ditch on the adjacent property that ultimately drains to a storm drain main that runs north towards Breeze Hill Road.

The grading plan has been prepared to show the extents of pad grading, and house and driveway coverage that will be constructed on each pad. In the proposed condition, onsite storm water runoff will be collected in proposed storm drain and conveyed to the proposed biofiltration basin. The biofiltration basin provide hydromodification flow control that will outlet to the concrete ditch on the adjacent property.

The BMP totals an area of 2,300 square feet. This treatment area will provide hydromodification management flow control and storm water pollutant control for the project’s onsite runoff. The proposed BMP area will be a community asset, maintained by the future subdivision HOA. Two tree wells along the property frontage along Melrose way will provide pollutant control treatment, hydromodification management, and volume retention requirements that will be maintained by the future HOA. Refer to the project's Storm Water Quality Management Plan (SWQMP) for the hydromodification management and pollutant control analysis.

2.5 Identify Receiving Waters, Watershed and Hydrologic Unit Basin Number

The proposed project is located within the Carlsbad Hydrologic Unit (HU), Agua Hedionda Hydrologic Area (HA) - Los Monos Hydrologic Subarea (HSA), 904.31 and Buena Vista 904.22. The surface, coastal, and groundwater receiving waters located in the area and downstream of this project include Agua Hedionda Creek and Lagoon. The designated beneficial uses of these waters include MUN, AGR, IND, REC1, REC2, BIOL, WARM, WILD, COMM, EST, RARE, MAR, AQUA, MIGR, SPWN, SHELL.

The Carlsbad HU is approximately 210 square miles in area extending from the headwaters above Lake Wolhford to the Pacific Ocean. In addition to the cities of Carlsbad, San Marcos and Encinitas, it includes substantial portions of Vista, Oceanside, Escondido, Solana Beach and the community of Rancho Santa Fe. The Carlsbad HU includes four major coastal lagoons, three lakes, and two large water storage reservoirs. The HU contains six hydrologic areas including Loma Alta (904.10), Buena Vista Creek (901.20), Agua Hedionda (904.30), Encinas (904.40), San Marcos (904.50), and Escondido Creek (904.60).

Based on Final 2012 Clean Water Act Section 303(d) Integrated Report (USEPA Final Approval July 30, 2015) Agua Hedionda Creek is listed as a 303(d) impaired water body. The pollutants listed are: Enterococcus, Fecal Coliform, Manganese, Phosphorus, Selenium, Total Dissolved Solids, Total Nitrogen as N, and Toxicity.

Refer to:
http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2012.shtml

2.6 Project Type and Activities

The project consists of a detached single-family subdivision with 15 residential lots. The anticipated activities are consistent with normal residential use. The anticipated pollutants to be generated by the land use are:

Detached Residential Development and Streets:

- Sediment
- Nutrients
- Trash and Debris
- Oxygen demanding substances
- Oil and Grease
- Bacteria and Viruses

- Pesticides
- Heavy Metals
- Organic Compounds including petroleum hydrocarbons

3.0 Summary of Storm Water Quality Management Plan (SWQMP)

The project is classified as a "Priority Development Project". Therefore, it is subject to local storm water quality and hydromodification management requirements.

To comply with storm water requirements, the project includes site design, source control and a treatment control BMP. The plans for the project detail the construction of a biofiltration basin which serves as the primary treatment control BMP. The biofiltration basin is designed to provide pollutant control and hydromodification management flow control for the project's onsite storm water runoff to satisfy the local requirements. The locations, details and pollutant control and hydromodification calculations are included in the approved SWQMP for the project on file with the City of Vista.

A summary of the project's BMPs are as follows:

1. Site Design:
   Optimize the site layout; Use pervious surfaces; Disperse runoff; and
   Design Integrated Management Practices (IMPs)
2. Source Control:
   Maintain on-site storm drain inlets; Limit Landscape/Outdoor Pesticide Use;
   Provide Efficient Irrigation; Sweep Streets
3. Treatment Control:
   Biofiltration Basin

4.0 Employee Training Program

The BMP maintenance is the responsibility of the future HOA. The future HOA will be responsible to train personnel in the practices of maintenance and record keeping of the permanent BMPs.

All applicable employees will be trained in a timely fashion, and at a minimum will be trained within one month of hiring. Training and refreshment courses will occur at least one time a year.

Training shall include but not be limited to training for the inspection of all source control and treatment control BMP's.

An example Training Log is located in Appendix D.

5.0 Inspection Program

At a minimum, the BMP shall be inspected annually or following significant rain events. Inspections shall be conducted by trained staff. An inspection form shall be completed with each inspection. Inspection logs shall be kept for a minimum of five years.

In addition, the BMP owner must verify annually that the O&M Plan is being implemented by submitting a self-certification statement to the City of Vista. The verification must include a record of inspection of the BMPs prior to the rainy season (October 1st of each year).

An example Inspection Log is located in Appendix E.

6.0 Maintenance Program

The cost and expense of maintaining the storm water permanent BMP shall be the responsibility of and paid for by the legally responsible party, owner or the heir, assigns and successors in interest of each such owner. The storm water BMP facility constructed by the owners, or their successors, include, but are not limited to biofiltration basins, drainage inlets, etc., all as shown on City approved SWQMP on file with the City of Vista.

A Maintenance Log will be filled out and kept for each maintenance service. The records will be kept for a minimum of five years. An example Maintenance Log is located in Appendix F.

7.0 Record Keeping

The legally responsible entity designated in this document will be the source for record keeping.

Examples of Training, Inspection and Maintenance Logs are contained in the Appendices. These shall be kept for a minimum of five years.

8.0 Cost Estimate

See Appendix G for the Cost Estimate.

9.0 Engineer of Work Statement

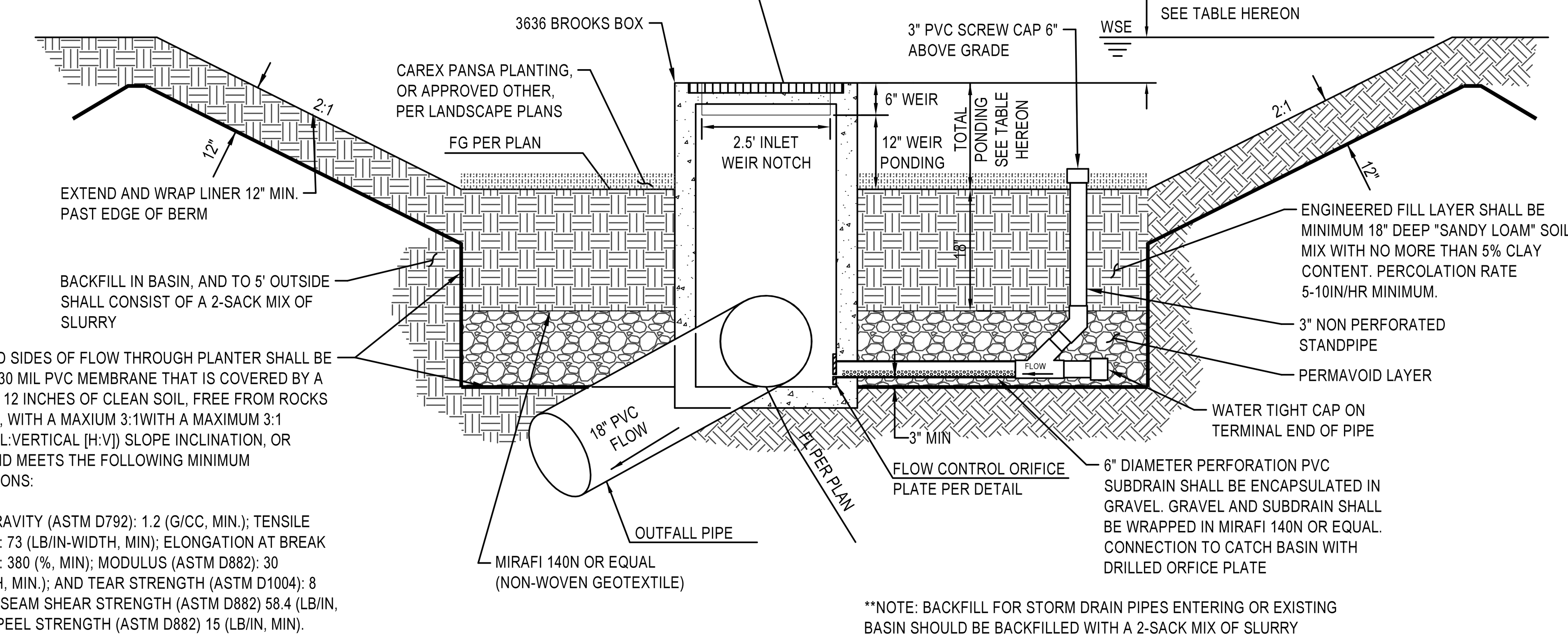
This Operation and Maintenance Plan was prepared by Pasco Laret Suiter & Associates under the supervision of W. Justin Suiter, P.E.

W. Justin Suiter, RCE 68964 DATE

Appendix A – Storm Water Mitigation Site Plan

0 40 80 120

SCALE: 1" = 40'



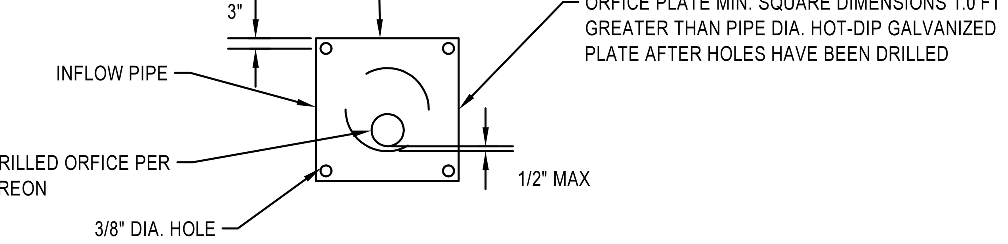
BOTTOM AND SIDES OF FLOW THROUGH PLANTER SHALL BE LINED WITH 30 MIL PVC MEMBRANE THAT IS COVERED BY A MINIMUM OF 12 INCHES OF CLEAN SOIL, FREE FROM ROCKS AND DEBRIS, WITH A MAXIUM 3:1WITH A MAXIMUM 3:1 (HORIZONTAL:VERTICAL [H:V]) SLOPE INCLINATION, OR FLATTER, AND MEETS THE FOLLOWING MINIMUM SPECIFICATIONS:

SPECIFIC GRAVITY (ASTM D792): 1.2 (G/CC, MIN.); TENSILE (ASTM D882): 73 (LB/IN-WIDTH, MIN); ELONGATION AT BREAK (ASTM D882): 380 (%, MIN); MODULUS (ASTM D882): 30 (LB/IN-WIDTH, MIN.); AND TEAR STRENGTH (ASTM D1004): 8 (LB/IN, MIN); SEAM SHEAR STRENGTH (ASTM D882) 58.4 (LB/IN, MIN); SEAM PEEL STRENGTH (ASTM D882) 15 (LB/IN, MIN).

PROVIDE 18-INCH OVERLAPPED, TAPED OR GLUED SEAMS AT ALL SEAMS. PLACE NON-WOVEN FILTER FABRIC (MIRAFI 140N OR EQUAL) ON EITHER SIDE OF PVC LINER TO PROTECT LINER FROM PUNCTURE ON ALL SIDES, "SANDWHICHING" THE PVC LINER WITH A FABRIC CUSHION.

**NOTE: BACKFILL FOR STORM DRAIN PIPES ENTERING OR EXISTING BASIN SHOULD BE BACKFILLED WITH A 2-SACK MIX OF SLURRY

BIOFILTRATION BASIN TABLE					
BASIN NO.	ENGINEERED SOIL LAYER	PERMAVOID LAYER	TOTAL PONDING	FREE BOARD	ORIFICE
1	18"	38.4"	12"	1.0'	1.5"



FLOW CONTROL ORFICE PLATE

BIOFILTRATION BASIN DETAIL

N.T.S.

DMA DATA TABLE			
DMA NO.	IMPERVIOUS AREA (S.F.)	PERVIOUS AREA (S.F.)	TOTAL AREA (S.F.)
1-1	53,174	52,620	105,794
2-1	5,171	537	5,708
SELF-MITIGATING	-----	-----	4,188 SF
DE-MINIMUS AREA	-----	-----	275 SF
INFEASIBLE TO TREAT	-----	-----	2,346 SF

GENERAL INFORMATION

PROJECT SITE IS LOCATED IN THE LOS MONOS H.S.A. (904.31) OF AGUA HEDIONDA CREEK H.A. OF CARLSBAD H.U., HOWEVER DRAINAGE FROM THE SITE ULTIMATELY DISCHARGES TO THE RECIEVING WATERS OF BUENA VISTA CREEK H.S.A. (904.22) OF BUENA VISTA CREEK H.A. OF CARLSBAD H.U.

POLUTTANTS OF CONCERN - BENTHIC COMMUNITY EFFECTS, BIFENTHRIN, SELENIUM, TOXICITY, INDICATOR BACTERIA, NUTRIENTS, AND SEDIMENTATION/SILTATION

LID SITE DESIGN BMP'S

1. BIOFILTRATION BASIN
2. ROOF DRAIN TO LANDSCAPING
3. MINIMIZE IMPERVIOUS SURFACES
4. PROTECT SLOPES AND CHANNELS
5. TREE WELLS

SOURCE CONTROL BMP'S

1. STORM DRAIN STENCILING
2. EMPLOY INTEGRATED PEST MANAGEMENT PRACTICES
3. EMPLOY EFFICIENT IRRIGATION AND DROUGHT TOLERANT LANDSCAPE DESIGN

SOIL INFORMATION

HYDROLOGIC SOIL GROUP: TYPE D

GROUND WATER INFORMATION

GROUND WATER WAS NOT ENCOUNTERED AT THE SITE. SEE REPORT PREPARED BY: GEOSOILS, INC
DATED: MARCH 5, 2021 W.O. 8058-A-SC

COARSE SEDIMENT YIELD

REFER TO ATTACHEMENT 2B OF THIS REPORT FOR CRITICAL COARSE SEDIMENT YIELD AREAS WITHIN THIS PROJECT SITE.

BMP NOTES

1. THESE BMPS AREA MANDATORY TO BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS OR THERE PLANS
2. NO CHANGES TO THE PROPOSED BMPS ON THIS SHEET WITHOUT PRIOR APPROVAL FORM THE CITY ENGINEERING DEPARTMENT
3. NO SUBSTITUTIONS TO THE MATERIAL TYPES OR PLANTING TYPES WITHOUT PRIOR APPROVAL FROM THE LAND DEVELOPMENT ENGINEER
4. NO OCCUPANCY WILL BE GRANTED UNTIL THE CITY INSPECTOR STAFF HAS INSPECTED THIS PROJECT FOR APPRORIATE BMP CONSTRUCTION AND INSTALLATION.

WATER QUALITY TECHNICAL REPOT

TITLE - PRIORITY DEVELOPMENT PROJECT STORM WATER QUALITY MANAGEMENT REPORT FOR 1205 MELROSE WAY
DATE - MARCH 2021
PREPARED BY - PASCO LARET SUITER & ASSOCIATES

MAINTENANCE AGREEMENT DOCUMENT

TITLE -
DATE -
PREPARED BY -

OPERATIONS AND MAINTENANCE PLAN

TITLE - STORM WATER OPERATIONS & MAINTENANCE PLAN FOR 1205 MELROSE WAY
DATE - MARCH 2021
PREPARED BY - PASCO LARET SUITER & ASSOCIATES

RESPONSIBLE PARTY INFORMATION

ZORAN DJORDJEVICH

551 LYNWOOD DRIVE

ENCINITAS, CA 92024

LEGEND

DESCRIPTION	SYMBOL
LOT NUMBER	10
DRAINAGE DIRECTION	
DRAINAGE MANAGEMENT AREA	
TYPE-B CURB INLET	
BROOKS BOX	
RIP RAP	

BMP ID #	BMP TYPE	SYMBOL	QUANTITY	DETAIL PLAN SET SHEET NO.	DETAIL NO.	HORIZONTAL DATUM: NAD 83		CONSTRUCTION CONFIRMATION
						NORTHING	EASTING	
1	ROOF DRAIN TO LANDSCAPING		30 (TWO PER PAD)					
2	BIOFILTRATION AREA		1					
3	STORM DRAIN STENCILING		3					
4	TREE WELL		2					

POST-CONSTRUCTION PERMANENT BMP OPERATION & MAINTENANCE PROCEDURE DETAILS

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT APPROVAL NO:

O&M RESPONSBILE PARTY DESIGNEE: PACIFIC INTERNATIONAL INVESTMENTS, INC

BMP DESCRIPTION	INSPECTION FREQUENCY	MAINTENANCE FREQUENCY	MAINTENANCE METHOD	QUANTITY	SHEET NUMBER(S)
EDUCATION PROGRAM (SOURCE CONTROL)	ANNUAL	AS NEEDED	EMPLOYEE EDUCATION PROGRAM	N/A	N/A
SIGNAGE & STENCILING	ANNUAL	AS NEEDED	REPAIR AND/OR REPLACE AS NECESSARY	3	N/A
BIOFILTRATION BASIN	ANNUAL	AS NEEDED	MOWING AND DEBRIS COLLECTION AS NECESSARY. REPAIR AS NEEDED	1	N/A
TREE WELL	MONTHLY	AS NEEDED	INSPECT TREE HEALTH & REPAIR/REPLACE AS NECCESSARY	2	N/A

DMA EXHIBIT

1205 MELROSE WAY
VISTA, CA
SCALE: 1' = 40'
DATE: AUGUST 2021
SHEET 1 OF 1

PASCO LARET SUITER & ASSOCIATES
San Diego | Solana Beach | Orange County
Phone 858.259.8212 | www.plsaengineering.com

Appendix B – Source Control BMPs

Chapter 4

COUNTY OF SAN DIEGO BMP DESIGN MANUAL

Source Control and Site Design Requirements for All Development Projects

This chapter presents general, source control, and site design requirements to be met by all Standard projects and PDPs. This Manual should be the first guidance document consulted during the development planning process. A second important County reference related to site design and source control is the Low Impact Development (LID) Handbook. The LID Handbook provides a comprehensive list of LID planning and stormwater management techniques for developers, builders, contractors, planners, landscape architects, engineers, and government employees. It can be found on the County's website:
http://www.sandiegocounty.gov/content/sdc/dpw/watersheds/DevelopmentandConstruction.html

Specific requirements and limitations for each site design and source control BMP are contained in applicable SWQMP forms, and in corresponding instructions and attachments. In some cases, separate Fact Sheets have also been developed for individual BMPs. The content of these and other materials specified by the County provides further, more detailed articulation of the requirements generally described in this Chapter.

4.1 General Requirements (GR) and Guidance

Per MS4 Permit Provision E.3.a.(1) and WPO Section 67.811(a)(3), BMPs must be designed, constructed and maintained subject to the following criteria:

4.1.1: Onsite BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters, and as close to the source as possible.

BMP location affects its ability to retain, and/or treat, the pollutants from the contributing drainage area. BMPs must remove pollutants from runoff and should be placed as close to the pollutant source as possible.

> **How to comply**: Projects must implement source control (Section 4.2) and site design BMPs (Section 4.3) that are applicable to their project and site conditions.

4.1.2: Structural BMPs must not be constructed within the Waters of the U.S.

Construction, operation, and maintenance of a structural BMP in a water body can negatively impact the physical, chemical, and biological integrity, as well as the beneficial uses, of the water body. However, offsite alternative compliance opportunities involving restoration of areas within Waters of the U.S. may be identified by the County.

> **How to comply**: Projects must prepare project plans depicting the location of receiving waters and proposed BMPs within the project boundary. These plans must demonstrate that storm water BMPs are not located within Waters of the U.S.

4.1.3: Onsite BMPs must be designed and implemented with measures to avoid the creation of nuisances or pollutions associated with vectors (e.g. mosquitos, rodents, or flies).

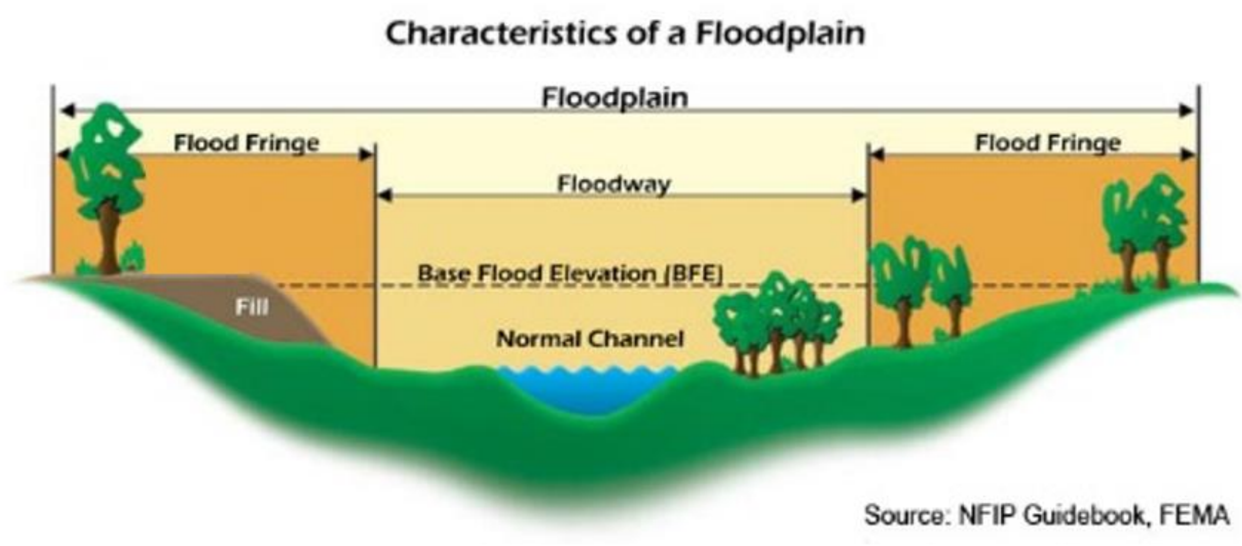
According to the California Department of Health, structural BMPs that retain standing water for over 96 hours are particularly concerning for facilitating mosquito breeding. Certain site design features that hold standing water may similarly produce mosquitoes.

> **How to comply**: Projects must incorporate design, construction, and maintenance principles demonstrating that they will drain retained water within **96 hours** and minimize standing water. Design calculations must be provided to demonstrate the potential for standing water ponding at surface level and accessible to mosquitos has been addressed.

4.1.4: Use caution when placing Structural BMPs in FEMA or County Floodplains and Floodways.

Placement of Structural BMPs within FEMA or County Floodplains or Floodways should be consulted with a wetland biologist to avoid future creation of habitat, where the S-BMP could become jurisdictional or connected to a jurisdictional area. If that is the case, an outside agency (such as the Army Corps of Engineers, Regional Water Quality Control Board, or California Department of Fish & Wildlife) may impose future restrictions on maintenance of these S-BMPs, and activities may need to be coordinated with those agencies, including processing of permits.

> **How to comply**: Use caution when placing BMPs within the floodway or floodplain. Consult with applicable agencies if necessary.



4.1.5: BMPs that provide for flood control detention in addition to water quality requirements and relationship to County Hydraulic Design Manual.

BMPs that are serving flood control purposes in addition to pollutant control and/or hydromodification management may not operate appropriately to satisfy the requirements of the County Hydraulic Design Manual.

> **How to comply**: Consult the County Hydraulic Design Manual in addition to the Conjunctive Use handout that is posted in the Development Resources web page under Calculators and Modeling Software.

4.2 Source Control (SC) BMP Requirements

Source control BMPs avoid and reduce pollutants in storm water runoff. Everyday activities, such as recycling, trash disposal, and irrigation generate potential storm water pollutants. Source control BMPs are defined as activities or features that reduce the potential for storm water runoff to come into contact with pollutants. Per MS4 Permit Provision E.3.a.(2) and WPO Section 67.811(a)(4)), all development projects must implement source control BMPs where applicable and feasible.

> **How to comply**: Projects must implement all source control BMPs that are applicable to their project. Applicability should be determined through a consideration of the development project's proposed features and the anticipated pollutant sources associated with them. Appendix C provides guidance for identifying source control BMPs applicable to a project. Table 2 "Baseline BMPs for Pollutant-Generating Sources" located in Standard and PDP SWQMPs must be used to document compliance with these requirements. Table 2 applies to all projects except for Small Residential Projects. Small Residential Projects are those requiring either: a Building Permit, Minor Residential Grading Permit, or site Plan Permit for a single family home; or a Tentative Parcel Map Permit for up to 4 single family homes and a remainder parcel.

4.2.1 Prevent illicit discharges into the MS4

Per WPO Section 67.804, illicit discharges (i.e., discharges to the MS4 that are not composed entirely of storm water) are prohibited, except as exempted per WPO Section 67.805. Projects must effectively eliminate discharges of non-storm water into the MS4.

For outdoor areas, exposure reduction generally requires work areas and storage areas to be covered to prevent rain exposure; graded to prevent stormwater run-on and run-off; and protected from the wind so that materials are not dispersed. See Fact Sheet BL-5 (Work and Storage Areas) in Appendix C. If there are storm water discharges from outdoor areas work areas or storage areas, Fact Sheet BL-6 (Management of Stormwater Discharges) in Appendix C provides practices to prevent discharge of materials from these areas. For interior work surfaces, floor drains and sumps, drain lines, and fire sprinkler test water, exposure reduction generally requires directing the discharge to the sanitary sewer. See Fact Sheet BL-7 (Management of Non-Stormwater Discharges) in Appendix C. Fact Sheet BL-7 also discusses education for prevention of illicit discharges, which is discussed in more detail below in Section 1.2.2.

4.2.2 Identify the storm drain system using stenciling or signage

Storm drain signs and stencils are visible source controls typically placed adjacent to inlets. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signage must be provided for all storm water conveyance system inlets and catch basins within the project area. Storm drain signage may include concrete stamping, concrete painting, placards, or other methods approved by the County. A stenciling template used by the County is attached in the "Storm Drain Signage" section of Fact Sheet BL-7 in Appendix C. This template may be modified and used as educational pieces promoting improved water quality.

In addition to storm drain signage, the "Educational BMP Signage" section of Fact Sheet BL-7 encourages applicants to post temporary BMP signage to alert contractors during construction that a permanent BMP has been completed and to ensure it does not get disturbed during subsequent grading and building construction activities. Developments with model homes are encouraged to place educational signage to provide future homeowners a description of the benefits and responsibilities of the BMPs constructed on their property. Interpretive BMP signage provides permanent educational signage for the public to detail how BMPs benefit the local waterways, and may include prohibitive language (with graphical icons) regarding illegal dumping at trailheads, parks, building entrances, and public access points along channels and creeks within the project area.

4.2.3 Protect outdoor material storage areas from rainfall, run-on, runoff, and wind dispersal

Materials with the potential to pollute storm water runoff must be stored in a manner that prevents contact with rainfall and storm water runoff. All development projects must incorporate the following structural or pollutant control BMPs for outdoor material storage areas, as applicable and feasible:

- Storage areas must be paved and sufficiently impervious to contain leaks and spills, where necessary.
- The storage area must be sloped towards a sump or another equivalent measure that is effective to contain spills.
- Runoff from downspouts/roofs must be directed away from storage areas.
- The storage area must have a roof or awning that extends beyond the storage area to minimize collection of storm water within the secondary containment area. A manufactured storage shed may be used for small containers.
- Use other methods approved by the County.

See Fact Sheet BL-5 (Work and Storage Areas) in Appendix C for more information.

4.2.4 Protect materials stored in outdoor work areas from rainfall, run-on, runoff, and wind dispersal

Outdoor work areas have an elevated potential for pollutant loading and spills. All development projects must include the following structural or pollutant control BMPs for any outdoor work areas with potential for pollutant generation, as applicable and feasible:

- Create an impermeable surface such as concrete or asphalt, or a prefabricated metal drip pan, depending on the size needed to protect the materials.
- Cover the area with a roof or other acceptable cover.
- Berm the perimeter of the area to prevent water from adjacent areas from flowing on to the surface of the work area.

- Directly connect runoff to sanitary sewer or other specialized containment system(s), as needed and where feasible. This allows the more highly concentrated pollutants from these areas to receive special treatment that removes particular constituents. Approval for this connection must be obtained from the appropriate sanitary sewer agency.
- Locate the work area away from storm drains or catch basins.
- Use other methods approved by the County.

See Fact Sheets BL-5 (Work and Storage Areas) and BL-6 (Management of Stormwater Discharges) in Appendix C for more information.

4.2.5 Protect trash storage areas from rainfall, run-on, runoff, and wind dispersal

Storm water runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, or creeks. All development projects must include the following structural or pollutant control BMPs, as applicable:

- Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This can include berming or grading the waste handling area to prevent run-on of storm water.
- Ensure trash container areas are screened or walled to prevent offsite transport of trash.
- Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers.
- Locate storm drains away from immediate vicinity of the trash storage area and vice versa.
- Post signs on all dumpsters informing users that hazardous material are not to be disposed.
- Use other methods approved by the County.

See Fact Sheets BL-5 (Work and Storage Areas) and BL-6 (Management of Stormwater Discharges) in Appendix C for more information.

4.2.6 Use any additional BMPs determined to be necessary by the County to minimize pollutant generation at each project site

At its discretion, the County may determine that additional on-site controls are necessary to minimize pollutant generation. These determinations will be made on a project-specific basis. Appendix C provides guidance on permanent controls that are applicable at a project site based on potential sources of runoff pollutants at the project site. Applicants must implement all applicable and feasible source control BMPs listed in Appendix C.

4.3 Site Design (SD) BMP Requirements

Site design BMPs (also referred to as LID BMPs) are intended to reduce the rate and volume of storm water runoff and associated pollutant loads by minimizing surface soil compaction, reducing impervious surfaces, or providing flow pathways that are "disconnected" from the storm drain system, such as by routing flow over pervious surfaces. Site design BMPs may incorporate interception, storage, evaporation, evapotranspiration, infiltration, and/or filtration processes to retain and/or treat pollutants in storm water before it is discharged from a site.

Applicants are referred to the County of San Diego LID Handbook for additional guidance and information on the incorporation of low impact design features in the design of projects. Appendix K (Guidance for Green Infrastructure) provides additional guidance for implementing green street and other sustainable project features and types.

Appendix C also provides the following fact sheets to assist project applicants with designing BMPs to meet Site Design requirements:

- BL-1 – Existing Natural Site Features
- BL-2 – Outdoor Impervious Areas
- BL-3 – Rooftop Areas
- BL-4 – Landscaped Areas

In addition, Appendix E also provides the following fact sheets to assist applicants in Design Capture Volume (DCV) reduction using Enhanced Site Design BMPs:

- SD-A – Tree Wells
- SD-B – Impervious Area Dispersion
- SD-C – Green Roofs
- SD-D – Permeable Pavement (Site Design BMP)
- SD-E – Rain Barrels; and
- SD-F – Amended Soil

The County strongly encourages applicants to utilize these resources to inform the design and construction of low impact design and sustainable infrastructure features for their projects. In addition to generally being environmentally preferable, incorporation of these features can be significantly less expensive than traditional structural approaches, both for construction and ongoing maintenance. Incorporating many of these features may also reduce the sizing requirements for Structural BMPs.

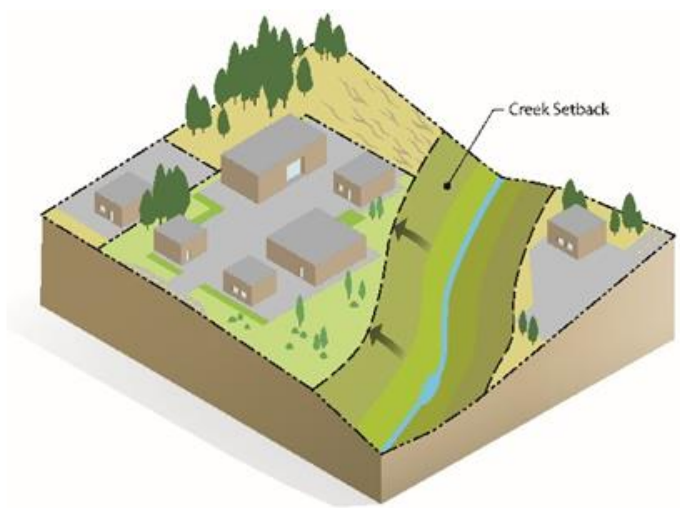
Implementation of Enhanced Site Design BMPs may result in quantifiable reductions in the site's DCV (refer to Appendix B.1); however, failure to meet the minimum thresholds for DCV reductions does not eliminate requirements to implement applicable Site Design BMPs. All applicable and feasible Site Design BMPs must be implemented to the maximum extent practicable. Additionally, implementation of Significant Site Design BMPs (SSD-BMPs) such as Tree Wells and Impervious Area Dispersion when designed to meet flow control per Fact Sheets SD-A and SD-B, respectfully may result in quantifiable hydromodification flow control benefits; refer to Section 6.1 and Appendix I.1.

Per MS4 Permit Provision E.3.a.(3) and WPO Section 67.811(a)(5), s*ite design BMPs listed below in 4.3.1 to 4.3.8 must be applied to all development projects as applicable and feasible for the project site and project conditions.*

How to comply: Projects must comply with this requirement by using all of the site design BMPs listed in this section that are applicable and practicable to their project type and site conditions. Applicability of a given site design BMP should be determined based on project type, soil conditions, presence of natural features (e.g. streams), and presence of site features (e.g. parking areas). Applicants must provide an explanation for any site design BMP they do not consider to be applicable and feasible. Site plans must identify site design BMPs and provide adequate supporting detail to ensure their effective implementation. Table 1 "Baseline BMPs for Existing and Proposed Site Features" which is part of both the Standard SWQMP and the PDP SWQMP listed in Appendix A, should be used to document compliance with site design BMP requirements. Table 1 applies to all development projects.

4.3.1 Maintain natural drainage pathways and hydrologic features

- Maintain or restore natural storage reservoirs and drainage corridors (including topographic depressions, areas of permeable soils, natural swales, and ephemeral and intermittent streams)
- Buffer zones for natural water bodies (where buffer zones are technically infeasible, require project applicant to include other buffers such as trees, access restrictions, etc.)



During the site assessment, natural drainages must be identified along with their connection to creeks or streams, if any. Natural drainages offer a benefit to storm water management as the soils and habitat already function as a natural filtering or infiltrating swale. When determining the development footprint of the site, altering natural drainages should be avoided. By providing a development envelope set back from natural drainages, the drainage can retain some water quality benefits to the watershed. In some situations, site constraints, regulations, economics, or other factors may not allow avoidance of drainages and sensitive areas. Projects proposing to dredge or fill materials in Waters of the U.S. must obtain Clean Water Act Section 401 Water Quality Certification. Projects proposing to dredge or fill waters of the State must obtain waste discharge requirements. Both the 401 Certification and the Waste Discharge Requirements are administered by the San Diego Water Board.

A setback of 50-200 feet is recommended for development proposed adjacent to Waters of the U.S depending on the type of Water of the U.S. For further guidance, refer to the County of San Diego Guidelines for Determining Significance and Report Format and Content Requirements Biological Resources last revised in September 15, 2010. This document can be found at http://www.sandiegocounty.gov/content/dam/sdc/pds/ProjectPlanning/docs/Biological_Guidelines.pdf.

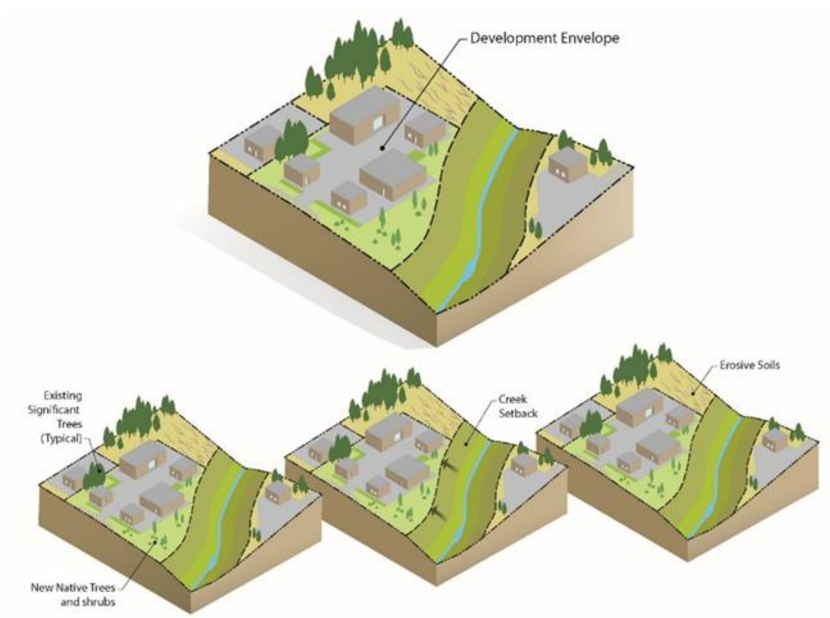
Projects can maintain these features into a project by implementing the following planning and design phase techniques:

- Evaluate surface drainage and topography in considering selection of Site Design BMPs that will be most beneficial for a given project site. Where feasible, maintain topographic depressions for infiltration.
- Optimize the existing site layout and reduce the need for grading. Where possible, conform the site layout along natural landforms, avoid grading and disturbance of vegetation and soils, and replicate the site's natural drainage patterns. Integrating existing drainage patterns into the site plan will help maintain the site's predevelopment hydrologic function and may reduce construction costs.
- Preserve existing drainage paths and depressions to maintain the time of concentration and infiltration rates of runoff, and decrease peak flow.
- Do not locate structural BMPs in buffer zones if a State or Federal resource agency (SDRWQCB, California Department of Fish and Wildlife; U.S. Army Corps of Engineers, etc.) prohibits maintenance or activity in the area.

See Fact Sheet BL-1 (Existing Natural Site Features) in Appendix C for more information.

4.3.2 Conserve natural areas, soils and vegetation

- Conserve natural areas within the project footprint including existing trees, other vegetation, and soils



To enhance a site's ability to support source control and reduce runoff, the conservation and restoration of natural areas must be considered in the site design process. By conserving or restoring the natural drainage features, natural processes are able to intercept storm water, thereby reducing the amount of runoff.

The upper soil layers of a natural area contain organic material, soil biota, vegetation, and a configuration favorable for storing and slowly conveying storm water and establishing or restoring vegetation to stabilize the site after construction. The canopy of existing native trees and shrubs also provide a water conservation benefit by intercepting rain water before it hits the ground. By minimizing disturbances in these areas, natural processes are able to intercept storm water, providing a water quality benefit. By concentrating development in the least environmentally sensitive areas of the site and set back from natural areas, storm water runoff is reduced, water quality can be improved, environmental impacts can be decreased, and many of the site's most attractive native landscape features can be retained. In some situations, site constraints, regulations, economics, or other factors may not allow avoidance of all sensitive areas on a project site. Project applicant must consult the County for specific requirements for mitigation of removal of sensitive areas.

Projects can incorporate BMPs SD-G (Conserve Natural Features) and SD-H (Buffers) in Fact Sheet BL-1 in Appendix C by implementing the following planning and design phase techniques:

- Identify areas most suitable for development, and areas that should be left undisturbed. Additionally, disturbance may be reduced by increasing building density and increasing height, if possible.
- Cluster development on the least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.

1. AREAS DEVOID OF VEGETATION, INCLUDING PREVIOUSLY GRADED AREAS AND AGRICULTURAL FIELDS
2. AREAS OF NON-NATIVE VEGETATION, DISTURBED HABITATS AND EUCALYPTUS WOODLANDS WHERE RECEIVING WATERS ARE NOT PRESENT
3. AREAS OF CHAMISE OR MIXED CHAPARRAL, AND NON-NATIVE GRASSLANDS
4. AREAS CONTAINING COASTAL SCRUB COMMUNITIES
5. ALL OTHER UPLAND COMMUNITIES
6. OCCUPIED HABITAT OF SENSITIVE SPECIES AND ALL WETLANDS (AS BOTH ARE DEFINED BY THE LOCAL JURISDICTION)

- Avoid areas with thick, undisturbed vegetation. Soils in these areas have a much higher capacity to store and infiltrate runoff than disturbed soils, and reestablishment of a mature vegetative community can take decades. Vegetative cover can also provide additional volume storage of rainfall by retaining water on the surfaces of leaves, branches, and trunks of trees during and after storm events.
- Preserve trees, especially native trees and shrubs, and identify locations for planting additional native or drought tolerant trees and large shrubs. Refer to Appendix E for additional guidance on implementing SD-A Tree Wells as a Site Design BMP.
- In areas of disturbance, topsoil should be removed before construction and replaced after the project is completed. When handled carefully, such an approach limits the disturbance to native soils and reduces the need for additional (purchased) topsoil during later phases.
- Avoid sensitive areas, such as wetlands, biological open space areas, biological mitigation sites, streams, floodplains, or particular vegetation communities, such as coastal sage scrub and intact forest. Also, avoid areas that are habitat for sensitive plants and animals, particularly those that are State or federally listed as endangered, threatened, or rare. Development in these areas is often restricted by federal, state and local laws.

See Fact Sheet BL-1 (Existing Natural Site Features) in Appendix C for more information.

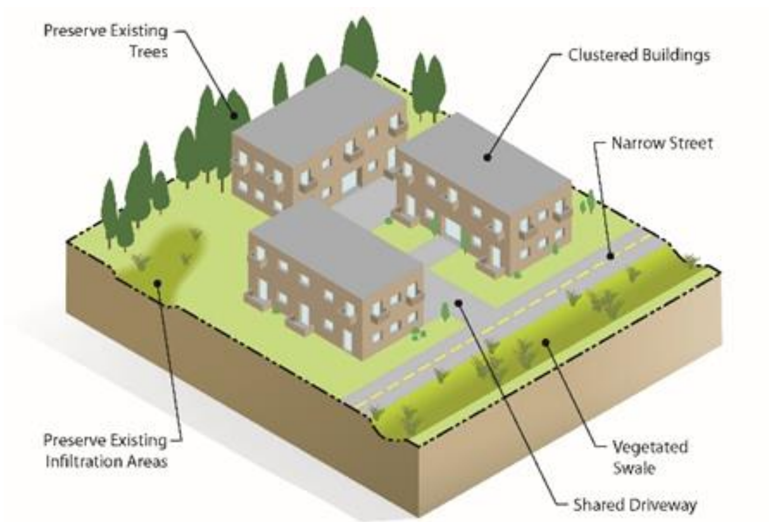
4.3.3 Minimize impervious area

- ☐ Construct streets, sidewalks or parking lots aisles to the minimum widths necessary, provided public safety is not compromised.
- ☐ Minimize the impervious footprint of the project.

One of the principal causes of environmental impacts by development is the creation of impervious surfaces. Imperviousness links urban land development to degradation of aquatic ecosystems in two ways:

- First, the combination of paved surfaces and piped runoff efficiently collects urban pollutants and transports them, in suspended or dissolved form, to surface waters. These pollutants may originate as airborne dust, be washed from the atmosphere during rains, or may be generated by automobiles and outdoor work activities.
- Second, increased peak flows and runoff durations typically cause erosion of stream banks and beds, transport of fine sediments, and disruption of aquatic habitat. Measures taken to control stream erosion, such as hardening banks with riprap or concrete, may permanently eliminate habitat.

Impervious cover can be minimized through identification of the smallest possible land area that can be practically impacted or disturbed during site development. Reducing impervious surfaces retains the permeability of the project site, allowing natural processes to filter and reduce sources of pollution.



Projects can conserve these features, by implementing the following planning and design phase techniques as applicable and feasible:

- Decrease the building footprint through the design of compact and taller structures when allowed by County zoning and design standards, and provided public safety is not compromised.
- Construct walkways, trails, patios, overflow parking lots, alleys, and other low-traffic areas with permeable surfaces. Refer to Appendix E for additional guidance on implementing SD-D Permeable Pavement as a Site Design BMP.
- Construct streets, sidewalks and parking lot aisles to the minimum widths necessary, provided that public safety and alternative transportation (e.g. pedestrians, bikes) are not compromised.
- Consider the implementation of shared parking lots and driveways where possible.
- Landscaped area in the center of a cul-de-sac can reduce impervious area depending on configuration. Design of a landscaped cul-de-sac must be coordinated with fire department personnel to accommodate turning radii and other operational needs.
- Design smaller parking lots with fewer stalls, smaller stalls, and more efficient lanes.
- Design parking indoors or underground.
- Minimize the use of impervious surfaces in the landscape design.

See Fact Sheets BL-2 (Outdoor Impervious Area), BL-3 (Rooftop Areas), and BL-4 (Landscaped Areas) in Appendix C for more information.

In addition, the following fact sheets provided in Appendix E describe ways to reduce impervious areas:

- SD-B – Impervious Area Dispersion;
- SD-C – Green Roofs; and
- SD-D – Permeable Pavement (Site Design).

4.3.4 Minimize soil compaction

- Minimize soil compaction in landscaped areas

The upper soil layers contain organic material, soil biota, and a configuration favorable for storing and slowly conveying storm water down gradient. By protecting native soils and vegetation in appropriate areas during clearing and grading the site can retain some of its existing beneficial hydrologic function. Soil compaction resulting from the movement of heavy construction equipment can reduce soil infiltration rates. It is important to recognize that areas adjacent to and under building foundations, roads and manufactured slopes must be compacted with minimum soil density requirements in compliance with County building and grading ordinances.

Projects can incorporate BMP SD-G (Conserve Natural Areas) and SD-K (Sustainable Landscaping) in Fact Sheets BL-1 and BL-4, respectively in Appendix C by implementing the following planning and design phase techniques as applicable and feasible:

- Avoid disturbance in planned green space and proposed landscaped areas where feasible. Areas that are planned for retaining their beneficial hydrological function should be protected during the grading and construction phase so that vehicles and construction equipment do not intrude and inadvertently compact the area.
- In areas planned for landscaping where compaction cannot be avoided, re-till the soil surface to allow for better infiltration capacity. Soil amendments are recommended and may be necessary to increase permeability and organic content. Soil stability, density requirements, and other geotechnical considerations associated with soil compaction must be reviewed by a qualified landscape architect or licensed geotechnical, civil or other professional engineer. Refer to fact sheet SD-F in Appendix E for additional guidance on implementing amended soils within the project footprint.

See Fact Sheets BL-1 (Existing Natural Site Features) and BL-4 (Landscaped Areas) in Appendix C for more information.

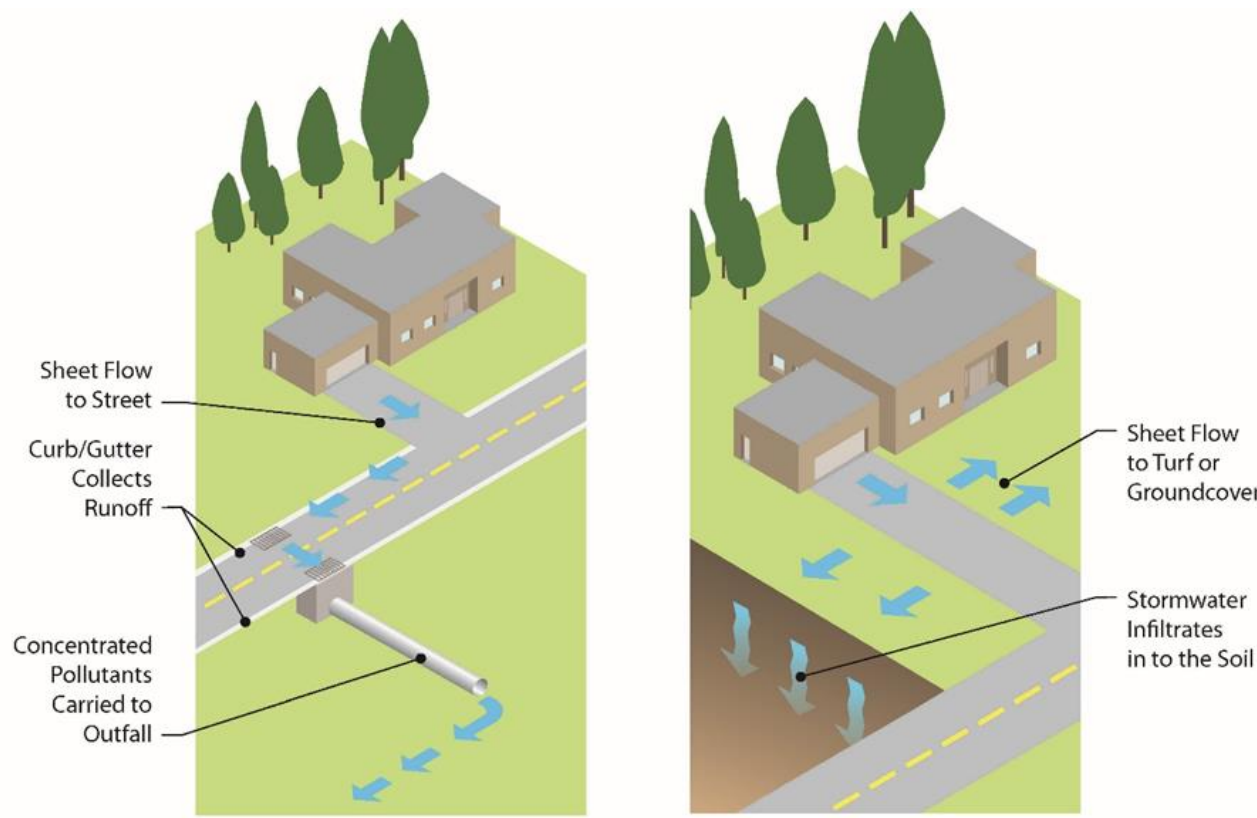
4.3.5 Disperse impervious areas

- Disconnect impervious surfaces through distributed pervious areas.
- Design and construct landscaped or other pervious areas to effectively receive and infiltrate, retain and/or treat runoff from impervious areas prior to discharging to the MS4

Impervious area dispersion (dispersion) refers to the practice of disconnecting impervious areas from directly draining to the storm drain system by routing runoff from impervious areas such as rooftops, walkways, and driveways onto the surface of adjacent pervious areas. The intent is to slow runoff discharges, and to reduce volumes while achieving incidental treatment. Volume reduction from dispersion is dependent on the infiltration characteristics of the pervious area and the amount of impervious area draining to the pervious area. Treatment is achieved through filtration, shallow sedimentation, sorption, infiltration, evapotranspiration, biochemical processes and plant uptake.

The effects of imperviousness can be mitigated by disconnecting impervious areas from the drainage system and by encouraging detention and retention of runoff near the point where it is generated. Detention and retention of runoff reduces peak flows and volumes and allows pollutants to settle out or adhere to soils before they can be transported downstream. Disconnection practices may be applied in almost any location, but impervious surfaces must discharge into a suitable receiving area for the practices to be effective. Information gathered during the site assessment will help determine appropriate receiving areas.

Project designs should direct runoff from impervious areas to adjacent landscaping areas that have higher potential for infiltration and surface water storage. This will limit the amount of runoff generated, and therefore the size of the mitigation BMPs downstream. The design, including consideration of slopes and soils, must reflect a reasonable expectation that runoff will soak into the soil and produce no runoff of the DCV. On hillside sites, drainage from upper areas may be collected in conventional catch basins and piped to landscaped areas that have higher potential for infiltration. Or use low retaining walls to create terraces that can accommodate BMPs.



Projects can incorporate impervious area dispersion through the following planning and design phase techniques:

- Implement design criteria and considerations listed in the impervious area dispersion fact sheet (SD-B) presented in Appendix E.
- Drain rooftops into adjacent landscape areas.
- Drain impervious parking lots, sidewalks, walkways, trails, and patios into adjacent landscape areas.
- Reduce or eliminate curb and gutters or place curb openings from roadway sections, thus allowing roadway runoff to drain to adjacent pervious areas.
- Replace curbs and gutters with roadside vegetated swales or place curb openings and direct runoff from the paved street or parking areas to adjacent LID facilities. This can reduce the overall capital cost of the site development while improving the storm water quantity and quality issues and the site's aesthetics.
- Plan site layout and grading to allow for runoff from impervious surfaces to be directed into distributed permeable areas such as turf, landscaped or permeable recreational areas, medians, parking islands, planter boxes, etc.
- Detain and retain runoff throughout the site. On flatter sites, landscaped areas can be interspersed among the buildings and pavement areas. On hillside sites, drainage from upper areas may be collected in conventional catch basins and conveyed to landscaped areas in lower areas of the site.
- Pervious area that receives run on from impervious surfaces should have a minimum width of 10 feet and a maximum slope of 5%.

See Fact Sheets BL-2 (Outdoor Impervious Areas), BL-3 (Rooftop Areas) and BL-4 (Landscaped Areas) in Appendix C for more information.

In addition, the following fact sheet in Appendix E describes ways to reduce the impact of runoff from impervious areas:

- SD-B- Impervious area dispersion

4.3.6 Collect runoff

- Use small collection strategies located at, or as close to as possible to the sources (i.e. the point where storm water initially meets the ground) to minimize the transport of runoff and pollutants to the MS4 and receiving waters
- Use permeable material for projects with low traffic areas and appropriate soil conditions. Refer to Appendix E for additional guidance on implementing SD-D Permeable Pavement as a Site Design BMP.

Distributed control of storm water runoff from the site can be accomplished by applying small collection techniques (e.g. SD-C Green Roofs in Appendix E), or integrated management practices, on small sub-catchments or on residential lots. Small collection techniques foster opportunities to maintain the natural hydrology provide a much greater range of control practices. Integration of storm water management into landscape design and natural features of the site, reduce site development and long-term maintenance costs, and provide redundancy if one technique fails. On flatter sites, it typically works best to intersperse landscaped areas and integrate small scale retention practices among the buildings and paving.

Permeable pavements contain small voids that allow water to pass through to a gravel base. They come in a variety of forms; they may be a modular paving system (concrete pavers, grass-pave, or gravel-pave) or poured in place pavement (porous concrete, permeable asphalt). Project applicants should identify locations where permeable pavements could be substituted for impervious concrete or asphalt paving. In areas where infiltration is not appropriate, permeable paving systems can be fitted with an under drain to allow filtration, storage, and evaporation, prior to drainage into the storm drain system.

Projects can incorporate runoff collection by implementing the following planning and design phase techniques:

- Implementing distributed small collection techniques to collect and retain runoff (see SD-E Rain Barrels in Appendix E)
- Installing permeable pavements (see SD-D Permeable Pavement in Appendix E)

See Fact Sheets BL-2 (Outdoor Impervious Areas) and BL-3 (Rooftop Areas) in Appendix C for more information.

4.3.7 Landscape with native or drought tolerant species

In accordance with the County's Watershed Protection Ordinance and Water Conservation in Landscaping Ordinance[5], applicants should select a landscape design and plant palette that minimizes required resources (irrigation, fertilizers and pesticides). Native plants require less fertilizer and pesticide use because they are already adapted to local rainfall patterns and soils conditions. Plants should be selected to be drought tolerant and to not require watering after establishment (2 to 3 years). After plants are established, watering should only be required during prolonged dry periods. Final selection of plant material should be made by a landscape architect experienced with LID techniques. Microclimates vary significantly throughout the region and consulting County resources (i.e., Water Efficient Landscape Design Manual[6]) will help to select plant material suitable for a specific geographic location.

See Fact Sheet BL-4 (Landscaped Areas) in Appendix C for more information.

Note: For projects with bioretention facilities, applicants should consult Fact Sheet F.3 in Appendix F for a list of low water use plants able to withstand up to 96 hours of inundation.

[5] Available online at https://www.sandiegocounty.gov/content/sdc/pds/LandscapeOrdinance.html
[6] Available online at https://www.sandiegocounty.gov/content/sdc/pds/LandscapeOrdinance.html.)

4.3.8 Harvest and use precipitation

Photograph Courtesy of Arid Solutions, Inc.

Harvest and use BMPs capture and store storm water runoff for later use. Harvest and use can be applied at smaller scales (Standard Projects) using rain barrels or at larger scales (PDPs) using cisterns. This harvest and use technique has been successful in reducing runoff discharged to the storm drain system conserving potable water and recharging groundwater.

Rain barrels are aboveground storage vessels that capture runoff from roof downspouts during rain events and detain that runoff for later reuse for irrigating landscaped areas. The temporary storage of roof runoff reduces the runoff volume from a property and may reduce the peak runoff velocity for small, frequently occurring storms. In addition, by reducing the amount of storm water runoff that flows overland into a storm water conveyance system (storm drain inlets and drain pipes), less pollutants are transported through the conveyance system into local creeks and the ocean. The reuse of the detained water for irrigation purposes leads to the conservation of potable water and the recharge of groundwater. SD-E fact sheet (Rain Barrels) in Appendix E provides additional detail for designing Harvest and Use BMPs. Projects can incorporate BMP SD-E by installing rain barrels or cisterns, as applicable.

Note: Harvest and use BMPs proposed for indoor uses may require additional County approvals. Applicants should consult with staff for specific requirements.

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Building & Grounds Maintenance SC-41

Description

Stormwater runoff from building and grounds maintenance activities can be contaminated with toxic hydrocarbons in solvents, fertilizers and pesticides, suspended solids, heavy metals, abnormal pH, and oils and greases. Utilizing the protocols in this fact sheet will prevent or reduce the discharge of pollutants to stormwater from building and grounds maintenance activities by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the stormwater collection system.

Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- ◻ Switch to non-toxic chemicals for maintenance to the maximum extent possible.
- ◻ Choose cleaning agents that can be recycled.
- ◻ Encourage proper lawn management and landscaping, including use of native vegetation.
- ◻ Encourage use of Integrated Pest Management techniques for pest control.
- ◻ Encourage proper onsite recycling of yard trimmings.
- ◻ Recycle residual paints, solvents, lumber, and other material as much as possible.

Objectives

- *Cover*
- *Contain*
- *Educate*
- *Reduce/Minimize*
- *Product Substitution*

Targeted Constituents	
Sediment	✓
Nutrients	✓
Trash	
Metals	✓
Bacteria	✓
Oil and Grease	
Organics	

Minimum BMPs Covered	
Good Housekeeping	✓
Preventative Maintenance	
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	✓
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- Clean work areas at the end of each work shift using dry cleaning methods such as sweeping and vacuuming.

Good Housekeeping

Pressure Washing of Buildings, Rooftops, and Other Large Objects

- In situations where soaps or detergents are used and the surrounding area is paved, pressure washers must use a water collection device that enables collection of wash water and associated solids. A sump pump, wet vacuum or similarly effective device must be used to collect the runoff and loose materials. The collected runoff and solids must be disposed of properly.

- If soaps or detergents are not used, and the surrounding area is paved, wash runoff does not have to be collected but must be screened. Pressure washers must use filter fabric or some other type of screen on the ground and/or in the catch basin to trap the particles in wash water runoff.

- If you are pressure washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement.

Landscaping Activities

- Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage, or by composting. Do not dispose of collected vegetation into waterways or storm drainage systems.

- Use mulch or other erosion control measures on exposed soils. See also SC-40, Contaminated and Erodible Areas, for more information.

Building Repair, Remodeling, and Construction

- Do not dump any toxic substance or liquid waste on the pavement, the ground, or toward a storm drain.

- Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.

- Use a ground cloth or oversized tub for activities such as paint mixing and tool cleaning.

- Clean paintbrushes and tools covered with water-based paints in sinks connected to sanitary sewers or in portable containers that can be dumped into a sanitary sewer drain. Brushes and tools covered with non-water-based paints, finishes, or other materials must be cleaned in a manner that enables collection of used solvents (e.g., paint thinner, turpentine, etc.) for recycling or proper disposal.

- Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grit, wash water, or other pollutants may escape the work area and enter a catch basin. This is particularly necessary on rainy days. The containment device(s) must be in place at the beginning of the work day, and accumulated dirty runoff and solids must be collected and disposed of before removing the containment device(s) at the end of the work day.

- ◻ If you need to de-water an excavation site, you may need to filter the water before discharging to a catch basin or off-site. If directed off-site, you should direct the water through hay bales and filter fabric or use other sediment filters or traps.

- ◻ Store toxic material under cover during precipitation events and when not in use. A cover would include tarps or other temporary cover material.

Mowing, Trimming, and Planting

- ◻ Dispose of leaves, sticks, or other collected vegetation as garbage, by composting or at a permitted landfill. Do not dispose of collected vegetation into waterways or storm drainage systems.

- ◻ Use mulch or other erosion control measures when soils are exposed.

- ◻ Place temporarily stockpiled material away from watercourses and drain inlets, and berm or cover stockpiles to prevent material releases to the storm drain system.

- ◻ Consider an alternative approach when bailing out muddy water: do not put it in the storm drain; pour over landscaped areas.

- ◻ Use hand weeding where practical.

Fertilizer and Pesticide Management

- ◻ Do not use pesticides if rain is expected.

- ◻ Do not mix or prepare pesticides for application near storm drains.

- ◻ Use the minimum amount needed for the job.

- ◻ Calibrate fertilizer distributors to avoid excessive application.

- ◻ Employ techniques to minimize off-target application (e.g., spray drift) of pesticides, including consideration of alternative application techniques.

- ◻ Apply pesticides only when wind speeds are low.

- ◻ Fertilizers should be worked into the soil rather than dumped or broadcast onto the surface.

- ◻ Irrigate slowly to prevent runoff and then only as much as is needed.

- ◻ Clean pavement and sidewalk if fertilizer is spilled on these surfaces before applying irrigation water.

Inspection

- ◻ Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering and repair leaks in the irrigation system as soon as they are observed.

Spill Response and Prevention Procedures

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials, such as brooms, dustpans, and vacuum sweepers (if desired) near the storage area where it will be readily accessible.
- Have employees trained in spill containment and cleanup present during the loading/unloading of dangerous wastes, liquid chemicals, or other materials.
- Familiarize employees with the Spill Prevention Control and Countermeasure Plan.
- Clean up spills immediately.

Material Handling and Waste Management

- Follow all federal, state, and local laws and regulations governing the use, storage, and disposal of fertilizers and pesticides and training of applicators and pest control advisors.
- Use less toxic pesticides that will do the job when applicable. Avoid use of copper-based pesticides if possible.
- Dispose of empty pesticide containers according to the instructions on the container label.
- Use up the pesticides. Rinse containers, and use rinse water as product. Dispose of unused pesticide as hazardous waste.
- Implement storage requirements for pesticide products with guidance from the local fire department and County Agricultural Commissioner. Provide secondary containment for pesticides.

Employee Training Program

- Educate and train employees on pesticide use and in pesticide application techniques to prevent pollution.
- Train employees and contractors in proper techniques for spill containment and cleanup.
- Be sure the frequency of training takes into account the complexity of the operations and the needs of individual staff.

Quality Assurance and Record Keeping

- Keep accurate logs that document maintenance activities performed and minimum BMP measures implemented.
- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- Establish procedures to complete logs and file them in the central office.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Additional capital costs are not anticipated for building and grounds maintenance. Implementation of the minimum BMPs described above should be conducted as part of regular site operations.

Maintenance

- Maintenance activities for the BMPs described above will be minimal, and no additional cost is anticipated.

Supplemental Information

Fire Sprinkler Line Flushing

Site fire sprinkler line flushing may be a source of non-stormwater runoff pollution. The water entering the system is usually potable water, though in some areas it may be non-potable reclaimed wastewater. There are subsequent factors that may drastically reduce the quality of the water in such systems. Black iron pipe is usually used since it is cheaper than potable piping, but it is subject to rusting and results in lower quality water. Initially, the black iron pipe has an oil coating to protect it from rusting between manufacture and installation; this will contaminate the water from the first flush but not from subsequent flushes. Nitrates, poly-phosphates and other corrosion inhibitors, as well as fire suppressants and antifreeze may be added to the sprinkler water system. Water generally remains in the sprinkler system a long time (typically a year) and between flushes may accumulate iron, manganese, lead, copper, nickel, and zinc. The water generally becomes anoxic and contains living and dead bacteria and breakdown products from chlorination. This may result in a significant BOD problem and the water often smells. Consequently dispose fire sprinkler line flush water into the sanitary sewer. Do not allow discharge to storm drain or infiltration due to potential high levels of pollutants in fire sprinkler line water.

References and Resources

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Kennedy/Jenks Consultants, 2007. *The Truckee Meadows Industrial and Commercial Storm Water Best Management Practices Handbook*. Available online at: http://www.cityofsparks.us/sites/default/files/assets/documents/env-control/construction/TM-I-C_BMP_Handbook_2-07-final.pdf.

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US EPA, 1997. *Best Management Practices Handbook for Hazardous Waste Containers*. Available online at: http://www.epa.gov/region6/6en/h/handbk4.pdf.

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http://www.vcstormwater.org/documents/programs_business/building.pdf.

Drainage System Maintenance SC-44

Description

As a consequence of its function, the stormwater drainage facilities on site convey stormwater that may contain certain pollutants either to the offsite conveyance system that collects and transports urban runoff and stormwater, or directly to receiving waters. The protocols in this fact sheet are intended to reduce pollutants leaving the site to the offsite drainage infrastructure or to receiving waters through proper on-site conveyance system operation and maintenance. The targeted constituents will vary depending on site characteristics and operations.

Approach

Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

General Pollution Prevention Protocols

- Maintain catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

- Develop and follow a site specific drainage system maintenance plan that describes maintenance locations, methods, required equipment, water sources, sediment collection areas, disposal requirements, and any other pertinent information.

Good Housekeeping

Illicit Connections and Discharges

- Look for evidence of illegal discharges or illicit connections during routine maintenance of conveyance system and drainage structures:

Objectives

- *Cover*
- *Contain*
- *Educate*
- *Reduce/Minimize*

Targeted Constituents	
Sediment	✓
Nutrients	✓
Trash	✓
Metals	✓
Bacteria	✓
Oil and Grease	✓
Organics	✓

Minimum BMPs Covered	
Good Housekeeping	✓
Preventative Maintenance	✓
Spill and Leak Prevention and Response	✓
Material Handling & Waste Management	
Erosion and Sediment Controls	
Employee Training Program	✓
Quality Assurance Record Keeping	✓

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- ✓ Identify evidence of spills such as paints, discoloring, odors, etc.
- ✓ Record locations of apparent illegal discharges/illicit connections.
- ✓ Track flows back to potential discharges and conduct aboveground inspections. This can be done through visual inspection of upgradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
- ✓ Eliminate the discharge once the origin of flow is established.

- ☐ Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" or similar stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- ☐ Refer to fact sheet SC-10 Non-Stormwater Discharges for additional information.

Illegal Dumping

- ☐ Inspect and clean up hot spots and other storm drainage areas regularly where illegal dumping and disposal occurs.
- ☐ Establish a system for tracking incidents. The system should be designed to identify the following:
  - ✓ Illegal dumping hot spots;
  - ✓ Types and quantities (in some cases) of wastes;
  - ✓ Patterns in time of occurrence (time of day/night, month, or year);
  - ✓ Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills); and
  - ✓ Responsible parties.
- ☐ Post "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- ☐ Refer to fact sheet SC-10 Non-Stormwater Discharges for additional information.

Preventative Maintenance

Catch Basins/Inlet Structures

- ☐ Staff should regularly inspect facilities to ensure compliance with the following:
  - ✓ Immediate repair of any deterioration threatening structural integrity.
  - ✓ Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.

- Clean catch basins, storm drain inlets, and other conveyance structures before the wet season to remove sediments and debris accumulated during the summer.

- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Prioritize storm drain inlets; clean and repair as needed.

- Keep accurate logs of the number of catch basins cleaned.

- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.

- Dewater the wastes if necessary with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed. Do not dewater near a storm drain or stream.

Storm Drain Conveyance System

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.

- Collect and pump flushed effluent to the sanitary sewer for treatment whenever possible.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.

- Do not allow discharge to reach the storm drain system when cleaning a storm drain pump station or other facility.

- Conduct routine maintenance at each pump station.

- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.

Open Channel

- Modify storm channel characteristics to improve channel hydraulics, increase pollutant removals, and enhance channel/creek aesthetic and habitat value.

- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural state of any river, stream, or lake in California, must enter into a Steam or Lake Alteration Agreement with the Department of Fish and Wildlife. The developer-applicant should also contact local governments (city, county, special districts), other state agencies (SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Army Corps of Engineers and USFWS.

Spill Response and Prevention Procedures

- Keep your spill prevention control plan up-to-date.

- Investigate all reports of spills, leaks, and/or illegal dumping promptly.
- Place a stockpile of spill cleanup materials where it will be readily accessible or at a central location.
- Clean up all spills and leaks using “dry” methods (with absorbent materials and/or rags) or dig up, remove, and properly dispose of contaminated soil.

Employee Training Program

- Educate employees about pollution prevention measures and goals.
- Train employees how to properly handle and dispose of waste using the source control BMPs described above.
- Train employees and subcontractors in proper hazardous waste management.
- Use a training log or similar method to document training.
- Ensure that employees are familiar with the site’s spill control plan and/or proper spill cleanup procedures.
- Have staff involved in detection and removal of illicit connections trained in the following:
  - ✓ OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).
  - ✓ OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and Federal OSHA 29 CFR 1910.146).
  - ✓ Procedural training (field screening, sampling, smoke/dye testing, TV inspection).

Quality Assurance and Record Keeping

- Keep accurate maintenance logs that document minimum BMP activities performed for drainage system maintenance, types and quantities of waste disposed of, and any improvement actions.
- Keep accurate logs of spill response actions that document what was spilled, how it was cleaned up, and how the waste was disposed.
- Keep accurate logs of illicit connections, illicit discharges, and illegal dumping into the storm drain system including how wastes were cleaned up and disposed.
- Establish procedures to complete logs and file them in the central office.

Potential Limitations and Work-Arounds

Provided below are typical limitations and recommended “work-arounds” for drainage system maintenance:

- Clean-up activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.

  ✓ Perform all maintenance onsite and do not flush accumulated material downstream to private property or riparian habitats.

- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, and liquid/sediment disposal.

  ✓ Develop and follow a site specific drainage system maintenance plan that describes maintenance locations, methods, required equipment, water sources, sediment collection areas, disposal requirements, and any other pertinent information.

- Regulations may include adoption of substantial penalties for illegal dumping and disposal.

  ✓ Do not dump illegal materials anywhere onsite.

  ✓ Identify illicit connections, illicit discharge, and illegal dumping.

  ✓ Cleanup spills immediately and properly dispose of wastes.

- Local municipal codes may include sections prohibiting discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the sanitary sewer system.

  ✓ Collect all materials and pollutants accumulated in drainage system and dispose of according to local regulations.

  ✓ Install debris excluders in areas with a trash TMDL.

Potential Capital Facility Costs and Operation & Maintenance Requirements

Facilities

- Capital costs will vary substantially depending on the size of the facility and characteristics of the drainage system. Significant capital costs may be associated with purchasing water trucks, vacuum trucks, and any other necessary cleaning equipment or improving the drainage infrastructure to reduce the potential .

- Developing and implementing a site specific drainage system maintenance plan will require additional capital if a similar program is not already in place.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.
- Teams of at least two people plus administrative personnel are required to identify illicit discharges, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Technical staff are required to detect and investigate illegal dumping violations.
- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary.

Supplemental Information

Storm Drain Flushing

Flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in storm drainage systems. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as an open channel, another point where flushing will be initiated, or the sanitary sewer and the treatment facilities, thus preventing re-suspension and overflow of a portion of the solids during storm events. Flushing prevents “plug flow” discharges of concentrated pollutant loadings and sediments. Deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, thereby releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce impacts of stormwater pollution, a second inflatable device placed well downstream may be used to recollect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to recollect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75% for organics and 55-65% for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used if allowed or that fire hydrant line flushing coincide with storm sewer flushing.

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Appendix C – Structural Control BMPs

E.14 BF-1 Biofiltration

Location: 43rd Street and Logan Avenue, San Diego, California

MS4 Permit Category

Biofiltration

Manual Category

Biofiltration

Applicable Performance Standard

Pollutant Control
Flow Control

Primary Benefits

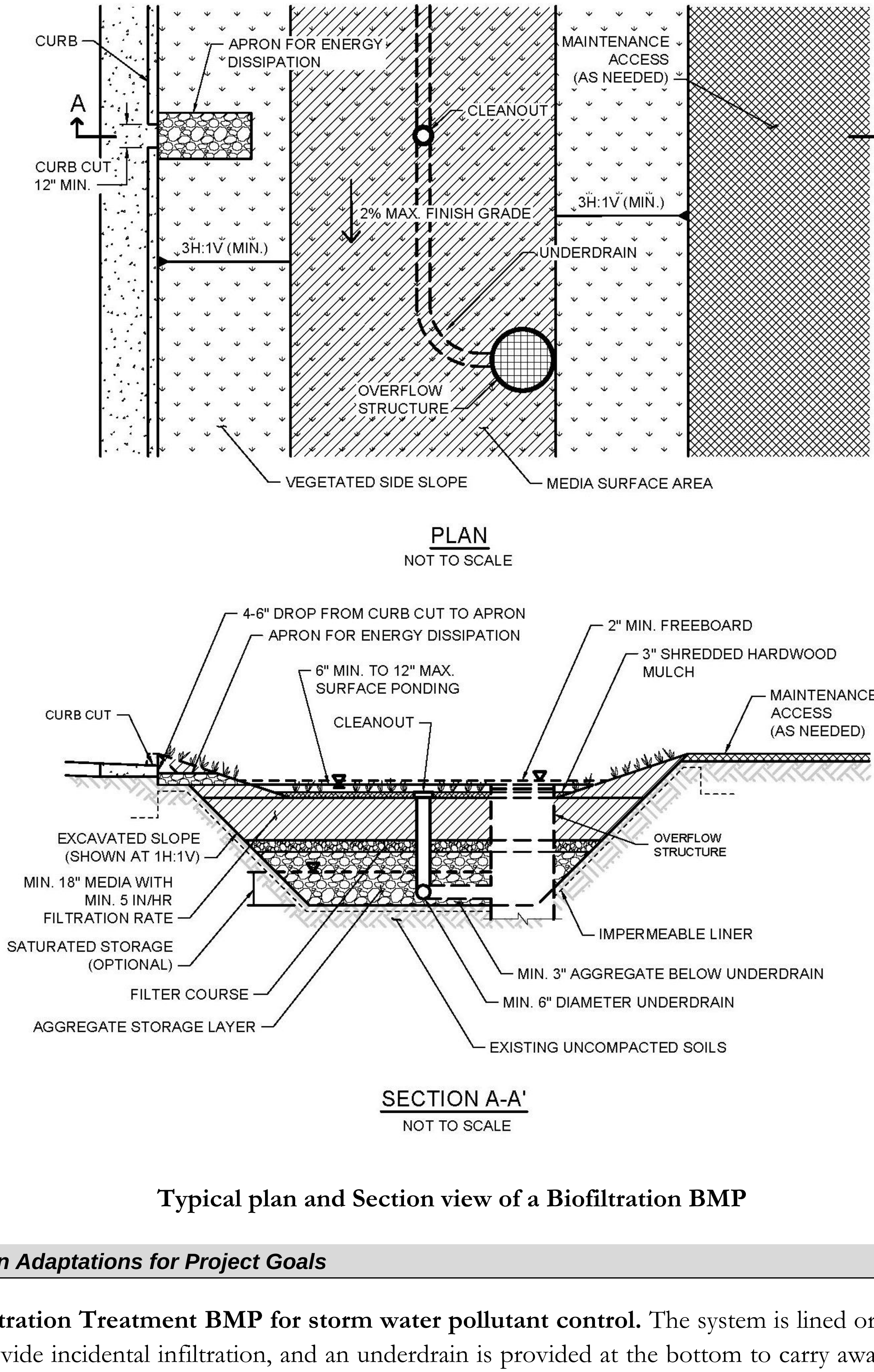
Treatment
Volume Reduction (Incidental)
Peak Flow Attenuation (Optional)

Description

Biofiltration (Bioretention with underdrain) facilities are vegetated surface water systems that filter water through vegetation, and soil or engineered media prior to discharge via underdrain or overflow to the downstream conveyance system. Bioretention with underdrain facilities are commonly incorporated into the site within parking lot landscaping, along roadsides, and in open spaces. Because these types of facilities have limited or no infiltration, they are typically designed to provide enough hydraulic head to move flows through the underdrain connection to the storm drain system. Treatment is achieved through filtration, sedimentation, sorption, biochemical processes and plant uptake.

Typical biofiltration components include:

- Inflow distribution mechanisms (e.g, perimeter flow spreader or filter strips)
- Energy dissipation mechanism for concentrated inflows (e.g., splash blocks or riprap)
- Shallow surface ponding for captured flows
- Side slope and basin bottom vegetation selected based on expected climate and ponding depth
- Non-floating mulch layer
- Media layer (planting mix or engineered media) capable of supporting vegetation growth
- Filter course layer consisting of aggregate to prevent the migration of fines into uncompacted native soils or the aggregate storage layer
- Aggregate storage layer with underdrain(s)
- Impermeable liner or uncompacted native soils at the bottom of the facility
- Overflow structure



Typical plan and Section view of a Biofiltration BMP

Design Adaptations for Project Goals

Biofiltration Treatment BMP for storm water pollutant control. The system is lined or un-lined to provide incidental infiltration, and an underdrain is provided at the bottom to carry away filtered runoff. This configuration is considered to provide biofiltration treatment via flow through the media layer. Storage provided above the underdrain within surface ponding, media, and aggregate storage is considered included in the biofiltration treatment volume. Saturated storage within the aggregate storage layer can be added to this design by raising the underdrain above the bottom of the aggregate storage layer or via an internal weir structure designed to maintain a specific water level elevation.

Integrated storm water flow control and pollutant control configuration. The system can be designed to provide flow rate and duration control by primarily providing increased surface ponding and/or having a deeper aggregate storage layer above the underdrain. This will allow for significant detention storage, which can be controlled via inclusion of an outlet structure at the downstream end of the underdrain.

Recommended Siting Criteria

	Siting Criteria	*Intent/Rationale*
☐	Placement observes geotechnical recommendations regarding potential hazards (e.g., slope stability, landslides, liquefaction zones) and setbacks (e.g., slopes, foundations, utilities).	Must not negatively impact existing site geotechnical concerns.
☐	An impermeable liner or other hydraulic restriction layer is included if site constraints indicate that infiltration or lateral flows should not be allowed.	Lining prevents storm water from impacting groundwater and/or sensitive environmental or geotechnical features. Incidental infiltration, when allowable, can aid in pollutant removal and groundwater recharge.
☐	The thickness of the Impermeable Liner shall be 30 MIL per County Green Streets Design Standard Drawing GS-3.00 and County Green Streets Supplement to Caltrans Specifications 20-11.08B.	Considerations when choosing an Impermeable Liner may include placement methods, media and underlying soil characteristics, and intended design life among others.
☐	Contributing tributary area must be ≤ 5 acres (≤ 1 acre preferred).	Bigger BMPs require additional design features for proper performance. Contributing tributary area greater than 5 acres may be allowed at the discretion of County staff if the following conditions are met: 1) incorporate design features (e.g. flow spreaders) to minimize short circuiting of flows in the BMP and 2) incorporate additional design features requested by County staff for proper performance of the regional BMP.

	Siting Criteria	*Intent/Rationale*
☐	Finish grade of the facility is ≤ 2%.	Flatter surfaces reduce erosion and channelization within the facility.

Design Criteria and Considerations

Biofiltration must meet the following design criteria. Deviations from the below criteria may be approved at the discretion of County staff if it is determined to be appropriate:

	Siting and Design	*Intent/Rationale*
	Surface Ponding	
☐	Surface ponding is limited to a 24-hour drawdown time.	Surface ponding limited to 24 hour for plant health. Surface ponding drawdown time greater than 24-hours but less than 96 hours may be allowed at the discretion of County staff if certified by a landscape architect or agronomist.
☐	Surface ponding depth is ≥ 6 and ≤ 12 inches.	Surface ponding capacity lowers subsurface storage requirements. Deep surface ponding raises safety concerns. Surface ponding depth greater than 12 inches (for additional pollutant control or surface outlet structures or flow-control orifices) may be allowed at the discretion of County staff if the following conditions are met: 1) surface ponding depth drawdown time is less than 24 hours; and 2) safety issues and fencing requirements are considered (typically ponding greater than 18" will require a fence and/or flatter side slopes) and 3) potential for elevated clogging risk is considered.
☐	A minimum of 2 inches of freeboard is provided.	Freeboard provides room for head over overflow structures and minimizes risk of uncontrolled surface discharge.
☐	Side slopes are stabilized with vegetation and are = 3H:1V or shallower.	Gentler side slopes are safer, less prone to erosion, able to establish vegetation more quickly and easier to maintain.

Siting and Design		*Intent/Rationale*
Vegetation		
☐	Plantings are suitable for the climate and expected ponding depth. A plant list to aid in selection can be found in Appendix F.	Plants suited to the climate and ponding depth are more likely to survive.
☐	An irrigation system with a connection to water supply should be provided as needed.	Seasonal irrigation might be needed to keep plants healthy.
Mulch (Mandatory)		
☐	3 inches of well-aged, shredded hardwood mulch.	Mulch will suppress weeds and maintain moisture for plant growth.
Media Layer		
☐	Media maintains a minimum filtration rate of 5 in/hr over lifetime of facility. An initial filtration rate of 8 to 12 in/hr is recommended to allow for clogging over time; the initial filtration rate should not exceed 12 inches per hour.	A filtration rate of at least 5 inches per hour allows soil to drain between events. The initial rate should be higher than long term target rate to account for clogging over time. However an excessively high initial rate can have a negative impact on treatment performance, therefore an upper limit is needed.
☐	Media is a minimum 18 inches deep, meeting either of these two media specifications: Appendix F.2 Biofiltration Soil Media (BSM) **or** County of San Diego Low Impact Development Handbook: Appendix G -Bioretention Soil Specification (June 2014, unless superseded by more recent edition). Alternatively, for proprietary designs and custom media mixes not meeting the media specifications, the media meets the pollutant treatment performance criteria in Section F.1.1.	A deep media layer provides additional filtration and supports plants with deeper roots. Standard specifications must be followed. For non-standard or proprietary designs, compliance with F.1.1 ensures that adequate treatment performance will be provided.

	Siting and Design	Intent/Rationale
☐	Media surface area is 3% of contributing area times adjusted runoff factor or greater. Unless demonstrated that the BMP surface area can be smaller than 3%.	Greater surface area to tributary area ratios: a) maximizes volume retention as required by the MS4 Permit and b) decrease loading rates per square foot and therefore increase longevity. Adjusted runoff factor is to account for site design BMPs implemented upstream of the BMP (such as rain barrels, impervious area dispersion, etc.). Refer to Appendix B guidance. If media surface area is under 3% of contributing area, refer to Sediment Loading calculations in Appendix B.
☐	Where receiving waters are impaired or have a TMDL for nutrients, the system is designed with nutrient sensitive media design (see fact sheet BF-2).	Potential for pollutant export is partly a function of media composition; media design must minimize potential for export of nutrients, particularly where receiving waters are impaired for nutrients.
Filter Course Layer		
☐	A filter course is used to prevent migration of fines through layers of the facility. Filter fabric is not used.	Migration of media can cause clogging of the aggregate storage layer void spaces or subgrade. Filter fabric is more likely to clog.
☐	Filter course is a minimum of 6 inches thick provided in two separate 3 inch layers. The top layer shall be made of ASTM C33 choker sand and the bottom layer shall be of ASTM No. 8 aggregate. Marker stakes shall be used to ensure uniform lift thickness.	To prevent reduction of the available storage volume that would lead to clogging of the underdrain and native soil beneath the BMP.
☐	Filter course is washed and free of fines.	Washing aggregate will help eliminate fines that could clog the facility and impede infiltration.
☐	Filter course calculations assessing suitability for particle migration prevention have been completed.	Gradation relationship between layers can evaluate factors (e.g., bridging, permeability, and uniformity) to determine if particle sizing is appropriate or if an intermediate layer is needed.

	Siting and Design	*Intent/Rationale*
Aggregate Storage Layer		
☐	Class 2 Permeable per Caltrans specification 68-1.025 is recommended for the storage layer. Washed, open-graded crushed rock may be used, however a 4-6 inch washed pea gravel filter course layer at the top of the crushed rock is required.	Washing aggregate will help eliminate fines that could clog the aggregate storage layer void spaces or subgrade.
☐	The depth of aggregate provided (12-inch typical) and storage layer configuration is adequate for providing conveyance for underdrain flows to the outlet structure.	Proper storage layer configuration and underdrain placement will minimize facility drawdown time.
Inflow, Underdrain, and Outflow Structures		
☐	Inflow, underdrains and outflow structures are accessible for inspection and maintenance.	Maintenance will prevent clogging and ensure proper operation of the flow control structures.
☐	Inflow velocities are limited to 3 ft/s or less or use energy dissipation methods. (e.g., riprap, level spreader) for concentrated inflows.	High inflow velocities can cause erosion, scour and/or channeling.
☐	Curb cut inlets are at least 12 inches wide, have a 4-6 inch reveal (drop) and an apron and energy dissipation as needed.	Inlets must not restrict flow and apron prevents blockage from vegetation as it grows in. Energy dissipation prevents erosion.
☐	Underdrain outlet elevation should be a minimum of 3 inches above the bottom elevation of the aggregate storage layer.	A minimal separation from subgrade or the liner lessens the risk of fines entering the underdrain and can improve hydraulic performance by allowing perforations to remain unblocked.
☐	Minimum underdrain diameter is 6 inches.	Smaller diameter underdrains are prone to clogging.
Inflow, Underdrain, and Outflow Structures		
☐	Underdrains are made of slotted, PVC pipe conforming to ASTM D 3034 or equivalent or corrugated, HDPE pipe conforming to AASHTO 252M or equivalent.	Slotted underdrains provide greater intake capacity, clog resistant drainage, and reduced entrance velocity into the pipe, thereby reducing the chances of solids migration.

	Siting and Design	*Intent/Rationale*
☐	An underdrain cleanout with a minimum 6-inch diameter and lockable cap is placed every 250 to 300 feet as required based on underdrain length.	Properly spaced cleanouts will facilitate underdrain maintenance.
☐	Overflow is safely conveyed to a downstream storm drain system or discharge point Size overflow structure to pass 100-year peak flow for on-line infiltration basins and water quality peak flow for off-line basins.	Planning for overflow lessens the risk of property damage due to flooding.

Conceptual Design and Sizing Approach for Storm Water Pollutant Control Only

To design biofiltration for storm water pollutant control only (no flow control required), the following steps should be taken:

1. Verify that siting and design criteria have been met, including placement requirements, contributing tributary area, maximum side and finish grade slopes, and the recommended media surface area tributary ratio.
2. Calculate the DCV per Appendix B based on expected site design runoff for tributary areas.
3. Use the sizing worksheet presented in Appendix B.5 to size biofiltration BMPs.

Conceptual Design and Sizing Approach when Storm Water Flow Control is Applicable

Control of flow rates and/or durations will typically require significant surface ponding and/or aggregate storage volumes, and therefore the following steps should be taken prior to determination of storm water pollutant control design. Pre-development and allowable post-project flow rates and durations should be determined as discussed in Chapter 6 of the manual.

1. Verify that siting and design criteria have been met, including placement requirements, contributing tributary area, maximum side and finish grade slopes, and the recommended media surface area tributary ratio.
2. Iteratively determine the facility footprint area, surface ponding and/or aggregate storage layer depth required to provide detention storage to reduce flow rates and durations to allowable limits. Flow rates and durations can be controlled from detention storage by altering outlet structure orifice size(s) and/or water control levels. Multi-level orifices can be used within an outlet structure to control the full range of flows.
3. If bioretention with underdrain cannot fully provide the flow rate and duration control required by this manual, an upstream or downstream structure with significant storage volume such as an underground vault can be used to provide remaining controls.

4. After bioretention with underdrain has been designed to meet flow control requirements, calculations must be completed to verify if storm water pollutant control requirements to treat the DCV have been met.

Maintenance Overview

Normal Expected Maintenance. Biofiltration requires routine maintenance to: remove accumulated materials such as sediment, trash or debris; maintain vegetation health; maintain infiltration capacity of the media layer; replenish mulch; and maintain integrity of side slopes, inlets, energy dissipators, and outlets. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

Non-Standard Maintenance or BMP Failure. If any of the following scenarios are observed, the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. Corrective maintenance, increased inspection and maintenance, BMP replacement, or a different BMP type will be required.

- The BMP is not drained between storm events. Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging of the media layer, filter course, aggregate storage layer, underdrain, or outlet structure. The specific cause of the drainage issue must be determined and corrected.
- Sediment, trash, or debris accumulation greater than 25% of the surface ponding volume within one month. This means the load from the tributary drainage area is too high, reducing BMP function or clogging the BMP. This would require pretreatment measures within the tributary area draining to the BMP to intercept the materials. Pretreatment components, especially for sediment, will extend the life of components that are more expensive to replace such as media, filter course, and aggregate layers.
- Erosion due to concentrated storm water runoff flow that is not readily corrected by adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the County reviewer shall be contacted prior to any additional repairs or reconstruction.

Other Special Considerations. Biofiltration is a vegetated structural BMP. Vegetated structural BMPs that are constructed in the vicinity of, or connected to, an existing jurisdictional water or wetland could inadvertently result in creation of expanded waters or wetlands. As such, vegetated structural BMPs have the potential to come under the jurisdiction of the United States Army Corps of Engineers, SDRWQCB, California Department of Fish and Wildlife, or the United States Fish and Wildlife Service. This could result in the need for specific resource agency permits and costly mitigation to perform maintenance of the structural BMP. Along with proper placement of a structural

BMP, routine maintenance is key to preventing this scenario.

Sediment Loading. Consider the effects of BMP design and tributary area land uses on the clogging potential of the BMP. Complete the sediment loading analysis included in Appendix F.

Summary of Standard Inspection and Maintenance

The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district.

Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.

Threshold/Indicator	Maintenance Action	Inspection and Maintenance Frequency
Accumulation of sediment, litter, or debris	Remove and properly dispose of accumulated materials, without damage to the vegetation or compaction of the media layer.	• Inspect monthly. If the BMP is 25% full* or more in one month, increase inspection frequency to monthly plus after every 0.1-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Obstructed inlet or outlet structure	Clear blockage.	• Inspect monthly and after every 0.5-inch or larger storm event. • Remove any accumulated materials found at each inspection.
Damage to structural components such as weirs, inlet or outlet structures	Repair or replace as applicable	• Inspect annually. • Maintain when needed.
Poor vegetation establishment	Re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintain when needed.

Threshold/Indicator	Maintenance Action	Inspection and Maintenance Frequency
Dead or diseased vegetation	Remove dead or diseased vegetation, re-seed, re-plant, or re-establish vegetation per original plans.	• Inspect monthly. • Maintain when needed.
Overgrown vegetation	Mow or trim as appropriate.	• Inspect monthly. • Maintain when needed.
2/3 of mulch has decomposed, or mulch has been removed	Remove decomposed fraction and top off with fresh mulch to a total depth of 3 inches.	• Inspect monthly. • Replenish mulch annually, or more frequently when needed based on inspection.
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation system.	• Inspect monthly. • Maintain when needed.
Erosion due to concentrated storm water runoff flow	Repair/re-seed/re-plant eroded areas, and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or minor re-grading to restore proper drainage according to the original plan. If the issue is not corrected by restoring the BMP to the original plan and grade, the County reviewer shall be contacted prior to any additional repairs or reconstruction.	• Inspect after every 0.5-inch or larger storm event. If erosion due to storm water flow has been observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintain when needed. If the issue is not corrected by restoring the BMP to the original plan and grade, the County reviewer shall be contacted prior to any additional repairs or reconstruction.
Standing water in BMP for longer than 24 hours following a storm event Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health	Make appropriate corrective measures such as adjusting irrigation system, removing obstructions of debris or invasive vegetation, clearing underdrains, or repairing/replacing clogged or compacted soils.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintain when needed.

Threshold/Indicator	Maintenance Action	Inspection and Maintenance Frequency
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	If mosquitos/larvae are observed: first, immediately remove any standing water by dispersing to nearby landscaping; second, make corrective measures as applicable to restore BMP drainage to prevent standing water. If mosquitos persist following corrective measures to remove standing water, or if the BMP design does not meet the 96-hour drawdown criteria due to release rates controlled by an orifice installed on the underdrain, the County reviewer shall be contacted to determine a solution. A different BMP type, or a Vector Management Plan prepared with concurrence from the County of San Diego Department of Environmental Health, may be required.	• Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintain when needed.
Underdrain clogged	Clear blockage.	Inspect if standing water is observed for longer than 24-96 hours following a storm event. Maintain when needed.

"25% full" is defined as ¼ of the depth from the design bottom elevation to the crest of the outflow structure (e.g., if the height to the outflow opening is 12 inches from the bottom elevation, then the materials must be removed when there is 3 inches of accumulation – this should be marked on the outflow structure).

E.2 SD-A Tree Wells

Tree Wells (Source: County of San Diego LID Manual – EOA, Inc.)

MS4 Permit Category

Site Design
Retention

Manual Category

Site Design
Infiltration

Applicable Performance Standard

Site Design
Pollutant Control
Flow Control

Primary Benefits

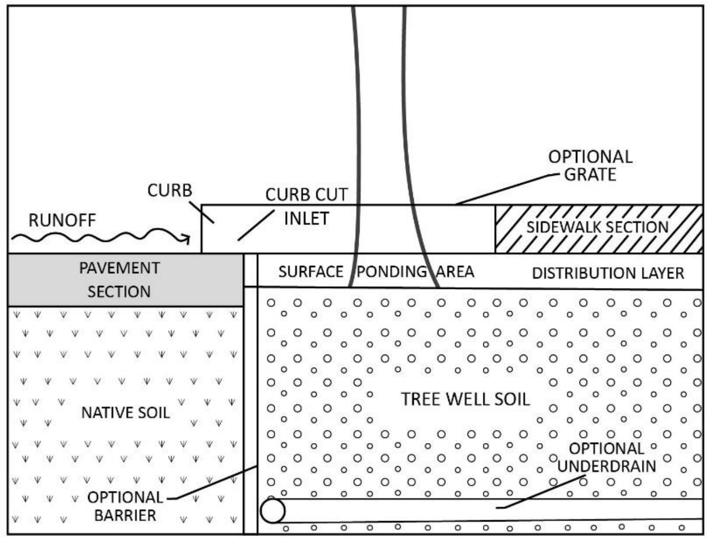
Volume Reduction

Description

Trees planted to intercept rainfall and runoff as described in this fact sheet may be used as storm water management measures to provide runoff reduction of the DCV per Appendix B.1.4. Additional benefits associated with tree wells, include energy conservation, air quality improvement, and aesthetic enhancement. In addition to the requirements provided in this fact sheet, tree wells located in the County Right-of-Way shall follow requirements in Appendix K of this manual. Deviations from the outlined criteria may be approved at the discretion of County staff. Typical storm water management benefits associated with trees include:

- **Interception of rainfall** – tree surfaces (roots, foliage, bark, and branches) intercept, evaporate, store, or convey precipitation to the soil before it reaches surrounding impervious surfaces
- **Reduced erosion** – trees protect denuded area by intercepting or reducing the velocity of rain drops as they fall through the tree canopy
- **Increased infiltration** – soil conditions created by roots and fallen leaves promote infiltration
- **Treatment of storm water** – trees provide treatment through uptake of nutrients and other storm water pollutants (phytoremediation) and support of other biological processes that break down pollutants

Typical tree well system components include:



Schematic of Tree Well

- Trees of the appropriate species for site conditions and constraints. Refer to the Plant List in this fact sheet.
- Available soil media reservoir volume based on mature tree size, soil type, water availability, surrounding land uses, and project goals
- Optional suspended pavement design to provide structural support for adjacent pavement without requiring compaction of underlying layers
- Optional root barrier devices as needed; a root barrier is a device installed in the ground, between a tree and the sidewalk, intended to guide roots down and away from the sidewalk in order to prevent sidewalk lifting from tree roots.
- Optional tree grates; to be considered to maximize available space for pedestrian circulation and to protect tree roots from compaction related to pedestrian circulation; tree grates are typically made up of porous material that will allow the runoff to soak through.
- Optional shallow surface depression for ponding of excess runoff
- Optional planter box drain

Design Adaptations for Project Goals

Site design BMP to provide incidental treatment. Tree wells primarily function as site design BMPs for incidental treatment.

Pollutant Control BMP to provide treatment. Project proponents are allowed to design trees to reduce the volume of stormwater runoff that requires treatment, (the Design Capture Volume [DCV]), or completely fulfill the pollutant control BMP requirements by retaining the entire DCV. Benefits from tree wells are accounted for by using the volume reduction values in Table B.1-3 presented in Appendix B. This credit can apply to other trees that are used for landscaping purposes that meet the same criteria. Project proponents are required to provide calculations supporting the amount of credit claimed from implementing trees within the project footprint.

Flow Control BMP to meet hydromodification requirements. Project proponents are also allowed to design tree wells as a flow control BMP. Benefits from tree wells are accounted for by using the DCV multipliers listed below. Project proponents are required to provide calculations showing that the entire DCV including the DCV multiplier is retained.

Design Criteria and Considerations

Tree Wells, whether designed as Site Design BMPs, as Stormwater Pollutant Control BMP, or as a Flow Control BMP must meet the following design criteria and considerations, and if placed in the right-of-way must be consistent with the County of San Diego Green Streets Design Criteria and Green Streets Standard Drawings in Appendix K. Deviations from the below criteria may be approved at the discretion of the County staff if it is determined to be appropriate:

<table>
<tr><th></th><th>Siting and Design</th><th>Intent/Rationale</th></tr>
<tr><td>☐</td><td>Tree species is appropriately chosen for the development (private or public). For public rights-of-ways, local planning guidelines and zoning provisions for the permissible species and placement of trees are consulted. A list of trees appropriate for site design that can be used by all county municipalities are provided in this fact sheet.</td><td>Proper tree placement and species selection minimizes problems such as pavement damage by surface roots and poor growth.</td></tr>
<tr><td>☐</td><td>Tree well placement: ensure area is graded; and the well is located so that full amount of DCV reduction drains to the well.</td><td>Minimizes short-circuiting of run off and assures DCV reductions are retained onsite.</td></tr>
<tr><td>☐</td><td>Location of trees planted along public streets follows guidance on green infrastructure (Appendix K). Vehicle and pedestrian line of sight and clear recovery zones are considered in tree selection and placement.

Unless exemption is granted by County staff the following minimum tree separation distance is followed

<table>
<tr><th>Improvement</th><th>Minimum distance to tree well</th></tr>
<tr><td>Traffic Signal, Stop sign</td><td>20 feet</td></tr>
<tr><td>Underground Utility lines (except sewer)</td><td>5 feet</td></tr>
<tr><td>Sewer Lines</td><td>10 feet</td></tr>
<tr><td>Above ground utility structures (Transformers, Hydrants, Utility poles, etc.)</td><td>10 feet</td></tr>
<tr><td>Driveways</td><td>10 feet</td></tr>
<tr><td>Intersections (intersecting curb lines of two streets)</td><td>25 feet</td></tr>
</table></td><td>Roadway safety for both vehicular and pedestrian traffic is a key consideration for placement along public streets.</td></tr>
</table>

	Siting and Design	*Intent/Rationale*
☐	**Underground utilities and overhead wires** are considered in the design and avoided or circumvented. Underground utilities are routed around or through the planter in suspended pavement applications. All underground utilities are protected from water and root penetration.	Tree growth can damage utilities and overhead wires resulting in service interruptions. Protecting utilities routed through the planter prevents damage and service interruptions. Refer to Section 6.6 of the Green Streets Design Criteria in Appendix K for guidelines regarding utility placement and potential conflict with BMP facilities.
☐	Suspended pavement was used for confined Tree Well soil volume. Suspended pavement design was developed where appropriate to minimize soil compaction and improve infiltration and filtration capabilities. Suspended pavement was constructed with an approved structural cell.	Suspended pavement designs as shown in Page 7 of the Green Streets Guidelines in Appendix K provide structural support without compaction of the underlying layers, thereby promoting tree growth. Recommended structural cells include poured in place concrete columns, Silva Cells manufactured by Deeproot Green Infrastructures and Stratacell and Stratavault systems manufactured by Citygreen Systems.
☐	A minimum soil volume of 2 cubic feet per square foot of mature tree canopy projection area is provided for each tree. Canopy projection area is the ground area beneath the mature tree, measured at the drip line. Soil volume must be within 1.5 times the mature tree canopy radius. Soil depth shall be a minimum of 30 inches deep, preferably 36 inches deep. When placing tree well next to curb use Structural Soil as outlined in the section below titled "Confined Tree Well Soil Volume" and use Specifications in Appendix K Use Amended Soil per Fact Sheet SD-F in all other cases.	The minimum soil volume ensures that there is adequate storage volume to allow for unrestricted evapotranspiration and infiltration.

	Siting and Design	*Intent/Rationale*
☐	To claim credit for existing trees, the root structure of existing tree shall be protected and additional soil volumes provided to meet the above requirements. A berm or well must be constructed around the perimeter of the soil volume to be credited and an inlet structure must be of the appropriate size to allow runoff to enter the well. Considerations should be made to prevent root and water intrusion damage to surrounding infrastructure.	The minimum soil volume ensures that there is adequate storage volume to allow for unrestricted storage, evapotranspiration, and infiltration.
☐	DCV from the tributary area draining to the tree is equal to or greater than the tree credit volume	The minimum tributary area ensures that the tree receives enough runoff to fully utilize the infiltration and evapotranspiration potential provided. In cases where the minimum tributary area is not provided, the tree credit volume must be reduced proportionately to the actual tributary area.
☐	Inlet opening to the tree that is at least 18 inches wide. A minimum 2 inch drop in grade from the inlet to the finish grade of the tree. Grated inlets are allowed for pedestrian circulation. Grates need to be ADA compliant and have sufficient slip resistance.	Design requirement to ensure that the runoff from the tributary area does not bypass the BMP. Different inlet openings and drops in grade may be allowed at the discretion of County staff if calculations are shown that the diversion flow rate (Appendix B.) from the tributary area can be conveyed to the tree. In cases where the inlet capacity is limiting the amount of runoff draining to the tree, the tree credit volume must be reduced proportionately.

Conceptual Design and Sizing Approach for Site Design

Determine the areas where tree wells can be used in the site design to achieve incidental treatment. Tree wells reduce runoff volumes from the site. Refer to Appendix B.2. Document the proposed tree locations in the SWQMP.

Conceptual Design and Sizing Approach for Pollutant Control

When trees are proposed as a storm water pollutant control BMP, the project proponent must submit detailed calculations for the DCV treated by trees. Document the proposed tree locations on the BMP Plan & DMA Map, and provide sizing calculations in the SWQMP Attachment following the steps in Appendix B.

Conceptual Design and Sizing Approach for Flow Control

When trees are proposed as a flow control BMP, the project proponent must submit detailed calculations for the Required Retention Volume (RRV) treated by trees. Document the proposed tree locations on the BMP Plan & DMA Map, and provide sizing calculations in the SWQMP Attachment. Tree Wells that are designed to meet flow control requirements are designated as SSD BMPs.

1. **Determine how much volume you need**. The Required Retention Volume (RRV) is the volume of rainfall that must be retained by the tree wells in the DMA to meet flow control requirements. It is calculated by multiplying the DCV by a DCV multiplier.

    a. Determine the DCV. See Appendix B.

    b. Determine the DCV Multiplier. The DCV Multiplier is based on two factors: (1) The tree well soil depth and, (2) The Hydrologic Soil Group. Once you know both values, determine the DCV Multiplier using this table:

    c. Calculate the Required Retention Volume (DCV x DCV Multiplier). Calculate the RRV by multiplying the DCV by the DCV Multiplier. This is the volume of runoff that must be offset by the Tree Well Credit Volume. Repeat this process for each DMA.

Minimum Tree Well Soil Depth (inches)	Hydrologic Soil Group A	B	C	D (Default)	
30"	1.60	2.20	2.50	2.90	DCV Multiplier
36"	1.80	2.47	2.83	3.17	
42"	2.00	2.73	3.17	3.43	
48"	2.20	3.00	3.50	3.70	

DCV Multiplier Table

Tree Well Soil Depth is the vertical distance from the top to the bottom of the soil layer in the tree well. **Hydrologic Soil Group** describes the native soil surrounding the tree well. Soil type affects how well water can infiltrate into the area surrounding the tree well. Group A soils provide the most infiltration and Group D the least. If your soil type is unknown, you can assume Group D. But this will result in larger DCV Multipliers, and in turn increase the size or number of tree wells needed.

Alternative Proposals: You can also propose RRV values or use methods and assumptions different than those described here. Proposals must be based on SWMM modeling or other methods acceptable to the County.

2. **Determine how much volume you have**. The Tree Well Credit Volume is the volume of runoff retention in cubic feet per tree (ft^3/tree) to be provided by each tree well (or group) in the DMA. Together retain a volume that is equal to or greater than the RRV for the DMA.

   The volume credited for each tree well is based on the mature canopy diameter of the tree species selected. Any species listed below can be used in a tree well so long as it meets all other applicable restrictions and requirements for the project area. Native and drought tolerant species are required where feasible.

	Botanical Name	Common Name	Mature Height (ft)	Mature Canopy Diameter (ft)	Credit Volume per Tree (ft3)
1	*Ceanothus 'Ray Hartman"*	California Mountain Lillac	30	**10**	**40**
2	*Pittosporum Phillyraeoides*	Willow Pittosporum	25	**15**	**100**
3	*Salix Lasiolepsis*	Arroyo Willow	25		
4	*Arbutus Unedo*	Strawberry Tree	30	**20**	**180**
5	*Prunus Ilicifolia*	Hollyleaf Cherry	30		
6	*Prunus Lynoii*	Catalina Cherry	40		
7	*Cercis Occidentalis*	Western Redbud	25	**25**	**290**
8	*Heteromeles Arbutifolia*	Toyon, Christmas Berry	25		
9	*Alnus Rhombifolia*	White Elder	75	**30**	**420**
10	*Arbutus 'Marina'*	Hybrid Strawberry Tree	35		
11	*Chilopsis Linearis*	Desert Willow	30		
12	*Lyonothamnus Floribundus*	Catalina Ironwood	50		
13	*Magnolia Grandiflora*	Southern Magnolia	40		
14	*Pinus Torreyana*	Torrey Pines	80		
15	*Platanus Racemosa*	California sycamore	60		
16	*Quercus Agrifolia*	Coast Live Oak	70		
17	*Quercus Engelmannii*	Engelmann Oak	50		
18	*Quercus Suber*	Cork Oak	40		
19	*Sambucus Mexicana*	Blue Elderberry	30		

Tree Palette Table

Below are sources for Tree Palette Mature Height and Mature Canopy Diameter:

A. Water Efficient Landscape Design Manual, County of San Diego, 2016
B. Sustainable Landscapes Guidelines, San Diego County Water Authority, 2015
C. Low Impact Development Handbook, County of San Diego, 2014
D. Low Impact Development Design Manual, City of San Diego, 2011
E. Street Tree Selection Guide, City of San Diego, 2013
F. Environmentally Friendly Garden Plant List, City of San Diego, 2004
G. BMP Design Manual, County of San Diego, 2016
H. California Native Plant Society. 2017

Alternative Species. Tree species other than those listed are allowable, but must be approved by the County. If you know the mature canopy diameter of the species you want to propose, use the values in the table to determine its credit volume. Note that even if you select a species with a canopy diameter greater than **30 feet**, the maximum credit any tree can generate is **420 ft^3**.

3. **Determine if you have enough volume**. Compare your total Tree Well Credit Volume from Step 2 to the RRV you calculated in Step 1. Once your Credit Volume is equal to or greater than

your RRV, this requirement is satisfied. If your Credit Volume is initially too low, adjust your design either to (1) increase it with more or bigger trees, or (2) decrease the RRV through DCV reductions.

Tree wells will normally be placed at the **discharge point** of the DMA, either individually or in groups. If some of them will retain runoff from different areas in the DMA, RRV and DCV calculations must be specific to each subarea.

If an **underdrain** is proposed for the Tree Well, the sizing factors shown in the DCV Multiplier Table cannot be used, and instead continuous simulation modeling should be performed. This would allow to obtain credit for soil volume underneath the underdrain.

Tree Planting Design in New or Reconstructed Streetscapes

1. Maximized open soil area for tree planting is the most cost effective method of achieving the required soil volume.
2. Tree wells within sidewalks shall have a minimum open area of four feet wide by six feet long. Larger areas may be required to accommodate large root balls.
3. Tree well soil characteristics shall meet the requirements of SD-F Amended Soil.

Structural Requirements for Confined Tree Well Soil Volume

In order to provide adequate soil volume for tree wells, soils may be placed confined beneath adjacent paved surfaces. Acceptable soil systems capable of carrying D-50 loading include structural soils, structural slabs, and structural cells:

1. Structural soil systems include CU-StructuralSoil™, Stalite Structural Soil, or equivalent.
2. Suspended pavements that allow uncompacted growing soil beneath the sidewalk include; structural slabs that span between structural supports, structural cells, and other commercially available structural systems. See Page 7 of the Green Streets Guidelines in Appendix K for illustrations. Manufacturer details and certification must be provided for commercial systems. Structural calculations and details must be provided for structural slab installations. Structural cells are commercially-available structural systems placed subsurface that support the sidewalk and are filled with amended soil (SD-F). Manufacturer details and certification must be provided for commercial systems.

Stormwater Retention and Treatment Volume

Tree wells with expanded soil volume will serve as a method of capturing and retaining the required volume of stormwater in accordance with County requirements in Appendix B of this manual. These facilities can be designed to meet the County requirements when surface ponding volume is provided, whether designed as an enclosed plant bed with covered soil volume, or a continuous open area (either mulched or with turf) with soil volume under the adjacent sidewalk.

Maintenance Overview

Normal Expected Maintenance. Tree health shall be maintained as part of normal landscape maintenance. Additionally, ensure that storm water runoff can be conveyed into the tree well as designed. That is, the opening that allows storm water runoff to flow into the tree well (e.g., a curb opening, tree grate, or surface depression) shall not be blocked, filled, re-graded, or otherwise changed in a manner that prevents storm water from draining into the tree well. A summary table of standard inspection and maintenance indicators is provided within this Fact Sheet.

Non-Standard Maintenance or BMP Failure. Trees wells are site design BMPs that normally do not require maintenance actions beyond routine landscape maintenance. The normal expected maintenance described above ensures the BMP functionality. If changes have been made to the tree well entrance / opening such that runoff is prevented from draining into the tree well (e.g., a curb inlet opening is blocked by debris or a grate is clogged causing runoff to flow around instead of into the tree well, or a surface depression has been filled so runoff flows away from the tree well), the BMP is not performing as intended to protect downstream waterways from pollution and/or erosion. Corrective maintenance will be required to restore drainage into the tree well as designed.

Surface ponding of runoff directed into tree wells is expected to infiltrate/evapotranspirate within 24-96 hours following a storm event. Surface ponding longer than approximately 24 hours following a storm event may be detrimental to vegetation health, and surface ponding longer than approximately 96 hours following a storm event poses a risk of vector (mosquito) breeding. Poor drainage can result from clogging or compaction of the soils surrounding the tree. Loosen or replace the soils to restore drainage.

Other Special Considerations. Site design BMPs, such as tree wells, installed within a new development or redevelopment project are components of an overall storm water management strategy for the project. The presence of site design BMPs within a project is usually a factor in the determination of the amount of runoff to be managed with structural BMPs (i.e., the amount of runoff expected to reach downstream retention or biofiltration basins that process storm water runoff from the project as a whole). When site design BMPs are not maintained or are removed, this can lead to clogging or failure of downstream structural BMPs due to greater delivery of runoff and pollutants than intended for the structural BMP. Therefore, the County Engineer may require confirmation of maintenance of site design BMPs as part of their structural BMP maintenance documentation requirements. Site design BMPs that have been installed as part of the project should not be removed, nor should they be bypassed by re-routing roof drains or re-grading surfaces within the project. If changes are necessary, consult the County Engineer to determine requirements.

Summary of Standard Inspection and Maintenance

The property owner is responsible to ensure inspection, operation and maintenance of permanent BMPs on their property unless responsibility has been formally transferred to an agency, community facilities district, homeowners association, property owners association, or other special district.

Maintenance frequencies listed in this table are average/typical frequencies. Actual maintenance needs are site-specific, and maintenance may be required more frequently. Maintenance must be performed whenever needed, based on maintenance indicators presented in this table. The BMP owner is responsible for conducting regular inspections to see when maintenance is needed based on the maintenance indicators. During the first year of operation of a structural BMP, inspection is recommended at least once prior to August 31 and then monthly from September through May. Inspection during a storm event is also recommended. After the initial period of frequent inspections, the minimum inspection and maintenance frequency can be determined based on the results of the first year inspections.

Threshold/Indicator	Maintenance Action	Inspection and Maintenance Frequency
Tree health	Routine actions as necessary to maintain tree health.	• Inspect monthly. • Maintain when needed.
Dead or diseased tree	Remove dead or diseased tree. Replace per original plans.	• Inspect monthly. • Maintain when needed.
Standing water in tree well for longer than 24 hours following a storm event Surface ponding longer than approximately 24 hours following a storm event may be detrimental to tree health	Loosen or replace soils surrounding the tree to restore drainage.	• Inspect monthly and after every 0.5-inch or larger storm event. If standing water is observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintain when needed.
Presence of mosquitos/larvae For images of egg rafts, larva, pupa, and adult mosquitos, see http://www.mosquito.org/biology	Disperse any standing water from the tree well to nearby landscaping. Loosen or replace soils surrounding the tree to restore drainage (and prevent standing water).	• Inspect monthly and after every 0.5-inch or larger storm event. If mosquitos are observed, increase inspection frequency to after every 0.1-inch or larger storm event. • Maintain when needed

Threshold/Indicator	Maintenance Action	Inspection and Maintenance Frequency
Entrance / opening to the tree well is blocked such that storm water will not drain into the tree well (e.g., a curb inlet opening is blocked by debris or a grate is clogged causing runoff to flow around instead of into the tree well; or a surface depression is filled such that runoff drains away from the tree well)	Make repairs as appropriate to restore drainage into the tree well.	• Inspect monthly. • Maintain when needed.

Appendix D – Employee Training Program

TRAINED PERSONNEL LOG

Name of Person Attending Training	Date of Training	Title of Training	Location of Training	Signature of Person Attending Training

Appendix E – Inspection Program

BMP INSPECTION LOG

Name of Person/Company Providing Maintenance	Date of Maintenance	BMP Maintained	Maintenance Performed	Signature of Person Providing Maintenance
		Efficient Irrigation and Landscaping		
		Storm Drain Inlet Stenciling and Signage		
		Biofiltration Basin		
		Street Sweeping		
		Tree Wells		

Appendix F – Maintenance Program

BMP MAINTENANCE LOG

Name of Person/Company Providing Maintenance	Date of Maintenance	BMP Maintained	Maintenance Performed	Signature of Person Providing Maintenance
		Efficient Irrigation and Landscaping		
		Storm Drain Inlet Stenciling and Signage		
		Biofiltration Basin		
		Street Sweeping		
		Tree Wells		

Appendix G – Cost Estimate

COST ESTIMATE

BMP	Quantity	Inspection Cost	Annual O&M Cost	Start Up Date	O&M Frequency (weekly/monthly/ quarterly)
Efficient Irrigation and Landscaping	1	$100	$400	Prior to Occupancy	Quarterly
Storm Drain Inlet Stenciling and Signage	3	$150	$500	Prior to Occupancy	Quarterly
Biofiltration Basin	1	$125	$400	Prior to Occupancy	Bi-annually
Street Sweeping	1	$100	$400	Prior to Occupancy	After rain event or after visual inspection shows sediment accumulation
Tree Wells	2	$20	$160	Prior to Occupancy	Monthly

Total Annual / 10-year O&M Cost = $1,860 / $18,600

ATTACHMENT 3B – MAINTENANCE AGREEMENT

All projects are required to maintain designed functionality of structural BMPs in perpetuity. Privately-owned projects must record a *Storm Drain Maintenance Agreement* with the County of San Diego Assessor's Office. A template *Storm Drain Maintenance Agreement* is available at:

http://www.cityofvista.com/services/city-departments/community-development/building-planning-permits-applications/land-development-autocad-templates/storm-water-forms

RECORDING REQUESTED BY:

CITY OF VISTA

WHEN RECORDED MAIL TO:

CITY OF VISTA
200 CIVIC CENTER DRIVE
VISTA, CA 92084-6275
ATTN: CITY CLERK

Fee Exempt: Government Code Section 27383

APN: 166-184-10-00 , 166-183-17-00
DTT: $0.00; R&TC § 11922, Conveyance to Government Agency; Signed:________________________

PRIVATE STORM WATER POLLUTION CONTROL FACILITIES MAINTENANCE AGREEMENT

THIS AGREEMENT is entered into between the **CITY OF VISTA**, a chartered municipal corporation ("CITY") and **Zoran Djordjevich** ("OWNER"), and dated for reference purposes as of date.

DEFINITIONS

BEST MANAGEMENT PRACTICES: Control measures ("BMPs") taken to mitigate changes to both quantity and quality of urban runoff as they may be defined or promulgated from time-to-time in the City's NPDES storm water management permit.

GOVERNING APPROVALS: PC xx-xxxx ; LD #xx-xxx GP(s) xx-xxx ; and DWG No(s). xxx

PROPERTY: Real property legally described in Exhibit A [and commonly known as__________][with no common street address].

FACILITIES: Those certain private storm water pollution control facilities ("SWPCFs") and appurtenances developed or installed on the PROPERTY as detailed in the GOVERNING APPROVALS as the same may be amended from time to time through changes in the governing ordinances and statutes.

WATER QUALITY TECHNICAL REPORT: The approved plan (the "WQTR") is designed to mitigate changes to both quantity and quality of urban runoff from the PROPERTY. The plan was initially approved by the City with GOVERNING APPROVALS, is on file with the City, and shall be modified from time-to-time pursuant to the City's then-current NPDES storm water management permit.

RECITALS

A. This Agreement is required as a condition of approval by the CITY.

B. The OWNER is the owner of the PROPERTY and is required to install and provide for the perpetual maintenance of the FACILITIES as a condition of being permitted to develop the PROPERTY.

C. It is the mutual desire of the parties hereto that the FACILITIES be maintained in a safe and usable condition by the OWNER.

D. It is the mutual intention of the parties that this Agreement constitutes a covenant running with the land, binding upon each successive lot owner of all or any portion of the PROPERTY.

NOW, THEREFORE, IT IS HEREBY AGREED AS FOLLOWS:

1. The cost and expense of maintaining the FACILITIES shall be paid by the OWNER or the heirs, assigns and successors in interest of the OWNER.

2. Repairs and maintenance under this Agreement shall consist of all work reasonably necessary or proper in the sole discretion of the CITY to repair and preserve FACILITIES. Repair and maintenance responsibilities for all post-construction structural FACILITIES and required BMPs associated with the project are set forth in the most current WQTR. The WQTR shall all times specify by name, title, and phone number the persons or entities responsible for maintenance and reporting activity, the persons or entities responsible for funding, schedules and procedures for inspection and maintenance of the FACILITIES and implementation of worker training requirements, and any other activities necessary to ensure BMP maintenance. The plan shall provide for servicing of all post-construction structural FACILITIES as needed and at least once annually within 60 days prior to October 1st, and for the retention of inspection and maintenance records for at least three years. Adherence to the plan shall result in effective Storm Water pollution control. The CITY shall have the right to inspect the FACILITIES and records as needed to ensure the FACILITIES are being properly maintained.

3. OWNER Indemnification.

3.1. The OWNER shall indemnify and hold the CITY harmless against any and all liability, loss, damage, fine, penalty, expense, claim, or cost (including without limitation costs and fees of litigation) of every nature (collectively, “Liability”) arising out of or in connection with this Agreement or its performance (including acts of omission) except for Liability caused by the CITY’s sole negligence or willful misconduct.

3.2 For purposes of this Section, the CITY includes CITY’s officers, officials, employees, agents, representatives, and volunteers.

3.3 It is expressly understood and agreed that the foregoing provisions will survive termination of this Agreement.

3.4 The indemnity protections provided by this Section are not intended to exceed the indemnity available under applicable law. If the indemnity protections are found by a court to be unlawful in any way, the protection shall be curtailed or adjusted, but only to the minimum extent required to conform to applicable law.

4. If in the CITY’S sole judgment the FACILITIES are not being maintained to standards set forth in this Agreement, the CITY may thereupon provide written notice to the OWNER to initiate repairs or construction within ninety (90) days. Upon failure to demonstrate good faith to make repairs or construction within ninety (90) days, the OWNER agrees that the CITY may make all needed repairs to the FACILITIES to meet the standards set forth in paragraph 3 and to then assess costs to the OWNER.

5. CITY shall have no responsibility or liability for the exercise or non-exercise of any discretionary powers it may have under this Agreement. Nothing in this Agreement, the specifications or other contract documents relating to the work required by this Agreement, or CITY approval of the plans and specifications or inspection of the work, is intended to create any contractual liability, express or implied, for the construction, maintenance or repair of the FACILITIES required by this Agreement, and the CITY, CITY’S engineer, and their consultants, and each of their officials, directors, officers, employees and agents, shall have absolutely no responsibility or liability therefor.

6. If CITY elects to make necessary repairs in accordance with paragraph 5 above, that work shall be without warranty. The repairs shall be accepted “as is” by the OWNER without any warranty of workmanship and shall be guaranteed and indemnified by it in accordance with paragraph 4. CITY will endeavor to minimize interference with OWNER’s use of the PROPERTY.

7. The foregoing covenants shall run with the land, shall be deemed to be for the direct benefit of the land, and shall be binding on the heirs, executors, administrators, successors, and assigns of the OWNER. Any subsequent purchaser of all or any portion thereof, by acceptance of delivery of a deed and/or conveyance regardless of form, shall be deemed to have consented to and become bound by these presents.

8. Nothing in this Agreement shall be construed to in any way limit or constrain CITY's exercise of its regulatory powers, police powers, or other powers of enforcement insofar as they may relate to the subject matter of this Agreement or any other matter within the power or authority of the CITY.

9. This Agreement shall be governed by the laws of the State of California. In the event that any of the provisions of this Agreement are held to be unenforceable or invalid by any court of competent jurisdiction, the validity, and enforceability of the remaining provisions shall not be affected thereby. The exclusive jurisdiction and venue of any legal action instituted in connection with this Agreement shall be San Diego County, California.

"CITY"

CITY OF VISTA, a chartered municipal corporation

By:______________________________________
GREGORY D. MAYER, CITY ENGINEER

"OWNER"

Zoran Djordjevich

By:______________________________________

Name/Title

By:______________________________________

Name/Title

(When signing as Corporation necessary signatures are President OR Vice President AND Secretary OR Assistant Secretary.)

NOTE: A CALIFORNIA ALL PURPOSE NOTARY ACKNOWLEDGMENT MUST BE ATTACHED FOR ALL SIGNATURES ABOVE

ATTEST:
KATHY VALDEZ, CITY CLERK

By:______________________________________

APPROVED AS TO FORM:
DAROLD PIEPER, CITY ATTORNEY

By:______________________________________

ATTACHMENT 4 - REQUIREMENTS FOR CONSTRUCTION PLANS

Section 8.2.2 of the *BMP Design Manual* identifies minimum requirements for storm drain construction plan sheets. Use this checklist to ensure project construction plans submitted for review include necessary information for storm drain improvements. Construction plans must include the following:

☐ All items identified in Section 8.2.2 of the *BMP Design Manual*.

TENTATIVE SUBDIVISION MAP FOR 1205 MELROSE WAY

PROJECT FILE NUMBER: **P21-0130**

LEGEND

ITEM	SYMBOL
PROJECT BOUNDARY	
LOT LINE	
EASEMENT LINE	
SETBACK LINE	
BUILDING LINE	
CENTERLINE	
EXISTING OVERHEAD ELECTRICAL	OE
EXISTING WATERLINE	W
EXISTING SEWER MAIN	S
EXISTING GAS LINE	G
EXISTING STORM DRAIN	
EXISTING FIRE HYDRANT	
EXISTING FENCE	X
DAYLIGHT LINE	
CUT/FILL LINE	C F
FINISHED GROUND CONTOUR	440
EXISTING GROUND CONTOUR	440
PROPOSED CUT/FILL SLOPE	2:1
RETAINING WALL (PER SEPARATE PERMIT)	
EXISTING SPOT ELEV.	(400.50 FG)
FUTURE SPOT ELEVATIONS	400.50 FG
PROPOSED 6" CURB & GUTTER	
PROPOSED 6" ROLLED CURB & GUTTER	
PROPOSED STORM DRAIN	SD
PROPOSED CURB INLET	
PROPOSED STORM DRAIN CLEANOUT	
PROPOSED BROOKS BOX	
PROPOSED HEADWALL	
PROPOSED RIP RAP	
PROPOSED SEWER MAIN	S
PROPOSED SEWER MANHOLE	
PROPOSED WATER MAIN	W

AERIAL TOPOGRAPHY

AERIAL TOPOGRAPHY SUPPLIED BY: PHOTO GEODETIC
1161 EAST MAIN ST, SUITE 102
EL CAJON, CA 92021
619-631-1366
FLOWN 04/14/2020

ASSESSOR'S PARCEL NUMBER

166-184-10-00, 166-183-17-00, 166-184-09-00
TAX RATE AREA: 012004

EARTHWORK QUANTITIES

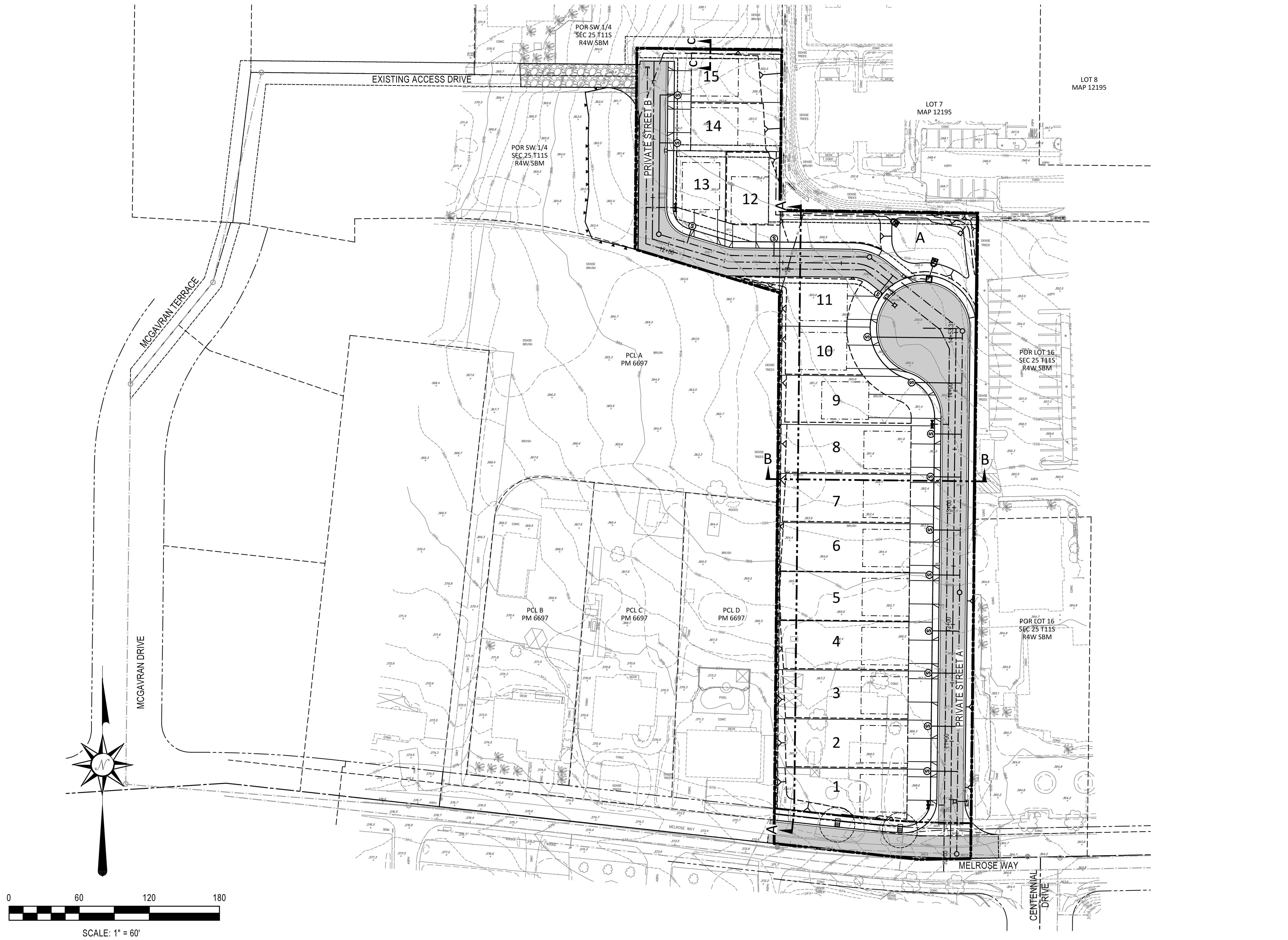
CUT: 2,602 C.Y.
FILL: 6,636 C.Y.
IMPORT: 4,034 C.Y.

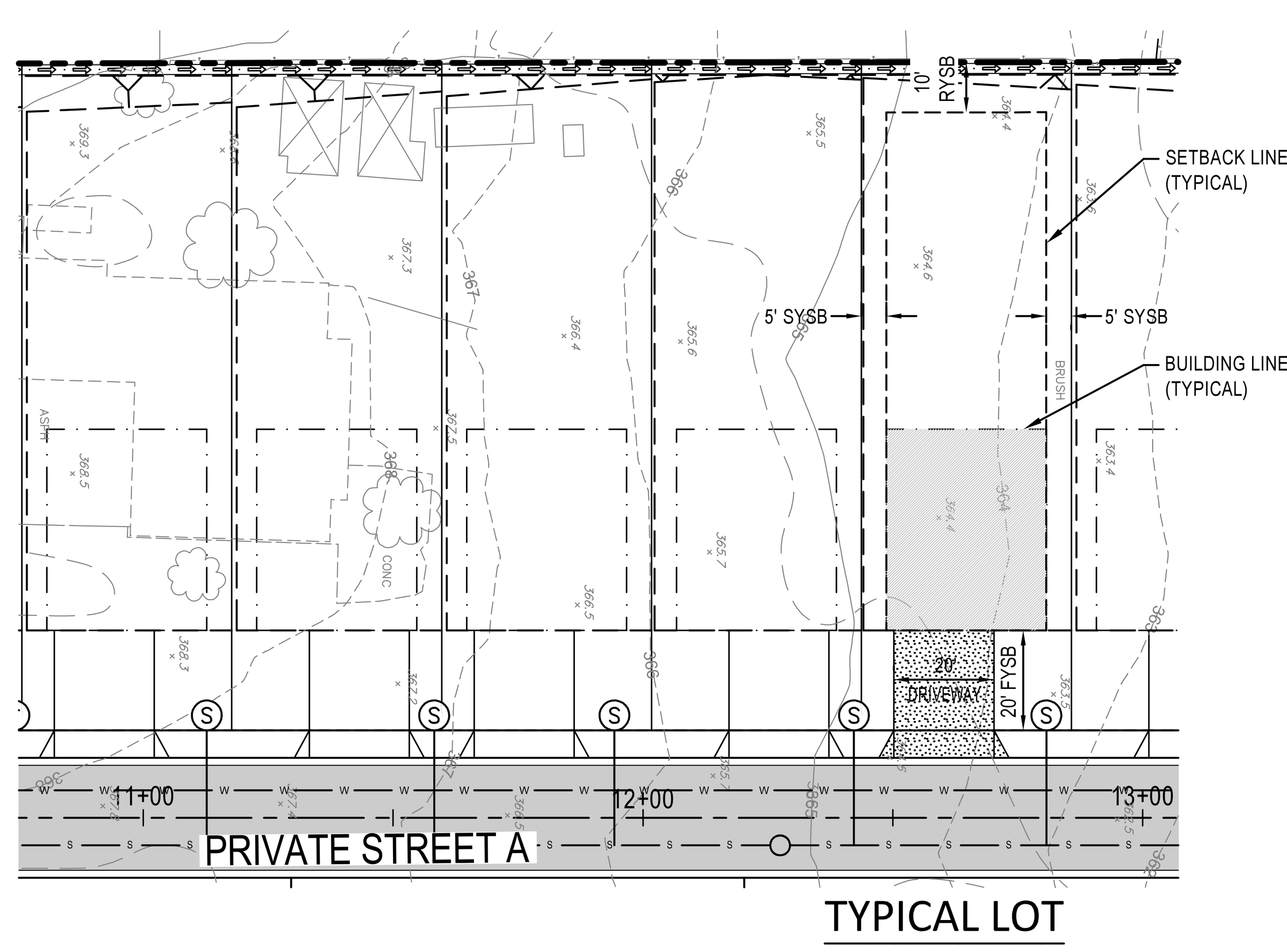
NOTE: QUANTITIES DO NOT INCLUDE ANY EARTHWORK FOR REMEDIAL PURPOSES. EARTHWORK ESTIMATES ARE BASED ON IN PLACE VOLUMES AND DO NOT ACCOUNT FOR ANY SKRINKAGE OR SWELL OF THE SOIL THAT MAY OCCUR DURING GRADING.

LOT MATRIX

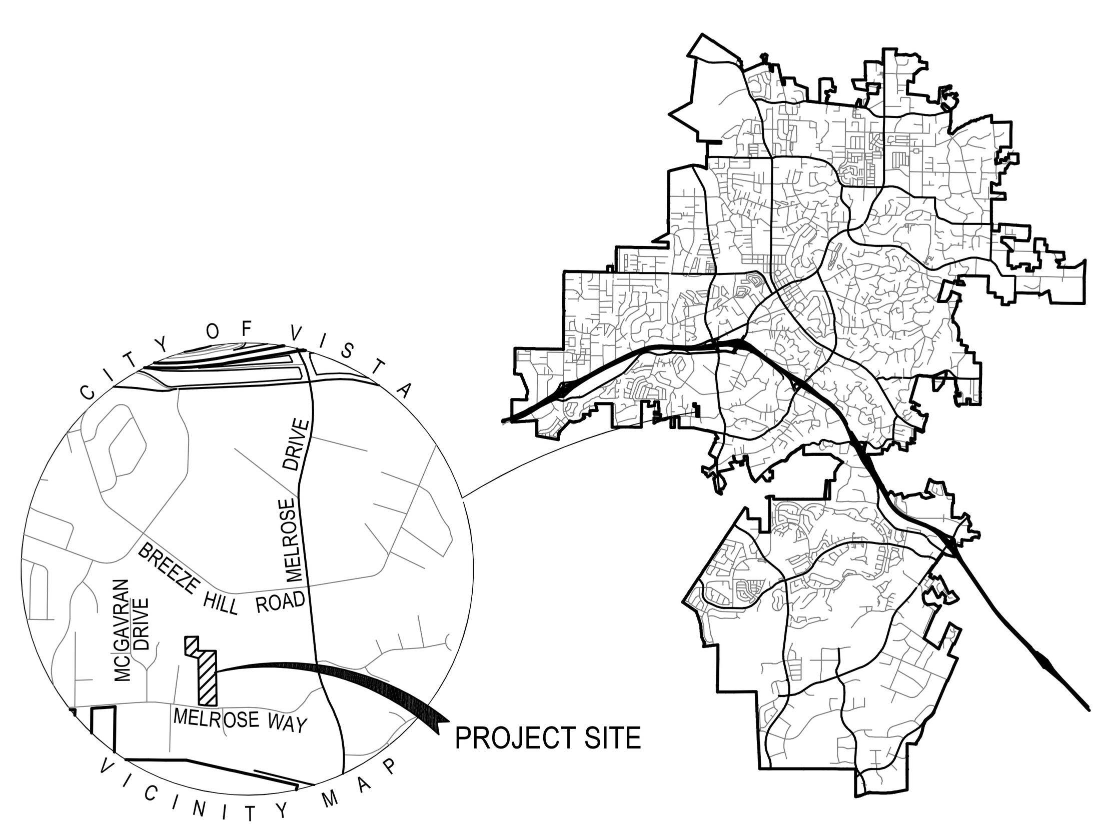
LOT INFORMATION	
LOT NO.	LOT AREA (S.F.)
1	5,411
2	5,605
3	5,607
4	5,609
5	5,611
6	5,613
7	5,616
8	5,618
9	5,360
10	3,585
11	3,756
12	3,895
13	3,656
14	4,082
15	4,702
A	7,599

LOT INFORMATION	
LOT NO.	LOT AREA (S.F.)
PRIVATE STREET	20,400
PRIVATE DRIVEWAY	12,868





TYPICAL LOT
SCALE: 1" = 30'



OWNER/SUBDIVIDER

WE HEREBY CERTIFY THAT WE ARE THE RECORD OWNERS OF THE PROPERTY SHOWN ON THIS TENTATIVE SUBDIVISION MAP AND THAT SAID MAP SHOWS OUR ENTIRE CONTIGUOUS OWNERSHIP (EXCLUDING SUBDIVISION LOTS). WE UNDERSTAND THAT PROPERTY IS CONSIDERED CONTIGUOUS EVEN IF IT IS SEPARATED BY ROADS, STREETS, UTILITY EASEMENTS OR RAILROADS RIGHTS-OF-WAY.

OWNER/SUBDIVIDER

PACIFIC INTERNATIONAL INVESTMENTS, INC
CONTACT: ZORAN DJORDJEVICH
551 LYNWOOD DRIVE
ENCINITAS, CA 92024

ENGINEER OF WORK

WILLIAM J. SUITER RCE 68964

REGISTERED PROFESSIONAL ENGINEER
WILLIAM J. SUITER
No. RCE 68964
EXP. 12-31-23
Civil
STATE OF CALIFORNIA

LEGAL DESCRIPTION

PORTION OF LOT 15 OF SECTION 25, TOWNSHIP 11 SOUTH, RANGE 4 WEST, SAN BERNARDINO MERIDIAN, IN THE CITY OF VISTA, COUNTY OF SAN DIEGO, CA.
(MORE PARTICULARLY DESCRIBED IN DEEDS DD1: F/P 2014-0543887, O.R. REC. 12/10/2014; DD2: F/P 2014-0543888, O.R. REC. 12-10-2014; DD3: F/P 2014-0543889, O.R. REC. 12/10/2014)

GENERAL NOTES:

1. APN: 166-184-10-00, 166-183-17-00, 166-184-09-00
2. GROSS ACREAGE: 2.55 AC
3. NET ACREAGE: 2.21 AC
4. NUMBER OF LOTS: 16
5. NUMBER OF DWELLING UNITS: 15
6. EXISTING ZONING: E-1 ESTATE RESIDENTIAL
   PROPOSED ZONING: R-1
7. EXISTING GENERAL PLAN: LOW DENSITY RESIDENTIAL (LD) - 2 DU/AC
   PROPOSED GENERAL PLAN: MEDIUM LOW DENSITY RESIDENTIAL (MLD) - 5 DU/AC
8. FINISH GRADES SHOWN HEREON ARE APPROXIMATE AND ARE SUBJECT TO CHANGE IN FINAL DESIGN.
9. PROPOSED DENSITY: 5 DU/AC
10. CUT AND FILL SLOPES NO STEEPER THAN 2:1
11. PUBLIC SERVICES AND DISTRICTS:
    GAS & ELECTRIC: SAN DIEGO GAS AND ELECTRIC
    TELEPHONE: AT&T
    WATER: VISTA IRRIGATION DISTRICT
    SEWER: CITY OF VISTA
    FIRE DISTRICT: CITY OF VISTA
    SCHOOL DISTRICT: VISTA UNIFIED SCHOOL DISTRICT
12. NO SPECIAL DISTRICTS ARE PROPOSED
13. REQUIRED SETBACK PER R-1 ZONE:
    FRONT YARD = MINIMUM 20'
    SIDE YARD = MINIMUM 10'
    REAR YARD= MINIMUM 10' FOR 1 STORY OR 20' FOR 2 STORY
    PROPOSED SETBACK PER DENSITY BONUS WAIVERS:
    FRONT YARD = MINIMUM 20'
    SIDE YARD = MINIMUM 5'
    REAR YARD= MINIMUM 10'
14. SEE STORM WATER MITIGATION PLAN PREPARED BY: PASCO LARET SUITER & ASSOCIATES DATED: MARCH 2021
15. SEE PRELIMINARY DRAINAGE STUDY PREPARED BY: PASCO LARET SUITER & ASSOCIATES DATED: MARCH 2021
16. SEE PRELIMINARY GEOTECHNICAL EVALUATION PREPARED BY: GEOSOILS, INC DATED: MARCH 5, 2021 W.O. 8058-A-SC

PROJECT DESCRIPTION

ZONE CHANGE, GENERAL PLAN ADMENDMENT, TENTATIVE SUBDIVISION MAP, AND DENSITY BONUS FOR 1 VERY LOW-INCOME UNIT

DENSITY BONUS CALCULATION

2.55 GROSS ACRES

2.55 AC * 5 DU/AC = 12.75 DU'S

12.75 DU'S * 0.20 BONUS = 2.55 (ROUNDED UP TO 3 DENSITY BONUS UNITS)

TOTAL DU'S (12 + 3) = 15

AFFORDABLE CALCULATION

2.55 AC * 5 DU/AC = 12.75 DU'S

12.75 DU'S * 0.05 AFFORDABLE = 0.63 (ROUNDED UP TO 1 VERY LOW INCOME)

TOTAL UNIT COUNT = 15 (1 VERY LOW INCOME)

PASCO LARET SUITER & ASSOCIATES
San Diego | Solana Beach | Orange County
Phone 858.259.8212 | www.plsaengineering.com

SIGNATURES CONSTITUTE THAT ALL PLANS, SPECIFICATIONS, GUARANTEES, AND OTHER REQUIREMENTS NECESSARY FOR ISSUANCE OF A BUILDING PERMIT CONFORMING TO THIS SITE DEVELOPMENT PLAN HAVE BEEN COMPLETED AND APPROVED BY THE APPROPRIATE DEPARTMENT.

PLANNING DEPARTMENT	DATE
ENGINEERING DEPARTMENT	DATE
FIRE DEPARTMENT	DATE
PUBLIC WORKS DEPARTMENT	DATE

SHEET 1 — CITY of VISTA — OF 6

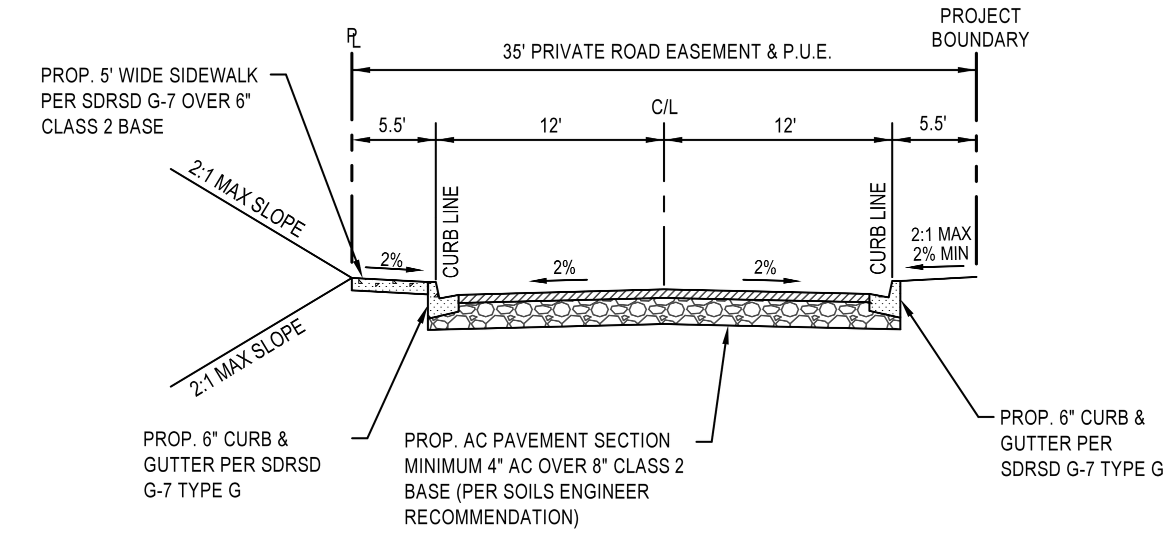
ZC, TSM, SDP: P21-0130
OWNER: ZORAN DJORDJEVICH PHONE:
ADDRESS: 551 LYNWOOD DRIVE ENCINITAS, CA 92024
ARCHITECT, ENGINEER OR DESIGNER: PASCO LARET SUITER & ASSOCIATES, INC. PHONE: 949-661-6695
ADDRESS: 27127 CALLE ARROYO, SUITE 1904 SAN JUAN CAPISTRANO, CA 92675
TYPE OF DEVELOPMENT: 15 LOTS
EXIST. ZONE: E-1 | PROP. ZONE: R-1 | APN(S): 166-184-10, 166-183-17, 166-184-09

SITE DATA AREA (SQ. FT.)		COVERAGE %	DWELLING	UNITS	COMMON OPEN SPACE PROVIDED	COMMON OPEN SPACE REQUIRED
LOT:	740,084	100%	1 BDRM			
			2 BDRM	-		
BLDG:	19,320	3%	3 BDRM	7	PRIVATE OPEN SPACE	
PARKING/PVMT:	32,517	4%	4 BDRM	8	PROVIDED	REQUIRED
LANDSCAPE:	688,247	93%	TOTAL UNITS	15		

PARKING		ORD. REQ.			DRIVEWAY (SIZE & SLOPE)	SETBACKS	
GARAGE	30	LOADING	-	REC. VEH. STORAGE SPACES N/A	1 WAY -	FRONT 20'	REAR 10' SINGLE STORY 20' TWO STORY
GUEST	30	HANDICAP	-		2 WAY -	L. SIDE 10'	SPECIAL N/A
OPEN	-	TOTAL	60		SLOPE VARIES	R. SIDE 10'	ACCES. BLDG N/A

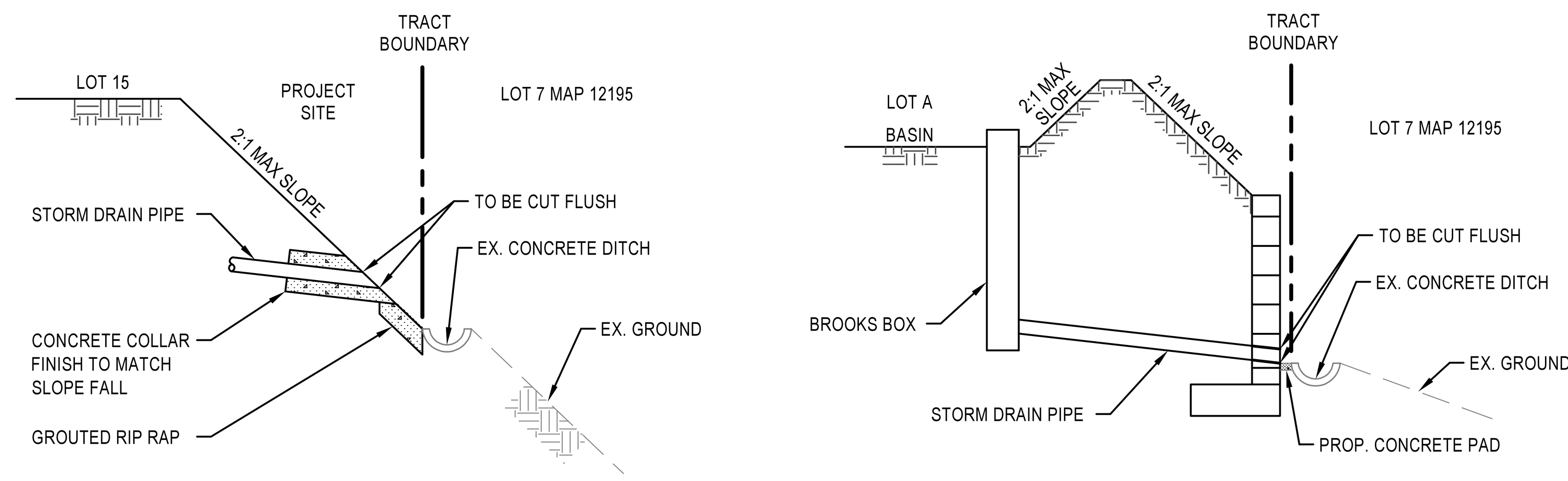
TENTATIVE SUBDIVISION MAP FOR 1205 MELROSE WAY

PROJECT FILE NUMBER: **P21-0130**



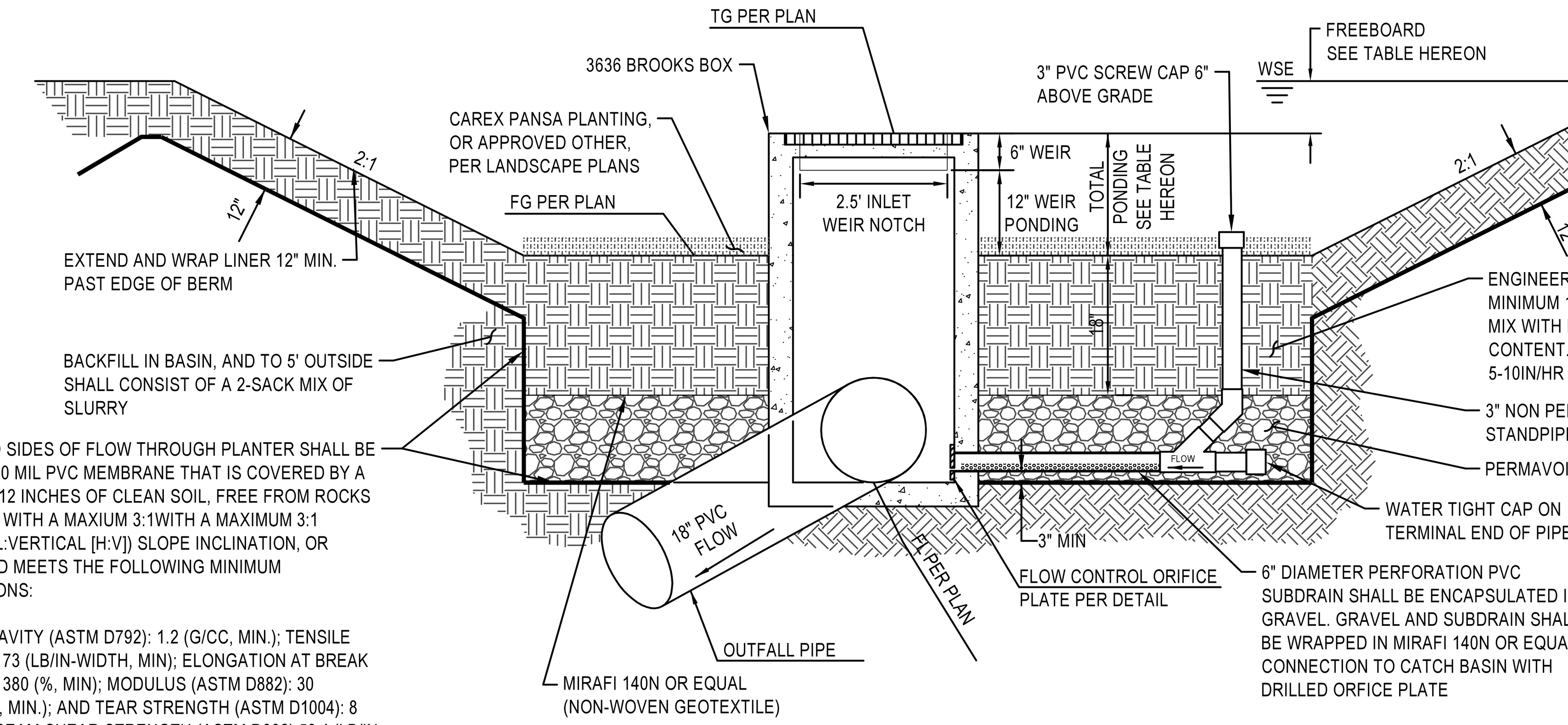
TYPICAL SECTION - PRIVATE STREET A

SCALE: NTS



DRAIN PIPE TO DAYLIGHT FINISH GRADE DETAIL

SCALE: NTS

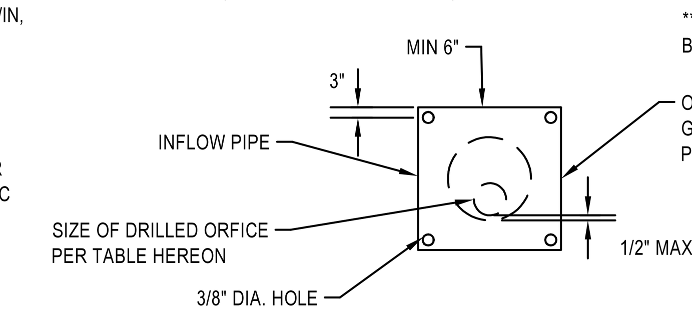


BOTTOM AND SIDES OF FLOW THROUGH PLANTER SHALL BE LINED WITH 30 MIL PVC MEMBRANE THAT IS COVERED BY A MINIMUM OF 12 INCHES OF CLEAN SOIL, FREE FROM ROCKS AND DEBRIS, WITH A MAXIUM 3:1WITH A MAXIMUM 3:1 (HORIZONTAL:VERTICAL [H:V]) SLOPE INCLINATION, OR FLATTER, AND MEETS THE FOLLOWING MINIMUM SPECIFICATIONS:

SPECIFIC GRAVITY (ASTM D792): 1.2 (G/CC, MIN.); TENSILE (ASTM D882): 73 (LB/IN-WIDTH, MIN); ELONGATION AT BREAK (ASTM D882): 380 (%, MIN); MODULUS (ASTM D882): 30 (LB/IN-WIDTH, MIN.); AND TEAR STRENGTH (ASTM D1004): 8 (LB/IN, MIN); SEAM SHEAR STRENGTH (ASTM D882) 58.4 (LB/IN, MIN); SEAM PEEL STRENGTH (ASTM D882) 15 (LB/IN, MIN).

PROVIDE 18-INCH OVERLAPPED, TAPED OR GLUED SEAMS AT ALL SEAMS. PLACE NON-WOVEN FILTER FABRIC (MIRAFI 140N OR EQUAL) ON EITHER SIDE OF PVC LINER TO PROTECT LINER FROM PUNCTURE ON ALL SIDES, "SANDWHICHING" THE PVC LINER WITH A FABRIC CUSHION.

**NOTE: BACKFILL FOR STORM DRAIN PIPES ENTERING OR EXISTING BASIN SHOULD BE BACKFILLED WITH A 2-SACK MIX OF SLURRY



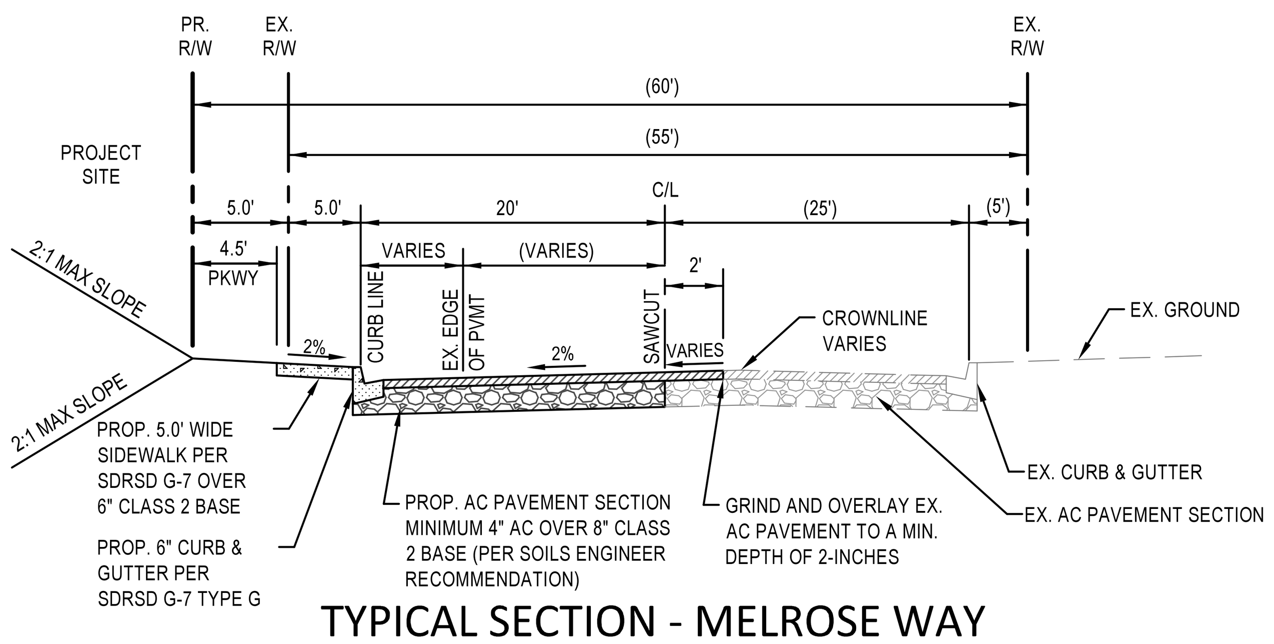
FLOW CONTROL ORFICE PLATE

BIOFILTRATION BASIN TABLE

BASIN NO.	ENGINEERED SOIL LAYER	PERMAVOID LAYER	TOTAL PONDING	FREE BOARD	ORIFICE
1	18"	38.4"	12"	1.0'	1.5"

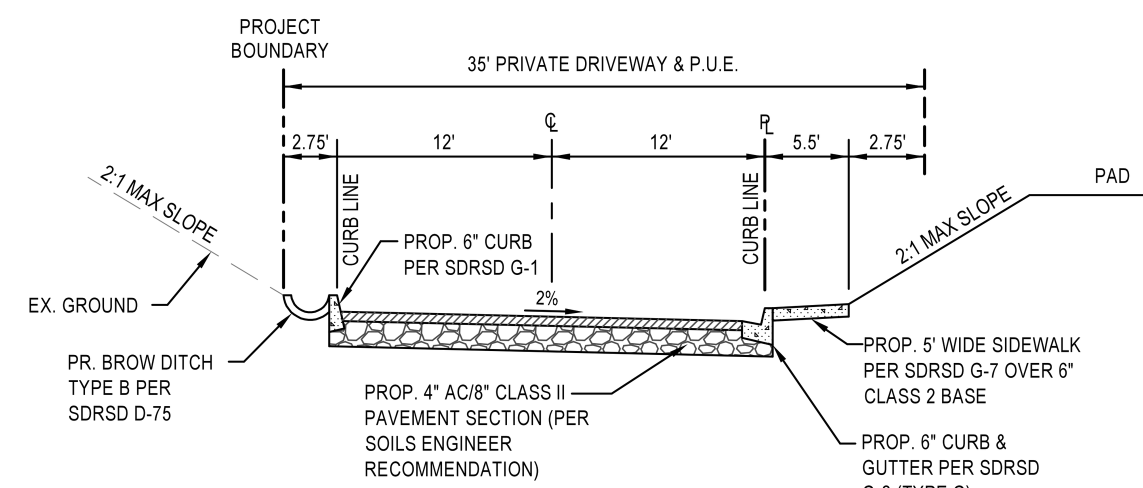
BIOFILTRATION BASIN DETAIL

SCALE: NTS



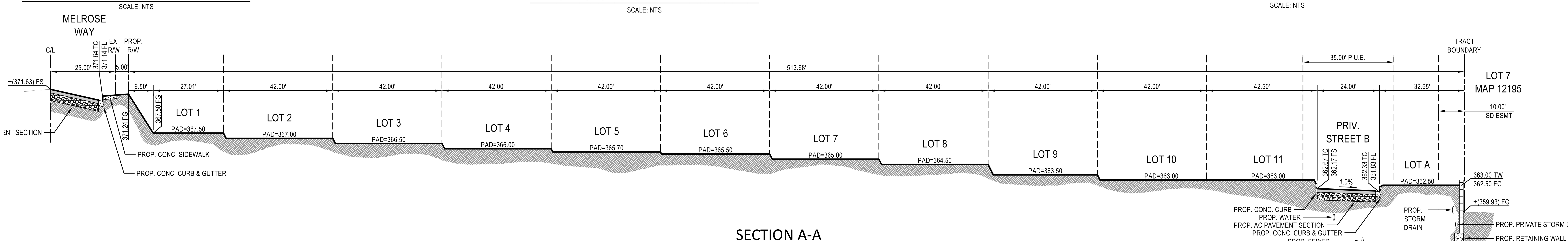
TYPICAL SECTION - MELROSE WAY

SCALE: NTS



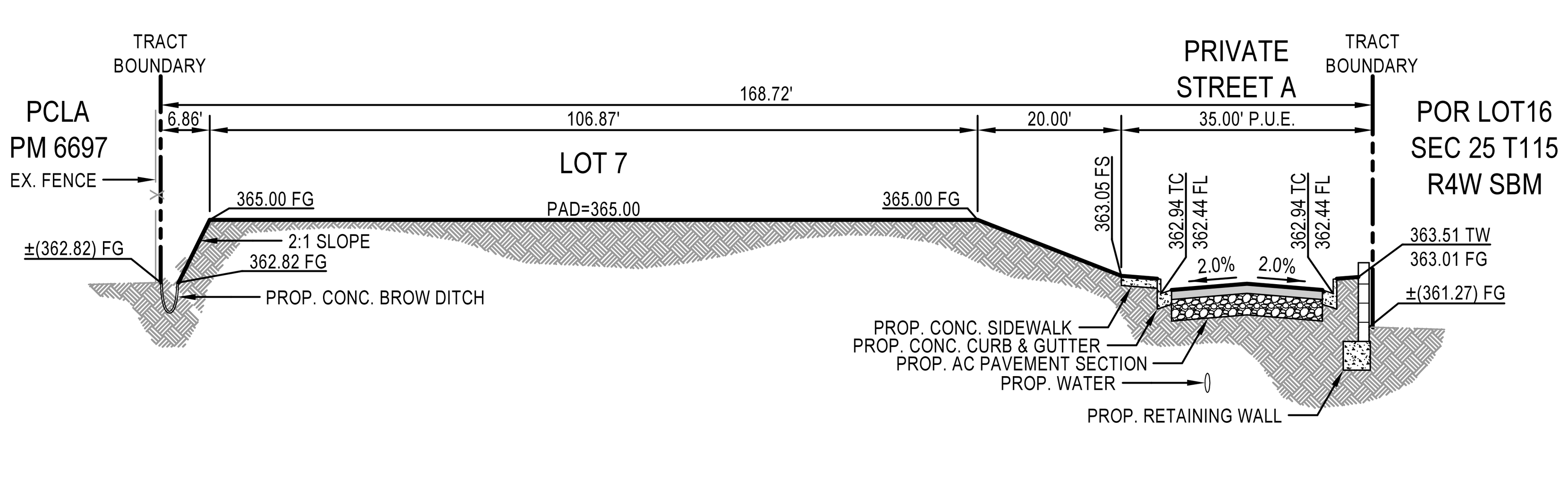
TYPICAL SECTION - PRIVATE STREET B

SCALE: NTS



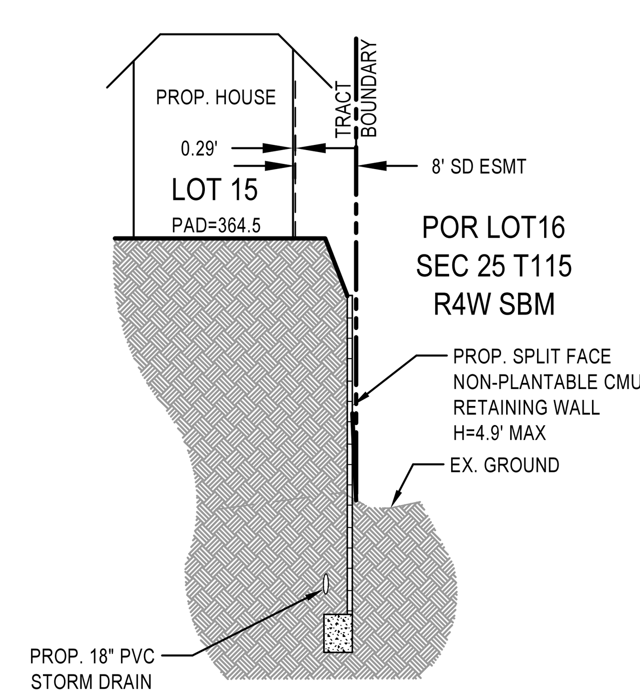
SECTION A-A

SCALE: NTS



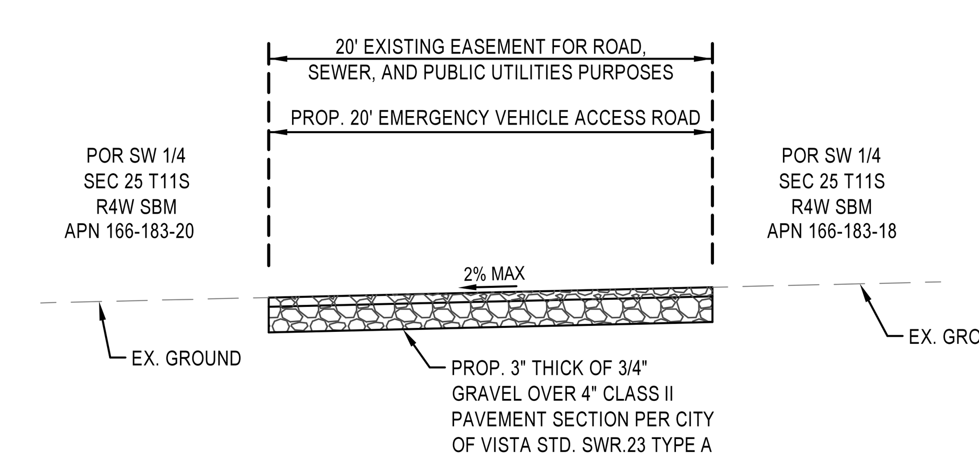
SECTION B-B

SCALE: NTS



SECTION C-C

SCALE: NTS



TYPICAL SECTION - EMERGENCY VEHICLE ACCESS ROAD

SCALE: NTS

SIGNATURES CONSTITUTE THAT ALL PLANS, SPECIFICATIONS, GUARANTEES, AND OTHER REQUIREMENTS NECESSARY FOR ISSUANCE OF A BUILDING PERMIT CONFORMING TO THIS SITE DEVELOPMENT PLAN HAVE BEEN COMPLETED AND APPROVED BY THE APPROPRIATE DEPARTMENT.

PLANNING DEPARTMENT	DATE
ENGINEERING DEPARTMENT	DATE
FIRE DEPARTMENT	DATE
PUBLIC WORKS DEPARTMENT	DATE

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SHEET 2 — CITY of VISTA — OF 6

ZC, TSM, SDP: P21-0130

OWNER: ZORAN DJORDJEVICH PHONE:

ADDRESS: 551 LYNWOOD DRIVE ENCINITAS, CA 92024

ARCHITECT, ENGINEER OR DESIGNER: PASCO LARET SUITER & ASSOCIATES, INC. PHONE: 949-661-6695

ADDRESS: 27127 CALLE ARROYO, SUITE 1904 SAN JUAN CAPISTRANO, CA 92675

TYPE OF DEVELOPMENT: 15 LOTS

EXIST. ZONE: E-1 | PROP. ZONE: R-1 | APN(S): 166-184-10, 166-183-17, 166-184-09

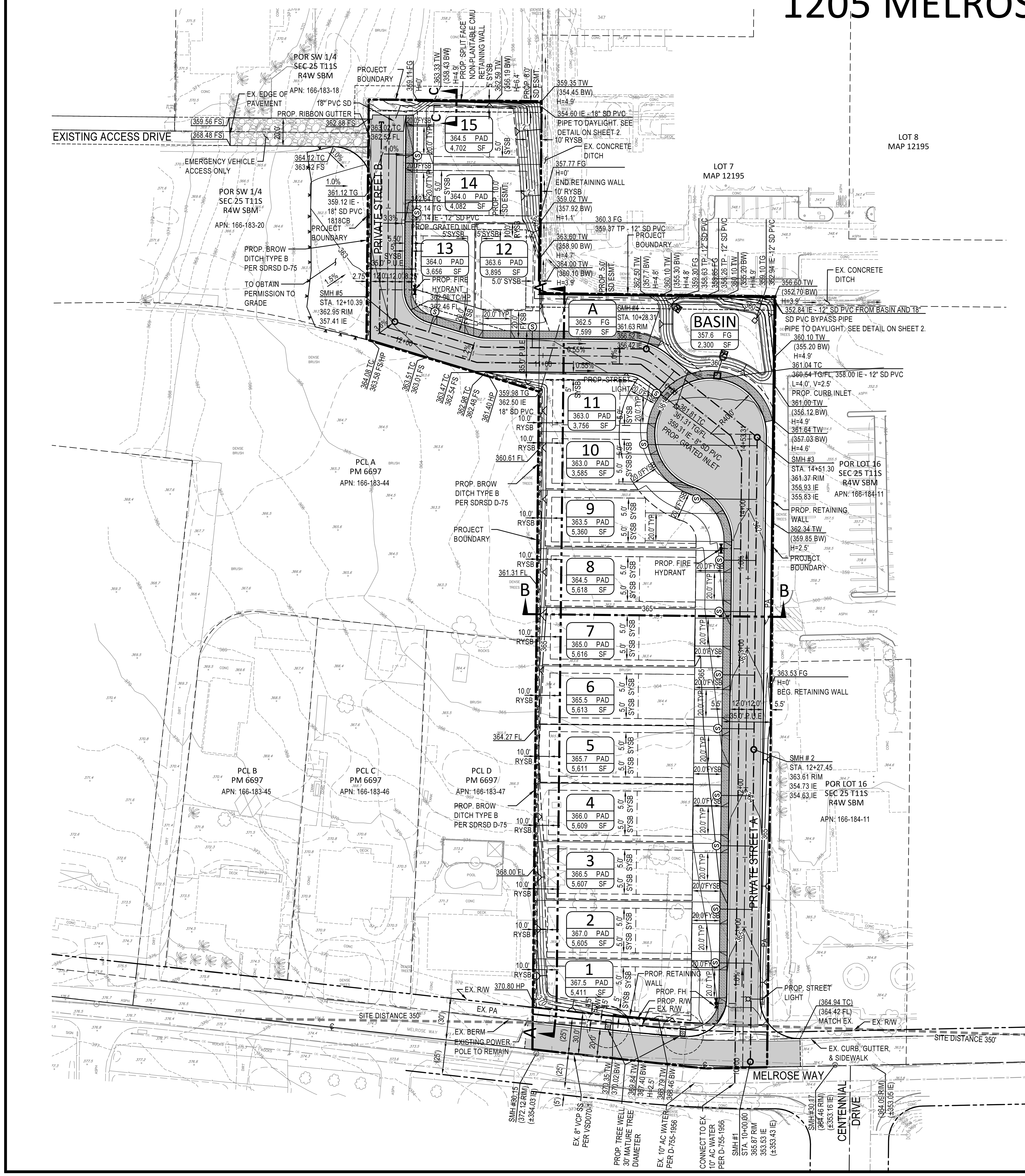
SITE DATA AREA (SQ. FT.)		COVERAGE %	DWELLING	UNITS	COMMON OPEN SPACE PROVIDED	REQUIRED
LOT:	740,084	100%	1 BDRM			
BLDG:	19,320	3%	2 BDRM	-		
PARKING/PVMT:	32,517	4%	3 BDRM	7	PRIVATE OPEN SPACE	
LANDSCAPE:	688,247	93%	4 BDRM	8	PROVIDED	REQUIRED
			TOTAL UNITS	15		

PARKING		ORD. REQ.			DRIVEWAY (SIZE & SLOPE)		SETBACKS	
GARAGE	30	LOADING	-	REC. VEH. STORAGE SPACES	1 WAY	-	FRONT 20'	REAR 10' SINGLE STORY 20' TWO STORY
GUEST	30	HANDICAP	-		2 WAY	-	L. SIDE 10'	SPECIAL N/A
OPEN	-	TOTAL	60	N/A	SLOPE	VARIES	R. SIDE 10'	ACCES. BLDG N/A

SAVE DATE: 09/22/21 ~ PLOT DATE: — ~ FILE NAME: J:\ACTIVE JOBS\3334 MELROSE WAY\CIVIL\DRAWING\DISCRETIONARY PLANS\TENTATIVE MAP\3334-TM-TBLOCK.dwg

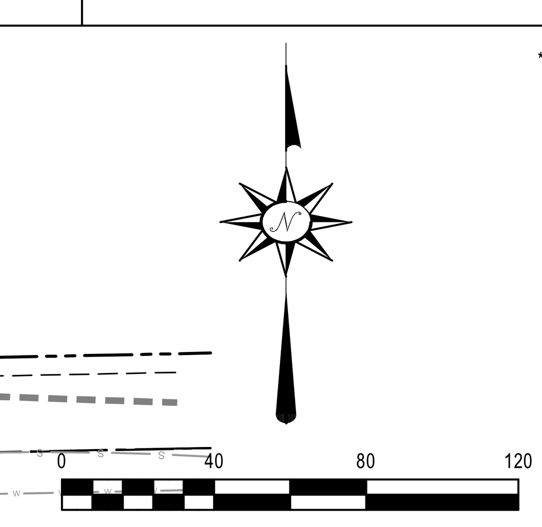
PRELIMINARY GRADING PLAN FOR 1205 MELROSE WAY

PROJECT FILE NUMBER: P21-0130



CONCENSSION/ INCENTIVE/WAIVER	DESIGN REQUIREMENTS	PROPOSED	JUSTIFICATION
FRONT YARD SETBACK LOTS 1-15	18.28.030 R-1 ZONE: NO LESS THAN 50 FEET FROM THE CENTERLINE OF THE STREET UPON WHICH THE BUILDING SITE FRONTS	MINIMUM 20 FOOT FRONTAGE	THE EXISTING DEVELOPMENT STANDARD WOULD PRECLUDE CONSTRUCTION OF THE PROJECT AS DESIGNED. THE SITE PLAN MAKES EFFICIENT USE OF THE SITE WHICH RESULTS IN LIMITED PHYSICAL AREA TO MEET THE SETBACK STANDARD WITHOUT MAKING BACKYARDS UNFEASIBLY SMALL. THEREFORE, THE EXISTING SETBACK DEVELOPMENT STANDARD WOULD NEED TO BE REDUCED IN ORDER FOR THE PROJECT TO BE CONSTRUCTED TO THE DENSITY ALLOWED THROUGH THE STATE DENSITY BONUS LAWS.
SIDE YARD SETBACK LOTS 1-15	18.28.040 R-1 ZONE: EACH SIDE YARD SHALL BE NOT LESS THAN 10 FEET IN WIDTH	MINIMUM 5 FOOT WIDTH SIDE YARDS	THE EXISTING DEVELOPMENT STANDARD WOULD PRECLUDE CONSTRUCTION OF THE PROJECT AS DESIGNED. THE SITE PLAN MAKES EFFICIENT USE OF THE SITE WHICH RESULTS IN LIMITED PHYSICAL AREA TO MEET THE SETBACK STANDARD WITHOUT MAKING BACKYARDS UNFEASIBLY SMALL. THEREFORE, THE EXISTING SETBACK DEVELOPMENT STANDARD WOULD NEED TO BE REDUCED IN ORDER FOR THE PROJECT TO BE CONSTRUCTED TO THE DENSITY ALLOWED THROUGH THE STATE DENSITY BONUS LAWS.
REAR YARD SETBACK LOTS 1-15	18.28.050 R-1 ZONE: REAR YARD NOT LESS THAN 10 FEET IN DEPTH; A SECOND STORY PORTION SHALL NOT BE CLOSER THAN 20 FEET FROM THE REAR PROPERTY LINE	MINIMUM 10 FOOT REAR YARD	THE EXISTING DEVELOPMENT STANDARD WOULD PRECLUDE CONSTRUCTION OF THE PROJECT AS DESIGNED. THE SITE PLAN MAKES EFFICIENT USE OF THE SITE WHICH RESULTS IN LIMITED PHYSICAL AREA TO MEET THE SETBACK STANDARD WITHOUT MAKING BACKYARDS UNFEASIBLY SMALL. THEREFORE, THE EXISTING SETBACK DEVELOPMENT STANDARD WOULD NEED TO BE REDUCED IN ORDER FOR THE PROJECT TO BE CONSTRUCTED TO THE DENSITY ALLOWED THROUGH THE STATE DENSITY BONUS LAWS.
PARKING LOTS 1-15	18.54.050 SEMI-RURAL SUBDIVISION: 2 GARAGE STALLS AND +2.5 GUEST STALLS; ADDITIONAL OFF-STREET PARKING	PER STATE GOVERNMENT CODE AB2345 AND 65915(P) – UNIT WITH 2-3 BEDROOMS: 1.5 PARKING SPACES REQUIRED AND UNIT WITH 4 BEDROOMS: 2.5 PARKING SPACES REQUIRED. THIS PROJECT SITE PROVIDES 2 GARAGE STALLS, 2 GUEST STALLS IN DRIVEWAY, & NO OFF-STREET PARKING PROVIDED.	THE PROJECT PROVIDES A TOTAL OF 60 PARKING SPACES THAT EXCEEDS THE MINIMUM STATE GOVERNMENT CODE AB2345 AND 65915(P) REQUIREMENT FOR DENSITY BONUS PROJECTS. THE PROJECT MAKES EFFICIENT USE OF THE SITE WHICH RESULTS IN LIMITED PHYSICAL AREA TO PROVIDE OFF-STREET PARKING, BUT THE GARAGES/DRIVEWAYS PROVIDE AMPLE RESIDENT & GUEST PARKING.
MINIMUM LOT SIZE LOTS 1-15	18.28.060 R-1 ZONE: MINIMUM LOT SIZE OF AT LEAST 10,000 SF	PER PLAN LOT SIZE LESS THAN 10,000 SF	THE EXISTING DEVELOPMENT STANDARD WOULD PRECLUDE CONSTRUCTION OF THE PROJECT AS DESIGNED. THE SITE PLAN MAKES EFFICIENT USE OF THE SITE WHICH RESULTS IN LIMITED PHYSICAL AREA TO MEET THE SETBACK STANDARD WITHOUT MAKING BACKYARDS UNFEASIBLY SMALL. THEREFORE, THE EXISTING SETBACK DEVELOPMENT STANDARD WOULD NEED TO BE REDUCED IN ORDER FOR THE PROJECT TO BE CONSTRUCTED TO THE DENSITY ALLOWED THROUGH THE STATE DENSITY BONUS LAWS.
MINIMUM LOT WIDTH LOTS 1-15	17.16.010(C) EVERY LOT AT LEAST 50 FEET WIDE EXCLUSIVE OF SIDE YARDS REQUIRED IN THE ZONE IN WHICH THE LOT IS LOCATED MEASURED AT THE BUILDING SETBACK LINE	MINIMUM LOT WIDTH EXCLUDING SIDE YARD REQUIREMENTS IS 32 FEET	THE EXISTING DEVELOPMENT STANDARD WOULD PRECLUDE THE ALLOWABLE DENSITY UNDER THE STATE DENSITY BONUS LAW. THE PROJECT AS PROPOSED MAXIMIZES THE NUMBER OF UNITS ALLOWABLE ON THE SITE STATE DENSITY BONUS LAW AND SUPPORTED BY THE CALCULATIONS PROVIDED. THEREFORE, THE EXISTING DEVELOPMENT STANDARD LIMIT WOULD NEED TO BE REDUCED IN ORDER FOR THE PROJECT TO BE CONSTRUCTED AS DESIGNED.
MINIMUM LOT DEPTH LOTS 10-13	17.16.010(I) LOT DEPTH SHALL BE AT LEAST 90 FEET AND SHALL BE NO GREATER THAN THREE TIMES THE AVERAGE WIDTH	4 OUT OF 15 UNITS DO NOT MEET THE MINIMUM LOT DEPTH. 9 OUT OF 15 UNITS DO NOT HAVE A LOT DEPTH LESS THAN THREE TIMES THE AVERAGE WIDTH.	THE EXISTING DEVELOPMENT STANDARD WOULD PRECLUDE CONSTRUCTION OF THE PROJECT AS DESIGNED. 4 UNITS DO NOT MEET THE REQUIREMENT DUE TO THE OFFSET CUL-DE-SAC AND LAYOUT DESIGN OF PRIVATE STREET B. THE EXISTING DEVELOPMENT STANDARD WOULD NEED TO BE REDUCED SINCE THE PRIVATE STREET IS REQUIRED TO MEET THE MINIMUM WIDTH REQUIREMENTS AND CANNOT CHANGE. THE 9 UNITS THAT HAVE LARGER LOT DEPTHS THAN THREE TIMES THE AVERAGE WIDTH, MAXIMIZES ON PROVIDING THE LARGEST LOT SIZES THAT COULD BE PROVIDED.
PRIVATE STREET WIDTH	16.57.040 32 FOOT PAVED WIDTH WITHIN A 40 FOOT ROAD EASEMENT	24 FOOT PAVED WIDTH WITHIN A 35 FOOT ROAD EASEMENT	NO ON-STREET PARKING IS BEING PROPOSED. THE EXISTING DEVELOPMENT STANDARD WOULD PRECLUDE CONSTRUCTION OF THE PROJECT AS DESIGNED. IF THE STREET MET THE REQUESTED STANDARD, THE LOT DEPTHS WOULD NEED TO BE FURTHER REDUCED AND THEREFORE THE PRIVATE STANDARD NEEDS TO BE REVISED.
RETAINING WALL TYPE LOT 15	PER THE CITY OF VISTA LANDSCAPE MANUAL, RETAINING WALLS GREATER THAN 5' IN HEIGH SHALL BE PLANTABLE	SPLIT FACED NON-PLANTABLE CMU RETAINING WALL	THE EXISTING DEVELOPMENT STANDARD WOULD MAKE THE MAINTENANCE FOR A PLANTABLE WALL DIFFICULT. THE WALL IS ONLY VIEWED BY THE NEIGHBORING ADJACENT PROPERTY. THE WALL IS CURRENTLY DESIGNED WITHIN THE PROJECT'S BOUNDARY.
WIDTH OF STORM DRAIN EASEMENT LOT 15	STORM DRAIN EASEMENT MINIMUM 10 FOOT WIDE	MINIMUM 8 FOOT WIDE STORM DRAIN EASEMENT	THE STORM DRAIN EASEMENT ON THE NORTH SIDE OF LOT 15 CANNOT BE 10 FEET WIDE DUE TO THE BUILDING EDGE OF THE PROPOSED HOUSE. IF THE EASEMENT WERE TO BE 10 FEET, THE DESIRED WIDTH OF THE HOUSE COULD NOT BE ACCOMMODATED.

**NOTE: THIS INFORMATION IS FOR REFERENCE ONLY. SEE DENSITY BONUS PROJECT PROPOSAL FOR FURTHER INFORMATION.



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PLANNING DEPARTMENT	DATE
ENGINEERING DEPARTMENT	DATE
FIRE DEPARTMENT	DATE
PUBLIC WORKS DEPARTMENT	DATE

SHEET 3 — CITY of VISTA — OF 6

ZC, TSM, SDP: P21-0130
OWNER: ZORAN DJORDJEVICH PHONE:
ADDRESS: 551 LYNWOOD DRIVE ENCINITAS, CA 92024
ARCHITECT, ENGINEER OR DESIGNER: PASCO LARET SUITER & ASSOCIATES, INC. PHONE: 949-661-6695
ADDRESS: 27127 CALLE ARROYO, SUITE 1904 SAN JUAN CAPISTRANO, CA 92675
TYPE OF DEVELOPMENT: 15 LOTS
EXIST. ZONE: E-1 | PROP. ZONE: R-1 | APN(S): 166-184-10, 166-183-17, 166-184-09

SITE DATA AREA (SQ. FT.)		COVERAGE %	DWELLING	UNITS
			1 BDRM	
LOT:	740,084	100%	2 BDRM	-
BLDG:	19,320	3%	3 BDRM	7
PARKING/PVMT:	32,517	4%	4 BDRM	8
LANDSCAPE:	688,247	93%	TOTAL UNITS	15

COMMON OPEN SPACE	
PROVIDED	REQUIRED

PRIVATE OPEN SPACE	
PROVIDED	REQUIRED

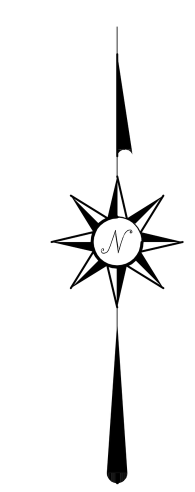
PARKING		ORD. REQ.		
GARAGE	30	LOADING	-	REC. VEH. STORAGE SPACES
GUEST	30	HANDICAP	-	
OPEN	-	TOTAL	60	N/A

DRIVEWAY (SIZE & SLOPE)	
1 WAY	-
2 WAY	-
SLOPE	VARIES

SETBACKS	
FRONT 20'	REAR 10' SINGLE STORY 20' TWO STORY
L. SIDE 10'	SPECIAL N/A
R. SIDE 10'	ACCES. BLDG N/A

TENTATIVE SUBDIVISION MAP FOR 1205 MELROSE WAY

PROJECT FILE NUMBER: **P21-0130**



0 40 80 120

SCALE: 1" = 40'

LAWYERS TITLE REPORT NO. 321319167, DATED 3/25/2021 SCHEDULE "B" EXCEPTIONS - PARCEL A

2 UNSPECIFIED WIDTH EASEMENT TO VISTA IRRIGATION DISTRICT EASEMENT FOR PIPELINE PURPOSES PER BOOK 1136, PAGE 239, RECORDED OCTOBER 24, 1925, (NOT PLOTTABLE)

3 20' WIDE ROAD EASEMENT PER BOOK 142, PAGE 301, RECORDED AUGUST 13, 1932

4 UNSPECIFIED WIDTH SAN DIEGO GAS & ELECTRIC COMPANY EASEMENT, FOR PUBLIC UTILITIES, INGRESS, EGRESS PURPOSES PER BOOK 651, PAGE 212, RECORDED MAY 10, 1937
PLOTS SOUTHERLY OF THIS PROPERTY- DOES NOT AFFECT THIS PROPERTY

5 50' WIDE COUNTY OF SAN DIEGO EASEMENT FOR PUBLIC HIGHWAY PER BOOK 832, PAGE 431, RECORDED OCTOBER 21, 1938

6 SAN DIEGO GAS & ELECTRIC COMPANY EASEMENT, FOR PUBLIC UTILITIES, INGRESS, EGRESS PURPOSES PER DOC. NO. 88-205124, RECORDED MAY 3, 1988.
THE EXACT LOCATION AND EXTENT OF SAID EASEMENT IS NOT DISCLOSED OF RECORD, (NOT PLOTTABLE)

LAWYERS TITLE REPORT NO. 321319262, DATED 3/29/2021 SCHEDULE "B" EXCEPTIONS - PARCEL B

2 UNSPECIFIED WIDTH EASEMENT TO VISTA IRRIGATION DISTRICT EASEMENT FOR PIPELINE PURPOSES PER BOOK 1136, PAGE 239, RECORDED OCTOBER 24, 1925, (NOT PLOTTABLE)

3 UNSPECIFIED WIDTH ROAD EASEMENT PER BOOK 74, PAGE 498, RECORDED FEBRUARY 19, 1932, (NOT PLOTTABLE)

4 UNSPECIFIED WIDTH ROAD EASEMENT PER 20512, RECORDED FEBRUARY 4, 1963; PER 77675, RECORDED APRIL 29, 1964; PER 111503, RECORDED JUNE 22, 1964, (NOT PLOTTABLE)

5 UNSPECIFIED WIDTH VISTA IRRIGATION DISTRICT EASEMENT FOR SEWER LINES PER 195231, RECORDED OCTOBER 26,1970, (NOT PLOTTABLE)

7 UNSPECIFIED WIDTH EASEMENT TO WERNER P. REINEMANN AND VIRGINIA S. REINEMANN FOR ROAD, SEWER, AND PUBLIC UTILITY PURPOSES PER 76-027345, RECORDED JANUARY 29, 1976, (NOT PLOTTABLE)

8 UNSPECIFIED WIDTH EASEMENT TO ZORAN DJORDJEVICH FOR ROAD, SEWER, AND PUBLIC UTILITY PURPOSES PER 2006-0689622, RECORDED JANUARY 29, 1976, (NOT PLOTTABLE)

LAWYERS TITLE REPORT NO. 321319335, DATED 3/26/2021 SCHEDULE "B" EXCEPTIONS - APN 166-183-20

4 UNSPECIFIED WIDTH EASEMENT TO VISTA IRRIGATION DISTRICT EASEMENT FOR PIPELINE PURPOSES PER BOOK 1136, PAGE 239, RECORDED OCTOBER 24, 1925, (NOT PLOTTABLE)

6 SAN DIEGO GAS & ELECTRIC COMPANY EASEMENT, FOR PUBLIC UTILITIES, INGRESS, EGRESS PURPOSES PER DOC. NO. 88-205124, RECORDED MAY 3, 1988.
THE EXACT LOCATION AND EXTENT OF SAID EASEMENT IS NOT DISCLOSED OF RECORD, (NOT PLOTTABLE)

7 TIMES MIRROR CABLE TELEVISION OF SAN DIEGO COUNTY EASEMENT, RECORDED AUGUST 1, 1988, DOC. NO. 88-375422, O.R.
THE EXACT LOCATION AND EXTENT OF SAID EASEMENT IS NOT DISCLOSED OF RECORD, (NOT PLOTTABLE)

8 SAN DIEGO GAS & ELECTRIC COMPANY EASEMENT, FOR PUBLIC UTILITIES, INGRESS AND EGRESS PURPOSES, RECORDED AUGUST 31, 1988, DOC. NO. 88-437715, O.R.
THE EXACT LOCATION AND EXTENT OF SAID EASEMENT IS NOT DISCLOSED OF RECORD, (NOT PLOTTABLE)

PASCO LARET SUITER & ASSOCIATES
San Diego | Solana Beach | Orange County
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PLANNING DEPARTMENT	DATE
ENGINEERING DEPARTMENT	DATE
FIRE DEPARTMENT	DATE
PUBLIC WORKS DEPARTMENT	DATE

SHEET 4 — **CITY of VISTA** — OF 6

ZC, TSM, SDP: P21-0130

OWNER: ZORAN DJORDJEVICH PHONE:

ADDRESS: 551 LYNWOOD DRIVE ENCINITAS, CA 92024

ARCHITECT, ENGINEER OR DESIGNER: PASCO LARET SUITER & ASSOCIATES, INC. PHONE: 949-661-6695

ADDRESS: 27127 CALLE ARROYO, SUITE 1904 SAN JUAN CAPISTRANO, CA 92675

TYPE OF DEVELOPMENT: 15 LOTS

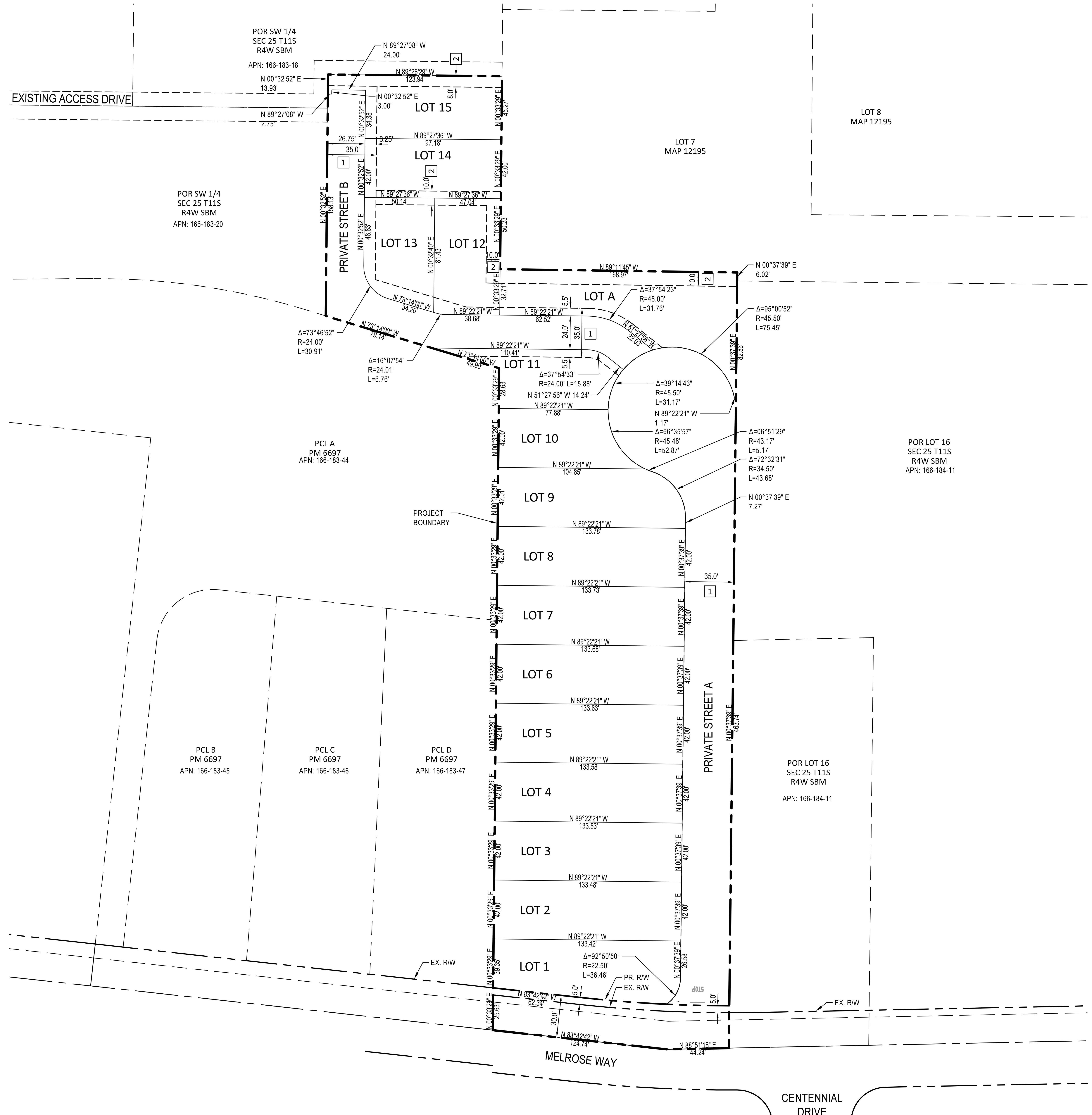
EXIST. ZONE: E-1 | PROP. ZONE: R-1 | APN(S): 166-184-10, 166-183-17, 166-184-09

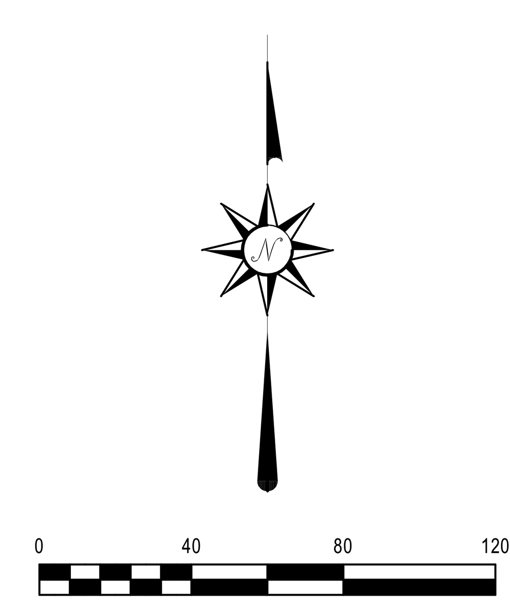
SITE DATA AREA (SQ. FT.)		COVERAGE %	DWELLING	UNITS	COMMON OPEN SPACE PROVIDED	COMMON OPEN SPACE REQUIRED
			1 BDRM			
LOT:	740,084	100%	2 BDRM	-		
BLDG:	19,320	3%	3 BDRM	7	PRIVATE OPEN SPACE	
PARKING/PVMT:	32,517	4%	4 BDRM	8	PROVIDED	REQUIRED
LANDSCAPE:	688,247	93%	TOTAL UNITS	15		

PARKING		ORD. REQ.			DRIVEWAY (SIZE & SLOPE)		SETBACKS	
GARAGE	30	LOADING	-	REC. VEH. STORAGE SPACES	1 WAY	-	FRONT 20'	REAR 10' SINGLE STORY 20' TWO STORY
GUEST	30	HANDICAP	-		2 WAY	-	L. SIDE 10'	SPECIAL N/A
OPEN	-	TOTAL	60	N/A	SLOPE	VARIES	R. SIDE 10'	ACCES. BLDG N/A

TENTATIVE SUBDIVISION MAP FOR 1205 MELROSE WAY

PROJECT FILE NUMBER: P21-0130





LEGEND

TRACT BOUNDARY
PROPOSED RIGHT-OF-WAY
EXISTING RIGHT
PROPOSED LOT LINE
PROPOSED EASEMENT LINE
ADJACENT PROPERTY LINE

PROPOSED EASEMENTS

1 INDICATES RIGHT OF WAY, PUBLIC UTILITY EASEMENT, AND PUBLIC SEWER EASEMENT TO THE CITY OF VISTA

2 INDICATES STORM DRAIN EASEMENT

LOT TABLE

LOT NO.	AREA (S.F.)
1	5,411 SF
2	5,605 SF
3	5,607 SF
4	5,609 SF
5	5,611SF
6	5,613 SF
7	5,616 SF
8	5,618 SF
9	5,360 SF
10	3,585 SF
11	3,756 SF
12	3,895 SF
13	3,656 SF
14	4,082 SF
15	4,702 SF
A	7,599 SF
PRIVATE STREET A	20,400 SF
PRIVATE STREET B	12,868 SF

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PLANNING DEPARTMENT	DATE
ENGINEERING DEPARTMENT	DATE
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SHEET 5 — CITY of VISTA — OF 6

ZC, TSM, SDP: P21-0130

OWNER: ZORAN DJORDJEVICH PHONE:

ADDRESS: 551 LYNWOOD DRIVE ENCINITAS, CA 92024

ARCHITECT, ENGINEER OR DESIGNER: PASCO LARET SUITER & ASSOCIATES, INC. PHONE: 949-661-6695

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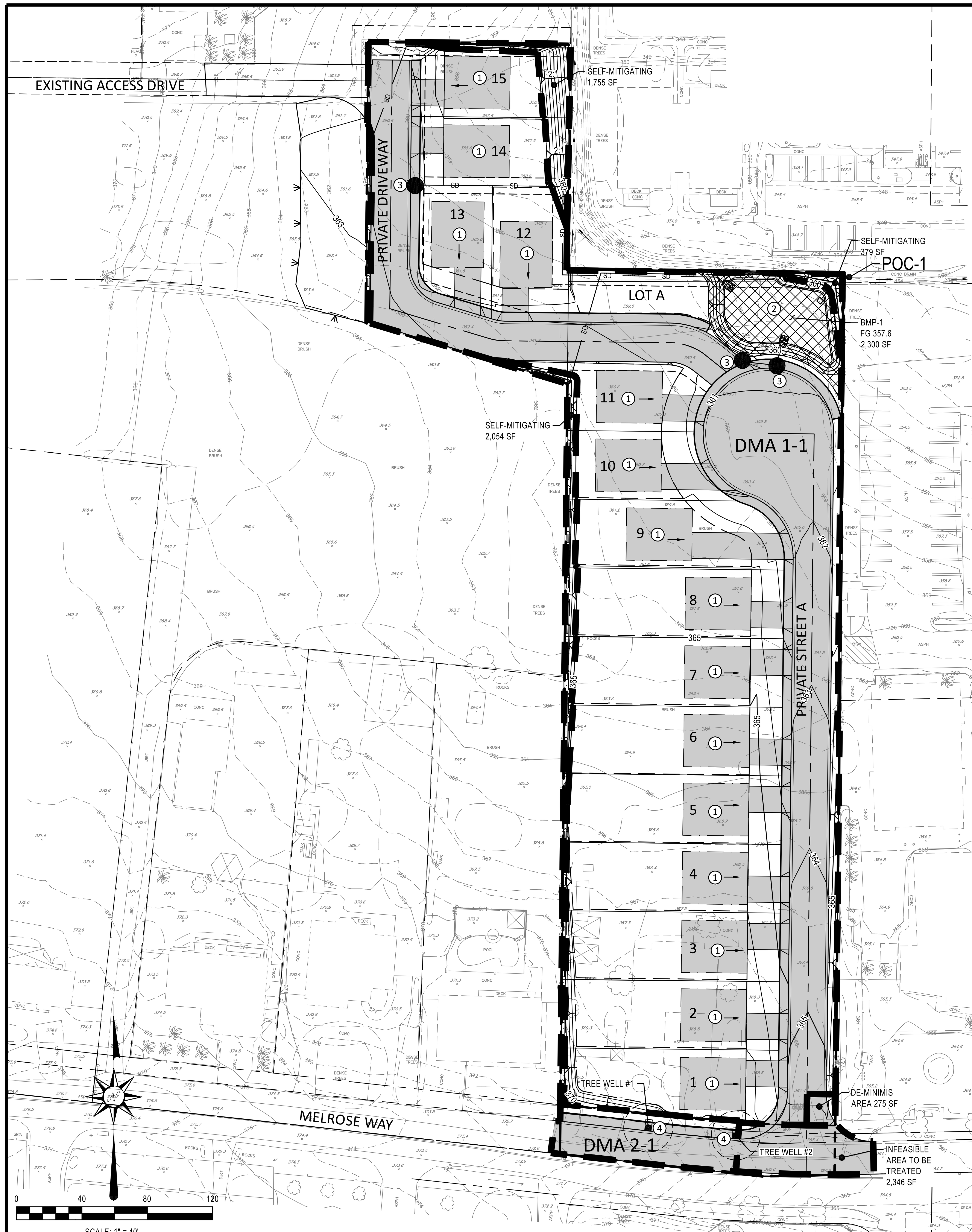
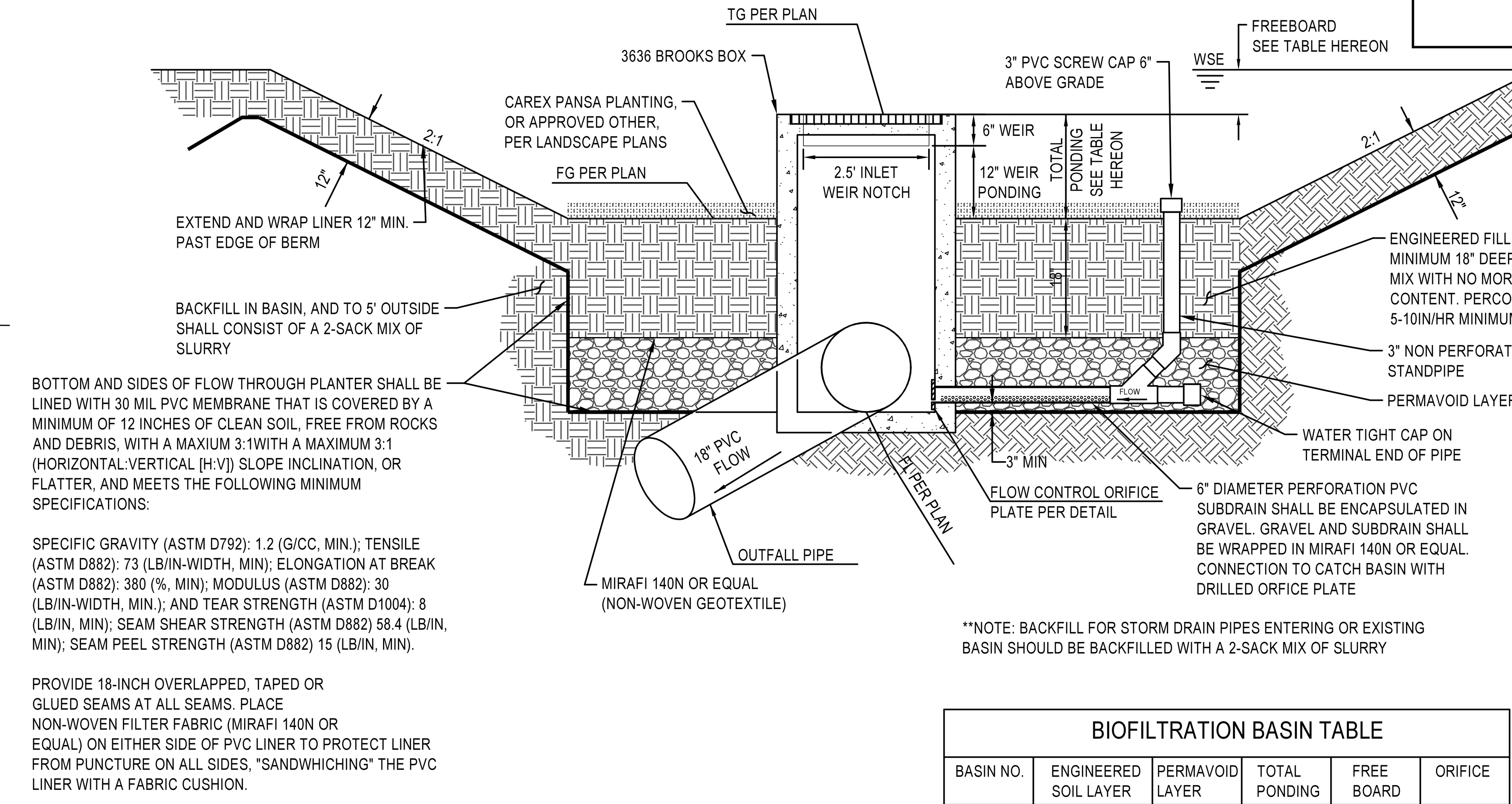
			TOTAL UNITS	15		

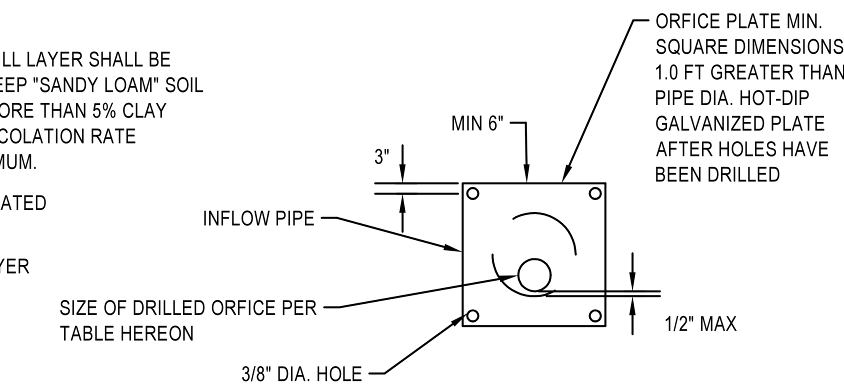
PARKING		ORD. REQ.			DRIVEWAY (SIZE & SLOPE)		SETBACKS	
GARAGE	30	LOADING	-	REC. VEH. STORAGE SPACES	1 WAY	-	FRONT 20'	REAR 10' SINGLE STORY 20' TWO STORY
GUEST	30	HANDICAP	-		2 WAY	-	L. SIDE 10'	SPECIAL N/A
OPEN	-	TOTAL	60	N/A	SLOPE	VARIES	R. SIDE 10'	ACCES. BLDG N/A

PROJECT FILE NUMBER: **P21-0130**





**NOTE: BACKFILL FOR STORM DRAIN PIPES ENTERING OR EXISTING BASIN SHOULD BE BACKFILLED WITH A 2-SACK MIX OF SLURRY



FLOW CONTROL ORFICE PLATE

BIOFILTRATION BASIN TABLE					
BASIN NO.	ENGINEERED SOIL LAYER	PERMAVOID LAYER	TOTAL PONDING	FREE BOARD	ORIFICE
1	18"	38.4"	12"	1.0'	1.5"

BIOFILTRATION BASIN DETAIL

N.T.S.

DMA DATA TABLE			
DMA NO.	IMPERVIOUS AREA (S.F.)	PERVIOUS AREA (S.F.)	TOTAL AREA (S.F.)
1-1	53,174	52,620	105,794
2-1	5,171	537	5,708
SELF-MITIGATING	-----	-----	4,188 SF
DE-MINIMUS AREA	-----	-----	275 SF
INFEASIBLE TO TREAT	-----	-----	2,346 SF

GENERAL INFORMATION

PROJECT SITE IS LOCATED IN THE LOS MONOS H.S.A. (904.31) OF AGUA HEDIONDA CREEK H.A. OF CARLSBAD H.U., HOWEVER DRAINAGE FROM THE SITE ULTIMATELY DISCHARGES TO THE RECIEVING WATERS OF BUENA VISTA CREEK H.S.A. (904.22) OF BUENA VISTA CREEK H.A. OF CARLSBAD H.U.

POLUTTANTS OF CONCERN - BENTHIC COMMUNITY EFFECTS, BIFENTHRIN, SELENIUM, TOXICITY, INDICATOR BACTERIA, NUTRIENTS, AND SEDIMENTATION/SILTATION

LID SITE DESIGN BMP'S

1. BIOFILTRATION BASIN
2. ROOF DRAIN TO LANDSCAPING
3. MINIMIZE IMPERVIOUS SURFACES
4. PROTECT SLOPES AND CHANNELS
5. TREE WELLS

SOURCE CONTROL BMP'S

1. STORM DRAIN STENCILING
2. EMPLOY INTEGRATED PEST MANAGEMENT PRACTICES
3. EMPLOY EFFICIENT IRRIGATION AND DROUGHT TOLERANT

   LANDSCAPE DESIGN

BMP NOTES

1. THESE BMPS AREA MANDATORY TO BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS OR THERE PLANS
2. NO CHANGES TO THE PROPOSED BMPS ON THIS SHEET WITHOUT PRIOR APPROVAL FORM THE CITY ENGINEERING DEPARTMENT
3. NO SUBSTITUTIONS TO THE MATERIAL TYPES OR PLANTING TYPES WITHOUT PRIOR APPROVAL FROM THE LAND DEVELOPMENT ENGINEER
4. NO OCCUPANCY WILL BE GRANTED UNTIL THE CITY INSPECTOR STAFF HAS INSPECTED THIS PROJECT FOR APPRORIATE BMP CONSTRUCTION AND INSTALLATION.

SOIL INFORMATION

HYDROLOGIC SOIL GROUP: TYPE D

GROUND WATER INFORMATION

GROUND WATER WAS NOT ENCOUNTERED AT THE SITE. SEE REPORT PREPARED BY: GEOSOILS, INC
DATED: MARCH 5, 2021 W.O. 8058-A-SC

COARSE SEDIMENT YIELD

NO CRITICAL COARSE SEDIMENT YIELD AREAS EXIST WITHIN THIS PROJECT SITE.

WATER QUALITY TECHNICAL REPOT

TITLE - PRIORITY DEVELOPMENT PROJECT STORM WATER QUALITY MANAGEMENT REPORT FOR 1205 MELROSE WAY
DATE - MARCH 2021
PREPARED BY - PASCO LARET SUITER & ASSOCIATES

MAINTENANCE AGREEMENT DOCUMENT

TITLE -
DATE -
PREPARED BY -

OPERATIONS AND MAINTENANCE PLAN

TITLE - STORM WATER OPERATIONS & MAINTENANCE PLAN FOR 1205 MELROSE WAY
DATE - MARCH 2021
PREPARED BY - PASCO LARET SUITER & ASSOCIATES

RESPONSIBLE PARTY INFORMATION

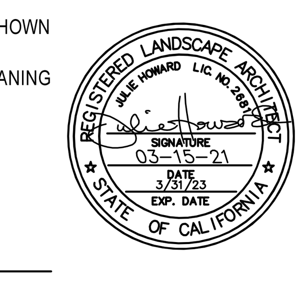
ZORAN DJORDJEVICH

551 LYNWOOD DRIVE

ENCINITAS, CA 92024

LANDSCAPE NOTE

I HAVE REVIEWED THE BIOLFILTRATION BASIN LOCATION SHOWN ON THE CIVIL PLAN AND CONFIRM THAT THE CONCEPT LANDSCAPE PLANS ARE COORDINATED AND APPROATE PLANING AND IRRIGATION WILL BE DIESNG IN THOSE BIOFILTRATION BASINS.



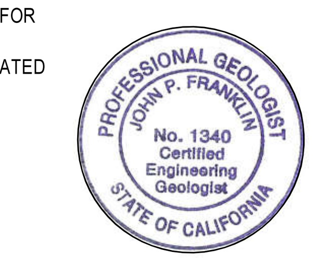
ARCHITECT NOTE

MY ARCHITECT'S SEAL AND SIGNATURE IS TO VERIFY THAT THE KTGY ARCHITECTURAL PLANNING HAS REVIEWED THIS PLAN PREPARED BY THE CIVIL ENGINEER AND HARD COORDINATED THE SCHEMATIC DESIGN OF THE BUILDING ARCHITURE ACCORDINGLY.

GEOTECHNICAL NOTE

I HAVE REVIEWED THE SOIL AND GEOLOGIC CONDITIONS FOR THIS PROJECT AND CONFIRM THE SELECTED POST CONSTRUCTION BMPS HAVE BEEN DISCUSSED, COORDINATED AND JUSTIFIED AS REQUIRED BY THE C.O.V. BMP DESIGN MANUAL.

John P. Franklin



LEGEND

DESCRIPTION	SYMBOL
LOT NUMBER	10
DRAINAGE DIRECTION	→
DRAINAGE MANAGEMENT AREA	
TYPE-B CURB INLET	
BROOKS BOX	□
RIP RAP	

BMP ID #	BMP TYPE	SYMBOL	QUANTITY	DETAIL PLAN SET SHEET NO.	DETAIL NO.	HORIZONTAL DATUM: NAD 83 NORTHING	EASTING	CONSTRUCTION CONFIRMATION
1	ROOF DRAIN TO LANDSCAPING		30 (TWO PER PAD)					
2	BIOFILTRATION AREA		1					
3	STORM DRAIN STENCILING	●	3					
4	TREE WELL		2					

POST-CONSTRUCTION PERMANENT BMP OPERATION & MAINTENANCE PROCEDURE DETAILS

STORM WATER MANAGEMENT AND DISCHARGE CONTROL MAINTENANCE AGREEMENT APPROVAL NO:

O&M RESPONSBILE PARTY DESIGNEE: PACIFIC INTERNATIONAL INVESTMENTS, INC

BMP DESCRIPTION	INSPECTION FREQUENCY	MAINTENANCE FREQUENCY	MAINTENANCE METHOD	QUANTITY	SHEET NUMBER(S)
EDUCATION PROGRAM (SOURCE CONTROL)	ANNUAL	AS NEEDED	EMPLOYEE EDUCATION PROGRAM	N/A	N/A
SIGNAGE & STENCILING	ANNUAL	AS NEEDED	REPAIR AND/OR REPLACE AS NECESSARY	3	N/A
BIOFILTRATION BASIN	ANNUAL	AS NEEDED	MOWING AND DEBRIS COLLECTION AS NECESSARY. REPAIR AS NEEDED	1	N/A
TREE WELL	MONTHLY	AS NEEDED	INSPECT TREE HEALTH & REPAIR/REPLACE AS NECCESSARY	2	N/A

DMA EXHIBIT

1205 MELROSE WAY
VISTA, CA
SCALE: 1' = 40'
DATE: JUNE 2021

PASCO LARET SUITER & ASSOCIATES
San Diego | Solana Beach | Orange County
Phone 858.259.8212 | www.plsaengineering.com

SIGNATURES CONSTITUTE THAT ALL PLANS, SPECIFICATIONS, GUARANTEES, AND OTHER REQUIREMENTS NECESSARY FOR ISSUANCE OF A BUILDING PERMIT CONFORMING TO THIS SITE DEVELOPMENT PLAN HAVE BEEN COMPLETED AND APPROVED BY THE APPROPRIATE DEPARTMENT.

PLANNING DEPARTMENT	DATE
ENGINEERING DEPARTMENT	DATE
FIRE DEPARTMENT	DATE
PUBLIC WORKS DEPARTMENT	DATE

SHEET 6 — CITY of VISTA — OF 6

ZC, TSM, SDP: P21-0130
OWNER: ZORAN DJORDJEVICH PHONE:
ADDRESS: 551 LYNWOOD DRIVE ENCINITAS, CA 92024
ARCHITECT, ENGINEER OR DESIGNER: PASCO LARET SUITER & ASSOCIATES, INC. PHONE: 949-661-6695
ADDRESS: 27127 CALLE ARROYO, SUITE 1904 SAN JUAN CAPISTRANO, CA 92675
TYPE OF DEVELOPMENT: 15 LOTS
EXIST. ZONE: E-1 | PROP. ZONE: R-1 | APN(S): 166-184-10, 166-183-17, 166-184-09

SITE DATA AREA (SQ. FT.)		COVERAGE %	DWELLING	UNITS	COMMON OPEN SPACE PROVIDED	REQUIRED
LOT:	740,084	100%	1 BDRM			
BLDG:	19,320	3%	2 BDRM	-		
PARKING/PVMT:	32,517	4%	3 BDRM	7	PRIVATE OPEN SPACE	
LANDSCAPE:	688,247	93%	4 BDRM	8	PROVIDED	REQUIRED
			TOTAL UNITS	15		

PARKING		ORD. REQ.			DRIVEWAY (SIZE & SLOPE)		SETBACKS	
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