Draft

TWIN PINES PARK STORMWATER DETENTION BASIN PROJECT

Draft EIR

Prepared for
The City of Belmont

May 2024

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Acronyms and Other Abbreviations

AB	Assembly Bill
ac-ft	acre-feet
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
air quality plan	2017 Bay Area Clean Air Plan
ARDRR	Archaeological Resources Data Recovery Report
ARDRTP	Archaeological Resources Data Recovery and Treatment Plan
BAAQMD	Bay Area Air Quality Management District
Basin Plan	San Francisco Bay Basin Water Quality Control Plan
BCWMP	2019 Belmont Creek Watershed Management Plan
BP	before present
bgs	below ground surface
BMPs	best management practices
CAA	Clean Air Act
CAAQS	California ambient air quality standards
CalEEMod	California Emissions Estimator Model
California Register	California Register of Historical Resources
CAP	Climate Action Plan
CARB	California Air Resources Board
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CGP	Construction General Permit
CHRIS	California Historical Resources Information System
cm	centimeter
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society’s
CRLF	California red-legged frog
CRMP	Cultural Resources Monitoring Plan
CRMR	Cultural Resources Monitoring Report
CRPR	California Rare Plant Rank
CO	carbon monoxide
CO_2	carbon dioxide

CWA	Clean Water Act
DBH	diameter at breast height
DPM	diesel particulate matter
EIR	environmental impact report
EPA	U.S. Environmental Protection Agency
ESA	Environmental Science Associates
FEMA	Federal Emergency Management Agency
FESA	Federal Endangered Species Act
General Plan	The City of Belmont General Plan
GHG	greenhouse gas
HRA	health risk assessment
HSC	California Health and Safety Code
LTS	less than significant
LTSM	less than significant with mitigation
MBTA	Migratory Bird Treaty Act
MEI	maximally exposed individual
MLD	Most Likely Descendant
MRP	Municipal Regional Permit
Muwekma	Muwekma Ohlone Tribe of the San Francisco Bay Area
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
National Register	National Register of Historic Places
NFIP	National Flood Insurance Program
NI	no impact
NOP	Notice of Preparation
NPDES	National Pollutant Discharge Elimination System
NPPA	Native Plant Protection Act
NO_x	nitrogen oxides
NO_2	nitrogen dioxide
NWPT	northwestern pond turtle
OSHA	Occupational Safety and Health Administration
PM	particulate matter
Porter-Cologne Act	State of California’s Porter-Cologne Water Quality Control Act
PRC	California Public Resource Code
Program	Cultural Resources Awareness and Sensitivity Training Program
Project	Twin Pines Park Stormwater Detention Basin Project

Restoration Project	Twin Pines Park Belmont Creek Restoration Project
ROG	reactive organic gases
RWQCB	Regional Water Quality Control Board
SFBAAB	San Francisco Bay Area Air Basin
SFGS	San Francisco garter snake
SIP	State Implementation Plan
SLF	Sacred Lands File
SMAQMD	Sacramento Metropolitan Air Quality Management District
SMCWPPP	San Mateo Countywide Pollution Prevention Program
SO_2	sulfur dioxide
SU	significant and unavoidable
SWPPP	Stormwater Pollution Prevention Plan
TACs	toxic air contaminants
Tribes	California Native American Tribes
the City	The City of Belmont
USFWS	U.S. Fish and Wildlife Service
WDRs	waste discharge requirements

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EXECUTIVE SUMMARY

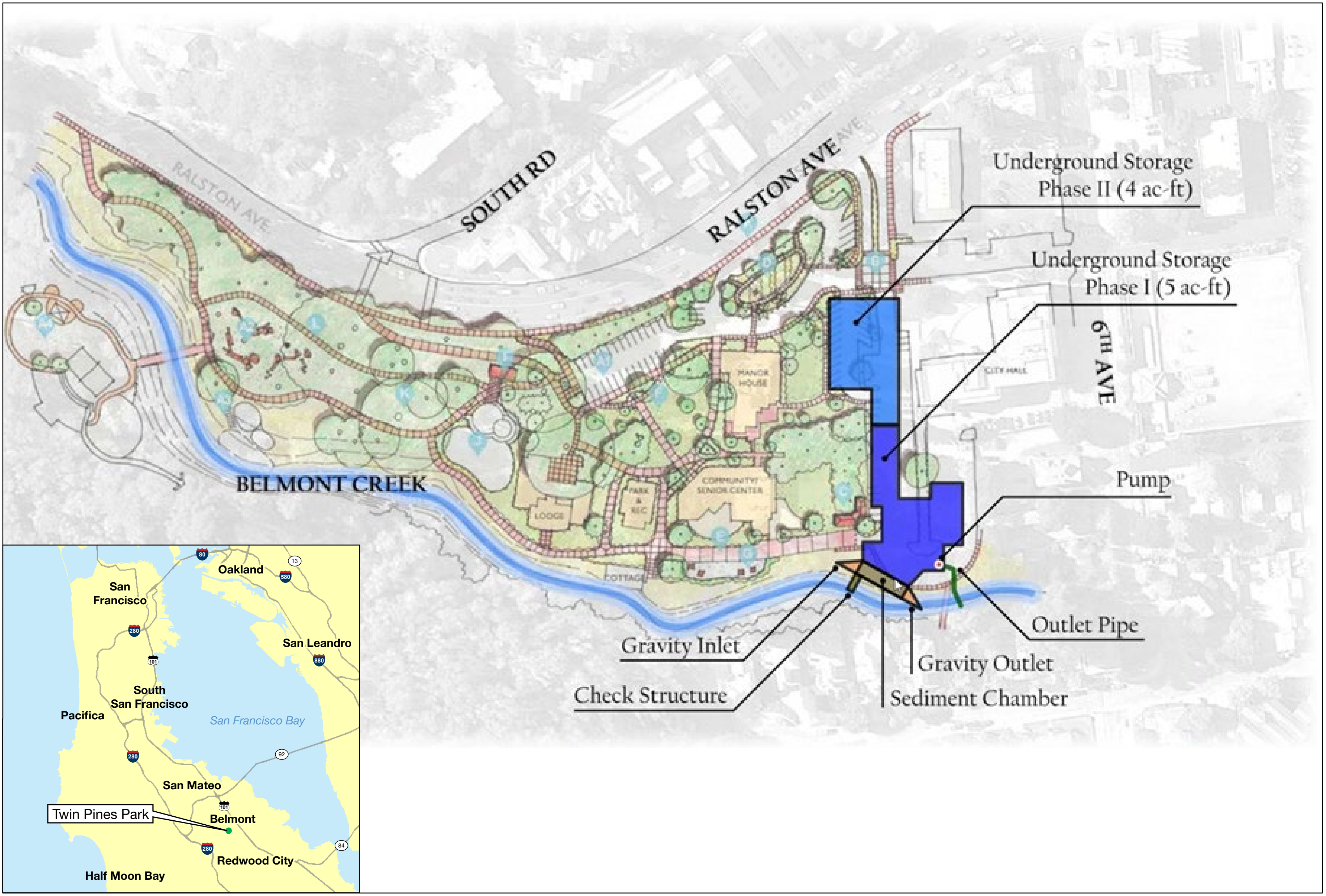
ES.1 Introduction

This environmental impact report (EIR) has been prepared by the City of Belmont (the City) in conformance with the provisions of the California Environmental Quality Act (CEQA) and the CEQA *Guidelines*. The City serves as the lead agency for development of the EIR for the proposed Twin Pines Park Stormwater Detention Basin Project (Project), with input and coordination provided by other agencies and local jurisdictions. The City has determined that the Project could cause significant environmental impacts, and that preparation of an EIR is warranted. Pursuant to CEQA *Guidelines* Section 15161, this is a project-level EIR. The City has prepared this EIR to provide information about the Project's potential effects on the environment to the public and responsible and trustee agencies reviewing the Project. This EIR describes the potential environmental impacts that could result from implementation of the Project, identifies mitigation measures for reducing impacts to less-than-significant levels where feasible, and evaluates alternatives to the Project.

ES.2 Background

Belmont Creek serves as an integral part of the Belmont community. The Belmont Creek watershed encompasses approximately 1,900 acres, originates at an elevation of 700 feet from Pulgas Ridge, and has three substantial tributaries, one near Carlmont Drive, one near Alameda de las Pulgas, and one near University of Notre Dame de Namur, as shown on **Figure ES-1**. The creek serves as a major storm drainage collector for the City of Belmont, City of San Carlos, and San Mateo County. Portions of the creek are on private property without an easement. The watershed's channel includes areas with vegetated channel banks, rock lining, concrete-rubble lining, concrete lining, and concrete culverts (Wood Rodgers, 2023).

Regional flooding in the watershed historically occurs downstream of El Camino Real, where the creek enters the flat, tidally influenced Harbor/Industrial Area before discharging into Belmont Slough. The downstream portion of the creek was designed to convey a 10-year storm; however, due to sedimentation in the downstream channel, more frequent events currently exceed the capacity of the system downstream.



SOURCE: Craftwater, 2023

Twin Pines Park Stormwater Detention Basin Project

Figure ES-1
Project Location and Components

ES.3 Project Objectives

The overarching purpose of the Project is to provide flood protection for nearby properties while maintaining habitat and natural surface water features. The Project objectives are to develop a reasonable and cost effective project that:

- Reduces downstream flooding and maximizes flood protection in the Lower Belmont Creek watershed;
- Reduces erosion and prevent failure of stream banks;
- Reduces downstream sedimentation and need for dredging;
- Minimizes disruption and damage to public and private landowners; and
- Improves water quality through pollutant capture and removal.

ES.4 Project Description

ES.4.1 Project Location and Proposed Components

Chapter 2 of this EIR presents the Project Description. Twin Pines Park is located at 1 Twin Pines Lane in Belmont, California (see **Figure ES-1** for location). An overview of Twin Pines Park is depicted in **Figure ES-2.** The Project components, shown in **Figure ES-3**, are to construct an underground stormwater detention facility at Twin Pines Park and are described below:

Underground Stormwater Storage Facility. The City would construct a 9-acre-foot below-ground stormwater storage facility under the Twin Pines Park parking lot off the main Belmont Creek channel. The underground stormwater storage facility would be constructed in two phases. The first phase, constructed closer to Belmont Creek, would store up to 5 acre-feet of water. The second phase would add storage for up to an additional 4 acre-feet of water. The facility would be 1.6 acres in size and its ceiling would be approximately 2 to 4 feet below the current parking lot surface. The bottom of the facility would be approximately 16 to 18 feet below the ground surface (at elevation 32.5 feet NAVD88).[1] Water in the storage facility above elevation 36 feet would drain from the storage facility through an outlet pipeline (described below) by gravity. To drain the remaining water between 34 and 38.9 feet, the storage facility would include a sump pump with capacity to pump 318 gallons per minute (0.71 cubic feet per second). The electric sump pump would drain the storage facility within 72 hours.

High Flow Diversion Weir. A 40-foot-wide diversion weir would allow high flows from Belmont Creek to pass into the proposed stormwater basin. The diversion weir would be constructed along the creek bank and parallel to the direction of creek flow. The diversion weir would likely consist of four 10-foot-wide electric tilting weir gates that would allow the weir crest elevations to be set at different levels for different sized storm events. The tilting weir gate would provide a flexible and adaptable design to modulate the weir crest elevation by up to 6 feet vertically.

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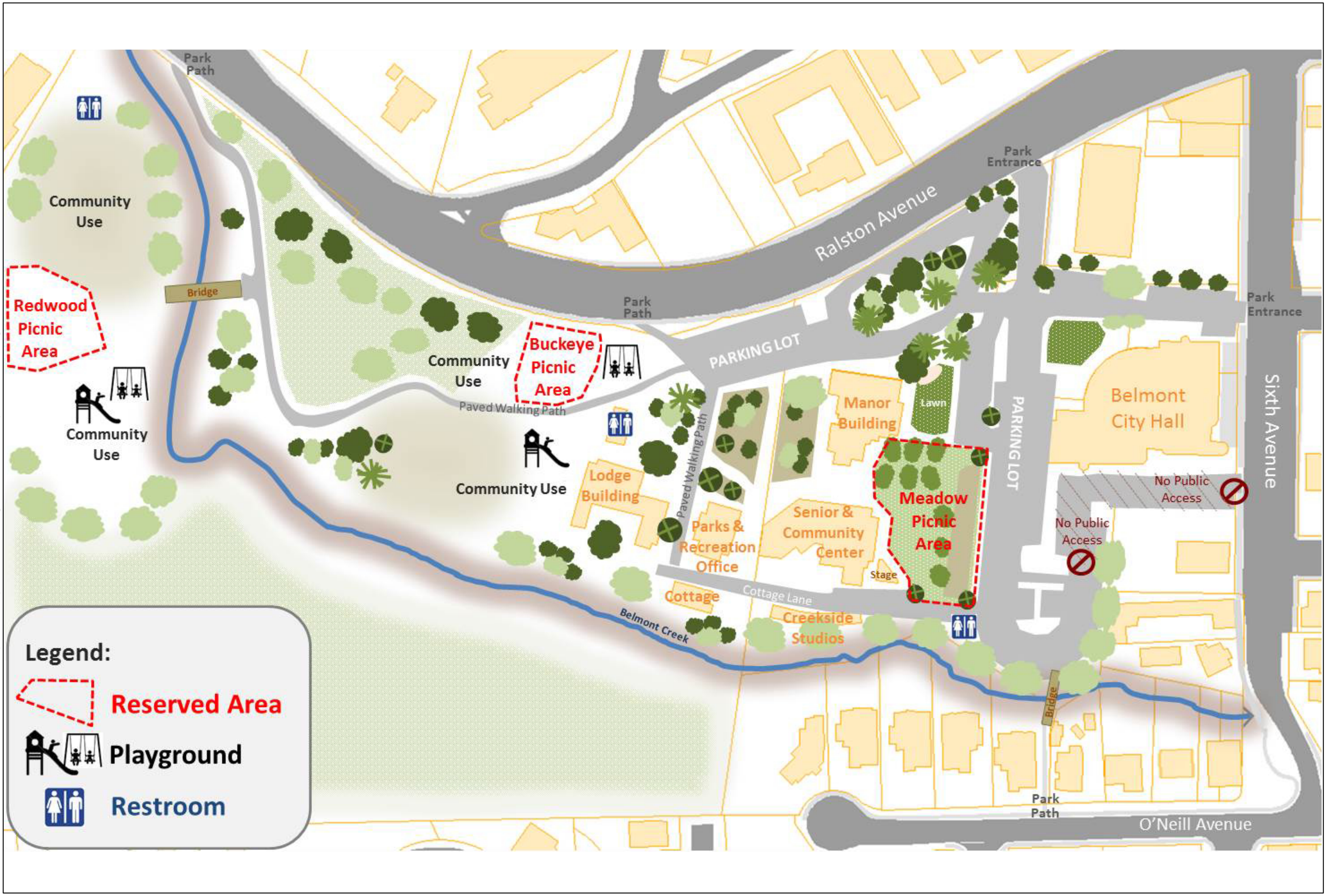
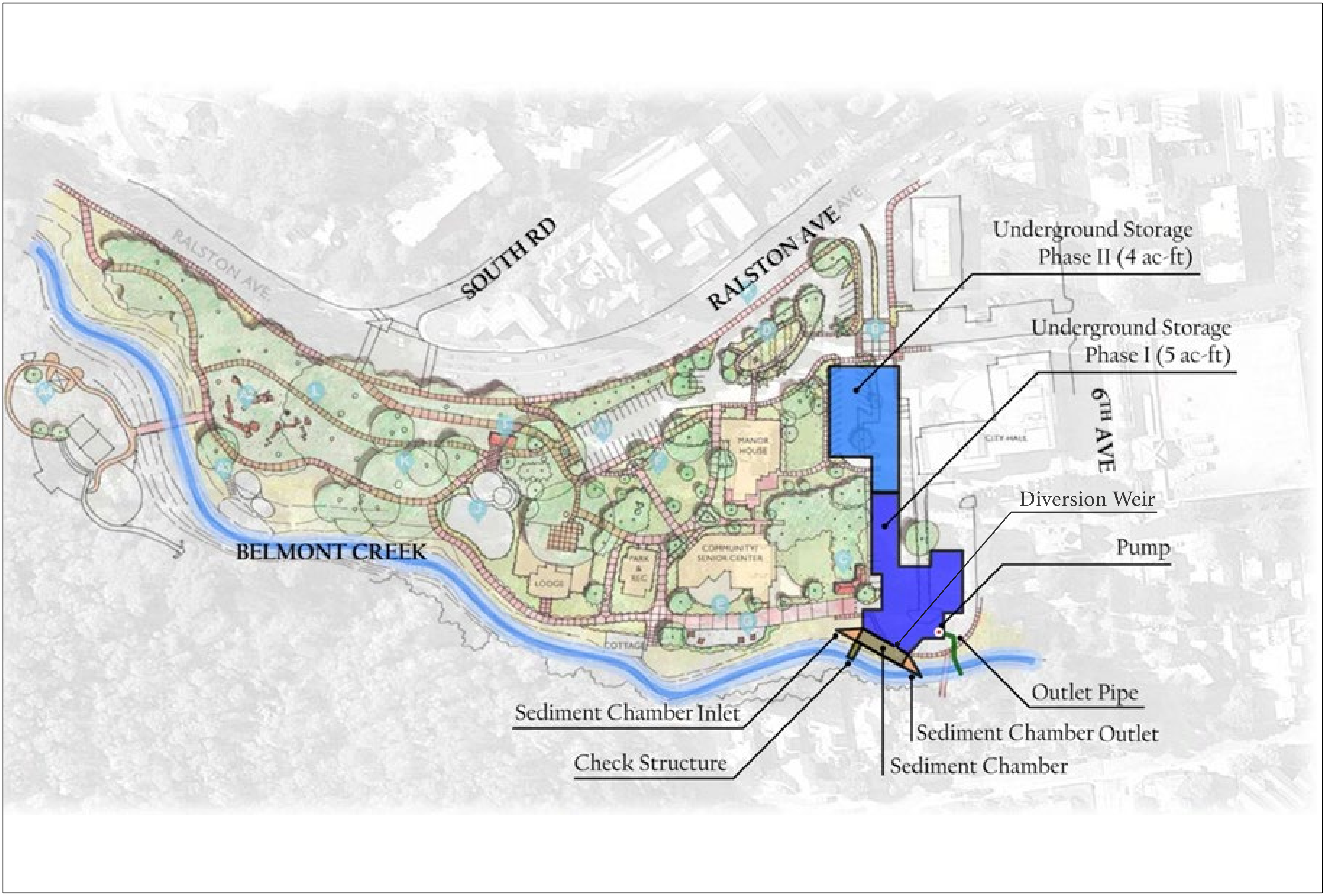
[1] North American Vertical Datum of 1988. All subsequent elevations reported in this chapter are provided in NAVD88 unless otherwise noted.



SOURCE: City of Belmont

Twin Pines Park Stormwater Detention Basin Project

Figure ES-2
Twin Pines Park



SOURCE: Craftwater, 2023

2021\D202101220.00 - Twin Pines Park Storm Water Capture\05 Graphics-GIS-Modeling-USE AZURE\05 Graphics-GIS-Modeling\Illustrator

Twin Pines Park Stormwater Detention Basin Project

Figure ES-3
Project Components

ESA

Sediment Chamber. Between the creek and the high flow diversion weir, the City would construct a sediment chamber designed to capture coarse sediment prior to stormflows passing over the weir and into the storage facility. The sediment chamber would be sized to capture approximately 200 cubic yards of coarse sediment, and would be maintained by removing sediment on an as needed basis. The chamber would be approximately 65 feet long, 17 feet wide, and 5 feet deep.

Bank Stabilization. Concrete retaining walls would be constructed along the northern bank of Belmont Creek at the upstream and downstream ends of the sediment chamber to prevent structure undermining and provide channel stability. The toe of the retaining walls would extend to 6 feet below the thalweg[2] elevation in the vicinity of the sediment chamber. Approximately 120 linear feet of bank stabilization consisting of riprap would be placed along the southern bank of Belmont Creek starting near the upstream concrete retaining wall.

In-Steam Check Structure. A 6-foot-high stone or reinforced concrete check structure spanning the width of Belmont Creek (approximately 40 feet) would increase water surface in-stream and direct water and sediment into the sediment chamber inlet. The check structure would be designed to overtop above the 2-year peak flow. If constructed with stone, the check structure would consist of riprap with a median size greater than 14 inches.

Outlet Pipe. A 12-inch diameter outlet pipe would connect the basin to Belmont Creek downstream of the check structure and the pedestrian bridge and would be sized to allow the detention facility to drain within 72 hours when full. The downstream end of the outlet pipe would include a duckbill valve to prevent sediment or high tailwater[3] in Belmont Creek from entering the pipe. Riprap would be placed along the creek bank at the downstream end of the outlet pipe to prevent scour during outlet pipe operations.

Flood Reduction. The Project would reduce the size of the floodplain in Lower Belmont Creek, upstream of the culvert under US 101, from 120.5 acres to 111 acres during a large flood (an event with a 1 percent chance of occurring in any given year). The Project would also reduce the floodplain area during more frequent events.

ES.4.2 Construction

Construction is expected to begin in May 2025 and is expected to occur over two years until April 2027. Details (e.g., construction techniques, hours, work force, equipment, staging areas, traffic routing) are presented in Section 2.5 of Chapter 2, *Project Description*.

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[2] A stream thalweg is the conceptual line joining the lowest points of successive cross sections along the stream channel.

[3] Tailwater refers to waters located immediately downstream from a hydraulic structure, such as a dam, spillway, bridge, or culvert.

ES.4.3 Operations and Maintenance

Key aspects of proposed operations and maintenance include the following:

- ***Maintenance of the underground storage facility.*** This would include regular inspection and periodic sediment removal from the sediment chamber during the dry season to maintain capacity. The amount of sediment removed during routine (likely annual) maintenance would vary depending on storm events and sediment moving through the creek each year but is estimated to be approximately 200 cubic yards on average. Removed sediment would be hauled to a site within San Mateo County for beneficial reuse or to Ox Mountain Landfill.

- ***Proposed Infrastructure Operations.*** The Project would not require new employees to operate the proposed infrastructure because Department of Public Works staff would perform regular maintenance such as sediment removal using City-owned vacuum trucks on an as needed basis. Pacific Gas & Electric would provide electricity to the site to power the motors that control the weirs and the sump pump. The motors are anticipated to operate for less than one hour per week. No emergency generators would be used, and no permanent on-site lighting would be installed.

Refer to Section 2.6 of Chapter 2, *Project Description* for more information on proposed operations and maintenance.

ES.5 Summary of Project Impacts and Mitigation Measures

Chapter 3 of this EIR presents the environmental impacts analyses for several resource areas consistent with CEQA *Guidelines* Appendix G. For each resource area, the impact analysis describes the environmental and regulatory setting, identifies significance criteria used in the analysis, evaluates potential physical effects of the Project on both a project and cumulative basis, and provides feasible mitigation measures that would reduce the severity of significant impacts.

Table ES-1 summarizes all impacts identified for the Project in this EIR, lists the significance determination for each impact, and presents the full text of the mitigation measures identified to avoid, reduce, or otherwise lessen significant impacts. As shown in the table, although most of the impacts were determined to be less than significant or could be mitigated to less-than-significant levels, Project implementation was determined to result in significant and unavoidable impacts for tribal cultural resources.

ES.6 Alternatives to the Proposed Project

Chapter 5 presents the CEQA alternatives analysis for the Project. This chapter describes the methodology used to screen and select feasible alternatives that could avoid or substantially lessen the significant impacts identified for the Project while still meeting most of the Project objectives. The alternatives selected for evaluation in Chapter 5, *Alternatives* include:

1. **Alternative 1 – No Project.** This alternative describes conditions that would generally be expected to occur without implementation of the Project.

2. **Alternative 2 – Hidden Canyon Park**. The Hidden Canyon Park detention basin consists of approximately 4.14 acre feet of storage accomplished by replacing an existing 60-inch reinforced concrete pipe and installing an 18-inch outfall pipe and an emergency overflow structure. The 27,300-square-foot underground detention basin requires 9,100 cubic yards of excavation, along with landscaping and surface restoration.

3. **Alternative 3 – Norte Dame Belmont High School Softball Field.** The Notre Dame Belmont High School softball field detention basin consists of approximately 11.12 acre feet of storage, a 24-inch inlet and outlet pipes, and an emergency overflow structure. The 102,840-square-foot underground detention basin requires 38,089 cubic yards of excavation, along with softball field-specific surface improvements.

4. **Alternative 4 – Norte Dame de Namur Soccer Field.** The Notre Dame de Namur soccer field detention basin consists of approximately 8.77 acre feet of storage, a 24-inch inlet and outlet pipes, and an emergency overflow structure. The 72,000-square-foot underground detention basin requires 26,667 cubic yards of excavation, along with soccer field-specific surface improvements.

5. **Alternative 5 – Carlmont High School Softball Field.** The Carlmont High School softball field detention basin consists of approximately 13.08 acre feet of storage, a 24-inch and outlet pipes, and an emergency overflow structure. The 131,574-square-foot underground detention basin requires 38,985 cubic yards of excavation, along with softball field-specific surface improvements.

Refer to Chapter 5, *Alternatives*, for more information.

TABLE ES-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Significance Determination	Mitigation Measure
Air Quality and Greenhouse Gas Emissions, EIR Section 3.2		
Impact AIR-1: Conflict with or obstruct implementation of the applicable air quality plan.	LTSM	**Mitigation Measure AIR-1: Implement BAAQMD's Basic and Enhanced Best Management Practices for Construction-Related Fugitive Dust Emissions** During Project construction, the construction contractor shall reduce construction-related fugitive dust (PM_{10} and $PM_{2.5}$) by implementing BAAQMD's basic best management practices for construction-related fugitive dust emissions at all construction and staging areas. The following measures are based on BAAQMD's 2022 CEQA guidelines. The construction contractor shall comply with the following: • All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day. • All haul trucks transporting soil, sand, or other loose material offsite shall be covered. • All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping shall be prohibited. • All vehicle speeds on unpaved roads, driveways, or driving surfaces shall be limited to 15 mph. • All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used. • All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph. • All trucks and equipment, including their tires, shall be washed off prior to leaving the site. • Unpaved roads providing access to sites located 100 feet or further from a paved road shall be treated with a 6- to 12-inch layer of compacted wood chips, mulch, or gravel. • Publicly visible signs shall be posted with the telephone number and name of the person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The BAAQMD's General Air Pollution Complaints number shall also be visible to ensure compliance with applicable regulations. • Limit the simultaneous occurrence of excavation, grading, and ground-disturbing construction activities. • Install wind breaks (e.g., trees, fences) on the windward side(s) of actively disturbed areas of construction. Wind breaks should have at maximum 50 percent air porosity. • Plant vegetative ground cover (e.g., fast-germinating native grass seed) in disturbed areas as soon as possible and watered appropriately until vegetation is established. • Install sandbags or other erosion control measures to prevent silt runoff to public roadways from sites with a slope greater than one percent. • Minimize the amount of excavated material or waste materials stored at the site. • Hydroseed or apply non-toxic soil stabilizers to construction areas, including previously graded areas, that are inactive for at least 10 calendar days.

SU = Significant and Unavoidable with Mitigation LTSM = Less than Significant with Mitigation LTS = Less than Significant NI = No Impact

IMPACT	Significance Determination	Mitigation Measure
Impact AIR-2: 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.	LTSM	**Mitigation Measure AIR-1: Implement BAAQMD's Basic and Enhanced Best Management Practices for Construction-Related Fugitive Dust Emissions**
Impact AIR-3: Expose sensitive receptors to substantial pollutant concentrations.	LTSM	**Mitigation Measure AIR-2: Require Tier 4 Engines on Construction Equipment** The construction contractor shall be required, as a condition of contract, to further reduce construction-related exhaust emissions by ensuring that all off-road equipment operating for more than 20 total hours over the entire duration of construction activities shall operate on EPA-approved Tier 4 Final or newer engines. Exemptions can be made for specialized equipment where Tier 4 engines are not commercially available within 200 miles of the Project site. The construction contract must identify these pieces of equipment, document their unavailability, and ensure that they operate on no less than an EPA-approved Tier 3 engine. CARB regulations will result in an increasing percentage of Tier 4 engines in the construction equipment fleet over the next several years.
Impact AIR-4: Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.	LTS	No mitigation required.
Impact AIR-5: Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.	LTS	No mitigation required.
Impact AIR-6: Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.	LTS	No mitigation required.
Biological Resources, EIR Section 3.3		
Impact BIO-1: Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.	LTSM	**Mitigation Measure BIO-1: Worker Awareness Environmental Training** Prior to construction, a qualified biologist shall provide worker awareness environmental training to inform construction personnel about protected biological resources, including special-status species, their habitat, legal protections, and wetlands and waters of the U.S. and/or State. The training shall include photos of special-status species to aid in identification, the qualified biologist's contact information, and the City's point of contact. All construction personnel must undergo this training prior to working on the Project and a sign-in sheet shall be maintained to keep a record of those trained. **Mitigation Measure BIO-2: Pre-Construction Survey for Special Status Plants** A qualified biologist shall conduct appropriately timed bloom surveys to identify any special-status plant species (bent-flowered fiddleneck and western leatherwood) that may occur within the Project site. The optimal identification window for bent-flowered fiddleneck is March through June while the window for western leatherwood is November through March (perennial and identifiable year-round). If a special-status plant is observed during the survey, a 10-foot buffer shall be placed around the plant for the construction contractor to avoid during construction. The biologist shall prepare a report of the special-status plant species survey and provide it to the Project lead engineer at the City.

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IMPACT	Significance Determination	Mitigation Measure
		If impacts to special-status plant species cannot be avoided, a restoration and mitigation plan would be prepared to provide plant salvage and relocation consistent with CDFW guidance. At a minimum, the plan shall include collection of reproductive structures from affected plants, a full description of microhabitat conditions necessary, seed germination requirements, assessments of potential transplant and enhancement sites, success and performance criteria, and monitoring programs, as well as measures to ensure long-term sustainability. The following considerations shall be met: a. Prior to unavoidable and permanent disturbance to a population of a special-status plant species, propagules shall be collected from the population to be disturbed. This may include seed collection or cuttings, and these propagules shall be used to establish a new population in or near the Project site. Transplantation may be attempted but shall not be used as the primary means of plant salvage and new population creation, because for many local rare plant species, seeding may provide a better option to establish annual species. Irrigation shall be provided as necessary to ensure survival of new plantings. b. A minimum 5-year monitoring plan with adaptive management shall be implemented to document the success of new plant populations. Adequate assurances shall be provided to ensure long-term protection and management of lands to promote established rare plant populations. Success criteria for seeded or transplanted populations shall include at least 75 percent survival of salvaged or relocated plants after 5 years, a similar number of new plants (by area and numbers) to the impacted population, and minimal presence of invasive weeds at planting locations. **Mitigation Measure BIO-3: Wildlife Exclusion Fencing** To prevent special-status species from entering the work area, the construction contractor shall install a multi-purpose protective barrier (such as silt fencing) at the upstream and downstream boundaries of the Project work site adjacent to suitable wildlife habitat. If special-status species are found during pre-construction surveys, a qualified biologist shall oversee the fence installation. The fence shall be a minimum of 3 feet above ground surface with an additional 4 to 6 inches of fence material buried such that species cannot crawl under the fence. If a portion of the fence cannot be buried, it shall be continuously weighed down with sand or gravel bags. Fence installation shall occur within one day of any protected species relocation or within three days of pre-construction survey where protected species are determined to be absent, whichever occurs first. • No equipment mobilization, grading, clearing, or storage of equipment or machinery, or similar activity shall occur at the Project site until a qualified biologist has inspected and approved the wildlife exclusion fencing; and • The City of Belmont shall ensure that the fencing is continuously maintained until all construction is complete. **Mitigation Measure BIO-4: Pre-Construction Surveys for Special-status Bats** Prior to any tree removal and the start of any construction activities expected to commence during the breeding season for special-status bat species (April 15 to August 31) or the winter torpor period (October 15 to February 28), a qualified biologist shall conduct a pre-construction survey to determine whether active roosts are present on site or within 100 feet of the Project work site. Areas adjacent to the Project site that are inaccessible due to private property restrictions shall be surveyed using binoculars from the nearest vantage point. If no roosting bats are found, then no further mitigation is required and the biologist shall submit a letter report to the City summarizing the survey results. If at any time during the roosting season construction stops for a period of two weeks or longer, pre-construction surveys shall be conducted prior to resuming construction. If roosting bats are found, the construction contractor shall avoid construction within 100 feet of the roost until breeding season or winter torpor is complete and a qualified biologist confirms bats are absent. **Mitigation Measure BIO-5: Pre-Construction/Activity Surveys for Common Nesting Birds** If construction or operational (e.g., active maintenance) activities begin during the avian nesting season (February 1 to September 15), a qualified biologist shall be retained by the City to conduct a pre-construction/activity survey for active nests in suitable nesting habitat within 500 feet of the construction and/or operation limits for nesting raptors and migratory birds. Areas adjacent to the work area that are inaccessible due to private property restrictions shall be surveyed using binoculars from the nearest vantage point. The survey shall be conducted by a qualified biologist no more than seven days prior to the onset of

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IMPACT	Significance Determination	Mitigation Measure
		construction or operational activity. If no active nests are identified during the pre-construction/activity survey, no further mitigation is necessary. If construction or operational activities begin prior to February 1, it is assumed that no birds would nest in the Project construction or operation area during active construction/operational activities and no pre-construction/activity surveys are required. If at any time during the nesting season construction or operational activities stop for a period of two weeks or longer, pre-construction/activity surveys shall be conducted prior to construction or operational activities resuming. If active nests are found during the survey, the City shall implement active nest protection measures to ensure that the nests would not be adversely affected, which would include establishing a no-work buffer zone around the active nest. Active nest protection measures shall include, but not be limited to: • If active nests are found on or within 500 feet of the Project construction or operation limits, then the qualified biologist shall establish no-disturbance buffers for active nests of 250 feet for migratory non-raptor species and 500 feet for raptor species until the breeding season has ended or until a qualified biologist has determined that the birds have fledged and are no longer reliant upon the nest or parental care for survival. • Depending on conditions specific to each nest, and the relative location to proposed construction or operational activities, it may be feasible for construction or operational activities to occur as planned within the buffer without impacting the breeding/nesting effort. In this case (to be determined on a case-by-case basis), the nest(s) shall be monitored by a qualified biologist during any construction or operational activities within the buffer. If, in the professional opinion of the monitor, the Project would impact the nesting birds or young, the biologist shall immediately inform the construction or maintenance manager and the City, who shall stop construction or operational activities within the buffer until the nest is no longer active or a new buffer distance is agreed upon based on the biologist's recommendations. Completion of nesting and fledging activities shall be determined by the qualified biologist. • If construction or operational activities begins outside of the breeding season (February 1 through September 15), then the City is permitted to continue construction or operational activities throughout the breeding season.
Impact BIO-2: Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service or on state or federally protected wetlands through direct removal, filling, hydrological interruption, or other means.	LTSM	**Mitigation Measure BIO-6: Compensation of Affected Riparian Habitat** The City shall retain a qualified botanist, biologist, restoration ecologist, or landscape architect to develop a riparian habitat mitigation and monitoring plan. At a minimum, the City shall compensate impacted riparian areas at a ratio no less than 3:1 (compensation area to impact area) per CDFW policy. Compensation may occur in the form of on- or off-site (along adjacent reaches of Belmont Creek) restoration or enhancement by planting riparian vegetation and subsequent monitoring to ensure success is ultimately achieved. Monitoring shall occur for at least 5 years over the course of a 10-year timeline. The final mitigation ratio shall be determined in consultation with CDFW during the process of obtaining the necessary regulatory permits. At a minimum, success criteria shall include 75% coverage by native riparian species and 70% survival of restoration/enhancement plantings as compared to reference sites nearby by the end of the total 10-year timeline. Once the final mitigation ratio is determined and the mitigation and monitoring plan finalized through consultation between the City and CDFW, the City shall implement riparian restoration and enhancement within one year of Project-related impacts. The City shall retain a qualified botanist, biologist, restoration ecologist, or landscape architect to conduct routine monitoring per the mitigation and monitoring plan and evaluate its success. If success is achieved at the end of the monitoring period, no further action is necessary.

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IMPACT	Significance Determination	Mitigation Measure
Impact BIO-3: Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.	LTSM	**Mitigation Measure BIO-6: Compensation of Affected Riparian Habitat** **Mitigation Measure BIO-7: No Net Loss of Waters of U.S. and/or State** The City shall retain a qualified hydrologist, landscape architect, or biologist to develop a wetland mitigation and monitoring plan as a part of the permitting process, which shall include enhancement of Belmont Creek upstream of the Project site to improve physical conditions and stability, monitoring success criteria, annual monitoring intervals and duration (for at least 3 years), and adaptive management options. Mitigation may occur in the form of restoration, enhancement, or creation and shall be implemented within one year of Project-related impacts on waters of the U.S. and/or State to avoid temporal loss of wetland and other water functions and values. The exact mitigation ratio shall be determined in consultation with the applicable permitting agencies, which may include USACE, CDFW, and/or RWQCB. At a minimum, the City shall compensate permanently impacted waters at a ratio no less than 1:1 per USACE and State no net loss policy.
Impact BIO-4: 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.	LTS	No mitigation required.
Impact BIO-5: Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.	LTSM	**Mitigation Measure BIO-1: Worker Awareness Environmental Training** **Mitigation Measure BIO-2: Pre-Construction Survey for Special Status Plants** **Mitigation Measure BIO-3: Wildlife Exclusion Fencing** **Mitigation Measure BIO-4: Pre-Construction Surveys for Special-status Bats** **Mitigation Measure BIO-5: Pre-Construction/Activity Surveys for Common Nesting Birds**
Impact BIO-6: Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.	NI	No mitigation required.
Cultural Resources, EIR Section 3.4		
Impact CUL-1: Cause a substantial adverse change in the significance of a historical resource pursuant to CEQA *Guidelines* Section 15064.5.	NI	No mitigation required.
Impact CUL-2: Cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA *Guidelines* Section 15064.5.	LTSM	**Mitigation Measure CUL-1: Development and Implementation of an Archaeological Resources Data Recovery and Treatment Plan** A qualified archaeologist, defined as one meeting the Secretary of the Interior's Professional Qualifications Standards for Archeology and with experience in California archaeology, in coordination with the Muwekma Ohlone Tribe of the San Francisco Bay Area (Muwekma) and the City, shall prepare and implement an Archaeological Resources Data Recovery and Treatment Plan (ARDRTP) for the Project and, specifically, P-41-000152. The ARDRTP shall be approved by the City at least 60 days prior to Project construction. The ARDRTP shall be heavily based on Muwekma's MLD treatment recommendations and shall include and require the following:

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IMPACT	Significance Determination	Mitigation Measure
		• **Research Design:** The ARDRTP shall outline the applicable cultural context for P-41-000152, within a regional context, identify research goals and questions that are applicable to P-41-000152, and list the data needs (types, quantities, quality) required to answer each research question. The research design shall address all four California Register Criteria (1 to 4) and identify the methods that will be required to inform treatment, such as subsurface investigation, documentary/archival research, and/or oral history. • **Data Recovery Plan:** The ARDRTP shall outline the field and laboratory methods to be employed, and any specialized studies that will be conducted, as part of the data recovery effort. These methods will likely include controlled volume archaeological excavations and artifact/feature analyses. The latter will be dependent on the specific archaeological material encountered but will likely include osteological analyses, faunal analyses, flaked-stone and ground-stone analyses, and radiocarbon dating, among others. • **Protocols for Native American Monitoring and Input:** The ARDRTP shall outline the role and responsibilities of Native American Tribal representatives. It shall include communication protocols and an opportunity and timelines for review of the ARDRR. The ARDRTP shall include provisions for full-time Native American monitoring during field work (see Mitigation Measure CUL-2). • **Cultural Resources Monitoring Plan:** The Cultural Resources Monitoring Plan shall outline the archaeological and Native American monitors responsibilities and requirements, communications protocol, treatment protocol, and reporting requirements (see Mitigation Measure CUL-2). • **Security Measures:** The ARDRTP shall include recommended security measures to protect P-41-000152 from vandalism, looting, and non-intentionally damaging activities during field work. • **Procedures for Treatment of Human Remains and Associated Funerary Objects:** The ARDRTP shall outline the protocols and procedures to be followed for treatment of human remains and associated funerary objects. These shall include stop-work and protective measures, notification protocols, and compliance with HSC Section 7050.5, PRC Section 5097.98. • **Curation Requirements:** The ARDRTP shall stipulate the protocol and specifics for curation of archaeological materials. Disposition of Native American archaeological materials and human remains shall be determined through consultation between the qualified archaeologist, Muwekma, and the City. Any significant non-indigenous archaeological materials shall be curated at a repository accredited by the American Association of Museums that meets the standards outlined in Code of Federal Regulations Title 36 Section 79.9. If no accredited repository accepts the collection, then it may be curated at a non-accredited repository as long as it meets the minimum standards set forth by 36 Code of Federal Regulations Section 79.9. If neither an accredited nor a non-accredited repository accepts the collection, then it may be offered to a public, non-profit institution with a research interest in the materials, or donated to a local school or historical society in the area for educational purposes, to be determined by the qualified archaeologist in consultation with Muwekma and the City. • **Reporting Requirements:** Upon completion of data recovery for P-41-000152, the qualified archaeologist shall document the findings in an Archaeological Resources Data Recovery Report (ARDRR), whose development shall include participation and approval by Muwekma. The draft ARDRR shall be submitted to the City within 360 calendar days after completion of the data recovery, including laboratory analysis, and the final ARDRR shall be submitted to the City within 60 days after the receipt of City comments. The ARDRR shall meet the Secretary of the Interior's Standards for archaeological technical reporting and shall be submitted to the Northwest Information Center upon approval by the City unless the document contains information that any California Native American Tribes involved in its development determine should not be filed with the Northwest Information Center, in which case the report shall be submitted to the California Native American Heritage Commission. **Mitigation Measure CUL-2: Development and Implementation of a Cultural Resources Monitoring Plan** A qualified archaeologist, defined as one meeting the Secretary of the Interior's Professional Qualifications Standards for Archeology and with experience in California archaeology, in coordination with the Muwekma Ohlone Tribe of the San Francisco Bay Area (Muwekma) and the City, shall prepare and implement a Cultural Resources Monitoring Plan (CRMP) based on the

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IMPACT	Significance Determination	Mitigation Measure
		final approved Project design. The CRMP shall be a component of the Archaeological Resources Data Recovery and Treatment Plan (see Mitigation Measure CUL-1), which shall be approved by the City at least 60 days prior to Project construction. The CRMP shall include: • **Provisions for Archaeological Monitoring:** The CRMP shall outline the archaeological monitor(s) responsibilities and requirements. • **Provisions for Native American Monitoring and Input:** The CRMP shall outline the Native American monitor(s) responsibilities and requirements. The CRMP shall include provisions for full-time Native American monitoring during field work (see Mitigation Measure CUL-1). • **Procedures for Discovery of Archaeological Resources:** Procedures to be implemented in the event of an archaeological discovery (outside of data recovery; see Mitigation Measure CUL-1) shall be fully defined in the CRMP, and shall include stop-work and protective measures, notification protocols, procedures for significance assessments, and appropriate treatment measures. • **Procedures for Discovery of Human Remains and Associated Funerary Objects:** The CRMP shall outline the protocols and procedures to be followed in the event that human remains and associated funerary objects are encountered during construction (outside of data recovery; see Mitigation Measure CUL-1). These shall include stop-work and protective measures, notification protocols, and compliance with California Health and Safety Code Section 7050.5 and PRC Section 5097.98. • **Curation Requirements:** The CRMP shall stipulate the protocol and specifics for curation of archaeological materials in accordance with the ARDRTP (see Mitigation Measure CUL-1). • **Reporting Requirements:** Upon completion of cultural resources monitoring, the qualified archaeologist shall document the findings in a Cultural Resources Monitoring Report (CRMR), whose development shall include participation and approval by Muwekma. The draft CRMR shall be submitted to the City within 360 calendar days after completion of the construction monitoring, and the final CRMR shall be submitted to the City within 60 days after the receipt of City comments. The CRMR shall meet the Secretary of the Interior's Standards for archaeological technical reporting and shall be submitted to the Northwest Information Center upon approval by the City unless the document contains information that any California Native American Tribes involved in its development determine should not be filed with the Northwest Information Center, in which case the report shall be submitted to the California Native American Heritage Commission. **Mitigation Measure CUL-3: Development and Implementation of a Cultural Resources Awareness and Sensitivity Training Program** A qualified archaeologist, defined as one meeting the Secretary of the Interior's Professional Qualifications Standards for Archeology and with experience in California archaeology, in coordination with the Muwekma Ohlone Tribe of the San Francisco Bay Area and the City, shall prepare and implement a Cultural Resources Awareness and Sensitivity Training Program (Program) for all construction and field workers involved in Project ground-disturbing activities. The Program shall include a presentation that covers, at a minimum, the types of cultural resources common to the area, regulatory protections for cultural resources, and the protocol for unanticipated discovery of archaeological resources and human remains (see Mitigation Measures CUL-1 and CUL-2). Personnel working in areas of Project ground-disturbing activities shall receive the training prior to working in these areas. Written materials associated with the Program shall be provided to Project personnel as appropriate. Documentation of the training attendance shall be maintained by the City. **Mitigation Measure CUL-4: Development and Installation of Public Informational Signage** A qualified archaeologist, defined as one meeting the Secretary of the Interior's Professional Qualifications Standards for Archeology and with experience in California archaeology, in coordination with the Muwekma Ohlone Tribe of the San Francisco Bay Area and the City, shall develop public informational signage with respect to P-41-000152 that shall: further educate the general public about the history and heritage of the California Native American Tribes cultural and geographically associated with

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		the Project area; provide information about the ancestral San Francisco Bay Ohlone–speaking tribal groups that were brought under the sphere of influence of Missions San Francisco, Santa Clara, and San Jose; emphasize the ensuing adverse impacts to California Native Americans through the colonial eras of Spanish and American conquests and destruction; provide non-confidential information obtained through archaeological data recovery of P-41-000152 (see Mitigation Measure CUL-1); and provide a name for P-41-000152 in an Ohlone language. The City shall install, in coordination with the Muwekma and other California Native American Tribes, the signage at or near the Project area, if feasible.
Impact CUL-3: Disturb any human remains, including those interred outside of dedicated cemeteries.	LTSM	**Mitigation Measure CUL-1: Development and Implementation of an Archaeological Resources Data Recovery and Treatment Plan** **Mitigation Measure CUL-2: Development and Implementation of a Cultural Resources Monitoring Plan**
Hydrology and Water Quality, EIR Section 3.5		
Impact HYD-1: Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality.	LTSM	**Mitigation Measure HYD-1: In-Water Construction Measures** To the extent feasible, work below top of bank in Belmont Creek shall be completed during the dry season and when the channel is dry or contains little water. If construction activities must occur in the wetted channel of Belmont Creek, the City shall develop an in-water construction plan consisting of measures that reduce or avoid the release of pollutants into Belmont Creek. The City shall implement the in-water construction plan for the duration of construction activities in Belmont Creek. The in-water construction plan shall include, but not be limited to, the following types of measures: • *In-Water Concrete Use Measures.* Where possible, poured concrete shall be excluded from contact with surface or groundwater during initial curing. During that time, runoff from the concrete shall not be allowed to enter surface or groundwater. If this is not feasible, commercial sealants that are non-toxic to aquatic life shall be applied before poured concrete comes into contact with flowing water. • *Cofferdam Construction Measures.* Construction of cofferdams shall begin in the upstream area and continue in a downstream direction, allowing water to drain from the area being isolated by the cofferdam, prior to closure. Cofferdams and stream diversion systems shall remain in place and be fully functional throughout the construction period. Stream diversions shall be limited to the shortest duration necessary to complete in-water work. In-water cofferdams shall be built in a manner that minimizes siltation and/or turbidity. Where possible, cofferdams shall be pushed into place. When appropriate, cofferdams shall be removed so surface elevations of water impounded above the cofferdam shall not be reduced at a rate greater than one inch per hour. All dewatering/diversion facilities shall be installed such that natural flow is maintained upstream and downstream of Project areas. • *Dewatering Plan.* If dewatering is required to create a dry work area, the area to be dewatered shall encompass the minimum area and be in place for the minimum amount of time necessary to perform construction activities. The City shall prepare a dewatering plan with a description of the proposed dewatering structures, and appropriate types of best management practices for the installation, operation, maintenance, and removal of those structures. The best management practices shall be selected to allow water to flow through or around the dewatered area while avoiding increased stream velocity and preventing scour or turbidity during dewatering and bypass. Water pumped or removed from dewatered areas shall be conveyed in a manner that does not contribute turbidity to nearby receiving waters. If dewatering pumps are required, pumps shall be refueled in an area well away from the stream channel. Upon completion of construction activities, any diversions or barriers to flow shall be removed in a manner that will allow flow to resume with the least disturbance to the channel bed and banks to avoid creating turbidity. • *In-Water Pile Driving Measures.* If in-water pile driving is required, caissons or a continuous length of silt curtain shall be implemented surrounding the pile driving area to provide sediment containment and avoid the release of turbid water during

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		pile driving. The silt curtain will restrict the surface visible turbidity plume to the area of pile construction and will control and contain the migration of re-suspended sediments at the water surface and at depth. • *Bank Stabilization Materials Placement Measures.* Material used for bank stabilization or in-water restoration shall minimize discharges of sediment or other forms of waste. Equipment shall not operate in standing or flowing waters. All materials placed in Belmont Creek shall be nontoxic.
Impact HYD-2: Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin.	LTS	No mitigation required.
Impact HYD-3: Result in substantial erosion or siltation on- or off-site.	LTSM	**Mitigation Measure HYD-2: Geomorphic Monitoring and Adaptive Management Plan** Prior to Project construction, the City shall develop a geomorphic monitoring and adaptive management plan, which shall specify an approach to monitoring Belmont Creek for accelerated channel erosion between the outlet of the sediment chamber and the culvert at 6th Avenue and O'Neill Street. The City shall complete baseline monitoring, as part of the geomorphic monitoring and adaptive management plan, prior to Project construction. Upon Project completion the City shall implement monitoring consistent with the geomorphic monitoring and adaptive management plan. If monitoring identifies accelerated channel erosion, at the end of the dry season the City shall place a portion of removed sediment from the sediment chamber on the toe of the creek bank at the downstream edge of the Project area near the outlet pipe to passively augment sediment in the downstream reach. The City shall conduct a sediment study to estimate the amount of sediment that should be placed to provide sufficient passive augmentation. The City shall monitor the placed sediment and downstream reach to assess whether sediment placement has reduced channel erosion to rates similar to current conditions. If sediment placement has not reduced the channel erosion attributable to the Project, additional sediment placement would be required. The City shall review the geomorphic monitoring and adaptive management plan annually to ensure it has been implemented or revised appropriately. After three consecutive years without sediment augmentation during which channel erosion rates in the downstream reach are similar to pre-Project conditions, the City shall no longer monitor the downstream reach for Project-related erosion.
Impact HYD-4: Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite.	LTS	No mitigation required.
Impact HYD-5: Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.	LTS	No mitigation required.
Impact HYD-6: Impede or redirect flood flows.	LTS	No mitigation required.
Impact HYD-7: In flood hazard, tsunami, or seiche zones, risk release of pollutants due to Project inundation?	LTS	No mitigation required.

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Impact HYD-8: Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.	LTSM	**Mitigation Measure HYD-1: In-Water Construction Measures**
Tribal Cultural Resources, EIR Section 3.6		
Impact TCR-1: Cause a substantial adverse change in the significance of a tribal cultural resource, as defined in PRC Section 21074.	SU	**Mitigation Measure CUL-1: Development and Implementation of an Archaeological Resources Data Recovery and Treatment Plan** **Mitigation Measure CUL-2: Development and Implementation of a Cultural Resources Monitoring Plan** **Mitigation Measure CUL-3: Development and Implementation of a Cultural Resources Awareness and Sensitivity Training Program** **Mitigation Measure CUL-4: Development and Installation of Public Informational Signage**
Geology and Soils, Appendix B Section 7		
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.	LTSM	**Mitigation Measure GEO-1: Paleontological Monitoring** a) **Project Paleontologist**: The City shall retain a qualified professional paleontologist (qualified paleontologist) meeting the Society of Vertebrate Paleontology (SVP) standards as set forth in the “Definitions” section of Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources prior to demolition or grading. The qualified paleontologist shall attend the project kick-off meeting and project progress meetings on a regular basis, shall report to the site in the event potential paleontological resources are encountered, and shall implement the outlined duties. b) **Worker Training**: Prior to the start of any ground-disturbing activity the qualified paleontologist shall prepare paleontological resources sensitivity training materials for use during project-wide Worker Environmental Awareness Training (or equivalent). The paleontological resources sensitivity training shall be conducted by a qualified environmental trainer working under the supervision of the qualified paleontologist. In the event construction crews are phased in, additional trainings shall be conducted for new construction personnel. The training session shall focus on the recognition of the types of paleontological resources that could be encountered within the project site and the procedures to be followed if they are found, as outlined in an approved Paleontological Resources Monitoring and Mitigation Plan (discussed below). The City shall retain documentation demonstrating that all construction personnel attended the training prior to the start of work on the site. c) **Paleontological Resources Discovery and Monitoring**: The qualified paleontologist shall prepare a Paleontological Resources Monitoring and Mitigation Plan applicable to excavation deeper than 7 feet below ground surface. The City shall review and approve the plan at least 30 days prior to the start of construction. This plan shall address specifics of monitoring and mitigation and comply with the recommendations of the SVP, as follows: i. The Paleontological Resources Monitoring and Mitigation Plan shall clearly map portions of the project which will excavate below 7 feet below ground surface in previously undisturbed sediments within the project site that have high paleontological sensitivity, based on final project design. ii. The qualified paleontologist shall establish in the Plan the type of paleontological resources monitoring for ground-disturbing activities which will excavate below 7 feet below ground surface, based on site observations, subsurface stratigraphy, or other factors. Monitoring shall be conducted either by trained workers or by qualified paleontological resource monitors meeting the SVP standards. If necessary, the qualified paleontologist shall identify and retain qualified paleontological resource monitors (qualified monitors) meeting the SVP standards.

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		iii. Monitoring under the direction of the qualified paleontologist shall be conducted for all ground-disturbing activities which will excavate below 7 feet below ground surface in previously undisturbed sediments within the project site that have high paleontological sensitivity, or as otherwise specified in the Plan. iv. The qualified paleontologist (based on site observations, subsurface stratigraphy, or other factors) may reduce or discontinue monitoring, as warranted, if they determine that the possibility of encountering significant paleontological resources is low. v. If many pieces of heavy equipment are in use simultaneously but at diverse locations, each location will need to be individually monitored, if recommended by the qualified paleontologist. vi. Monitors shall have the authority to temporarily halt or divert work away from exposed fossils to evaluate and recover the fossil specimens, establishing a 50-foot buffer. vii. If construction or other personnel discover any potential fossils during construction, regardless of the depth of work or location and regardless of whether the site is being monitored, work at the discovery location shall cease in a 50-foot radius of the discovery until the qualified paleontologist has assessed the discovery and made recommendations as to the appropriate treatment. viii. The qualified paleontologist shall determine the significance of any fossils discovered and shall determine the appropriate treatment for significant fossils in accordance with the SVP standards. ix. Monitors shall prepare daily logs detailing the types of activities and soils observed, and any discoveries. The qualified paleontologist shall prepare a final monitoring and mitigation report to document the results of the monitoring effort and any curation of fossils and submit to the City for their records. d) **Significant Fossil Treatment.** If any find is deemed significant, as defined in the SVP standards, the qualified paleontologist shall salvage and prepare the fossil for permanent curation with a certified repository with retrievable storage following the SVP standards. The city shall retain a repository receipt from the curation facility.
Noise, Appendix B Section 13		
a) Result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.	LTSM	**Mitigation Measure NOI-1: Construction Noise Reduction Measures** The construction contractor shall implement the following noise reduction measures to reduce the impact of temporary construction-related noise on sensitive receptors: 1. Require construction equipment and trucks used for project construction to utilize the best available noise control techniques (including mufflers, use of intake silencers, ducts, engine enclosures and acoustically attenuating shields or shrouds). 2. Turn off construction equipment when not in use. 3. Locate stationary equipment, construction staging areas, and construction material areas as far from sensitive receptors as possible. 4. Require any impact equipment (e.g., jack hammers, pavement breakers, etc.) used for project construction be hydraulically or electrical powered wherever feasible to avoid noise associated with compressed air exhaust from pneumatically powered tools. Where use of pneumatically powered tools is unavoidable, the use of an exhaust muffler on the compressed air exhaust is recommended to lower noise levels from the exhaust by up to about 10 dBA. When feasible, external jackets on the impact equipment should also be incorporated to achieve a further reduction of 5 dBA. In the event that external jackets on impact equipment are not feasible, other best management practices shall be employed to reduce noise by 5 dBA. Whenever feasible, require the use of quieter procedures. 5. When construction takes place within 100 feet of sensitive receptors, use specific techniques such as, but not limited to, restrictions on construction timing, use of sound blankets on construction equipment, and the use of temporary walls and noise barriers to block and deflect noise.

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b) Result in generation of excessive groundborne vibration or groundborne noise levels.	LTSM	**Mitigation Measure NOI-2: Vibration Avoidance from Compaction** The construction contractor shall implement the following noise reduction measures to reduce the impact of temporary construction-related noise on nearby receptors: 1. Use non-vibratory, excavator-mounted compaction wheels and small, smooth drum rollers for final compaction of asphalt base and asphalt concrete, if within 50 feet of a historic structure or 15 feet of a conventionally constructed structure. If needed to meet compaction requirements, smaller vibratory rollers shall be used to minimize vibration levels during repaving activities where needed to meet vibration standards. 2. Avoid using vibratory rollers and clam shovel drops within 15 feet of buildings of conventional construction. 3. Construction methods shall be modified, or alternative construction methods shall be identified, and designed to reduce vibration levels below the limits of 0.5 PPV in/sec for modern structures.

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CHAPTER 1
Introduction

1.1 Purpose of this Environmental Impact Report

This environmental impact report (EIR) has been prepared by the City of Belmont (the City) in conformance with the provisions of the California Environmental Quality Act[1] (CEQA) and the CEQA *Guidelines*.[2] The City of Belmont serves as the lead agency for development of the EIR for the proposed Twin Pines Park Stormwater Detention Basin Project (Project), with input and coordination provided by other agencies and local jurisdictions. The lead agency is the public agency that has principal responsibility for carrying out or approving a project. CEQA requires the preparation of an EIR when a project could have significant impacts on the physical environment. The City determined that the Project, for which the City of Bemont is also the project sponsor, could cause significant environmental impacts, and that preparation of an EIR was warranted.

The Project involves the construction and operation of an underground stormwater storage facility beneath the parking lots and other areas of the 10-acre Twin Pines Park in Belmont, California. A detailed description of the Project is provided in Chapter 2, *Project Description*. This document reflects the City of Belmont's independent judgement and analysis of the environmental effects of the Project.

The City has prepared this EIR to provide the public as well as responsible and trustee agencies reviewing the Project with information about the Project's potential effects on the environment. This EIR describes the potential environmental impacts that could result from implementation of the Project, identifies mitigation measures for reducing impacts to a less-than-significant level where feasible, and evaluates alternatives to the Project.

1.2 Environmental Review Process

The environmental review process for the Project consists of multiple steps: publication of a Notice of Preparation (NOP), a public scoping period, publication of a Draft EIR, public and agency review of the Draft EIR, publication of responses to public and agency comments on the Draft EIR, and certification of the Final EIR. Each of these steps involves public outreach, as described below. Additional public outreach for the Project is described in Section 1.3.

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[1] Public Resources Code Sections 21000 *et seq*.

[2] California Code of Regulations, Title 14, Division 6, Chapter 3, Sections 15000 *et seq*.

1.2.1 Notice of Preparation

In accordance with CEQA *Guidelines* Sections 15063 and 15082, the City of Belmont distributed an NOP on October 4, 2023, to responsible and other public agencies and interested parties to begin the formal 30-day CEQA scoping process for the Project. The NOP informed agencies and the public about the Project and the City's decision to prepare an EIR, and included a request for comments on environmental issues that should be addressed in the EIR.

The public comment period ended on November 3, 2023. **Appendix A** presents the NOP and written comments received during the scoping period. The City has considered all comments pertaining to the scope and content of the EIR that were made by the public and agencies in preparing this EIR.

1.2.2 Draft EIR

This document is a project-level EIR pursuant to CEQA *Guidelines* Section 15161. A project-level EIR focuses on the changes in the environment that would result from construction and operation of a specific development project. Furthermore, this EIR is also a focused EIR, in accordance with CEQA *Guidelines* Section 15063(c). In accordance with CEQA *Guidelines* Section 15128, the City has prepared an initial study for the project (see **Appendix B** of this EIR) to identify topics for which the Project's impacts would be less than significant and not require further analysis, and those topics that warrant more detailed environmental analysis in the EIR. The initial study is being published concurrently with the EIR, and comments will be accepted on the initial study during the public review period for the EIR.[3]

The CEQA *Guidelines* encourage public participation in the planning and environmental review process. Publication of this Draft EIR marks the beginning of a 45-day public comment period, during which the Draft EIR will be available to local, state, and federal agencies, interested organizations, and individuals for review. The Draft EIR is available for public review on the City's web page (https://www.belmont.gov/StormwaterBasin). The City will hold a public hearing at the City's Planning Commission Meeting for the Draft EIR on June 4, 2024 at 7:00 p.m. at the City Council Chambers in City Hall, 1 Twin Pines Lane, to receive comments on the Draft EIR.

Written comments on the Draft EIR may be submitted by 5:00 p.m. on June 28, 2024, to:

Elizabeth Wada, P.E., Senior Civil Engineer
City of Belmont
1 Twin Pines Lane, Suite 385
Belmont, CA 94002
ewada@belmont.gov

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[3] Under CEQA Guidelines section 15128, the EIR must contain a brief statement indicating the reasons why certain effects were determined not to be significant and thus were not discussed in the EIR.

1.2.3 Final EIR

Following the close of the Draft EIR public comment period, the City of Belmont will prepare and publish a document entitled "Responses to Comments," which will contain a copy of all comments received on this Draft EIR and written responses to all substantive comments. The document may also contain specific changes and revisions to the Draft EIR. The Draft EIR, together with the Responses to Comments document, will constitute the Final EIR. In an advertised public meeting, the Belmont City Council will consider whether to certify the Final EIR as adequate and in compliance with CEQA.

1.2.4 Project Approval and Mitigation Monitoring and Reporting Program

The City of Belmont's City Council, at a regularly scheduled meeting, will review all of the related material and make a determination as to adequacy of this analysis of whether to approve, modify, or deny the Project or aspects of the Project. If the City approves the Project, it will adopt CEQA findings that identify potential Project-related impacts and the mitigation measures or alternatives that have been recommended to reduce potentially significant impacts. A Mitigation Monitoring and Reporting Program must be adopted by the City as part of the adoption of the CEQA findings. The Mitigation Monitoring and Reporting Program lists the mitigation measures included in the Project as identified in the Final EIR, entities responsible for carrying out the measures, timing of implementation of the measures, and associated reporting requirements. If significant and unavoidable impacts would occur even with the implementation of all identified mitigation measures, the City must adopt as a condition of Project approval a Statement of Overriding Considerations documenting how the benefits of Project implementation outweigh its significant and unavoidable impacts on the environment.

A Notice of Determination, if made, would then be filed with the San Mateo County Clerk-Recorder. The Project would proceed after the filing of the Notice of Determination. The documents and other materials that constitute the record of proceedings of this process are on file with the City of Belmont.

1.3 Organization of the EIR

This EIR is organized as follows:

Chapter ES, *Executive Summary*. This chapter summarizes the Project, identifies significant environmental impacts and mitigation measures, and describes the alternatives considered in this EIR. It also identifies areas of controversy and issues to be resolved.

Chapter 1, *Introduction*. This chapter describes the purpose and organization of the EIR, as well as the environmental review process and public outreach efforts.

Chapter 2, *Project Description*. This chapter describes the Project (including Project background and objectives), summarizes Project components, and provides information about Project construction and operation. The chapter also lists permits and approvals relevant to the construction and operation of the Project.

Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures*. This chapter is subdivided into sections for each environmental resource topic analyzed. Each section describes the environmental and regulatory setting, the criteria used to determine impact significance, and the approach to the analysis for that resource topic. It then presents analyses of potential environmental impacts as well as mitigation measures that have been developed to address significant and potentially significant impacts. Each section also includes an evaluation of cumulative impacts with respect to that resource topic.

Chapter 4, *Other CEQA Considerations*. This chapter identifies the significant environmental effects that cannot be avoided if the Project is implemented, and describes significant irreversible impacts.

Chapter 5, *Alternatives*. This chapter describes the alternatives to the Project and compares their impacts to those of the Project. This chapter also summarizes the alternatives that were considered but eliminated from further analysis.

Chapter 6, *Report Preparers*. This chapter lists the authors of this EIR.

Technical and supporting information for the EIR is included in appendices to the EIR.

CHAPTER 2
Project Description

2.1 Project Overview and Location

The City of Belmont (the City) proposes the Twin Pines Park Stormwater Detention Basin Project (Project), which would construct an underground stormwater storage facility beneath the parking lots or other areas of the 10-acre Twin Pines Park, which is located at 1 Twin Pines Lane in Belmont, California. The Project is designed to attenuate the peak stormwater flow of Belmont Creek, to trap sediment and debris, to reduce flood risk in the flood-prone lower creek reach downstream of El Camino Real, and to provide ancillary water quality benefits. A diversion weir would divert high flows from Belmont Creek to the 9-acre-foot[1] underground storage facility, where water would remain before flowing back into Belmont Creek through a 12-inch outlet pipe. The Project would also include a sediment chamber, bank stabilization at the basin inlet and outlet within Belmont Creek, and an in-stream check structure in Belmont Creek. The Project site is located on four city-owned parcels (Accessor Parcel Numbers 045-170-080, 045-181-250, 045-181-230, and 045-181-280) adjacent to Twin Pines Lane east of Ralston Avenue and south of 6th Avenue in Belmont, therefore no rights-of-way or land acquisition is required to execute the project.

2.2 Project and Site Background

Belmont Creek serves as an integral part of the Belmont community. The Belmont Creek watershed encompasses approximately 1,900 acres, originates at an elevation of 700 feet from Pulgas Ridge, and has three substantial tributaries, one near Carlmont Drive, one near Alameda de las Pulgas, and one near University of Notre Dame de Namur, as shown on **Figure 2-1**. The creek serves as a major storm drainage collector for the City of Belmont, City of San Carlos, and San Mateo County. Portions of the creek are on private property without an easement. The watershed's channel includes areas with vegetated channel banks, rock lining, concrete-rubble lining, concrete lining, and concrete culverts (Wood Rodgers, 2023).

Regional flooding in the watershed historically occurs downstream of El Camino Real, where the creek enters the flat, tidally influenced Harbor/Industrial Area before discharging into Belmont Slough. The downstream portion of the creek was designed to convey a 10-year storm; however, due to sedimentation in the downstream channel, more frequent events currently exceed the capacity of the system downstream.

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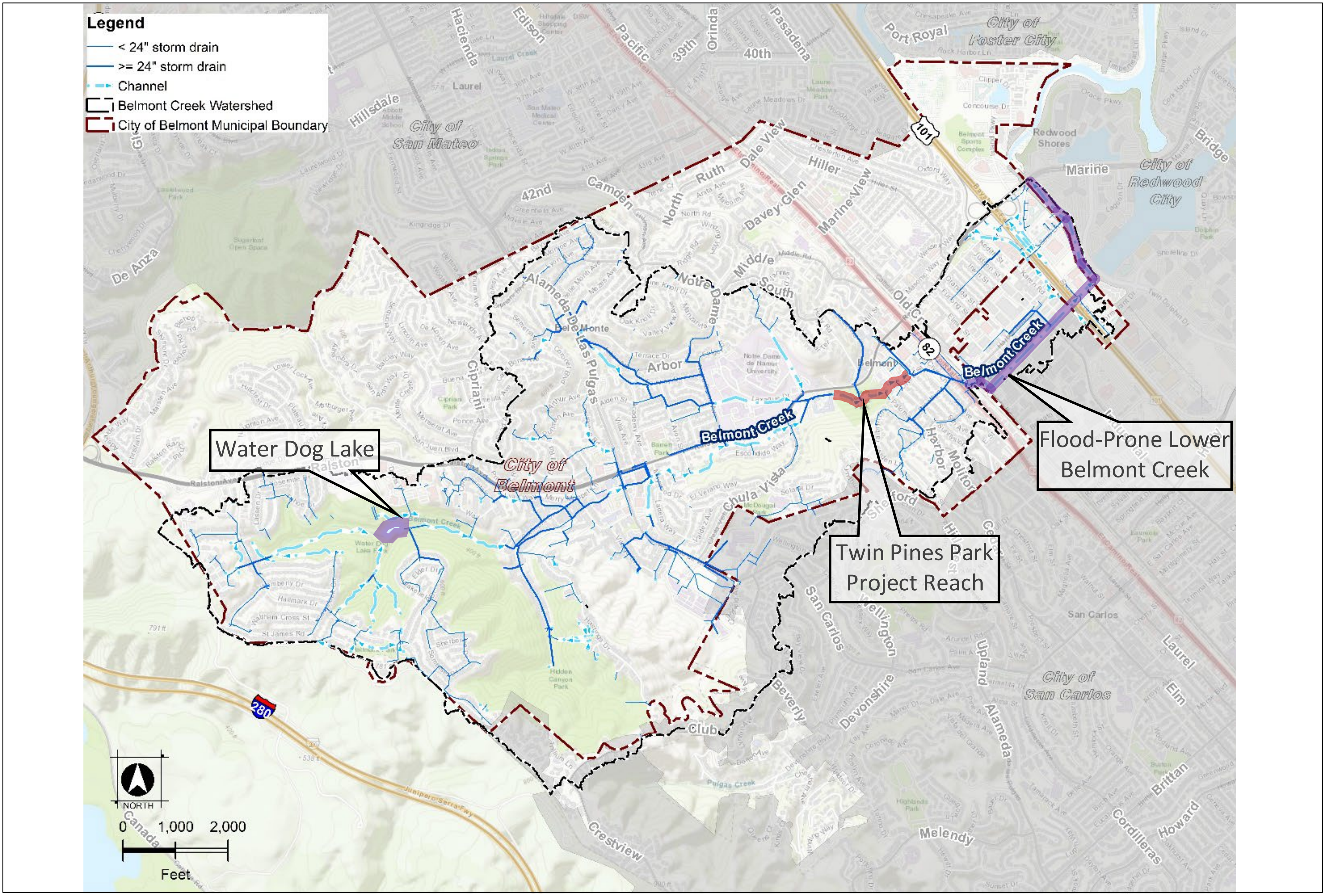
[1] An acre-foot of water is equal to the volume of water that could cover one acre in area and one foot in depth; also 43,560 cubic feet.



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SOURCE: Wood Rodgers, 2022

Figure 2-1
Belmont Creek Watershed

The watershed has been studied and analyzed for flood conveyance capacity deficiencies, sedimentation and erosion processes, and bank stability. The most recent study, the *Belmont Creek Watershed Management Plan* (County of San Mateo et al., 2019) (see **Appendix E**), was written to analyze the hydraulic performance of nine alternatives. The alternatives included detention basins identified in the County's *Stormwater Resource Plan* (Paradigm, 2017) and prioritized the alternatives by cost, flood protection efficacy, water quality and ecosystem benefits, and feasibility of construction. The *Belmont Creek Watershed Management Plan* proposed a 21.5-acre-foot underground stormwater detention basin within Twin Pines Park to reduce peak flow in Belmont Creek and subsequently reduce flooding downstream; this is the basis for the proposed Project.

2.3 Project Objectives

The overarching purpose of the Project is to provide flood protection for nearby properties while maintaining habitat and natural surface water features. The Project objectives are to develop a reasonable and cost effective project that:

- Reduces downstream flooding and maximizes flood protection in the Lower Belmont Creek watershed;
- Reduces erosion and prevent failure of stream banks;
- Reduces downstream sedimentation and need for dredging;
- Minimizes disruption and damage to public and private landowners; and
- Improves water quality through pollutant capture and removal.

2.3.1 Flood Reduction

To achieve the Project objective of reducing downstream flooding, the Project would reduce the size of the floodplain in Lower Belmont Creek, upstream of the culvert under US 101, from 120.5 acres to 111 acres during a large flood (an event with a 1 percent chance of occurring in any given year). The Project would also reduce the floodplain area during more frequent events, as shown in **Table 2-1**.

TABLE 2-1
REDUCTION IN FLOODING WITH PROJECT

Return Period[a]	Existing Condition, Lower Belmont Creek upstream of US 101 Floodplain (acres)	Proposed Condition, Lower Belmont Creek upstream of US 101 Floodplain (acres)	Floodplain Reduction (acres)
2 years	11.2	2.6	8.6
10 years	53.9	41.8	12.1
100 years	120.5	111	9.5

NOTES:

a. "Return period" reflects the anticipated statistical likelihood of certain flooding extents in a given year. A return period of 2 years indicates that the amount of flooding shown has a 50 percent chance of occurring in a given year.

Source: Wood Rogers, 2023.

2.4 Project Components

To fulfill the Project objectives, the City would construct an underground stormwater detention facility at Twin Pines Park. Twin Pines Park, illustrated on **Figure 2-2**, is a public park owned and operated by the City that includes picnic areas, playgrounds, a senior and community center, the Manor Building, the City's Parks and Recreation office, and Belmont City Hall. The following sections describe the facilities and features of the Project, shown on **Figure 2-3**.

2.4.1 Underground Stormwater Storage Facility

The City would construct a 9-acre-foot below-ground stormwater storage facility under the Twin Pines Park parking lot off the main Belmont Creek channel. The underground stormwater storage facility would be constructed in two phases. The first phase, constructed closer to Belmont Creek, would store up to 5 acre-feet of water. The second phase would add storage for up to an additional 4 acre-feet of water. The facility would be 1.6 acres in size and its ceiling would be approximately 2 to 4 feet below the current parking lot surface. The bottom of the facility would be approximately 16 to 18 feet below the ground surface (at elevation 32.5 feet NAVD88).[2] Water in the storage facility above elevation 36 feet would drain from the storage facility through an outlet pipeline (described below) by gravity. To drain the remaining water between 34 and 38.9 feet, the storage facility would include a sump pump with capacity to pump 318 gallons per minute (0.71 cubic feet per second). The electric sump pump would drain the storage facility within 72 hours.

2.4.2 High Flow Diversion Weir

A 40-foot-wide diversion weir would allow high flows from Belmont Creek to pass into the proposed stormwater basin. The diversion weir would be constructed along the creek bank and parallel to the direction of creek flow. The diversion weir would likely consist of four 10-foot-wide electric tilting weir gates that would allow the weir crest elevations to be set at different levels for different sized storm events. The tilting weir gate would provide a flexible and adaptable design to modulate the weir crest elevation by up to 6 feet vertically.

2.4.3 Sediment Chamber

Between the creek and the high flow diversion weir, the City would construct a sediment chamber designed to capture coarse sediment prior to stormflows passing over the weir and into the storage facility. The sediment chamber would be sized to capture approximately 200 cubic yards of coarse sediment, and would be maintained by removing sediment on an as needed basis. The chamber would be approximately 65 feet long, 17 feet wide, and 5 feet deep.

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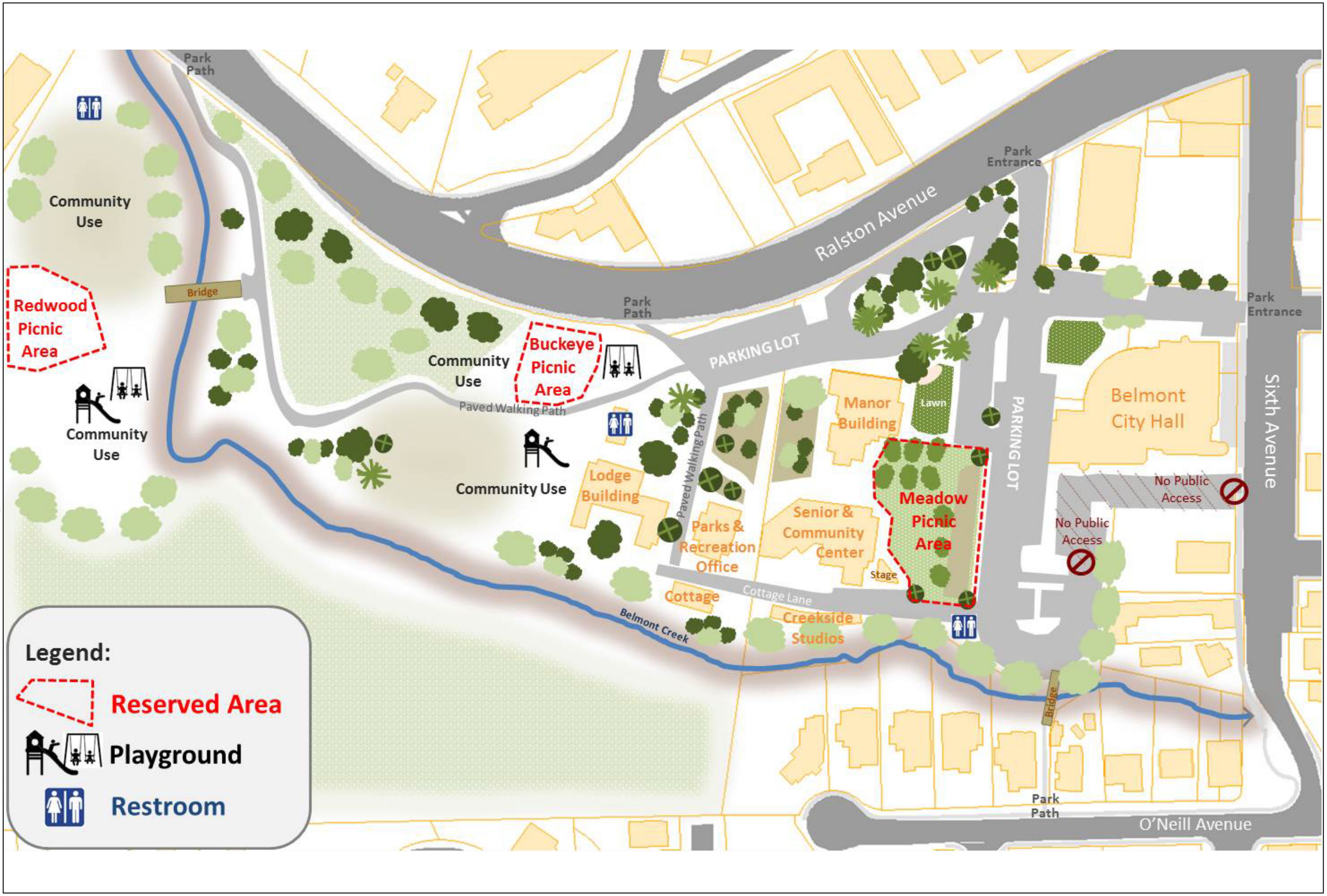
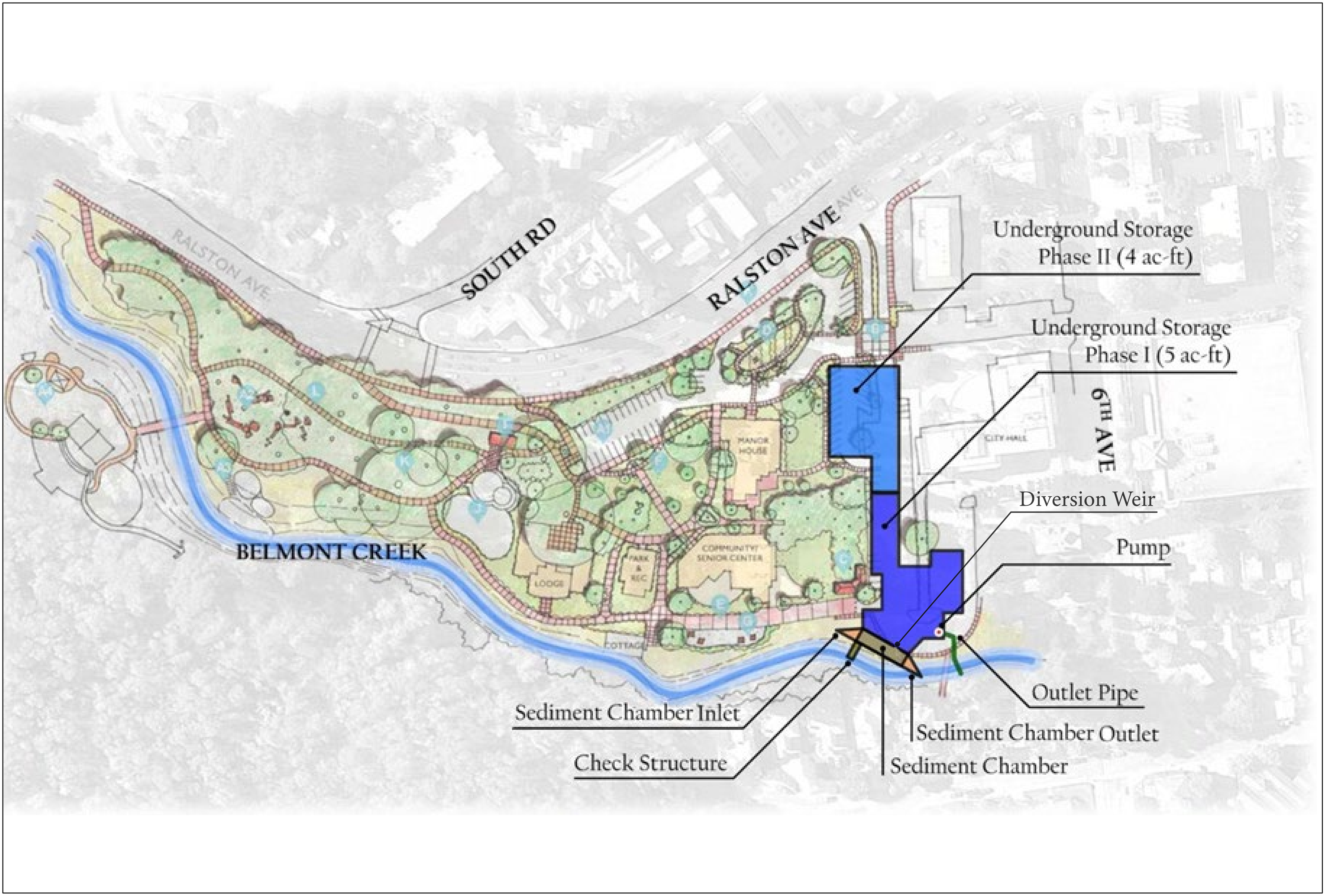
[2] North American Vertical Datum of 1988. All subsequent elevations reported in this chapter are provided in NAVD88 unless otherwise noted.



SOURCE: City of Belmont

Twin Pines Park Stormwater Detention Basin Project

Figure 2-2
Twin Pines Park



SOURCE: Craftwater, 2023

Twin Pines Park Stormwater Detention Basin Project

Figure 2-3
Project Components

2.4.4 Bank Stabilization

Concrete retaining walls would be constructed along the northern bank of Belmont Creek at the upstream and downstream ends of the sediment chamber to prevent structure undermining and provide channel stability. The toe of the retaining walls would extend to 6 feet below the thalweg[3] elevation in the vicinity of the sediment chamber. Approximately 120 linear feet of bank stabilization consisting of riprap would be placed along the southern bank of Belmont Creek starting near the upstream concrete retaining wall.

2.4.5 In-Stream Check Structure

A 6-foot-high stone or reinforced concrete check structure spanning the width of Belmont Creek (approximately 40 feet) would increase water surface in-stream and direct water and sediment into the sediment chamber inlet. The check structure would be designed to overtop above the 2-year peak flow. If constructed with stone, the check structure would consist of riprap with a median size greater than 14 inches.

2.4.6 Outlet Pipe

A 12-inch diameter outlet pipe would connect the basin to Belmont Creek downstream of the check structure and the pedestrian bridge and would be sized to allow the detention facility to drain within 72 hours when full. The downstream end of the outlet pipe would include a duckbill valve to prevent sediment or high tailwater[4] in Belmont Creek from entering the pipe. Riprap would be placed along the creek bank at the downstream end of the outlet pipe to prevent scour during outlet pipe operations.

2.5 Project Construction

2.5.1 Construction Activities

Project construction would proceed in two phases; the first phase (constructing a 5-acre-foot storage facility) would include all of the following activities, and the second phase (constructing an additional 4-acre-feet of storage north of the first phase's facility) would include the activities listed below, except for the weirs, sedimentation basin, and check structure construction; outlet pipe installation; and landscaping and stream restoration.

- **Site mobilization, clearing, grubbing, and vegetation removal.** The City would close the southern parking lot and portions of Twin Pines Park and would remove vegetation including approximately 7 trees ranging in size from 4 inches to 15 inches in diameter at breast height[5] from the parking lot and along Belmont Creek.

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[3] A stream thalweg is the conceptual line joining the lowest points of successive cross sections along the stream channel.

[4] Tailwater refers to waters located immediately downstream from a hydraulic structure, such as a dam, spillway, bridge, or culvert.

[5] Diameter at breast height, or DBH, is the tree diameter measured at 4.5 feet above the ground surface.

- **Demolition of existing parking lot.** Structures demolished would include the parking lot pavement, curbs and gutters, and fencing adjacent to the parking lot. Demolished concrete would be hauled offsite.
- **Underground storage facility excavation.** The City would install excavation supports (such as sheet piles) and excavate to approximately 20 feet below the ground surface under the parking lot. The base of the excavated area would be graded. Excavated soil would be stored onsite for reuse or hauled offsite.
- **Underground storage facility construction and backfill**. The City would place pre-cast concrete storage modules on a cast-in-place foundation slab. Once the storage facility is in place, soil would be backfilled over the storage facility and graded.
- **Weirs, sedimentation basin, and check structure construction.** Construction of these components would include work within Belmont Creek during Phase 1. Construction equipment would access Belmont Creek from the north along Cottage Lane or through Twin Pines Park on the maintenance road (refer to **Figure 2-4**). Construction of the sedimentation basin would require excavation supports such as sheet piles to create the basin. If the check structure is made of reinforced concrete, the check structure would be constructed concurrently with the sediment basin and would connect to the basin. If riprap is used to construct the check structure, approximately 27 cubic yards of riprap would be placed within Belmont Creek.
- **Outlet pipe installation**. The City would excavate along the outlet pipe alignment east of the pedestrian bridge and place the 12-inch pipe into the excavation during Phase 1. Equipment used to excavate the outlet pipe alignment would access the area from the eastern side of the parking lot, east of the pedestrian bridge. The outlet pipe would then be buried and the area graded to preconstruction elevations. The terminal portion of the outlet pipe would be placed in the bank of Belmont Creek as a freestanding pipe without any required excavation within the creek bed. Approximately 2 cubic yards of riprap would be placed in Belmont Creek at the downstream end of the outlet pipe for erosion protection.
- **Park landscaping replacement**. Park areas used for construction staging would be restored to conform with the Twin Pines Park Master Plan (City of Belmont, 2019) and would appear similar to existing conditions and vegetation would be replaced. The area adjacent to the existing senior center building (referred herein as the Meadow) would be reconfigured after serving as the staging area for construction. The City would add new walking paths to the area and restore a gathering space. The Meadow would be restored as a part of Phase 2.
- **Parking lot reconstruction.** The existing parking lot would be reconfigured to expand the police department secure parking and reconfiguration of the parking lot islands. The police department parking expansion would relocate the security fence to encompass more parking stalls and would not expand beyond the existing curbline. The south end of the parking lot would add a new pedestrian sidewalk behind the existing curbline to connect the pedestrian bridge to the Meadow area. The sidewalk would follow the existing curbline where it then lays overtop the diversion structure before crossing Cottage Lane and into the park. The remaining portions of the parking lot along Twin Pines Lane would be restored to comply with Americans with Disability Act (ADA) sizing requirements and City zoning. The restored parking lot would be retrofitted with bioretention areas that would capture and treat runoff. The bioretention would pass the runoff through a minimum of 18 inches of soil media before allowing discharge into the new underground storage facility and eventually to Belmont Creek.
- **Landscaping and stream restoration**. Park areas disturbed during construction (such as the Belmont Creek construction access areas) would be graded to preconstruction conditions and

vegetation would be replaced per the landscape plan that conforms to the Twin Pines Park Master Plan. Trees removed for construction of the sedimentation basin would be replanted in parking lot medians; no removed trees would be replaced above the sedimentation basin.

- **Ancillary park improvements.** Ancillary park improvements include demobilizing construction equipment, restoring staging and laydown areas, restriping the parking lot and staging area, and filling potholes in the staging area lot. The Meadow restoration would include trash receptacles, shade/vending facilities, and seating areas.

2.5.2 Construction Schedule

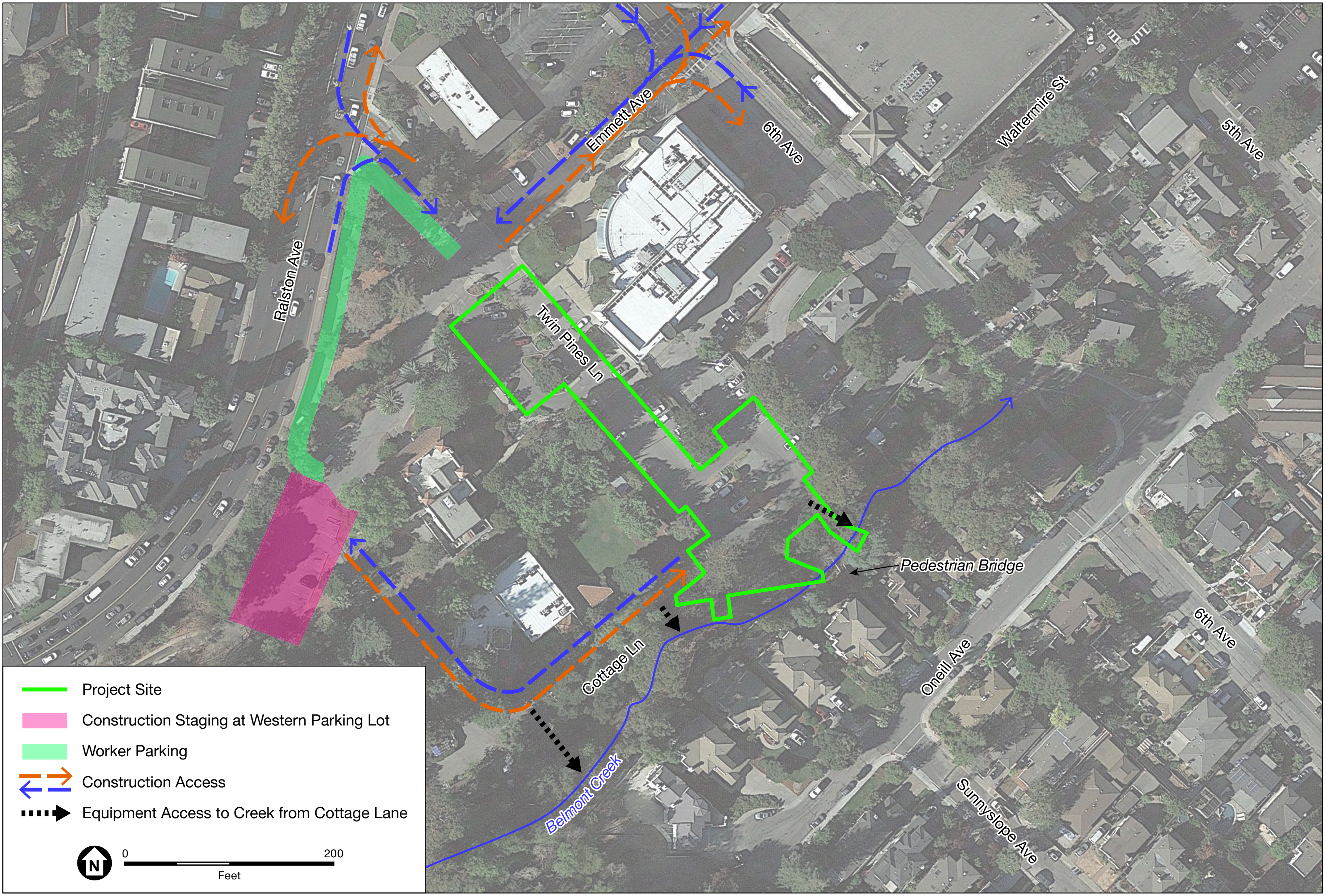
Project construction is expected to occur over approximately two years between May 2025 and April 2027. **Table 2-2** shows the anticipated construction schedule, including the approximate duration of each phase of construction. During this period, the City would close the main parking lot near City Hall, portions of Twin Pines Lane within the Project area, and the pedestrian bridge across Belmont Creek (refer to **Figure 2-4**). The rest of Twin Pines Park would remain open for public use during construction and would be returned to existing conditions once construction is complete. Construction would proceed during the hours of 8:00 a.m. to 5:00 p.m. Monday through Friday except holidays, and 10:00 a.m. to 5:00 p.m. on Saturdays, consistent with the City's noise ordinance. No nighttime construction would be required.

TABLE 2-2
ANTICIPATED CONSTRUCTION SCHEDULE

Construction Activity	Anticipated Start	Anticipated Finish
Site Mobilization, Clearing, Grubbing, and Vegetation Removal	May 2025	July 2025
Demolition of Existing Parking Lot	August 2025	September 2025
Underground Storage Facility Excavation	October 2025	January 2026
Underground Storage Facility Construction and Backfill	February 2026	July 2026
Weirs, Sedimentation Basin, and Check Structure Construction	August 2026	August 2026
Outlet Pipe Installation	September 2026	September 2026
Field Surface Replacement	October 2026	October 2026
Parking Lot Reconstruction	November 2026	December 2026
Landscaping and Stream Restoration	January 2027	February 2027
Ancillary Park Improvements	March 2027	April 2027

Source: Craftwater Engineering, 2023

Phase 2 construction is subject to funding and is not yet scheduled but is anticipated to require 9 to 12 months to complete.



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SOURCE: ESA, 2022; Google Earth, 2022

Twin Pines Park Stormwater Detention Basin Project

Figure 2-4
Project Site with Construction Access and Staging

2.5.3 Construction Access, Staging, Equipment, and Workforce

Refer to **Figure 2-4** for construction staging/parking areas and access routes. Construction vehicles and equipment would access the Project site from Ralston Avenue, Emmett Avenue, or 6th Avenue via Twin Pines Lane. The Project would use local and regional roadways to haul construction materials, and would not require any roadway improvements. Equipment staging and temporary stockpiling of soil or parking lot surfacing materials would occur within the Project site or in the western parking lot. Worker parking would be provided along Ralston Ave and Twin Pines Lane between the Project area and the construction staging area.

The following presents a list of equipment types that would likely be used during Project construction. Pile drivers would be used for approximately 20 days for driving shoring along the perimeter of the underground storage excavation area. Although electrical grid power would be used for construction trailers, most other construction equipment would be diesel powered. Diesel-powered generators may also be used, for example, to support pumps dewatering excavated areas. Between 6 to 18 construction workers are anticipated to be onsite during a given construction phase.

- Pavers
- Paving Equipment
- Grader
- Excavator
- Tractor/backhoe/loader
- Forklift
- Cement and mortar mixer
- Pile driver
- Water pump
- Crane
- Skid-steer loader
- Concrete/industrial saw
- Signal boards
- Roller
- Trencher

2.5.4 Earthwork and Truck Trips

Project demolition and earthwork would generate approximately 39,000 cubic yards of excavated materials, with approximately 15,000 cubic yards to be reused onsite as backfill and approximately 24,000 cubic yards of material to be off-hauled in 14-cubic-yard trucks. Depths of excavation would vary based upon the Project component and location. Project construction would require importing approximately 1,600 cubic yards of material, including concrete for the underground storage facility and weir. Waste off-hauled from the Project area would likely be disposed of at the Republic Ox Mountain Landfill in Half Moon Bay (about 7 miles west of the Project area) or the Shoreway Environmental Center (approximately 2 miles east of the Project area).

Construction activities are anticipated to generate between 12 and 36 one-way worker trips per day, up to 14 one-way off-haul truck trips per day (generally related to underground storage excavation), and up to 22 one-way construction material delivery trips per day (generally related to underground storage construction and backfill) for the duration of construction.

2.5.5 Additional Construction Information

Approximately 2,000 gallons of water per day would be used for dust suppression during construction. Water would be obtained from fire hydrants near 1070 6th Avenue or 1090 Ralston Avenue adjacent to the Project site. No nighttime construction is expected; therefore, no security lighting would be provided onsite.

2.5.6 Geotechnical Recommendations

The City would follow all recommendations provided in the Geotechnical Exploration Report prepared for the Project (ENGEO, 2022). The report characterizes the subsurface conditions of the Project site and provides geotechnical recommendations for design and construction of the Project components. The primary geotechnical concerns are seismic hazards, expansive soil, shallow groundwater, and deep excavations. The geotechnical recommendations contained in the report would be incorporated into the design plans and specifications.

2.5.7 Construction Best Management Practices

The following best management practices would be implemented during Project construction:

- Sediment filter bags at catch basins to prevent pollutants from entering storm drains
- Wind screens along the construction boundary to reduce wind erosion and air pollution
- Silt fencing to control the flow path and prevent runoff from leaving the site
- Fiber rolls on slopes to reduce runoff speed and soil erosion
- Stabilized construction entrances and exits to reduce dust leaving the site

The San Mateo Countywide Water Pollution Prevention Program also has a list of Construction Best Practices (SMCWPPP, 2024) that would be implemented during Project construction:

- **Cleaning & Preventing Spills**: Use a drip pan and funnel when draining or pouring fluids. Sweep up dry spills instead of hosing. Be ready for spills by preparing and using spill containment and cleanup kits that include safety equipment and dry cleanup materials such as kitty litter or sawdust.
- **Concrete & Mortar Application**: Never dispose of cement washout into driveways, streets, gutters, or drainage ditches. Wash concrete mixers and equipment only in specified washout areas, where the water flows into lined containment ponds. Cement wash water can be recycled by pumping it back into cement mixers for reuse.
- **Maintaining Vehicles & Equipment**: Maintain and refuel vehicles and equipment at a single location on-site, away from the street, gutter, and storm drains. Perform major equipment repairs and washings off-site. Inspect vehicles and equipment frequently for leaks, and prevent leaks from stored vehicles by draining gas, hydraulic oil, transmission, and brake and radiator fluids.
- **Preventing Erosion**: Avoid excavation or grading during wet weather. Plant temporary vegetation or add hydro mulch on slopes where construction is not immediately planned. Plant permanent vegetation once excavation and grading are complete. Construct diversion dikes to channel runoff to a detention basin and around the construction site. Use gravel

approaches where truck traffic is frequent to reduce soil compaction and limit the tracking of sediment into the streets.

- **Ordering Materials & Recycling Waste**: Reduce waste by ordering only the amounts of materials needed for the job. Use recycled or recyclable materials whenever possible. You can recycle broken asphalt, concrete, wood, and cleared vegetation. Dispose of hazardous materials through a hazardous waste hauler or other means in accordance with the construction permit. Non-recyclable materials should be taken to a landfill or disposed of as hazardous waste.
- **Storing Materials Safely**: Keep construction materials and debris away from the street, gutter, and storm drains. Cover exposed stockpiles of soil, sand or gravel, and excavated material with plastic sheeting, protected from rain, wind, and runoff.

2.6 Project Operations and Maintenance

The Project components as described in Section 2.4 would operate together during wet weather events. When water levels rise to the elevation of the diversion weir, water from Belmont Creek would spill over the diversion weir into the storage facility. Once high flows have passed, water collected in the storage facility would exit the storage facility through the 12-inch outlet pipe back into Belmont Creek. In the event that storage facility capacity is reached and creek flows continued to increase, water from the creek channel would no longer pass through the diversion weir and would instead continue to flow downstream in Belmont Creek. Between winter storms, low flows in Belmont Creek would be diverted through the sediment chamber but would be allowed to exit the chamber just downstream of the check structure.

Project maintenance would include regular inspection and periodic sediment removal (likely annually) from the sediment chamber during the dry season to maintain capacity. The amount of sediment removed would vary depending on storm events and the amount of sediment moving through the creek, but is estimated to be approximately 200 cubic yards on average. Removed sediment would be hauled to a site within San Mateo County for beneficial reuse or to Ox Mountain Landfill.

The Project would not require new employees to operate the proposed infrastructure because Department of Public Works staff would perform regular maintenance such as sediment removal using City-owned vacuum trucks on an as needed basis. Pacific Gas & Electric would provide electricity to the site to power the motors that would control the weirs and the sump pump. The motors are anticipated to operate for less than one hour per week. No emergency generators would be used, and no permanent onsite lighting would be installed.

2.7 Intended Uses of this Document and Required Actions and Approvals

This document is intended to provide information and describe the potential environmental consequences of the Project in accordance with California Environmental Quality Act requirements for public disclosure and to assist public agency decision-makers in considering the approvals necessary for implementing the Project. The permits and approvals that could be required from federal, state, and local agencies are listed below. The City would also obtain any other regulatory approvals as required by law.

2.7.1 Federal

- U.S. Army Corps of Engineers: Clean Water Act Section 404 authorization and associated National Environmental Policy Act compliance, for work in jurisdictional waters
- U.S. Fish and Wildlife Service: Section 7 Federal Endangered Species Act consultations for potential effects on federally listed species and/or designated critical habitat

2.7.2 State

- California Office of Historic Preservation: National Historic Preservation Act Section 106 consultation for potential effects on historic resources
- California Department of Fish and Wildlife: Fish and Game Code Section 1600 Lake and Streambed Alteration Agreement
- State Water Resources Control Board: Construction Stormwater General Permit and Storm Water Pollution Prevention Plan for potential construction effects on water quality
- San Francisco Regional Water Quality Control Board: Clean Water Act Section 401 Water Quality Certification and/or Porter-Cologne Water Quality Control Act Report of Waste Discharge for potential discharges to Waters of the United States and Waters of the State

2.8 References

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CHAPTER 3

Environmental Setting, Impacts, and Mitigation Measures

3.1 Overview

This chapter provides an analysis of the physical environmental effects of implementing the proposed Twin Pines Park Stormwater Detention Basin Project (Project) as described in Chapter 2, *Project Description*. This chapter describes the environmental setting, assesses potential impacts, and identifies mitigation measures for significant impacts.

3.1.1 Scope of Analysis

Initial Study Topics

As described in Chapter 1, *Introduction and Background*, the City of Belmont determined that an environmental impact report (EIR) is required for the Project in compliance with the California Environmental Quality Act (CEQA), and published a Notice of Preparation (NOP) (see **Appendix A**). As part of the preparation of the EIR, the City of Belmont identified several resource topics that could be adequately addressed in an Initial Study. The Initial Study prepared for this EIR (see **Appendix B**) concluded that many of the physical environmental impacts of the Project would be less than significant, or that mitigation measures agreed to by the City would reduce potentially significant impacts to a less-than-significant level. CEQA does not require further assessment of the effects found not to be significant in the Initial Study; thus, those issues are not included in this chapter. The topics addressed in the Initial Study and not included in this chapter are listed below:

Aesthetics
Agriculture and Forestry Resources
Energy
Geology and Soils[1]
Hazards and Hazardous Materials
Land Use and Planning
Mineral Resources
Noise[2]
Population and Housing
Public Services
Recreation
Transportation
Utilities and Service Systems
Wildfire

Refer to **Appendix B** for the impact analysis of the Project with respect to these resource topics.

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[1] Mitigation Measure GEO-1, Paleontological Monitoring, is required to reduce impacts to less than significant.

[2] Mitigation Measures NOI-1, Construction Noise Reduction Measures, and NOI-2, Construction Noise Reduction Measures, are required to reduce impacts to less than significant.

EIR Topics

This chapter is organized by environmental resource topics, as follows:

- 3.1, Overview
- 3.2, Air Quality and Greenhouse Gas Emissions
- 3.3, Biological Resources
- 3.4, Cultural Resources
- 3.5, Hydrology and Water Quality
- 3.6, Tribal Cultural Resources

Each section of Chapter 3 contains the following elements, based on the requirements of CEQA:

- **Setting.** This subsection describes the existing physical environmental conditions in the Project area with respect to each resource topic, at an appropriate level of detail to allow the reader to understand the impact analysis.
- **Regulatory Framework.** This subsection describes the relevant laws and regulations that apply to protecting the environmental resources within the Project area, and the governmental agencies responsible for enforcing those laws and regulations.
- **Impacts and Mitigation Measures.** This subsection evaluates the potential for the Project to result in adverse effects on the physical environment described in the setting. Each impact analysis section defines significance criteria for evaluating potential environmental impacts, and the methodology explains how the significance criteria are applied in evaluating the Project impacts. The conclusion of each impact analysis is expressed in terms of the impact significance under CEQA, which is discussed further below. The analysis documents whether the adopted measures adequately avoid or mitigate significant impacts. Each impact subsection identifies mitigation measures for all of the impacts considered significant, consistent with CEQA *Guidelines* Section 15126.4. If needed, additional mitigation is included in the form of (1) modifications to update the adopted mitigation measures or (2) new mitigation measures to replace or augment an adopted mitigation measure. If additional impacts could result from implementation of a mitigation measure, those impacts are identified, consistent with CEQA *Guidelines* Section 15126.4.[3]
- **Cumulative Impacts.** This subsection discusses cumulative impacts, if applicable, following the description of the Project-specific impacts and identified mitigation measures. The cumulative impacts consider the potential impacts of the Project in combination with the impacts of other past, present, and probable future projects.

3.1.2 Significance Determinations

The significance criteria used in this EIR are based on CEQA *Guidelines* Appendix G. Each section of this chapter presents, before the discussion of impacts, the significance criteria used to analyze each resource topic. The categories used to designate impact significance are as follows:

- **No Impact (NI).** This determination applies if there is no potential for impacts or if the environmental resource does not occur within the Project area or the area of potential effect.

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[3] CEQA *Guidelines* Section 15126.4 states that "if a mitigation measure would cause one or more significant effects in addition to those that would be caused by the project as proposed, the effects of the mitigation measure shall be discussed but in less detail than the significant effects of the project as proposed."

- **Less than Significant (LTS).** This determination applies if there is a potential for some limited impact but not a substantial, adverse effect that qualifies under the significance criteria as a significant impact. No mitigation is required for impacts determined to be less than significant.
- **Less than Significant with Mitigation (LTSM).** This determination applies if there is a potential for the Project to result in an adverse effect that would or could meet or exceed the significance criteria, but feasible mitigation is available that would reduce the impact to a less-than-significant level.
- **Significant and Unavoidable with Mitigation (SU).** This determination applies if the Project would result in an adverse effect that would or could meet or exceed the significance criteria and there is feasible mitigation available to lessen the severity of the impact, but either the residual effect after implementation of the measure would remain significant or there is some uncertainty as to the effectiveness of the mitigation measure (e.g., implementation of the measures relies on an agreement with a third party).

3.1.3 Approach to Cumulative Impacts Analysis and Cumulative Projects

CEQA Provisions Regarding Cumulative Impacts

Cumulative impacts, as defined in CEQA *Guidelines* Section 15355, refer to two or more individual effects that, when taken together, are “considerable” or that compound or increase other environmental impacts. A cumulative impact from several projects is the change in the environment that would result from the incremental impact of each project when added to those of other closely related past, present, or probable future projects. CEQA *Guidelines* Section 15130 provides the following pertinent guidance for cumulative impact analysis:

- An EIR shall discuss cumulative impacts of a project when the project’s incremental effect is “cumulatively considerable” (i.e., the incremental effects of an individual project are considerable when viewed in connection with the effects of past, current, and probable future projects, including those outside the control of the agency, if necessary).
- An EIR should not discuss impacts that do not result in part from the project evaluated in the EIR.
- A project’s contribution is less than cumulatively considerable, and thus not significant, if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact.
- The discussion of impact severity and likelihood of occurrence need not be as detailed as for effects attributable to the project alone.
- The focus of analysis should be on the cumulative impact to which the identified other projects contribute, rather than on attributes of the other projects that do not contribute to the cumulative impact.

CEQA *Guidelines* Section 15130(b)(1) provides two approaches to a cumulative impact analysis. The analysis can be based (a) on a list of past, present, and probable future projects producing related or cumulative impacts; and/or (b) a summary of projections contained in a general plan or related planning document. Both approaches are used in this EIR.

Approach to Cumulative Impact Analysis in this EIR

The cumulative impact analysis considers the effects of the Project together with those of other past, present, or probable future projects proposed by the City of Belmont or others. In Sections 3.2 through 3.6 of this chapter, the cumulative impact analysis for each resource topic follows the analysis of the Project-specific impacts. Additional mitigation measures are identified if the cumulative impact analysis determines that a significant cumulative impact could occur and the Project's contribution to a significant cumulative impact would be considerable, even with project-level mitigation. As permitted in CEQA *Guidelines* Section 15130(b)(1), the analysis in this EIR employs the list-based approach for defining projects to be considered in the cumulative impact analysis — that is, the analysis is based on a list of past, present, and probable future projects that could result in related or cumulative impacts. A probable future project is defined as one that is "reasonably foreseeable," which is generally a project for which an application has been filed with the approving agency or that has approved funding. The probable future projects are subject to independent environmental review and consideration by approving agencies. Consequently, it is possible that some of the projects will not be approved or will be modified prior to approval (e.g., as a result of the CEQA process). Projects that are relevant to the cumulative analyses include those that could contribute incremental effects on the same environmental resources and would have similar environmental impacts as those identified for the Project in this EIR.

The cumulative analyses presented in Sections 3.2 through 3.6 first consider whether there is a Project impact that could result in adverse physical effects on the environment. If so, the cumulative analysis considers whether any of the relevant projects would result in related impacts or affect the same environmental resources as the Project, thereby resulting in a cumulative impact. If the cumulative impact is considered significant based on the identified significance criteria, the analysis considers whether the Project's contribution would be cumulatively considerable (significant) or not cumulatively considerable (less than significant). If the Project's contribution would be cumulatively considerable, mitigation measures are identified to reduce the Project's contribution to a less-than-cumulatively-considerable level (less than significant with mitigation). If there is no feasible mitigation to reduce the Project's contribution to a less-than-significant level, the Project's contribution to the cumulative impact is considered significant and unavoidable.

Table 3.1-1 describes the present and probable future projects that are considered in the cumulative analyses (based on the factors described above). The list includes other projects that have overlapping construction schedules with the Project (or would be completed prior to or following Project construction) and that could be constructed in the general vicinity of the Project, with the potential to result in cumulative impacts during construction. The list also includes projects that could be in operation concurrently with the Project and that could have similar environmental impacts as the Project's operations, with the potential to result in cumulative operational impacts.

TABLE 3.1-1
PROJECTS CONSIDERED IN CUMULATIVE IMPACT ANALYSIS

Project No. on Map	Project Name (Project Sponsor or Jurisdiction)	Project Description	Current Phase/Timeline
1	Twin Pines Park Belmont Creek Restoration Project (City of Belmont)[a]	This project addresses the severe erosion and bank failure along a portion of the reach of Belmont Creek in Twin Pines Park. The project will create a more natural stream channel, restore and create natural riparian habitat, remove invasive species of flora, stabilize stream banks through planting and other slope stabilization methods, and expand community connectivity through integration with the recreational facilities of the park. This work will include the construction of a low-flow sediment capture basin, which further reduces sediment transport downstream.	EIR expected to be complete by June 2024 Conceptual Design currently at 60%
2	Ralston Ave Corridor Improvement Project Phase 3 (City of Belmont)[b]	This project is a bike and pedestrian improvement project along Ralston Avenue from Alameda De las Pulgas to South Road. Sidewalk rehabilitation is planned to replace the current sidewalk that is in poor condition along the project segment on the Ralston Avenue corridor. Sidewalk paths may be widened or narrowed to provide adequate width for pedestrians. New bike lanes will be created in areas where current bike lanes may not exist. Some bike lanes will be painted green to increase visibility and provide a safer path of travel for bicycle use. New curb ramps will be installed at some street corners to meet Americans with Disabilities Act (ADA) guidelines. The pavement will be resurfaced and the street will be restriped so that all new changes are clear. Addition of a Rectangular Rapid Flashing Beacon System will create a safer measure of street crossing at high-density intersections.	The project has completed all improvements.
3	800 Laurel Avenue (City of Belmont)[c]	Located approximately 0.2 mile from Twin Pines Park, this project includes demolition of the existing single-family home and construction of four multi-story townhome buildings containing 16 dwelling units on a largely undeveloped 1.77-acre site. The construction dates for this project are currently unknown.	Initial Study Checklist for Categorical Exemption, September 2021
4	800-803 Belmont Avenue (City of Belmont)[d]	Located approximately 0.9 mile from Twin Pines Park, this project includes construction of 125 Affordable Residential Apartments, subterranean parking, ancillary space (community room, gym, office) and open space on a 1.5-acre property. Construction for this project is anticipated to begin in spring 2024.	The City Council certified the EIR and approved requested entitlements.
5	900 El Camino Real (City of Belmont)[e]	Located approximately 0.4 mile from Twin Pines Park, this project includes construction of a 37-unit affordable housing residential development with on-site services/amenities. Construction for this project is anticipated to begin in spring 2024.	Construction begins December 2023 and ends June 2025
6	Stanford University Conceptual Development Plan (Stanford University)[f]	Stanford entered into an option to a purchase agreement with Notre Dame de Namur University (NDNU) in September 2021 to work toward Stanford's purchase of the 46-acre campus. On October 5, 2022 Stanford submitted an application to the City of Belmont for a Conceptual Development Plan and Development Agreement for the NDNU campus property at 1500 Ralston Ave. Stanford seeks to renovate and revitalize the campus with continued use of academic and related on-site housing and other academic support uses over a 30-year timeframe.	Currently undergoing CEQA

NOTE:

TBA = To Be Announced

Sources:

a City of Belmont, 2023a. Public Works Projects. Available: https://www.belmont.gov/Home/Components/FacilityDirectory/FacilityDirectory/451/938. Accessed November 9, 2023.
b City of Belmont, 2023b. Public Works Projects. Available: https://www.belmont.gov/Home/Components/FacilityDirectory/FacilityDirectory/425/938. Accessed November 9, 2023.
c City of Belmont, 2023c. Development Projects. Available: https://www.belmont.gov/Home/Components/FacilityDirectory/FacilityDirectory/438/934. Accessed November 9, 2023.
d City of Belmont, 2023d. Development Projects. Available: https://www.belmont.gov/Home/Components/FacilityDirectory/FacilityDirectory/431/934. Accessed November 9, 2023.
e City of Belmont, 2023e. Development Projects. Available: https://www.belmont.gov/Home/Components/FacilityDirectory/FacilityDirectory/407/934. Accessed November 9, 2023.
f City of Belmont, 2023f. Development Projects. Available: https://www.belmont.gov/Home/Components/FacilityDirectory/FacilityDirectory/475/934. Accessed November 9, 2023.

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Belmont Creek Restoration Project

Under the separate but complementary Belmont Creek Restoration Project (Restoration Project), the City is proposing to stabilize and restore eroded sections of Belmont Creek in Twin Pines Park at a location approximately 500 feet upstream of the Project.

The Restoration Project would improve and enhance a segment of Belmont Creek using biostabilization techniques over two phases. Phase 1 would address 455 linear feet of the creek bed and adjacent banks and Phase 2 would address the channel from where the creek daylights at a concrete culvert upstream of the Phase 1 footprint to approximately 1,600 linear feet downstream. The Restoration Project would accomplish the following:

- Improve public safety through stabilizing eroding streambanks; setting back steep, vertical banks to a more gradual slope angle; and creating a dedicated creek access point for patrons;
- Expand the channel cross-sectional area and create riffle-run-pool sequences that would help reduce overall streamflow velocity and store entrained sediment;
- Improve riparian and aquatic habitat quality and complexity by developing geomorphic bed features along the stream channel and removing nonnative and invasive plant species and replacing them with native plantings; and
- Improve water quality by reducing channel erosion through the Restoration Project reach and sediment loading to the creek.

Construction periods of the Twin Pines Park Stormwater Detention Basin Project and the Restoration Project could overlap, and if so, would be implemented in a coordinated manner. Both projects would occur in the reach of Belmont Creek located within Twin Pines Park, and while the same construction staging areas may be used for both projects simultaneously, the Restoration Project would occur approximately 500 feet upstream of the Twin Pines Park Stormwater Detention Basin Project and the two project footprints would not physically overlap. Although both projects are aimed at addressing erosion, sedimentation, and flooding issues both onsite and downstream for some distance within the watershed (see **Appendix E**), the Twin Pines Park Stormwater Detention Basin Project is proposed independent of the Restoration Project and would proceed whether the Restoration Project is approved and implemented. The detention basin has been designed to capture sediment irrespective of the Restoration Project being implemented. Likewise, the Restoration Project does not require that the detention basin be built prior to or during the restoration of Belmont Creek.

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3.2 Air Quality and Greenhouse Gas Emissions

This section presents an analysis of potential impacts related to air quality and greenhouse gas (GHG) emissions that would result from implementation of the proposed Twin Pines Park Stormwater Detention Basin Project (Project).

3.2.1 Environmental Setting

Air Quality

The Project site is located within the San Francisco Bay Area Air Basin (SFBAAB), under the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). The air quality in the SFBAAB is influenced by natural factors such as topography, meteorology, climate, and the presence of existing air pollution sources and ambient conditions. Annual temperatures in the Project area average in the mid-50s (degrees Fahrenheit), ranging from the low 40s on winter mornings to the mid-70s during summer afternoons. Daily and seasonal oscillations of temperature are small because of the moderating effects of the nearby San Francisco Bay as well as the Pacific Ocean. In contrast to the steady temperature regime, rainfall is highly variable and confined almost exclusively to the rainy period from November through April. Precipitation varies widely from year to year as shifts in the annual storm track of a few hundred miles can mean the difference between a very wet year and drought conditions.

Criteria Air Pollutants

The U.S. Environmental Protection Agency (EPA) has identified criteria pollutants that are a threat to public health and welfare. These pollutants are called “criteria” air pollutants because standards have been established for each of them to meet specific public health and welfare criteria. The EPA originally identified National Ambient Air Quality Standards (NAAQS) for ozone, carbon monoxide (CO), particulate matter (PM), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead. Later, subsets of particulate matter were identified, and permissible levels established. These include the fractions of particulate matter 10 microns in diameter or less (PM_{10}) and 2.5 microns in diameter or less ($PM_{2.5}$). Most of the criteria air pollutants are emitted as primary pollutants; however, ground-level ozone is a secondary pollutant that is formed in the atmosphere by chemical reactions between nitrogen oxides (NO_x) and reactive organic gases (ROG) in the presence of sunlight. In addition to the criteria air pollutants identified by the EPA, California has set its own California Ambient Air Quality Standards (CAAQS) for the same six criteria air pollutants recognized by the EPA, as well as four additional pollutants including visibility-reducing particulates, sulfates, hydrogen sulfide, and vinyl chloride.

Table 3.2-1 summarizes the various criteria air pollutants, their health and environmental effects, and their major sources. The SFBAAB is designated as a non-attainment area with respect to the state and federal 8-hour ozone standards, the state one-hour ozone standard, the state and federal $PM_{2.5}$ standards, and the state PM_{10} standard. The area is designated as unclassified or an attainment area for all other state and federal standards (BAAQMD, 2017a).

TABLE 3.2-1
CRITERIA AIR POLLUTANTS, EFFECTS, AND SOURCES

Pollutant	Health & Environmental Effects	Major Sources
Ozone	High concentrations can directly affect lungs, causing irritation. Long-term exposure may cause damage to lung tissue.	Formed when ROG and NOx react in the presence of sunlight. Major sources include on-road motor vehicles, solvent evaporation, and commercial/industrial mobile equipment
CO	Classified as a chemical asphyxiant, carbon monoxide interferes with the transfer of fresh oxygen to the blood and deprives sensitive tissues of oxygen.	Internal combustion engines, primarily gasoline-powered motor vehicles.
NO_2	Irritating to eyes and respiratory tract. Colors atmosphere reddish-brown.	Motor vehicles, petroleum refining operations, industrial sources, aircraft, ships, and railroads.
SO_2	Irritates upper respiratory tract; injurious to lung tissue. Can yellow the leaves of plants, and destructive to marble, iron, and steel. Limits visibility and reduces sunlight.	Fuel combustion, chemical plants, sulfur recovery plants, and metal processing.
PM_{10}	May irritate eyes and respiratory tract; causes decreases in lung capacity, cancer, and increased mortality. Produces haze and limits visibility.	Dust and fume-producing industrial and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays).
$PM_{2.5}$	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and results in surface soiling.	Fuel combustion in motor vehicles, equipment, and industrial sources as well as residential and agricultural burning. Also formed from photochemical reactions of other pollutants, including NOx, sulfur oxides, and organics.
Lead	Disturbs gastrointestinal system, and causes anemia, kidney disease, and neuromuscular and neurological dysfunction.	Present source: lead smelters, battery manufacturing, and recycling facilities. Past source: combustion of leaded gasoline.
Hydrogen Sulfide	Nuisance odor (rotten egg smell), headache and breathing difficulties (higher concentrations).	Geothermal power plants and petroleum production and refining.
Sulfates	Causes breathing difficulties, aggravates asthma, reduces visibility.	Produced by the reaction in the air of SO_2.
Visibility-reducing Particles	Reduces visibility, reduces airport safety, lowers real estate value, and discourages tourism.	See $PM_{2.5}$

Toxic Air Contaminants

Toxic air contaminants (TACs) are airborne substances capable of causing short-term (acute) and/or long-term (chronic or carcinogenic, i.e., cancer-causing) adverse human health effects, including injury or illness. TACs include both organic and inorganic chemical substances. They may be emitted from a variety of common sources including gasoline stations, automobiles, dry cleaners, industrial operations, and painting operations. The current California list of TACs includes nearly 200 compounds, including diesel particulate matter (DPM) emissions from diesel-fueled engines (California Air Resources Board [CARB], 2023).

Sensitive Receptors

Air quality does not affect every individual in the population in the same way, and some groups are more sensitive to adverse health effects than others. More sensitive population groups include the elderly and the young; those with respiratory disease, such as asthma and chronic obstructive pulmonary disease; and those with other environmental or occupational health exposures (e.g., indoor air quality) that affect cardiovascular or respiratory diseases. BAAQMD defines sensitive receptors as schools, childcare centers, hospitals, and senior-care facilities as well as children, adults, and seniors occupying or residing in residential dwellings. Workers are generally not considered sensitive receptors because they have other legal protections; specifically, employers must follow regulations set forth by the Occupational Safety and Health Administration (OSHA) to ensure the health and well-being of employees. However, in its most recent guidance, BAAQMD requires that worker receptors be included in the evaluation of health risk impacts (BAAQMD, 2023a).

The Project site is generally surrounded by commercial uses to the north, and residential uses to the west and east. The Belmont Senior & Community Center and other park uses are located to the south. The nearest sensitive receptors to the Project site are the residences along O'Neill Avenue, located less than 50 feet to the southeast. City Hall is located immediately to the north of the Project site.

Greenhouse Gases

Gases that trap heat in the atmosphere are referred to as GHGs because they capture heat radiated from the sun as it is reflected back into the atmosphere, similar to a greenhouse. The most abundant GHGs in the earth's atmosphere are carbon dioxide (CO_2), methane, and nitrous oxide. The accumulation of GHGs has been implicated as a driving force for global climate change. Definitions of climate change vary between and across regulatory authorities and the scientific community, but in general can be described as the changing of the earth's climate caused by natural fluctuations and the impact of human activities that alter the composition of the global atmosphere. Both natural processes and human activities emit GHGs. Global climate change is a change in the average weather on earth that can be measured by wind patterns, storms, precipitation, and temperature. Although there is disagreement as to the speed of global warming and the extent of the impacts attributable to human activities, much of the scientific community now agrees that there is a direct link between increased emission of GHGs and long-term global temperature. Potential global warming impacts in California may include loss of snowpack, 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 impacts to agriculture, changes in disease vectors, and changes in habitat and biodiversity.

3.2.2 Regulatory Framework

Federal

Clean Air Act

The Clean Air Act (CAA), first enacted in 1963, has been amended numerous times (1965, 1967, 1970, 1977, and 1990). The CAA establishes federal air quality standards, known as NAAQS, and specifies future dates for achieving compliance. The CAA also mandates that the state submit and implement a State Implementation Plan (SIP) for local areas not meeting those standards. The SIPs must include pollution control measures that demonstrate how the standards will be met. The 1990 amendments to the CAA identify specific emission-reduction goals for areas not meeting the NAAQS. These amendments require both a demonstration of reasonable further progress toward attainment and incorporation of additional sanctions for failure to attain or meet interim milestones.

National Ambient Air Quality Standards

As required by the federal CAA of 1970, the EPA initially identified six criteria air pollutants that are pervasive in urban environments and for which federal and state health-based ambient air quality standards were established. The agency has regulated emissions of criteria air pollutants by developing specific public health and welfare–based criteria as the basis for setting permissible levels. Pursuant to the 1990 federal CAA Amendments, the EPA classifies air basins (or portions thereof) as in "attainment" or "nonattainment" for criteria air pollutants, based on whether or not the NAAQS had been achieved. **Table 3.2-2** summarizes the current NAAQS and attainment status for the SFBAAB.

TABLE 3.2-2
STATE AND FEDERAL AMBIENT AIR QUALITY STANDARDS AND ATTAINMENT STATUS FOR THE SAN FRANCISCO BAY AREA AIR BASIN

Pollutant	Averaging Time	State (CAAQS[a])		Federal (NAAQS[b])	
		Standard	Attainment Status	Standard	Attainment Status
Ozone	1-hour	0.09 ppm	**N**	NA	See Note c
	8-hour	0.070 ppm	**N**	0.070 ppm[d]	**N**/Marginal
CO	1-hour	20 ppm	A	35 ppm	A
	8-hour	9 ppm	A	9 ppm	A
NO$_2$	1-hour	0.18 ppm	A	0.100 ppm	U
	Annual	0.030 ppm	NA	0.053 ppm	A
SO$_2$	1-hour	0.25 ppm	A	0.075 ppm	A
	24-hour	0.04 ppm	A	0.14 ppm	A
	Annual	NA	NA	0.03 ppm	A
PM$_{10}$	24-hour	50 µg/m^3	**N**	150 µg/m^3	U
	Annual[e]	20 µg/m^3 [f]	**N**	NA	NA
PM$_{2.5}$	24-hour	NA	NA	35 µg/m^3	**N**
	Annual	12 µg/m^3	**N**	12 µg/m^3	U/A
Sulfates	24-hour	25 µg/m^3	A	NA	NA
Lead	30-day	1.5 µg/m^3	A	NA	NA
	Cal. Quarter	NA	NA	1.5 µg/m^3	A
	Rolling 3-month average	NA	NA	0.15	U
Hydrogen Sulfide	1-hour	0.03 ppm	U	NA	NA
Visibility-Reducing Particles	8-hour	See Note g	U	NA	NA

NOTES: A = Attainment; **N** = Non-attainment; U = Unclassified; NA = Not Applicable, no applicable standard; ppm = parts per million; µg/m^3 = micrograms per cubic meter.

a CAAQS = California ambient air quality standards. CAAQS for ozone, CO (except Lake Tahoe), SO$_2$ (1-hour and 24-hour), NO$_2$, PM, and visibility-reducing particles are values that are not to be exceeded. All other State standards shown are values not to be equaled or exceeded.

b NAAQS = national ambient air quality standards. NAAQS, other than ozone and particulates, and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The 8-hour ozone standard is attained when the 3-year average of the fourth highest daily concentration is 0.08 ppm or less. The 24-hour PM$_{10}$ standard is attained when the 3-year average of the 99th percentile of monitored concentrations is less than the standard. The 24-hour PM$_{2.5}$ standard is attained when the 3-year average of the 98th percentile is less than the standard.

c The EPA revoked the national 1-hour ozone standard on June 15, 2005.

d This Federal 8-hour ozone standard was approved by EPA in October 2015 and became effective on December 28, 2015.

e State standard = annual geometric mean; national standard = annual arithmetic mean.

f In June 2002, CARB established new annual standards for PM2.5 and PM10.

g Statewide visibility-reducing particle standard (except Lake Tahoe Air Basin): Particles in sufficient amount to produce an extinction coefficient of 0.23 per kilometer when the relative humidity is less than 70 percent. This standard is intended to limit the frequency and severity of visibility impairment due to regional haze and is equivalent to a 10-mile nominal visual range.

Source: BAAQMD, 2017a

State

California Clean Air Act

In 1988, the state legislature adopted the California CAA, which established a statewide air pollution control program. The California CAA requires all air districts in the state to endeavor to meet the CAAQS by the earliest practical date. Unlike the federal CAA, the California CAA does not set precise attainment deadlines. Instead, it establishes increasingly stringent requirements for areas that will require more time to achieve the standards.

The CARB manages air quality, regulates mobile emissions sources, and oversees the activities of county air pollution control districts and regional air quality management districts. CARB also establishes state ambient air quality standards and vehicle emissions standards.

CARB and the local air districts bear responsibility for achieving the CAAQS, which are to be achieved through district-level air quality management plans that would be incorporated into the SIP. In California, the EPA has delegated authority to prepare SIPs to CARB, which, in turn, has delegated that authority to individual air districts. CARB has traditionally established state air quality standards, maintained oversight authority in air quality planning, developed programs for reducing emissions from motor vehicles, developed air emission inventories, collected air quality and meteorological data, and approved SIPs.

The California CAA substantially adds to the authority and responsibilities of air districts. It designates air districts as lead air quality planning agencies, requires air districts to prepare air quality plans, and grants air districts authority to implement transportation control measures. The California CAA also emphasizes the control of "indirect and area-wide sources" of air pollutant emissions and gives local air districts explicit authority to regulate indirect sources of air pollution and to establish traffic control measures.

California Ambient Air Quality Standards

Although the federal CAA established the NAAQS, individual states retained the option to adopt more stringent standards and to include other pollution sources. California had already established its own air quality standards (CAAQS) when the federal standards were established. Because of California's unique meteorological challenges, there are differences between the CAAQS and the NAAQS. California's ambient standards tend to be at least as protective as the national ambient standards and are often more stringent. In addition to the six federal criteria air pollutants, California has adopted ambient air quality standards for sulfates, hydrogen sulfide, visibility-reducing particles, and vinyl chloride. Under the California CAA, areas have been designated as in attainment or non-attainment with respect to the state standards. The current CAAQS and SFBAAB's attainment status with respect to these standards are also shown in Table 3.2-2.

Mobile-Source Regulations

The transportation sector accounts for a large percentage of California's carbon dioxide emissions. In response, on July 22, 2002, the California Legislature enacted Assembly Bill (AB) 1493 (Health and Safety Code sections 42823 and 43018.5), also referred to as the "Pavley standards." AB 1493 required CARB to set GHG emissions standards for passenger vehicles, light-duty trucks, and other vehicles manufactured in and after 2009 whose primary use is non-commercial personal transportation. The federal CAA ordinarily preempts states from regulating motor vehicle emissions standards; however, California is allowed to set its own standards with a federal CAA waiver granted by EPA in June 2009.

In 2010, the EPA and the United States Department of Transportation adopted federal standards for model year 2012–2016 light-duty vehicles, which correspond to the vehicle model years regulated under California's Pavley Phase I standards. In August 2012, the EPA and the United States Department of Transportation adopted GHG emissions standards for model year 2017–2025 vehicles. Although these emissions standards are focused on reducing GHG emissions, they will also reduce emissions of criteria pollutants because increased fuel efficiency will result in fewer combustion emissions from gasoline and diesel fuel use.

Toxic Air Contaminants

The California Health and Safety Code defines TACs as air pollutants that may cause or contribute to an increase in mortality or in serious illness, or that may pose a present or potential hazard to human health. The State Air Toxics Program was established in 1983 under AB 1807 (Tanner). A total of 243 substances have been designated TACs under California law, including the 189 (federal) hazardous air pollutants adopted in accordance with AB 2728 in 1993. The Air Toxics "Hot Spots" Information and Assessment Act of 1987 (AB 2588) seeks to identify and evaluate risks from air toxics sources, requiring that high-priority facilities perform a health risk assessment and, if specific thresholds are violated, that the facilities communicate the results to the public.

In August 1998, CARB identified particulate emissions from diesel-fueled engines, DPM, as a TAC (CARB, 1998). CARB subsequently developed the *Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles* (CARB, 2000). The document proposed to reduce DPM emissions, with the goal of reducing emissions and associated health risks by 75 percent in 2010 and by 85 percent in 2020. The program aimed to require the use of state-of-the-art catalyzed DPM filters and ultra-low-sulfur diesel fuel in diesel-fueled engines.

In April 2005, CARB published the *Air Quality and Land Use Handbook: A Community Health Perspective* (CARB, 2005). This handbook is intended to give guidance to local governments for the siting of sensitive land uses such as residences, schools, day care centers, playgrounds, or medical facilities near sources of air pollution.

Assembly Bill 32 and Senate Bill 32

The California Global Warming Solutions Act of 2006 (AB 32) required that statewide GHG emissions be reduced to 1990 levels by 2020. This reduction was to be accomplished by enforcing a statewide cap on GHG emissions that would be phased in starting in 2012. This act defines GHGs as CO_2, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride and represents the first enforceable statewide program to limit emissions of these GHGs from all major industries with penalties for noncompliance. The law further requires that reduction measures be technologically feasible and cost effective. The California Global Warming Solutions Act assigned CARB the primary responsibility for reducing GHG emissions by adopting rules and regulations directing State actions that would achieve GHG emissions reductions equivalent to 1990 statewide levels by 2020.

In 2016, SB 32 and its companion bill AB 197 amended Health and Safety Code Division 25.5, establishing a new climate pollution reduction target of 40 percent below 1990 levels by 2030, and included provisions to ensure that the benefits of State climate policies reach Environmental Justice Communities.[1]

AB 1279 (California Climate Crisis Act)

AB 1279, also known as the California Climate Crisis Act, declares the policy of the state both to achieve net zero GHG emissions as soon as possible, but no later than 2045, and achieve and maintain net negative GHG emissions thereafter, and to ensure that by 2045, statewide anthropogenic GHG emissions are reduced to at least 85 percent below the 1990 levels. The bill would require CARB to work with relevant state agencies to ensure that updates to the scoping plan identify recommend measures to achieve these policy goals and to identify and implement a variety of policies and strategies that enable CO_2 removal solutions and carbon capture, utilization, and storage technologies in California, as specified.

Climate Change Scoping Plan

A specific requirement of AB 32 was for CARB to prepare a Climate Change Scoping Plan for achieving the maximum technologically feasible and cost-effective GHG emission reduction by 2020. CARB developed and approved the initial scoping plan in 2008, outlining the regulations, market-based approaches, voluntary measures, policies, and other emission reduction programs that would be needed to meet the 2020 statewide GHG emission limit and initiate the transformations needed to achieve the State's long-range climate objectives (CARB, 2008).

CARB approved the *First Update to the Climate Change Scoping Plan* in May 2014 and built upon the 2008 Scoping Plan with new strategies and recommendations (CARB, 2014). Then, in response to the 2030 GHG reduction target, CARB adopted *California's 2017 Climate Change Scoping Plan* which outlines the proposed framework of actions for achieving the 2030 GHG target of 40 percent reduction in GHG emissions relative to 1990 levels (CARB, 2017). The 2017 Scoping Plan recommends statewide targets of no more than 6 $MTCO_2e$ per capita by 2030 and no more than 2 $MTCO_2e$ per capita by 2050.

In May 2022, CARB adopted the 2022 update to the Scoping Plan, which assesses progress toward the statutory 2030 GHG reduction target while laying out a path to achieving carbon neutrality no later than 2045. The 2022 Scoping Plan focuses on outcomes needed to achieve carbon neutrality by assessing paths for clean technology, energy deployment, natural and working lands, and others, and is designed to meet the state's long-term climate objectives and support a range of economic, environmental, energy security, environmental justice, and public health priorities (CARB, 2022).

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[1] An Environmental Justice Community is a neighborhood or community, composed predominantly of persons of color or a substantial proportion of persons below the poverty line, that is subjected to a disproportionate burden of environmental hazards and/or experiences a significantly reduced quality of life relative to surrounding or comparative communities.

The 2022 Scoping Plan expands on prior Scoping Plans and responds to more recent legislation by outlining a technologically feasible, cost-effective, and equity-focused path to achieve the State's climate target of reducing anthropogenic emissions to 85 percent below 1990 levels by 2045 and achieving carbon neutrality[2] by 2045 or earlier.

The major element of the 2022 Scoping Plan is the decarbonization of every sector of the economy. This requires rapidly moving to zero-emission transportation for cars, buses, trains, and trucks; phasing out the use of fossil gas for heating; clamping down on chemicals and refrigerants; providing communities with sustainable options such as walking, biking, and public transit to reduce reliance on cars; continuing to build out solar arrays, wind turbine capacity, and other resources to provide clean, renewable energy to displace fossil-fuel fired electrical generation; scaling up new options such as renewable hydrogen for hard-to-electrify end uses; and biomethane where needed. "Successfully achieving the outcomes called for in the Scoping Plan would reduce demand for liquid petroleum by 94 percent and total fossil fuel by 86 percent by 2045 relative to 2022" (CARB, 2022).

The 2022 Scoping Plan approaches decarbonization from two perspectives: (1) managing a phasedown of existing energy sources and technology and (2) ramping up, developing, and deploying alternative clean energy sources and technology over time (CARB, 2022).

Regional

BAAQMD is the regional agency with jurisdiction over the nine-county region located in the SFBAAB. BAAQMD is responsible for attaining and/or maintaining air quality in the region within federal and State air quality standards. Specifically, BAAQMD has the responsibility to monitor ambient air pollutant levels throughout the region and to develop and implement strategies to attain the applicable federal and State standards.

BAAQMD Rules and Regulations

BAAQMD does not have authority to regulate emissions from motor vehicles. Specific rules and regulations adopted by BAAQMD limit the emissions that can be generated by various stationary sources and identify specific pollution reduction measures that must be implemented in association with various activities. These rules regulate not only emissions of the six criteria air pollutants, but also TAC emissions sources. Stationary sources are regulated through BAAQMD's permitting process and standards of operation. Through this permitting process, including an annual permit review, BAAQMD monitors the generation of stationary source emissions and uses this information in developing its air quality plans. Any sources of stationary emissions constructed as part of the Project would be subject to the BAAQMD Rules and Regulations. Both federal and State ozone plans rely heavily upon stationary source control measures set forth in BAAQMD's Rules and Regulations.

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[2] *Carbon neutrality* means "net zero" emissions of GHGs. In other words, it means that GHG emissions generated by sources such as transportation, power plants, and industrial processes must be less than or equal to the amount of carbon dioxide that is stored, both in natural sinks and through mechanical sequestration. AB 1279 uses the terminology net zero and the 2022 Scoping Plan uses the terminology carbon neutrality or carbon neutral. These terms mean the same thing and are used interchangeably.

BAAQMD Air Quality Plan

For State air quality planning purposes, the SFBAAB is classified as a serious non-attainment area for the 1-hour ozone standard. The "serious" classification triggers various plan submittal requirements and transportation performance standards. One such requirement is that BAAQMD update the Clean Air Plan every three years to reflect progress in meeting the air quality standards and incorporate new information regarding the feasibility of control measures and new emission inventory data (California Health and Safety Code Sections 40924 and 40925).

In April 2017, the BAAQMD adopted the *2017 Clean Air Plan* whose primary goals are to protect public health and to protect the climate (BAAQMD, 2017b). The plan includes a wide range of proposed control measures to reduce combustion-related activities, decrease fossil fuel combustion, improve energy efficiency, and decrease emissions of potent GHGs.

The *2017 Clean Air Plan* contains 85 measures that address reduction of several pollutants in one measure: ozone precursors, particulate matter, TACs, and GHGs. Other measures focus on a single type of pollutant, potent GHGs such as methane and black carbon that consists of harmful fine particles that affect public health.

BAAQMD CEQA Guidelines and Thresholds of Significance

BAAQMD publishes its CEQA Guidelines – Assessing the Air Quality Impacts of Projects and Plans, as a guidance document to provide lead government agencies, consultants, and project proponents with uniform procedures for assessing air quality impacts and preparing the air quality sections of environmental documents for projects subject to CEQA. The BAAQMD CEQA Guidelines is an advisory document and local jurisdictions are not required to use the methodology outlined therein. The document describes the criteria that BAAQMD uses when reviewing and commenting on the adequacy of environmental documents. It recommends thresholds for use in determining whether projects would have significant adverse environmental impacts, identifies methodologies for predicting project emissions and impacts, and identifies measures that can be used to avoid or reduce air quality impacts.

BAAQMD most recently updated its CEQA Air Quality Guidelines in April 2023 (BAAQMD, 2023a); these guidelines continue to provide direction on recommended analysis methodologies and thresholds for the evaluation of impacts. While the 2022 Guidelines updated the thresholds of significance for climate impacts from GHG emissions, the criteria pollutant thresholds of significance remain unchanged from those adopted in 2011. The analysis presented below accounts for changes to methodology set forth in BAAQMD's 2022 Guidelines.

Local

Table 3.2-3 lists the goals, actions, and policies contained in the City of Belmont's 2035 General Plan Conservation Element (City of Belmont, 2017a) that relate to air quality and GHG emissions.

TABLE 3.2-3
AIR QUALITY AND GREENHOUSE GAS EMISSIONS–RELATED POLICIES IN LOCAL GENERAL PLAN

City of Belmont 2035 General Plan
Goal 5.10 Reduce emissions of ozone-producing pollutants and particulate matter to improve regional air quality and protect the health of Belmont and Bay Area residents.
Policy 5.10-2 Require that new development with sensitive uses that is located adjacent to sources of toxic air contaminants (TAC) be designed to minimize any potential health risks.
Policy 5.10-3 Ensure that construction and grading activities minimize short-term impacts to air quality by employing appropriate mitigation measures and best practices.
Action 5.10-3a Require applicants proposing new development projects within the Planning Area to require their contractors, as a condition of contract, to reduce construction-related GHG emissions by implementing BAAQMD's recommended best management practices, including (but not limited to) the following measures (based on BAAQMD's (2011) CEQA Guidelines): • Use local building materials of at least 10 percent (sourced from within 100 miles of the planning area). • Recycle and reuse at least 50 percent of construction waste or demolition materials
Goal 5.11 Reduce emissions of greenhouse gases to 15 percent below the 2005 baseline levels by 2020 and to 50 percent below the 2005 baseline levels by 2035.
Sources: City of Belmont, 2017a.

Climate Action Plan

The 2017 Climate Action Plan (CAP; City of Belmont, 2017b) is a comprehensive plan for addressing the City of Belmont's GHG emissions and serves as a mitigation strategy under the CEQA for GHG and climate change impacts associated with the adopted 2035 Belmont General Plan and Belmont Village Specific Plan. The CAP was developed in partnership with the City and County Association of Governments of San Mateo County and includes a GHG emissions inventory for the baseline year of 2005, against which progress toward the City goal of reducing GHG emissions can be measured. The CAP set an initial emissions reduction target of 15 percent below the baseline 2005 levels by 2020 consistent with the AB 32 GHG reduction target. In line with the City of Belmont's General Plan update to 2035, the CAP also sets a second GHG reduction target of 50 percent below 2005 levels by 2035. The plan provides a list of climate action strategies targeting reductions in the energy, transportation and land use, and solid waste sectors as well as adaptation planning.

3.2.3 Impacts and Mitigation Measures

Significance Criteria

In accordance with the CEQA, CEQA *Guidelines* (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Project could have a significant impact if it were to:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard;
- Expose sensitive receptors to substantial pollutant concentrations;

- Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people;
- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or
- Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

Methodology

The study area for regional air quality impacts is the SFBAAB. The study area for localized health risk impacts is the area in the vicinity of the Project, generally defined by BAAQMD as the "zone of influence" extending 1,000 feet out from the Project site boundaries.

Air quality analysis conducted for this impact assessment employs emission factors, models, and tools distributed by a variety of agencies including CARB, the California Air Pollution Officers Association (CAPCOA), the California Office of Environmental Health Hazard Assessment (OEHHA), and the EPA. Additionally, the analysis follows methodologies identified in the BAAQMD's *2022 CEQA Air Quality Guidelines*.

Consistency with Air Quality Plan

The most recently adopted air quality plan for the Bay Area is the BAAQMD's *2017 Clean Air Plan: Spare the Air, Cool the Climate* (2017 Clean Air Plan), which identifies measures to reduce emissions and ambient concentrations of air pollutants; safeguard public health by reducing exposure to air pollutants that pose the greatest health risk, with an emphasis on protecting the communities most heavily affected by air pollution; and reduce GHG emissions. Consistency with the 2017 Clean Air Plan is the basis for determining whether the project would conflict with or obstruct implementation of an applicable air quality plan, the first bulleted significance criterion identified above.

In determining consistency with the 2017 Clean Air Plan, this analysis considers whether the project would (1) support the primary goals of the 2017 Clean Air Plan, (2) include applicable control measures from the 2017 Clean Air Plan, and (3) avoid disrupting or hindering implementation of control measures identified in the 2017 Clean Air Plan. To meet the primary goals, the 2017 Clean Air Plan includes 85 control measures and actions grouped into different categories to address emissions from various sources: stationery and area source measures, mobile source measures, transportation control measures, land use measures, and energy and climate measures. Consistency of the Project with applicable control measures in the 2017 Clean Air Plan is presented in Impact AIR-1 and addresses the first significance criterion.

Criteria Pollutant Emissions

Emissions from Project construction were estimated using the latest version of the California Emissions Estimator Model (CalEEMod; Version 2022.1.1.20). Data on construction schedule and phasing, equipment types, numbers, and size (horsepower [hp]), and the number of construction vehicle trips was provided by the City and engineering team. Model defaults were used when Project-specific data was not available. For each year of construction (2025 through

2027), the average daily emissions were calculated and compared to the BAAQMD thresholds for construction. Project construction would also result in potential localized impacts from fugitive dust emissions; these emissions are evaluated qualitatively using BAAQMD guidance to apply best management practices to control dust.

The Project would not introduce any new sources of criteria air pollutants to the Project site. Therefore, potential criteria air pollutant impacts from Project operation are discussed qualitatively.

TAC Health Risk Impacts

Construction-related TAC emissions generated by the Project primarily include DPM and $PM_{2.5}$, and can result in localized health risk impacts, expressed as annual average $PM_{2.5}$ concentrations, the increased probability of contracting cancer per 1 million persons exposed to TAC concentrations, and the chronic Hazard Index. DPM results in very negligible acute chronic risk and OEHHA does not provide a Reference Exposure Level for the estimation of acute risk from DPM. Therefore, the analysis presented below focuses on chronic Hazard Index from DPM.

A health risk assessment (HRA) was conducted to estimate health risks from exposure to TACs emitted during construction of the Project. The HRA evaluated the estimated incremental increase in lifetime cancer risk from exposure to emissions of DPM and the annual average $PM_{2.5}$ concentrations associated with construction equipment, vehicles, and on-road fugitive sources (including tire wear, brake wear, and road dust) that would be emitted by Project-related construction activities. Consistent with the most recent BAAQMD guidance, fugitive dust emissions generated onsite during construction were also accounted for in the $PM_{2.5}$ concentration analysis. The HRA includes DPM and $PM_{2.5}$ emissions from construction trucks but not from construction worker vehicle trips, which would be primarily gasoline-fueled and are therefore not a substantial source of DPM and $PM_{2.5}$ exhaust emissions.

The HRA focuses on the pollutants of concern ($PM_{2.5}$ and DPM) because these pollutants pose substantial health impacts at the local level more so than other types of air pollutants. While DPM is a complex mixture of gases and fine particles that includes over 40 substances that are listed by the EPA as hazardous air pollutants and by the BAAQMD as TACs, in accordance with OEHHA and BAAQMD health risk guidance, the DPM analysis uses exhaust PM_{10} emissions as a surrogate for DPM emissions (OEHHA & CARB, 1998). This is a conservative approach because DPM is a subset of exhaust PM_{10}; therefore, the fraction of DPM emissions is expected to be lower.

Projected DPM and $PM_{2.5}$ emissions from Project construction were estimated in grams per second using CalEEMod. These emission rates were input into the American Meteorological Society/Environmental Protection Agency Regulatory Model Improvement Committee regulatory air dispersion model (AERMOD version 21112; U.S. EPA, 2022) to derive concentrations across a 20 meter by 20 meter receptor grid that covered all receptors within 1,000 feet of the Project site boundaries. BAAQMD considers 1,000 feet around sources as the zone of influence for assessing health risk impacts (BAAQMD, 2023a). Receptors analyzed include residences and workers at commercial uses in the Project vicinity. There are no schools or childcare centers within 1,000 feet of the Project site boundaries.

In accordance with OEHHA and BAAQMD guidelines for HRAs (BAAQMD, 2023b; OEHHA, 2015), established health risk parameters were applied to the highest estimated DPM concentrations at various receptor types analyzed (residential, worker). Increase in lifetime cancer risk was estimated using the cancer potency factor for DPM, OEHHA-recommended age-sensitivity factors and breathing rates, as well as fraction of time at home and an exposure duration of 30 years. Age-sensitivity factors reflect the greater sensitivity of infants and small children to cancer-causing air pollutants. For assessing impacts to existing offsite residential receptors, construction exposure is assumed to begin at the start of the 3rd trimester of an unborn child. Estimation of cancer risk to workers assumed exposure to adults greater than 16 years of age. The chronic hazard index was estimated using acceptable reference concentrations for non-cancer health effects of DPM. Detailed HRA calculations are presented in **Appendix C**.

If the Project would generate TAC emissions resulting in increased health risk values or annual average $PM_{2.5}$ concentration contributions exceeding project-level BAAQMD thresholds at the maximally exposed individual (MEI) for the residential and worker receptors, the Project would have a significant impact. This analysis is presented in Impact AIR-3 and addresses the third significance criterion.

The Project would not introduce any new sources of TACs; this topic is therefore not discussed further.

Odors

Odor impacts are discussed qualitatively based on BAAQMD guidance.

Greenhouse Gas Emissions

GHG emissions from Project construction were estimated using CalEEMod using construction data from the City and engineering team. As the BAAQMD does not have quantitative significance thresholds for the evaluation of construction GHGs, the analysis uses thresholds from the nearby Sacramento Metropolitan Air Quality Management District (SMAQMD).

The Project is also evaluated for consistency with the City of Belmont General Plan, the Climate Action Plan, and CARB's 2022 Scoping Plan.

Cumulative Impacts

The contribution of a project's individual air emissions to regional air quality impacts is by its nature a cumulative effect. Emissions from past, present, and future projects in the vicinity also have or will contribute to adverse regional air quality impacts on a cumulative basis. No single project by itself would be sufficient in size to result in nonattainment of ambient air quality standards. Instead, a project's individual emissions contribute to existing cumulative air quality conditions (BAAQMD, 2023a). As described above, the project-level thresholds for criteria air pollutant impacts are based on levels at which new sources are not anticipated to contribute to an air quality violation, cause a significant human health risk, or result in a considerable net increase in criteria air pollutants. Therefore, if a project's emissions are below the project-level thresholds, the project would not be considered to result in a considerable contribution to cumulative regional air quality impacts.

Potential cumulative health risks were analyzed at the Project's residential MEI. The analysis considers health risks from the Project in combination with health risks from BAAQMD-permitted stationary sources and mobile sources (freeways, major streets, and rail) within 1,000 feet of the residential MEI (BAAQMD, 2023a).[3] Health risk data from BAAQMD-permitted stationary sources and background mobile source risks from on-road and rail sources were derived from the health risk screening tools available on the BAAQMD website (BAAQMD, 2023c; BAAQMD, 2023d).

Climate change is the cumulative effect of all natural and anthropogenic sources of GHGs accumulated on a global scale. The GHG emissions from an individual project, even a very large development project, would not individually generate sufficient GHG emissions to measurably influence global climate change, and thus the assessment of the Project's GHG emissions impacts presented above is inherently an analysis of its cumulative impact. Therefore, a separate cumulative analysis of the Project's GHG emissions is not provided, nor required.

Impacts and Mitigation Measures

Table 3.2-4 summarizes the impact conclusions presented in this section.

TABLE 3.2-4
AIR QUALITY AND GREENHOUSE GAS EMISSIONS IMPACT CONCLUSIONS

Impact	Level of Significance
Impact AIR-1: Conflict with or obstruct implementation of the applicable air quality plan.	LTSM
Impact AIR-2: 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.	LTSM
Impact AIR-3: Expose sensitive receptors to substantial pollutant concentrations.	LTSM
Impact AIR-4: Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.	LTS
Impact AIR-5: Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.	LTS
Impact AIR-6: Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.	LTS

NOTES:
LTS = less than significant, LTSM = less than significant with mitigation

Impact AIR-1: Conflict with or obstruct implementation of the applicable air quality plan. *(Less than Significant with Mitigation)*

The federal CAA and the California CAA require any air district that has been designated as a nonattainment area relative to the NAAQS and the CAAQS for ozone, CO, SO_2, or NO_2 to prepare and submit a plan for attaining and maintaining the standards. The most recently adopted air quality plan to address nonattainment issues in the SFBAAB is the 2017 Clean Air Plan (BAAQMD, 2017b). The 2017 Clean Air Plan provides a regional strategy to protect public

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[3] The MEI adequately captures analysis of all sensitive receptors.

health and the climate by progressing toward attaining all state and federal air quality standards, eliminating health risk disparities from exposure to air pollution among Bay Area communities, transitioning the region to a post-carbon economy needed to achieve GHG reduction targets for 2030 and 2050, and providing a regional climate protection strategy to achieve those GHG reduction targets. The plan includes a wide range of control measures designed to decrease emissions of the air pollutants that are most harmful to SFBAAB residents, such as particulate matter, ozone, and TACs; reduce emissions of methane and other "super-GHGs"[4] that are potent climate pollutants in the near-term; and decrease emissions of carbon dioxide by reducing fossil fuel combustion (BAAQMD, 2017b).

The BAAQMD CEQA Guidelines (BAAQMD, 2023a) recommend that a project's consistency with the current air quality plan be evaluated using the following three criteria:

a) The project supports the goals of the air quality plan,

b) The project includes applicable control measures from the air quality plan, and

c) The project does not disrupt or hinder implementation of any control measures from the air quality plan.

If it can be concluded with substantial evidence that a project would be consistent with the above three criteria, then the BAAQMD would consider it to be consistent with the air quality plan prepared for the Bay Area.

The primary goals of the 2017 Clean Air Plan are to make progress towards achieving attainment for all air quality standards, reduce population exposure to air pollution, and protect public health in the Bay Area. The BAAQMD-recommended guidance for determining if a project supports the goals of the current air quality plan is to compare project-estimated emissions with BAAQMD thresholds of significance. If a project's emissions would not exceed the thresholds of significance after the application of all feasible mitigation measures, the project would be consistent with the goals of the air quality plan. As indicated in the following discussion for Impact AIR-2, though there is no quantitative significance threshold for fugitive dust emissions, without implementation of BAAQMD recommended Best Management Practices for Construction-Related Fugitive Dust Emissions, the Project would be considered to result in significant fugitive dust emissions. As the project would not comply with this qualitative significance threshold, it would not be consistent with the goals of the air quality plan, resulting in a significant impact. Therefore, implementation of **Mitigation Measure AIR-1** would be required.

The 2017 Clean Air Plan contains 85 control measures aimed at reducing air pollution in the SFBAAB. Projects that incorporate all feasible control measures are considered consistent with the air quality plan. The 2017 Clean Air Plan does not contain any measures specific to stormwater detention basin facilities or parking lot land uses and the Project would not hinder implementation of other control measures. Additionally, as noted under the discussion of Impact AIR-2, the Project would not generate emissions of criteria air pollutants during operation that

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[4] "Super-GHGs" are climate pollutants that have the ability to contribute to climate change, such as methane, black carbon, and fluorinated gases.

would exceed the applicable BAAQMD thresholds of significance. Therefore, Project operation would not conflict with or obstruct implementation of the 2017 Clean Air Plan.

Mitigation Measure AIR-1: Implement BAAQMD's Basic and Enhanced Best Management Practices for Construction-Related Fugitive Dust Emissions

During Project construction, the construction contractor shall reduce construction-related fugitive dust (PM_{10} and $PM_{2.5}$) by implementing BAAQMD's basic best management practices for construction-related fugitive dust emissions at all construction and staging areas. The following measures are based on BAAQMD's 2022 CEQA guidelines. The construction contractor shall comply with the following:

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
- All haul trucks transporting soil, sand, or other loose material offsite shall be covered.
- All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping shall be prohibited.
- All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph.
- All trucks and equipment, including their tires, shall be washed off prior to leaving the site.
- Publicly visible signs shall be posted with the telephone number and name of the person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The BAAQMD's General Air Pollution Complaints number shall also be visible to ensure compliance with applicable regulations.
- Limit the simultaneous occurrence of excavation, grading, and ground-disturbing construction activities.
- Install wind breaks (e.g., trees, fences) on the windward side(s) of actively disturbed areas of construction. Wind breaks should have at maximum 50 percent air porosity.
- Plant vegetative ground cover (e.g., fast-germinating native grass seed) in disturbed areas as soon as possible and watered appropriately until vegetation is established.
- Install sandbags or other erosion control measures to prevent silt runoff to public roadways from sites with a slope greater than one percent.
- Minimize the amount of excavated material or waste materials stored at the site.
- Hydroseed or apply non-toxic soil stabilizers to construction areas, including previously graded areas, that are inactive for at least 10 calendar days.

Significance After Mitigation: Implementation of Mitigation Measure AIR-1 would require construction contractors to implement BAAQMD-recommended dust control measures to reduce the impact of fugitive dust emissions during Project construction. Consistent with BAAQMD guidance, the residual impact after mitigation would be considered less than significant. Overall, with implementation of Mitigation Measure AIR-1, the Project would not conflict with or obstruct implementation of the 2017 Clean Air Plan, the applicable air quality plan for the SFBAAB, and this impact would be **less than significant with mitigation**.

Impact AIR-2: Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is in non-attainment under an applicable federal or state ambient air quality standard. ***(Less than Significant with Mitigation)***

In developing thresholds of significance for air pollutants, BAAQMD considered the emission levels at which a project's individual emissions would be cumulatively considerable. Therefore, if a project would result in an increase in ROG, NO_X, PM_{10}, or $PM_{2.5}$ emissions more than its respective average daily emissions significance thresholds, then it would also contribute considerably to a significant cumulative impact. If a project would not exceed the significance thresholds, its emissions would not be cumulatively considerable. The Project's individual impacts are addressed below.

Construction

Project construction has the potential to create temporary air quality impacts through emissions of criteria air pollutants, primarily associated with the use of heavy-duty construction equipment, construction workers' vehicle trips, and truck trips for equipment and material transport. In addition, ROG off-gassing emissions associated with permeable paving is anticipated because the Project proposes the reconstruction of the surface parking lot. Emissions of criteria pollutants that would result from Project construction were estimated using CalEEMod, version 2022.1.1.20. Project-specific information was used for modeling when possible. Where Project-specific information was unavailable, CalEEMod defaults were used. CalEEMod assumptions and detailed modeling outputs are included in **Appendix C**.

Table 3.2-5 presents unmitigated average daily emissions generated from the Project's construction activities and compares them to the BAAQMD's thresholds of significance for construction. As shown in Table 3.2-5, Project emissions would not exceed the BAAQMD's construction thresholds of 54 pounds per day for ROG, NO_X, and exhaust $PM_{2.5}$, and 84 pounds per day for exhaust PM_{10}. Thus, Project impacts would be less than significant for ROG, NO_X, $PM_{2.5}$, and PM_{10} emissions during construction. Though unmitigated emissions would be well below significance thresholds, as shown in Table 3.2-5, implementation of **Mitigation Measure AIR-2** (required under Impact AIR-3 to mitigate health risk impacts to a less-than-significant level) would also reduce this impact further by reducing the amount of criteria air pollutants generated by construction equipment. Construction emissions with the implementation of **Mitigation Measure AIR-2** are also shown in Table 3.2-5.

BAAQMD's approach to analyzing construction-related particulate emissions impacts (other than exhaust PM) is to emphasize implementation of effective and comprehensive dust control measures rather than detailed quantification of emissions. BAAQMD considers construction-related fugitive dust project impacts to be less than significant if a suite of recommended dust-control measures, included as part of **Mitigation Measure AIR-1**, is implemented (BAAQMD, 2023a). Without these measures, fugitive dust from construction activities would result in a significant impact.

TABLE 3.2-5
UNMITIGATED AVERAGE DAILY EMISSIONS FOR PROJECT CONSTRUCTION

Construction Year	Average Daily Emissions (pounds per day)[a, b]			
	ROG	NOx	Exhaust PM_{10}	Exhaust $PM_{2.5}$
Unmitigated Emissions				
2025	1.2	11.0	0.38	0.35
2026	1.3	11.1	0.40	0.37
2027	0.2	1.6	0.04	0.03
Project Average	1.1	9.5	0.34	0.31
BAAQMD Threshold	*54*	*54*	*82*	*54*
Exceeds Threshold?	No	No	No	No
Emissions with Mitigation Measure AIR-2				
2025	0.2	3.6	0.04	0.04
2026	0.3	2.0	0.04	0.04
2027	0.1	1.3	0.01	0.01
Project Average	0.2	2.4	0.04	0.04
BAAQMD Threshold	*54*	*54*	*82*	*54*
Exceeds Threshold?	No	No	No	No

NOTES:

a. For each construction year, annual emissions are divided by the number of construction workdays in the year to determine the average daily emissions. The Project average is estimated by dividing the total construction emissions generated by the Project with the total number of workdays accounting for any overlapping construction phases.
b. Note that totals may not match sums of intermediate values presented in this table or Appendix C tables due to rounding.
c. Refer to Impact AIR-3 for discussion of Mitigation Measure AIR-2.

Source: ESA, 2023 (see Appendix C).

Operation

Upon completion of construction activities, the Project site would be restored to pre-construction conditions. Operational activities associated with the Project would be limited to occasional vehicle trips to the site for maintenance activities and sediment removal from the basin. These activities would generate minimal emissions that are not expected to exceed the BAAQMD's operational significance thresholds. Therefore, Project operation would result in a **less-than-significant impact** with respect to emissions of criteria air pollutants.

Mitigation: Mitigation Measure AIR-1 (refer to Impact AIR-1)

Significance After Mitigation: Implementation of **Mitigation Measure AIR-1** would require construction contractors to implement BAAQMD-recommended dust control measures to reduce the impact of fugitive dust emissions during Project construction. These measures reduce the potential for construction activities to generate dust from disturbed soil surfaces by limiting the creation or presence of dust particles, reducing/restricting construction in conditions conducive to dust formation, applying materials to bind dust particles, and capture and removal of dust particles. Consistent with BAAQMD guidance, the residual impact after mitigation would be less than significant. Overall, impacts associated with the potential for construction and operation-related emissions to result in or cumulatively contribute to a violation of an air quality standard would be **less than significant with mitigation**.

Impact AIR-3: Expose sensitive receptors to substantial pollutant concentrations. *(Less than Significant with Mitigation)*

Project impacts related to increased community health risk can occur by introducing a new source of TACs with the potential to adversely affect existing sensitive receptors in the Project vicinity. Sensitive residential receptors are located less than 50 feet from the Project site boundary to the east. Park users would also be exposed to emissions from construction activities, but they would be considered less sensitive as the exposure durations would be shorter compared to residential exposure, which assumes that a person would spend 95 percent of the time at home. The Project would include temporary construction involving heavy-duty equipment and vehicles that generate $PM_{2.5}$ and DPM (a TAC as identified by CARB). Project operation would generate minimal traffic consisting of light-duty vehicles, which would not be a source of substantial TACs or $PM_{2.5}$ emissions.

Community health risk impacts are addressed by predicting increased lifetime cancer risk, the increase in annual $PM_{2.5}$ concentrations, and computing the Hazard Index for non-cancer health risks. An HRA was completed for the Project, and the results are summarized in **Table 3.2-6**. **Appendix C** contains details of the health risk calculations and model outputs.

TABLE 3.2-6
UNMITIGATED CONSTRUCTION HEALTH RISK IMPACTS FOR A MAXIMALLY EXPOSED INDIVIDUAL (MEI)

Receptor Type	Maximum Cancer Risk (per million) [a]	Annual $PM_{2.5}$ concentration (µg/m^3)	Hazard Index
Unmitigated Resident Infant MEI[b]			
Project Risk	68.5	0.27	0.05
BAAQMD Threshold of Significance	10.0	0.3	1.0
Exceeds Significance Threshold?	**Yes**	**No**	**No**
Unmitigated Offsite Worker MEI[c]			
Project Risk	3.2	0.18	0.04
BAAQMD Threshold of Significance	10.0	0.3	1.0
Exceeds Significance Threshold?	**No**	**No**	**No**

NOTES:

Values in **bold** denote exceedance of Bay Area Air Quality Management District (BAAQMD) thresholds.

a There are no schools or daycares within 1,000 feet from the project site boundaries (the modeling parameters for the HRA). Cancer risks at nearby schools were conservatively assumed to exceed 1 in a million to determine the fraction of time at home to apply to the resident child cancer risk calculations.

b The residential MEI is located at a residence along O'Neill Avenue southeast of the Project site.

c The offsite worker MEI is located at the Belmont Senior Center.

Source: ESA, 2023 (Appendix C).

Community Health Risk Impacts Associated with Construction

Construction equipment and associated heavy-duty truck traffic generates DPM, which is a known TAC. Construction exhaust emissions may pose health risks for sensitive receptors. The HRA evaluated the potential health risks to nearby sensitive receptors from construction emissions of DPM and $PM_{2.5}$ (**Appendix C**). This assessment included dispersion modeling to predict the off-site concentrations resulting from Project construction so that lifetime cancer risks and non-cancer health effects could be evaluated.

The maximum modeled annual DPM and $PM_{2.5}$ concentrations were identified at nearby sensitive receptors to identify the MEI for both residential and worker receptors. Using the maximum annual modeled DPM concentrations, the maximum increased cancer risks were calculated using BAAQMD recommended methods and exposure parameters from OEHHA. Non-cancer health hazards and maximum $PM_{2.5}$ concentrations were also calculated.

To provide the most conservative health risks from Project construction, incremental lifetime cancer risk is calculated for a resident infant with exposure starting in the third trimester of pregnancy (exposure is assumed to start through the mother). Health risk calculations use the 95th percentile daily child breathing rate as recommended by the BAAQMD for children under the age of two. This breathing rate was used along with the modeled annual TAC concentrations assuming the exposure would occur for 350 days per year at the residence, as recommended by BAAQMD. The modeled annual TAC concentrations for Project construction activities were based on emissions occurring from 8 AM to 5 PM on weekdays and 10 AM to 5 PM on Saturdays, with no construction occurring on Sundays. As shown in **Table 3.2-6**, unmitigated construction activities would exceed the significance threshold for infant MEI, and **Mitigation Measure AIR-2** would be required to reduce construction-related exhaust emissions.

Table 3.2-6 summarizes the health risks from Project-related unmitigated construction activities at the residential and worker MEI. Results of the HRA indicate that Project construction would result in maximum health risks at a residence along O'Neill Avenue immediately southeast of the Project site. This would be the residential MEI with respect to health risks from Project construction. The maximum incremental residential cancer risks at this location would exceed the BAAQMD significance threshold of greater than 10 in one million and result in a significant impact. However, the non-cancer hazard index and the maximum annual average $PM_{2.5}$ concentration would be below the respective BAAQMD thresholds and hence less than significant. With respect to worker receptors, employees at the Belmont Senior Center would experience the maximum incremental lifetime cancer risk, chronic hazard index, and annual average $PM_{2.5}$ concentration from Project construction. However, as shown in **Table 3.2-6**, estimated health risks would be below the respective thresholds at this location.

Mitigation Measure AIR-2: Require Tier 4 Final Engines on Construction Equipment

The construction contractor shall be required, as a condition of contract, to further reduce construction-related exhaust emissions by ensuring that all off-road equipment operating for more than 20 total hours over the entire duration of construction activities shall operate on EPA-approved Tier 4 Final or newer engines. Exemptions can be made for specialized equipment where Tier 4 engines are not commercially available within

200 miles of the Project site. The construction contract must identify these pieces of equipment, document their unavailability, and ensure that they operate on no less than an EPA-approved Tier 3 engine. CARB regulations will result in an increasing percentage of Tier 4 engines in the construction equipment fleet over the next several years.

Significance After Mitigation: Table 3.2-7 shows the mitigated health risks associated with Project construction. Implementation of **Mitigation Measure AIR-2** would reduce health risk impacts from Project construction to below the BAAQMD thresholds with the use of clean construction equipment that meet the Tier 4 Final off-road emission standards as certified by CARB. Table 3.2-7 shows that the mitigated construction health risks for all receptor types would be **less than significant with mitigation**.

TABLE 3.2-7
MITIGATED CONSTRUCTION HEALTH RISK IMPACTS FOR THE MAXIMALLY EXPOSED INDIVIDUAL (MEI)

Receptor Type	Maximum Cancer Risk (per million) [a]	Annual $PM_{2.5}$ concentration ($\mu g/m^3$)	Hazard Index
Mitigated Resident Infant MEI[b]			
Project Risk	5.9	0.05	0.005
BAAQMD Threshold of Significance	10.0	0.3	1.0
Exceeds Significance Threshold?	No	No	No
Mitigated Offsite Worker MEI[c]			
Project Risk	0.3	0.05	0.005
BAAQMD Threshold of Significance	10.0	0.3	1.0
Exceeds Significance Threshold?	No	No	No

NOTES:

a There are no schools or daycares within 1,000 feet from the project site boundaries (the modeling parameters for the health risk analysis). Cancer risk at nearby schools were conservatively assumed to exceed 1 in a million to determine the fraction of time at home to apply to the resident child cancer risk calculations.
b The residential MEI for the is located at a residence along O'Neill Avenue southeast of the Project site.
c The offsite worker MEI is located at the Belmont Senior Center.

Source: ESA, 2023 (Appendix C).

Impact AIR-4: Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people. (*Less than Significant*)

During construction, use of diesel-powered vehicles, construction equipment, and permeable paving could temporarily generate intermittent, localized odors in the immediate vicinity. However, such odors would not persist for long durations, would dissipate rapidly beyond Project construction boundaries, and would not violate odor thresholds in BAAQMD Regulation 7. The Project does not include odor-generating operations of any kind; therefore, all temporarily generated localized odors would cease after construction. For these reasons the Project would not result in substantial short-term or long-term odors, and the impact would be **less than significant**.

Mitigation: None required.

Impact AIR-5: Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment. (*Less than Significant*)

BAAQMD's current CEQA Air Quality Guidelines include thresholds for project-level operational GHG emissions, which are based on implementation of best management practices. BAAQMD does not provide significance thresholds for construction-related GHG emissions. It considers a project's construction emissions to represent a very small portion of the project's lifetime GHG emissions. For this reason, among others, BAAQMD's proposed thresholds are designed to address primarily operational GHG emissions from land use projects, which represent most of project-related GHG emissions (BAAQMD, 2023a).

In the absence of applicable quantitative thresholds, this analysis applies the nearby SMAQMD's GHG significance threshold of 1,100 metric tons of CO_2e per year for construction activity (SMAQMD, 2023). Annual construction emissions that exceed the SMAQMD's GHG significance threshold of 1,100 metric tons of CO_2e per year would be considered to result in a significant impact on the environment.

During Project construction, GHGs would be emitted by fuel combustion from construction equipment and vehicles transporting workers, materials, and equipment to and from the Project site. GHG emissions generated would vary throughout the construction period based on the type and intensity of activities performed, and emissions would cease when construction is complete. The total GHG emissions generated over the entire construction duration from equipment and on-road vehicle exhaust were estimated using CalEEMod (**Appendix C**). Project-specific information was used for modeling, when possible, supplemented by CalEEMod default values when Project-specific data was not available.

It is estimated that Project construction activities would generate approximately 586 metric tons of CO_2e in total, with maximum annual emissions of 310 metric tons of CO_2e in 2026. Since the Project's annual emissions would not exceed the SMAQMD's 1,100 metric tons per year CO_2e significance threshold, this would be a less-than-significant impact.

Project operation would generate emissions associated with periodic vehicle trips to support maintenance activities and electricity used to power the weirs and sump pump. BAAQMD operational thresholds are developed for typical land use development projects and not for infrastructure development projects such as this one. As such, the operational thresholds do not apply to this Project and the minimal operational emissions generated would be less than significant. Therefore, the impact of the Project's GHG emissions from both construction and operation would be **less than significant**.

Mitigation: None required.

Impact AIR-6: Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases. (*Less than Significant*)

As described below, the Project would be consistent with the following plans and regulations:

- 2035 Belmont General Plan and 2017 Climate Action Plan
- 2022 Scoping Plan Update and AB 1279

The City of Belmont General Plan includes various goals, policies, and actions that directly and indirectly address climate change and reduce GHG emissions generated within the City. General Plan Policy 5.10-3 requires construction and grading activities to minimize short-term impacts to air quality by employing appropriate mitigation measures and best practices (City of Belmont, 2017a). The Project would be consistent with this General Plan policy, as the Project would implement recommended best management practices as required by BAAQMD.

The CAP was developed in partnership with the City and County Association of Governments of San Mateo County. It is a comprehensive plan for addressing Belmont's GHG emissions and serves as a mitigation strategy under CEQA for GHG/climate change impacts associated with the adopted 2035 Belmont General Plan. The CAP provides a list of programs and measures designed to increase environmental efficiency in energy and transportation, curtail waste deposited into landfills, and catalyze development of adaptation plans. In line with the City's 2035 General Plan, the CAP sets a GHG reduction target of 50 percent below 2005 levels by 2035 (City of Belmont, 2017b). However, the CAP does not identify any measures targeting construction equipment for GHG reductions to reach this goal. Therefore, the Project would not conflict with the City's CAP.

CARB's 2022 Scoping Plan lays out a path to reduce GHG emissions by 85 percent below 1990 levels and achieve carbon neutrality no later than 2045, consistent with AB 1279 targets. Local actions in the plan are expected to reduce GHG emissions primarily through the transition away from fossil fuel combustion in certain sectors, primarily building energy use and transportation (CARB, 2022). One action in the 2022 Scoping Plan Update that is applicable to construction activities requires that 25 percent and 75 percent of the energy demand of construction equipment to be electrified by 2030 and 2045, respectively. This would not apply to the equipment for the Project since construction would be completed before 2030. The Project does not include operational activities that would substantially increase the amount of electricity used currently under existing conditions. Therefore, the Project would not conflict with the 2022 Scoping Plan to reduce GHG emissions consistent with state's most recent goals.

Overall, the Project would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHG emissions and the impact would be **less than significant**.

Mitigation: None required.

Cumulative Impacts

Impact C-AIR-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse cumulative air quality impacts. (*Less than Significant with Mitigation*)

BAAQMD has developed thresholds of significance for both construction and operation with consideration of individual project emissions levels that would be cumulatively considerable. If a project's emissions would exceed the identified project significance levels, then its emissions would also be cumulatively considerable. The analysis in Impact AIR-2 demonstrates that, with implementation of **Mitigation Measure AIR-1: BAAQMD Basic Best Management Practices for Construction-Related Fugitive Dust Emissions**, Project construction emissions would not exceed the emissions thresholds for ROG, NOx, PM_{10}, or $PM_{2.5}$. Likewise, operational emissions would also not exceed the operational emissions thresholds for ROG, NOx, PM_{10}, or $PM_{2.5}$. Therefore, the Project's contribution to the regional cumulative air quality impact of the SFBAAB would be less than cumulatively considerable and the impact would be **less than significant with mitigation**. Impact AIR-1 addresses potential impacts of the Project with respect to consistency with the 2017 CAP. Because the 2017 CAP focuses on reducing population exposure to air pollutants throughout the region, the assessment presented in Impact AIR-1 is a cumulative analysis in itself as it assesses consistency with a regionwide air quality plan. The impact was determined to be less than significant and a separate cumulative assessment of consistency with the 2017 CAP is not required.

Mitigation: Mitigation Measure AIR-1.

Impact C-AIR-2: The Project, combined with health risk impacts from other sources in the Project vicinity, could result in cumulative health risk impacts. *(Less than Significant)*

Cumulative community risk impacts were addressed through an evaluation of TAC sources located within 1,000 feet of the residential MEI. These sources include freeways or highways, busy surface streets, and permitted stationary sources identified by BAAQMD. A review of BAAQMD's stationary source GIS map tool identified two stationary sources with the potential to affect the construction MEI, both of which are gas dispensing facilities located south of the Project site.

Table 3.2-8 presents cumulative health risks at the Project MEI from Project construction, permitted stationary sources within 1,000 feet, and background risks from freeways, major streets, and rail. As shown in the table, the cumulative cancer risk, non-cancer hazard index and annual $PM_{2.5}$ concentration at the MEI would not exceed BAAQMD's cumulative health risk thresholds of 100 in a million, 10.0 and 0.8 $\mu g/m^3$, respectively. As a result, cumulative health risk impacts at the Project MEI would be **less than significant**.

Mitigation: None required.

TABLE 3.2-8
CUMULATIVE HEALTH RISKS AT PROJECT CONSTRUCTION MAXIMALLY EXPOSED INDIVIDUAL (MEI)

Source	Cancer Risk (per million)	Annual $PM_{2.5}$ ($\mu g/m^3$)	Hazard Index
Resident Infant MEI			
Project Construction	68.5	0.27	0.05
Background Risk from Highways	9.55	0.21	<0.01
Background Risk from Major Streets	5.65	0.14	<0.01
Background Risk from Rail	5.79	0.01	<0.01
Safeway Inc. - Generator	<0.01	<0.01	<0.01
Belmont 76 Gas Dispensing Facility	0.14	<0.01	<0.01
City of Belmont - Generator	2.89	<0.01	<0.01
Total	92.5	0.63	0.06
BAAQMD Threshold of Significance	100	0.8	10
Exceeds Significance Threshold?	**No**	**No**	**No**

3.2.4 References

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3.3 Biological Resources

This section presents an analysis of potential impacts related to biological resources that would result from implementation of the proposed Twin Pines Park Stormwater Detention Basin Project (Project).

3.3.1 Environmental Setting

This section describes the natural setting and context of the study area based on the field reconnaissance survey and an aquatic resources delineation conducted on June 21, 2022, and the respectively corresponding biological resources report and aquatic delineation report (Horizon Water and Environment, 2022a and 2022b). Use of the term "study area" in this section refers to the area within and adjacent to the Project site, where direct, indirect, or cumulative biological resources impacts could occur as a result of the Project. Notes regarding existing vegetation communities, plant and wildlife species, and habitat assessed for its suitability to support special-status species[1] within and adjacent to the Project site were recorded during this survey effort. The survey effort also included a formal aquatic resource delineation to determine the location of biologically sensitive resources such as wetlands, riparian habitat, and regulated drainages.

Wildlife Habitats and Vegetation Communities

Wildlife habitats are generally described in terms of dominant plant species and plant communities along with landform, disturbance regime, and other unique environmental characteristics. Wildlife habitats generally correspond to vegetation communities, which are assemblages of plant species that occur together in the same area and are influenced by soil types and hydrologic conditions. Wildlife habitat and vegetation communities are defined by species composition and relative abundance. Each habitat type and vegetation community in the study area is described below.

Riverine Habitat

Belmont Creek is an intermittent stream that runs southwest to northeast through the southern portion of the Project site and ultimately flows to the San Francisco Bay. Upstream of the Project site exists the Notre Dame Dam, a Department of Water Resources permitted earthen dam that holds runoff in the watershed between April and November each year, and has gates fully open in the winter rainy months. The portion of the channel within the study area is approximately 0.6 acre, and the channel is approximately 10 to 20 feet wide through the length of the study area (Horizon Water and Environment 2022b). The channel provides aquatic habitat for common fish and wildlife and contains reaches with cobble 1 to 4 inches in diameter that dominates the substrate. Small pools are present downstream of culvert outfall areas and along the outside of bends downstream. Small-scale pool and riffle features occur in the channel indicating active sediment processes; these provide in-stream habitat for insects and small vertebrates. Human

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[1] Species that are protected pursuant to federal or state endangered species laws or have been designated as Species of Special Concern by CDFW, or species that are not included on any agency listing but meet the definition of rare, endangered, or threatened species of the CEQA Guidelines Section 15380(b), are collectively referred to as "special-status species"

disturbance, contamination, and run-off siltation within the riverine habitat may limit the suitability of the creek to support special-status fish or amphibians. Steelhead are not known or described from Belmont Creek (Horizon Water and Environment 2022a).

Mixed Evergreen Forest

Mixed evergreen forest on the southern portion of the Project site along Belmont Creek is dominated by broadleaved trees, including California bay (*Umbellularia californica*), coast live oak (*Quercus agrifolia*), and coast redwoods (*Sequoia sempervirens*). Less numerous tree species include big leaf maple (*Acer macrophyla*), California buckeye (*Aesculus californica*), and black walnut (*Juglans hindsii*). Non-native trees such as eucalyptus (*Eucalyptus globulus*), black locust (*Robinia pseudoacacia*), acacia (*Acacia spp*.), Canary Island date palm (*Phoenix canariensis*), and English walnut (*Juglans regia*) are also present in the tree layer. The understory is predominately bare ground with scattered non-native herbaceous species. The canopy ranges from relatively closed to open and is more open adjacent to the riverine habitat where the understory receives more sunlight and, as a result, is dominated by non-native vines such as greater periwinkle (*Vinca major*) and English ivy (*Hedera helix*). California blackberry (*Rubus ursinus*), a native species, also dominates understory vegetation near Belmont Creek. Some native shrubs such as spice bush (*Calycanthus occidentalis*) and creeping snowberry (*Symphoricarpos mollis*) are also present (Horizon Water and Environment, 2022a).

Mixed evergreen forests typically support a diverse assemblage of wildlife; however, due to their small size and isolated location within an urban setting and busy roads, the Project site is relatively narrow and confined by development. Therefore, the mixed evergreen forest in the Project site likely supports lower wildlife species richness and diversity than larger, more contiguous areas of mixed evergreen forest. Common avian wildlife observed in this community includes American crow (*Corvus brachyrhynchos*), Anna's hummingbird (*Calypte anna*), acorn woodpecker (*Melanerpes formicivorus*), Steller's jay (*Cyanocitta stelleri*), chestnut-backed chickadee (*Poecile rufescens*), oak titmouse (*Baeolophus inornatus*), bushtit (*Psaltriparus minimus*), and dark-eyed junco (*Junco hyemalis*) (Horizon Water and Environment 2022a). An adult red-shouldered hawk (*Buteo lineatus*) was observed during the June 2022 field surveys and other raptors, such as red-tailed hawk (*B. jamaicensis*), Cooper's hawk (*Accipiter cooperii*), and western screech-owl (*Megascops kennicottii*) may also occur (Horizon Water and Environment, 2022a). Amphibians such as California slender salamander (*Batrachoseps attenuatus*) and Sierran treefrog (*Pseudacris sierra*) may be found in this vegetation community, primarily near Belmont Creek. Small mammals that may occur include California mouse (*Peromyscus californicus*) and non-native eastern fox squirrel (*Sciurus niger*). Common and special-status bats may also forage within the forest and above Belmont Creek and could roost in trees adjacent to or within the Project site.

Landscaped/Developed

Landscaped/developed land cover within the Project site includes City Hall, the Twin Pines Park buildings, an access road, and parking lot. Native and non-native vegetation species found in the landscaped and developed areas includes coast live oak, coast redwood, California buckeye, eucalyptus, ginkgo (*Ginkgo biloba*), Canary Island date palm, southern magnolia (*Magnolia grandiflora*), and Peruvian pepper tree (*Schinus mole*). The understory is predominately bare ground with some minor coverage by non-native herbaceous plants (Horizon Water and Environment 2022b).

Generally, plant cover in landscaped/developed areas is scarce due to the lack of topsoil or routine disturbance (e.g., mowing), except where irrigated and maintained. Landscaped areas typically support little vegetative structure and diversity, and their value as habitat is influenced by the proximity to developed cover. Further, recurring disturbance typically does not support high quality vegetation or wildlife habitat for native species. Wildlife expected to occur within this cover, however at a lower frequency and in lower numbers, is the same as in the adjacent mixed evergreen forest. Structures and trees within this cover type may support nesting habitat for raptors and other bird species. Structures and trees in landscaped/developed areas may also support roosting bats.

Sensitive Natural Communities

A sensitive natural community is a biological community that is regionally rare, provides important habitat opportunities for wildlife, is structurally complex, or is in other ways of special concern to local, state, or federal agencies. Most sensitive natural communities are given special consideration under the California Environmental Quality Act (CEQA) because they perform important ecological functions, such as maintaining water quality or providing essential habitat for plants and wildlife.

Mixed riparian forest, which is also described more generally as riparian habitat, associated with Belmont Creek is regulated by the Federal Clean Water Act, California Porter-Cologne Act, and California Fish and Game Code (Section 1602) and is considered a sensitive natural community.

Special-Status Species

Special-status species are species protected pursuant to federal and/or state endangered species laws or that have been designated Species of Special Concern, Rare, or Fully Protected by the California Department of Fish and Wildlife (CDFW). CEQA Guidelines Section 15380(b) also provides a definition of rare, endangered, or threatened species that are not included in other listings. Plant species with a California Rare Plant Rank (CRPR) of 1 or 2 are required to be considered under CEQA.[2]

A list of special-status species with potential to occur in the vicinity of the study area was developed based on a query of CDFW's California Natural Diversity Database (CNDDB) (CDFW 2023), the California Native Plant Society's (CNPS) Rare Plant Inventory (CNPS, 2023), and U.S. Fish and Wildlife's (USFWS) Environmental Conservation Online database (USFWS 2023a). The Horizon Water and Environment biological resources report (2022b) was also considered in determining species potential to occur in the study area. **Appendix D** presents a comprehensive list of special-status plant and wildlife species that were included in the database searches (CDFW 2023; CNPS 2023; USFWS 2023a). However, most of the noted species are unlikely to occur in the study area or be affected by the Project due to the Project's location being

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[2] For example, vascular plants listed as rare or endangered or as CRPR Rank 1 or 2 are considered to meet Section 15380(b). Under some circumstances, CRPR Rank 3 or 4 species, or other species with locally limited distribution may also warrant consideration under CEQA.

outside of special-status species' geographic range; habitats within the study area being poor quality or insufficient to support the species; the degree of habitat isolation or fragmentation; or otherwise unsuitable conditions being present. From the full list of species in Appendix D, each special-status species was individually assessed based on habitat requirements and current distribution relative to vegetation communities and habitat characteristics that occur in and around the Project site. **Table 3.3-1** lists the special-status species that have at least a low to moderate potential to occur within the study area based on the database searches and the June 2022 reconnaissance-level site assessment.

TABLE 3.3-1
SPECIAL-STATUS SPECIES THAT MAY OCCUR WITHIN THE STUDY AREA

Species Name	Listing Status	General Habitat Requirements	Potential for Species Occurrence Within the Study Area
Plants			
Bent-flowered fiddleneck (*Amsinckia lunaris*)	- / - /1B.2	Cismontane woodland, valley and foothill grassland, coastal bluff scrub. 3-795 meters above mean sea level.	**Moderate.** Presence of limited marginally suitable habitat in the Project site, but most open areas are maintained lawn that do not represent habitat. Closest current recorded occurrence about 3.5 miles to the west.
Western leatherwood (*Dirca occidentalis*)	- / - /1B.2	Broad-leafed upland forest, chaparral, closed-cone coniferous forest, cismontane woodland, north coast coniferous forest, riparian forest, riparian woodland. On brushy slopes, mesic sites; mostly in mixed evergreen and foothill woodland communities. 20-640 meters above mean sea level.	**Moderate.** Suitable habitat presents in the Project site within the mixed evergreen forest near Belmont Creek. Nearest current recorded occurrences are within Belmont Creek watershed about 1.5 miles to the west. This species is perennial and was not observed during prior surveys.
Amphibians			
California red-legged frog (*Rana draytonii*)	FT/SSC	Lowlands and foothills in or near permanent sources of deep water with dense, shrubby, or emergent riparian vegetation. Requires 11-20 weeks of permanent water for larval development. Must have access to estivation habitat.	**Low.** Marginally suitable movement habitat in study area but breeding habitat is absent. No source populations available in the local area. Recorded occurrence about 3 miles west of the study area; however, existing urbanization and hydrologic barriers (long culverted segments) make dispersal to the study area unlikely. Based on this determination, this species is not discussed further.
Reptiles			
Northwestern pond turtle (*Emys marmorata*)	FPT/SSC	A thoroughly aquatic turtle of ponds, marshes, rivers, streams, and irrigation ditches, usually with aquatic vegetation, below 6,000 feet elevation. Need basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.3 miles from water for egg-laying.	**Low.** Marginally suitable habitat in study area but sufficiently deep pools are limited. Potential for stochastic dispersal into and along Belmont Creek from known occurrences within the watershed; however, existing urbanization and hydrologic barriers (long culverted segments) make dispersal to the study area unlikely. Recorded occurrence about 3 miles west of the study area. Based on this determination, this species is not discussed further.

Species Name	Listing Status	General Habitat Requirements	Potential for Species Occurrence Within the Study Area
San Francisco gartersnake (*Thamnophis sirtalis tetrataenia*)	FE/SE/FP	Vicinity of freshwater marshes, ponds, and slow-moving streams in San Mateo County and extreme northern Santa Cruz County. Prefers dense cover and water depths of at least 1 foot. Upland areas near water are also very important.	**Low**. Poor quality habitat in study area and along Belmont Creek. Project site is more than 2.5 miles from snake populations at Crystal Springs Reservoir, with no movement opportunities for the snake to the site given lack of suitable habitat. Based on this determination, this species is not discussed further.
Mammals			
Pallid bat (*Antrozous pallidus*)	- /SSC	Deserts, grasslands, shrublands, woodlands and forests. Most common in open, dry habitats with rocky areas for roosting. Roosts must protect bats from high temperatures. Very sensitive to disturbance of roosting sites.	**Moderate.** Marginally suitable foraging and roosting habitat is present in the study area. Nearest occurrence documented is over 5 miles from the study area.
Townsend's big-eared bat (*Corynorhinus townsendii*)	- /SSC	Throughout California in a wide variety of habitats. Most common in mesic sites. Roosts in the open, hanging from walls and ceilings. Roosting sites limiting. Extremely sensitive to human disturbance.	**Moderate.** Marginally suitable foraging and roosting habitat is present in the study area. Nearest occurrence documented is over 5 miles from the study area.

NOTES:

STATUS CODES:

Federal (U.S. Fish and Wildlife Service):
FE = Listed as Endangered by the Federal Government
FT = Listed as Threatened by the Federal Government
FPT = Federally Proposed as Threatened
FP = Proposed for Federal Listing
FC = Candidate for Federal Listing

State (California Department of Fish and Wildlife):
SE = Listed as Endangered by the State of California
SSC = Species of special concern

California Native Plant Society (CNPS):
Rank 1B = Plants rare, threatened, or endangered in California and elsewhere
CNPS Code Extensions .1 = Seriously threatened in California (over 80% of occurrences threatened/high degree and immediacy of threat) .2 = Fairly threatened in California (20-80% occurrences threatened)

Potential to Occur Categories:

Low = The project area and/or immediate vicinities only provide limited habitat. In addition, the species' known range may be outside of the project areas.

Moderate = The study area and/or immediate vicinities provide suitable habitat.

Source: CDFW 2023; USFWS 2023a; CNPS 2023, Horizon 2022a

Wildlife Movement Corridors

Wildlife movement corridors are considered an important ecological resource by various agencies (e.g., CDFW and USFWS) and under CEQA. Movement corridors may provide favorable locations for wildlife to travel between different habitat areas such as foraging sites, breeding sites, cover areas, and preferred summer and winter range locations. They may also function as dispersal corridors allowing animals to move between various locations within their range. Topography and other natural factors, in combination with urbanization, can fragment or separate large open-space areas. Areas of human disturbance or urban development can fragment wildlife habitats and impede wildlife movement between areas of suitable habitat. This fragmentation creates isolated "islands" of vegetation that may not provide sufficient area to accommodate sustainable populations and can adversely affect genetic and species diversity. Movement corridors mitigate the effects of this fragmentation by allowing animals to move between remaining habitats, which in turn allows depleted populations to be replenished and promotes genetic exchange between separate populations.

The urban neighborhood surrounding the Project site is unlikely to be used by wildlife species for dispersal and seasonal migration, particularly with the fragmentation by surface streets and frequent vehicular traffic. However, wildlife is known to move within creek corridors and may occasionally move within Belmont Creek. There are no documented wildlife movement corridors on the Project site (CDFW 2023).

Critical Habitat

Critical habitat is defined in Section 3(5)A of the Federal Endangered Species Act (FESA) as the specific portions of the geographic area occupied by the species in which physical or biological features essential to the conservation of the species are found and that may require special management considerations or protection. While critical habitat designations can cover large areas, the presence of primary constituent elements for federally listed species is required for a location to qualify as critical habitat. There is no designated critical habitat for federally listed species within or adjacent to the Project site (USFWS 2023a).

3.3.2 Regulatory Framework

Federal

Federal Endangered Species Act

The FESA conserves and protects plant and animal species and their habitats that have been identified by the USFWS as threatened or endangered. Endangered refers to species, subspecies, or distinct population segments that are in danger of extinction through all or a significant portion of their range. Threatened refers to species, subspecies, or distinct population segments that are likely to become endangered in the near future. The FESA is administered by the USFWS.

Critical Habitat

USFWS and the National Marine Fisheries Service (NMFS) designate critical habitat for listed species under the FESA. Designated *critical habitat* is a specific area within the geographic region that is occupied by a listed species and that is determined to be critical to the species' survival and recovery in accordance with the FESA. Federal entities issuing permits or acting as lead agencies must show that their actions do not negatively affect the critical habitat to the extent that it impedes the recovery of the species.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) (16 U.S. Code Sections 703–712) enacts the provisions of treaties between the United States, Great Britain, Mexico, Japan, and Russia and authorizes the U.S. Secretary of the Interior to protect and regulate the taking of migratory birds. Unless and except as permitted by regulations, the MBTA states that without a permit issued by the U.S. Department of the Interior, it is unlawful to pursue, hunt, take, capture, or kill any migratory bird. The law also applies to the intentional disturbance and removal of nests occupied by migratory birds or their eggs during the breeding season. USFWS is responsible for overseeing compliance with the MBTA.

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (16 U.S. Code Sections 668–668c) makes it illegal to "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner any bald eagle [*Haliaeetus leucocephalus*]... [or any golden eagle (*Aquila chrysaetos*)], alive or dead, or any part, nest, or egg thereof" (16 U.S. Code Section 668, (a) Prohibited acts: criminal penalties). The Bald and Golden Eagle Protection Act defines *take* as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb" (16 U.S. Code Section 668c). In addition to addressing direct impacts on active nest sites, the act provides protection of inactive nest sites (and/or disturbances when eagles are not present) and prohibits disturbances that may agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death, or nest abandonment.

USFWS may issue permits for the take, possession, or transportation of bald and golden eagles, as well as their parts, nests, and eggs. Permits may be issued for scientific, educational, and depredation control purposes; for the religious purposes of American Indian tribes; and to protect other interests in a particular locality (Code of Federal Regulations title 50, part 22 [50 C.F.R. Section 22]).

Clean Water Act

The Clean Water Act (CWA) (33 U.S.C. Section 1251–1387) establishes the basic structure for regulating discharges of pollutants to waters of the United States. The CWA serves as the primary federal law regulating the quality of the nation's surface waters, including lakes, rivers, and wetlands.

The CWA empowers the U.S. Environmental Protection Agency (EPA) to set national water quality standards and effluent limitations and includes programs addressing both point-source and nonpoint-source pollution. Point-source pollution is pollution that originates or enters surface waters at a single, discrete location, such as an outfall structure or an excavation or construction site. Nonpoint-source pollution originates over a broader area and includes urban contaminants in stormwater runoff and sediment loading from upstream areas. The CWA operates on the principle that all discharges into the nation's waters are unlawful unless specifically authorized by a permit; permit review is the CWA's primary regulatory tool.

State

California Endangered Species Act

The California Endangered Species Act (CESA), (Fish and Game Code Section 2050) addresses conservation and protection of state-listed endangered and threatened species as well as candidate species. Fish and Game Code Section 2080 prohibits the take, possession, purchase, sale, and import or export of endangered, threatened, or candidate species, unless otherwise authorized by permit or in the regulations. *Take* is defined as to "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill" (Fish and Game Code Section 86). It is important to note that take as defined under the CESA is different than take as defined under the FESA and does not include clauses for harm or harassment.

Native Plant Protection Act

The Native Plant Protection Act of 1977 (NPPA) (Fish and Game Code Sections 1900–1913) directed CDFW to carry out the California Legislature's intent to "preserve, protect, and enhance endangered plants in this state."[3] The NPPA is administered by CDFW. The NPPA gave the Fish and Game Commission the power to designate native plants as endangered or rare and to require permits for collecting, transporting, or selling such plants. When the CESA was amended in 1984, it expanded on the original NPPA, enhanced legal protection for plants, and created the categories of "threatened species" and "endangered species" to parallel the FESA. The NPPA remains part of the Fish and Game Code, and mitigation measures for impacts on rare plants are specified in a formal agreement between CDFW and a project applicant.

California Rare Plant Ranking System

CDFW works in collaboration with the CNPS, a private non-profit organization, to maintain a list of plant species native to California that have low numbers or limited distribution or are otherwise threatened with extinction. The list is referred to as the Inventory of Rare and Endangered Plants of California. These plants species are categorized by rarity in the CRPR system. The CRPR ranks are as follows:

- **Rank 1A:** Plants presumed extirpated in California and either rare or extinct elsewhere.
- **Rank 1B:** Plants Rare, Threatened, or Endangered in California and elsewhere.
- **Rank 2A:** Plants presumed extirpated in California, but more common elsewhere.
- **Rank 2B:** Plants Rare, Threatened, or Endangered in California, but more common elsewhere.
- **Rank 3:** Plants about which more information is needed—A Review List.
- **Rank 4:** Plants of limited distribution—A Watch List.

CDFW generally considers plant species to be rare if they are included on CRPR List 1A, 1B, 2A, or 2B of the CNPS Inventory of Rare and Endangered Plants of California. CRPR Rank 1B and Rank 2 species are considered eligible for state listing as endangered or threatened pursuant to the Fish and Game Code. Thus, potential impacts on non-listed plants identified as CRPR Rank 1 or 2 are included in this analysis. These species are fully evaluated, as they meet the definition of *threatened* or *endangered* under the NPPA and Fish and Game Code Sections 2062 and 2067.

Non-listed CRPR Rank 3 and 4 species are sometimes considered if the population has local significance in the area and would be affected by the Project. For the purposes of this document, CRPR Rank 3 and Rank 4 plants are omitted from further evaluation in the analysis, as they were not considered to meet criteria to be considered threatened or endangered under the NPPA.

Under California Code of Regulations Title 14, Section 786.9(b), CDFW may issue permits, agreements, plans, or programs that authorize rare plant impacts using the issuance of incidental take permits, voluntary local programs, natural community conservation plans, or safe harbor agreements.

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[3] Section 1900 of the California Fish and Game Code.

Local

City of Belmont Tree Ordinance

The Belmont Municipal Code, Chapter 25 Trees, describes a "protected tree" as any woody, perennial plant characterized by having a single main stem or trunk of 10 inches or more DBH [diameter at breast height] at 4.5 feet above natural grade, or multiple secondary stems totaling 10 inches or more DBH at 4.5 feet above natural grade, regardless of species. A DBH of 10 inches is approximately equivalent to a circumference of 31 inches. A single or multi-stemmed shrub or bush is not a protected tree.

City of Belmont 2035 General Plan

Refer to **Table 3.3-2** for goals, actions, and policies from the City of Belmont's (the City) 2035 General Plan Conservation Element that relate to biological resources.

TABLE 3.3-2
BIOLOGICAL RESOURCES–RELATED POLICIES IN LOCAL GENERAL PLAN

City of Belmont 2035 General Plan
Goal 5.3 Protect and restore biological and ecological resources in Belmont, including sensitive wildlife species and their habitats.
Policy 5.3-1 Support the protection, preservation, restoration, and enhancement of habitats of State or federally listed rare, threatened, endangered and/or other sensitive and special-status species, and favor enhancement of contiguous areas over small, segmented remainder parcels.
Policy 5.3-2 Continue to maintain, protect, restore, and enhance Belmont's ecologically important areas and seek to reduce impacts on them, including the creek corridors, the open space, and the wetlands around O'Neill Slough.
Policy 5.3-3 To the greatest extent feasible, ensure that development does not disturb sensitive habitat and special-status species by requiring appropriate and feasible mitigation measures.
Action 5.3-3a: Establish guidelines for habitat conservation and mitigation programs when sensitive habitat or special-status species would be disturbed by development. These could include, but are not limited to: • Protocols for the evaluation of a site's environmental setting and proposed design and operating parameters of proposed mitigation measures. • Methodology for the analysis of land to be acquired or set aside for mitigation activities. • Parameters for specification of the types and sources of plant material used for any revegetation, irrigation requirements, and post-planting maintenance and other operational measures to ensure successful mitigation by the project proponent. • Monitoring at an appropriate frequency by qualified personnel and reporting of data collected to permitting agencies, if necessary.
Action 5.3-3b: If Endangered or Threatened Species are discovered prior to or during construction of a development project, require project proponents to consult a qualified biologist for recommended proper action, and incorporate appropriate mitigation measures.
Policy 5.3-4 Maintain functional wildlife corridors and habitat linkage in order to contribute to regional biodiversity and the viability of rare, unique or sensitive biological resources throughout the city and region.
Policy 5.3-5 In design and construction, require use of best practices that preserve natural resources, such as soil, trees, native plants, and permeable surfaces.
Policy 5.3-7 Encourage the planting of native trees, shrubs, and grasslands in order to preserve the visual integrity of the landscape, provide habitat conditions suitable for native vegetation, and ensure the maximum number and variety of well-adapted plants are maintained.
Policy 5.3-8 Use native or drought-resistant vegetation in landscaping on City-owned property, and encourage private property owners to use native or drought-resistant vegetation in landscaping on private property.
Policy 5.3-9 Promote the healthy growth of trees and control the removal of trees within the city.
Action 5.3-9a: Maintain and enforce the City's Tree Ordinance to provide adequate and reasonable tree protection and removal standards and best management practices.
Sources: City of Belmont 2017

3.3.3 Impacts and Mitigation Measures

Significance Criteria

In accordance with the CEQA, CEQA *Guidelines* (including Appendix G), relevant plans, policies, guidelines, and agency standards, the Project could have a significant impact if it were to:

- 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;
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the CDFW or USFWS;
- Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
- 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;
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

Methodology

Impacts on biological resources are identified and evaluated based on the following: relevant CEQA and local standards, policies, and guidelines; the likelihood of the presence of the biological resources within the study area; and the potential effects that Project construction, operation, and maintenance might have on those biological resources with the Project area. The analysis assesses both direct impacts on individual species and impacts resulting from habitat modification and evaluates the potential impact in the form of temporary and permanent impacts. The analysis also assesses the cumulative impacts from the projects and other projects in the vicinity of the Project area. Special-status resources that are unlikely or have low potential to occur in the study area are not analyzed in the impact analysis.

Impacts and Mitigation Measures

Table 3.3-3 summarizes the impact conclusions presented in this section.

TABLE 3.3-3
BIOLOGICAL RESOURCES IMPACT CONCLUSIONS

Impact	Level of Significance
Impact BIO-1: Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service	LTSM
Impact BIO-2: Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service or on state or federally protected wetlands through direct removal, filling, hydrological interruption, or other means	LTSM
Impact BIO-3: Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means	LTSM
Impact BIO-4: 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	LTS
Impact BIO-5: Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance	LTSM
Impact BIO-6: Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan	NI

NOTES:
LTS = less than significant, LTSM = less than significant with mitigation, NI = no impact

Impact BIO-1: Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service. ***(Less than Significant with Mitigation)***

Special-status species and their habitats may be affected either directly or indirectly through implementation of the Project. In addition, common (i.e., non-special-status) nesting raptors and migratory birds may also be affected by Project construction. Each of these potentially affected species is listed in Table 3.3-1 and described below.

Special-status Plants

Focused botanical surveys have not been performed on the Project site; however, suitable habitat for two special-status plants (bent-flowered fiddleneck and western leatherwood) exists on site. Because Project construction requires vegetation clearing and earthwork, which could remove these species or degrade local habitat conditions if present, the Project could adversely affect these species through direct removal of plants. Such an impact would be significant. However, implementation of **Mitigation Measure BIO-1: Worker Awareness Environmental Training** and **Mitigation Measure BIO-2**: **Pre-Construction Survey for Special-status Plants** would avoid and reduce potential impacts to these special-status plants through conducting pre-construction surveys to determine presence or absence of the species, if presence is determined, appropriate conservation actions would be taken as described in Mitigation Measure BIO-2. In addition, **Mitigation Measure BIO-3: Wildlife Exclusion Fencing** would reduce impacts to special-status species by deterring the potential movement of the species into the work area. With implementation of Mitigation Measures BIO-1, BIO-2, and BIO-3, construction impacts would be reduced to **less than significant with mitigation**.

Due to the small operational footprint of the Project within the larger footprint disturbed during Project construction, operational use of existing roadways for maintenance access, limited habitat value of the site, and limited scale and infrequent maintenance during operation, operational impacts on special-status plants would be **less than significant**.

Special-status Bats

Mixed evergreen forest habitat and the bridge within the study area provide suitable roosting and foraging habitat for pallid bat and Townsend's big-eared bat. These species could roost in trees with dense foliage, suitable cavities, crevices, exfoliating bark, or bark fissures on and near the study area. Project construction could result in the removal of trees that support special-status bat roosts or deter bats from roosts through nearby noise or vibration. Special-status bat species may be directly affected if roosting sites are physically disturbed or are exposed to a substantial increase in noise or human presence during Project construction activities. If construction activities occur during the bat breeding season (April 15 to August 31) when young are incapable of flight or during winter torpor (a period of reduced metabolic activity) season (October 15 to February 28), disturbance to roosting or overwintering sites could result in mortality or injury through physical disturbance if bats are present. Such effects would be considered significant, particularly if a maternal roost is present. Implementation of Mitigation Measure BIO-1: Worker Awareness Environmental Training and **Mitigation Measure BIO-4: Pre-construction Surveys for Special-status Bats** would reduce potential impacts to special-status bats and their roosts through identification and implementation of seasonally appropriate buffers. Therefore, with implementation of Mitigation Measures BIO-1 and BIO-4, construction impacts would be reduced to **less than significant with mitigation**.

Given that the Project would restore the existing parking lot and landscaping and operational maintenance (i.e., sediment removal from the sediment basin) would occur within developed areas generally annually where human presence is already frequent, the potential to affect special-status bat roosts during operations would be **less than significant**.

Nesting Migratory Birds and Raptors

Suitable nest trees for common raptors and migratory birds (including American crow, Anna's hummingbird, Steller's jay, chestnut-backed chickadee, oak titmouse, bushtit, and dark-eyed junco) are located within and adjacent to the study area in the mixed evergreen forest and landscaped areas, and suitable foraging habitat for these species occurs within these areas. Habitat features within the Project site and adjacent areas, such as trees, shrubs, and herbaceous plants, could serve as nesting habitats or foraging areas for common migratory birds and raptors.

Project construction would result in the removal of vegetation which may serve as perching or nesting sites for common migratory birds and raptors. Direct impacts on nesting raptors or migratory birds or their habitat could result in substantially lowered reproductive success or habitat loss, thereby potentially adversely affecting local population levels. Additionally, human disturbances and noise/vibration from construction activities have the potential to cause nest abandonment and death of young or loss of reproductive success at active nests located near Project activities. Birds could be adversely affected if active nesting, roosting, or foraging sites are either removed or exposed to a substantial increase in noise or human presence during Project construction. Nesting birds and raptors are protected under Fish and Game Code Sections 3503, 3503.5, and 3800 (i.e., take, possession, or destruction of birds, their nests or eggs), and Section 3513 of the MBTA.

The impact of Project construction on nesting birds would be less than significant if construction activities occur during the non-breeding season (i.e., from September 16 through January 31). However, construction activities conducted during the breeding season between February 1 and September 15 could kill, injure, or displace nesting birds preventing parental care and nest success (e.g., egg or chick mortality), a significant impact. With the implementation of Mitigation Measures BIO-1: Worker Awareness Environmental Training and **BIO-5: Pre-Construction Surveys for Common Nesting Birds**, which includes pre-construction/activity nesting bird surveys to identify and avoid active nests, the Project's impact on nesting birds during construction would be reduced to **less than significant with mitigation**.

Given that the Project would restore the existing parking lot and landscaping (including trees and shrubs) and operational maintenance would occur within developed areas where human presence is already frequent, the potential for operational maintenance to affect an active bird nest is reduced but the potential remains. Were operational activities to cause nest abandonment or reduced nest fitness to the point of individual egg, chick, or adult mortality, such an effect would constitute a significant impact. However, with the implementation of Mitigation Measure BIO-5, operational activities would avoid disturbance of active nests, and the impact on active bird nests from Project operation would be **less than significant**.

Mitigation Measure BIO-1: Worker Awareness Environmental Training

Prior to construction, a qualified biologist shall provide worker awareness environmental training to inform construction personnel about protected biological resources, including special-status species, their habitat, legal protections, and wetlands and waters of the U.S. and/or State. The training shall include photos of special-status species to aid in identification, the qualified biologist's contact information, and the City's point of contact. All construction personnel must undergo this training prior to working on the Project and a sign-in sheet shall be maintained to keep a record of those trained.

Mitigation Measure BIO-2: Pre-Construction Survey for Special-Status Plants

A qualified biologist shall conduct appropriately timed bloom surveys to identify any special-status plant species (bent-flowered fiddleneck and western leatherwood) that may occur within the Project site. The optimal identification window for bent-flowered fiddleneck is March through June while the window for western leatherwood is November through March (perennial and identifiable year-round). If a special-status plant is observed during the survey, a 10-foot buffer shall be placed around the plant for the construction contractor to avoid during construction. The biologist shall prepare a report of the special-status plant species survey and provide it to the Project lead engineer at the City.

If impacts to special-status plant species cannot be avoided, a restoration and mitigation plan would be prepared to provide plant salvage and relocation consistent with CDFW guidance. At a minimum, the plan shall include collection of reproductive structures from affected plants, a full description of microhabitat conditions necessary, seed germination requirements, assessments of potential transplant and enhancement sites, success and performance criteria, and monitoring programs, as well as measures to ensure long-term sustainability. The following considerations shall be met:

a. Prior to unavoidable and permanent disturbance to a population of a special-status plant species, propagules shall be collected from the population to be disturbed. This may include seed collection or cuttings, and these propagules shall be used to establish a new population in or near the Project site. Transplantation may be attempted but shall not be used as the primary means of plant salvage and new population creation, because for many local rare plant species, seeding may provide a better option to establish annual species. Irrigation shall be provided as necessary to ensure survival of new plantings.

b. A minimum 5-year monitoring plan with adaptive management shall be implemented to document the success of new plant populations. Adequate assurances shall be provided to ensure long-term protection and management of lands to promote established rare plant populations. Success criteria for seeded or transplanted populations shall include at least 75 percent survival of salvaged or relocated plants after 5 years, a similar number of new plants (by area and numbers) to the impacted population, and minimal presence of invasive weeds at planting locations.

Mitigation Measure BIO-3: Wildlife Exclusion Fencing

To prevent special-status species from entering the work area, the construction contractor shall install a multi-purpose protective barrier (such as silt fencing) at the upstream and downstream boundaries of the Project work site adjacent to suitable wildlife habitat. If special-status species are found during pre-construction surveys, a qualified biologist shall oversee the fence installation. The fence shall be a minimum of 3 feet above ground surface with an additional 4 to 6 inches of fence material buried such that species cannot crawl under the fence. If a portion of the fence cannot be buried, it shall be continuously weighed down with sand or gravel bags. Fence installation shall occur within one day of any protected species relocation or within three days of pre-construction survey where protected species are determined to be absent, whichever occurs first.

- No equipment mobilization, grading, clearing, or storage of equipment or machinery, or similar activity shall occur at the Project site until a qualified biologist has inspected and approved the wildlife exclusion fencing; and
- The City of Belmont shall ensure that the fencing is continuously maintained until all construction is complete.

Mitigation Measure BIO-4: Pre-Construction Surveys for Special-status Bats

Prior to any tree removal and the start of any construction activities expected to commence during the breeding season for special-status bat species (April 15 to August 31) or the winter torpor period (October 15 to February 28), a qualified biologist shall conduct a pre-construction survey to determine whether active roosts are present on site or within 100 feet of the Project work site. Areas adjacent to the Project site that are inaccessible due to private property restrictions shall be surveyed using binoculars from the nearest vantage point. If no roosting bats are found, then no further mitigation is required and the biologist shall submit a letter report to the City summarizing the survey results. If at any time during the roosting season construction stops for a period of two weeks or longer, pre-construction surveys shall be conducted prior to resuming construction.

If roosting bats are found, the construction contractor shall avoid construction within 100 feet of the roost until breeding season or winter torpor is complete and a qualified biologist confirms bats are absent.

Mitigation Measure BIO-5: Pre-Construction/Activity Surveys for Common Nesting Birds

If construction or operational (e.g., active maintenance) activities begin during the avian nesting season (February 1 to September 15), a qualified biologist shall be retained by the City to conduct a pre-construction/activity survey for active nests in suitable nesting habitat within 500 feet of the construction and/or operation limits for nesting raptors and migratory birds. Areas adjacent to the work area that are inaccessible due to private property restrictions shall be surveyed using binoculars from the nearest vantage point. The survey shall be conducted by a qualified biologist no more than seven days prior to the onset of construction or operational activity. If no active nests are identified during the pre-construction/activity survey, no further mitigation is necessary. If construction or operational activities begin prior to February 1, it is assumed that no birds would nest in the Project construction or operation area during active construction/operational activities and no pre-construction/activity surveys are required. If at any time during the nesting season construction or operational activities stop for a period of two weeks or longer, pre-construction/activity surveys shall be conducted prior to construction or operational activities resuming.

If active nests are found during the survey, the City shall implement active nest protection measures to ensure that the nests would not be adversely affected, which would include establishing a no-work buffer zone around the active nest.

Active nest protection measures shall include, but not be limited to:

- If active nests are found on or within 500 feet of the Project construction or operation limits, then the qualified biologist shall establish no-disturbance buffers for active nests of 250 feet for migratory non-raptor species and 500 feet for raptor species until the breeding season has ended or until a qualified biologist has determined that the birds have fledged and are no longer reliant upon the nest or parental care for survival.
- Depending on conditions specific to each nest, and the relative location to proposed construction or operational activities, it may be feasible for construction or operational activities to occur as planned within the buffer without impacting the breeding/nesting effort. In this case (to be determined on a case-by-case basis), the nest(s) shall be monitored by a qualified biologist during any construction or operational activities within the buffer. If, in the professional opinion of the monitor, the Project would impact the nesting birds or young, the biologist shall immediately inform the construction or maintenance manager and the City, who shall stop construction or operational activities within the buffer until the nest is no longer active or a new buffer distance is agreed upon based on the biologist's

recommendations. Completion of nesting and fledging activities shall be determined by the qualified biologist.

- If construction or operational activities begins outside of the breeding season (February 1 through September 15), then the City is permitted to continue construction or operational activities throughout the breeding season.

Significance After Mitigation: Implementation of **Mitigation Measures BIO-1 through BIO-5** would require construction contractors to complete worker awareness training and for qualified biologists to conduct pre-construction for special status species. The measures also requires exclusion fencing for special-status species. Overall, with implementation of Mitigation Measures BIO-1 through BIO-5, the Project would not cause 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, and this impact would be **less than significant with mitigation**.

Impact BIO-2: Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service or on state or federally protected wetlands through direct removal, filling, hydrological interruption, or other means. *(Less than Significant with Mitigation)*

All wetlands in the biological resources study area are identified as sensitive natural communities and may also be regulated under Section 404 of the CWA. Impacts on wetlands are discussed under **Impact BIO-3**, below; this section includes only those sensitive natural communities (including riparian habitat) that are outside of CWA Section 404 jurisdiction. Riparian habitat described in Impact BIO-2 may also be regulated as a water of the state under the Porter-Cologne Water Quality Control Act and/or under Fish and Game Code Section 1600. Based on the Project design, Project implementation would permanently impact a maximum of 0.217 acre of riparian habitat; however, the actual riparian habitat impact could be much less. Such impacts would be permanent because riparian habitat would displaced by hardscape and in other disturbed areas it would require more than one year to revegetate to pre-Project conditions, and this impact would be significant. Implementation of **Mitigation Measure BIO-6: Compensation of Affected Riparian Habitat** through riparian restoration and enhancement would reduce the impact to **less than significant with mitigation.** Project operations would not impact riparian areas that are regulated by CDFW. Sediment removal under project operation would be limited to the constructed sediment basin and access would be through an existing road. No operational impact to CDFW regulated area would occur. Therefore, the operational impact would be **less than significant**.

Mitigation Measure BIO-6: Compensation of Affected Riparian Habitat

The City shall retain a qualified botanist, biologist, restoration ecologist, or landscape architect to develop a riparian habitat mitigation and monitoring plan. At a minimum, the City shall compensate impacted riparian areas at a ratio no less than 3:1 (compensation area to impact area) per CDFW policy. Compensation may occur in the form of on- or

> off-site (along adjacent reaches of Belmont Creek) restoration or enhancement by planting riparian vegetation and subsequent monitoring to ensure success is ultimately achieved. Monitoring shall occur for at least 5 years over the course of a 10-year timeline. The final mitigation ratio shall be determined in consultation with CDFW during the process of obtaining the necessary regulatory permits. At a minimum, success criteria shall include 75% coverage by native riparian species and 70% survival of restoration/enhancement plantings as compared to reference sites nearby by the end of the total 10-year timeline.
>
> Once the final mitigation ratio is determined and the mitigation and monitoring plan finalized through consultation between the City and CDFW, the City shall implement riparian restoration and enhancement within one year of Project-related impacts. The City shall retain a qualified botanist, biologist, restoration ecologist, or landscape architect to conduct routine monitoring per the mitigation and monitoring plan and evaluate its success. If success is achieved at the end of the monitoring period, no further action is necessary.

Significance After Mitigation: Implementation of **Mitigation Measure BIO-6** would require compensation of affected riparian habitat at a ratio of no less than 3:1. Overall, with implementation of Mitigation Measure BIO-6, the Project would not cause a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by CDFW or USFWS or on state or federally protected wetlands through direct removal, filling, hydrological interruption, or other means, and this impact would be **less than significant with mitigation.**

Impact BIO-3: Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means. (*Less than Significant with Mitigation*)

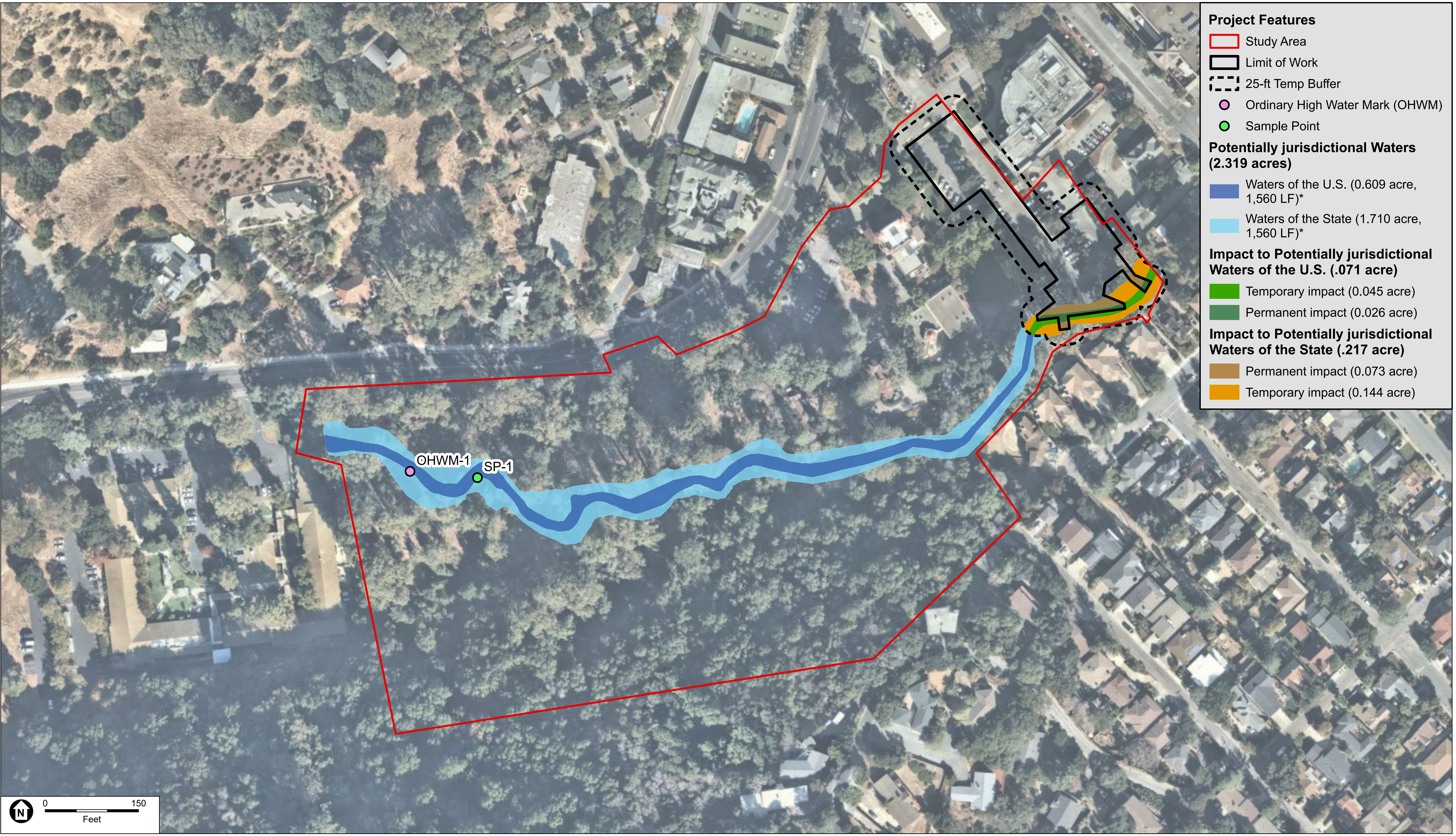
The Project site supports protected waters of the U.S. as defined in Section 404 of the CWA and State jurisdictional waters. These features associated with Belmont Creek are also considered sensitive natural communities.

Belmont Creek, as a non-wetland water of the U.S. and water of the State, is expected to be subject to U.S. Army Corps of Engineers' (USACE) jurisdiction under Sections 404 and 401 of the CWA, protection under the Porter-Cologne Act, and California Fish and Game Code Section 1600 et seq. The State Wetland Dredge and Fill Policy also regulates riparian vegetation along stream channels such as Belmont Creek. Compliance with these regulations requires that permits be obtained from the USACE, Regional Water Quality Control Board (RWQCB), and CDFW prior to the introduction of fill material that would occur during Project construction. Section 404 and 401 CWA permits generally require mitigation to offset losses of waters of the U.S., in accordance with Executive Order 11990, which is intended to result in no net loss of wetland functions or values.

Figures 3.3-1 and **3.3-2** respectively depict an overview of jurisdictional features within the Project site and Project impacts on jurisdictional areas. Based on the Project design and the limits of USACE jurisdiction, Project implementation would permanently impact up to 0.026 acre and temporarily impact up to 0.045 acre of federally protected waters of the U.S. Based on the Project design and the limits of RWQCB jurisdiction, which includes USACE jurisdiction and is typically more expansive (e.g., up to the top of the streambanks) (refer to Section 3.3.2, *Regulatory Framework*, for additional detail about USACE, RWQCB and CDFW regulations), Project construction would permanently impact up to 0.073 acre and temporarily impact 0.144 acre of waters of the State and CDFW regulated area protected under Section 1602 of the California Fish and Game Code. Permanent impacts on waters of the U.S. include those impacts that result in the loss of the aquatic resources or conversion of aquatic resources to other types for at least one year or more, such as the installation of hardscape (e.g., concrete, rip-rap). Permanent impacts are necessary for the construction of the following Project components: sediment chamber inlet, check structure, sediment chamber, and sediment chamber outlet. Temporary impacts correspond to areas disturbed on the periphery of permanent impacts that occur during Project construction, but temporarily impacted areas would be disturbed for less than one year. Temporary impacts on aquatic resources would be restored following completion of construction. Any exposure of bare soil, contamination of stormwater, and potential introduction of pollutants during Project construction could impair water quality within Belmont Creek. Permanent and water quality impacts on waters of the U.S. and/or State and/or CDFW regulated areas would be significant without mitigation.

Implementation of **Mitigation Measures BIO-6: Compensation of Affected Riparian Habitat; Mitigation Measure BIO-7: No Net Loss of Waters of U.S. and/or State** (through enhancement of the Belmont Creek channel in adjacent reaches upstream of the Project site); and stormwater and water quality best management practices (BMPs), such as wattles, silt fence, and other stormwater protection measures as described **Mitigation Measure HYD-1** (see Section 3.5, *Hydrology and Water Quality*) as required by the Section 401 Water Quality Certification and National Pollutant Discharge Elimination System permit would reduce the impact to **less than significant with mitigation**.

Project operation would not impact waters of the U.S. or State or CDFW regulated area beyond the areas affected during Project construction. Sediment removal under project operation would be limited to the constructed sediment basin (underlain by concrete) and accessed through existing roads. Further, sediment removal from the catchment basin would occur when Belmont Creek is dry or not conveying water, so possible water quality effects would be avoided. Therefore, no operational impacts to waters of U.S, waters of the State, or CDFW-regulated area would occur. Sediment inflow to the constructed sediment basin would occur passively through natural hydrologic processes and the basin would retain captured sediment until the stream is dry or flow is absent from the sediment basin, after which sediment would be removed. Therefore, the Project’s operational impact would be **less than significant**.



Path: U:\GIS\GIS\Projects\2021xxx\D202101220_00_Twin_Pines_Park\03_MXDs_Projects\Bio.aprx Fig 3.3-1 - Overview of Jurisdictional Areas, JAndersen 12/14/2023

SOURCE: ESA, 2023

Twin Pines Park Stormwater Detention Basin Project

Figure 3.3-1
Overview of Jurisdictional Areas

ESA

Path: U:\GIS\GIS\Projects\2021xxx\D202101220_00_Twin_Pines_Park\03_MXDs_Projects\Bio.aprx Fig 3.3-2 - Impacts to Jurisdictional Areas, JAndersen 12/14/2023

SOURCE: ESA, 2023

Twin Pines Park Stormwater Detention Basin Project

Figure 3.3-2
Impacts to Jurisdictional Areas

Mitigation Measure BIO-7: No Net Loss of Waters of U.S. and/or State

The City shall retain a qualified hydrologist, landscape architect, or biologist to develop a wetland mitigation and monitoring plan as a part of the permitting process, which shall include enhancement of Belmont Creek upstream of the Project site to improve physical conditions and stability, monitoring success criteria, annual monitoring intervals and duration (for at least 3 years), and adaptive management options. Mitigation may occur in the form of restoration, enhancement, or creation and shall be implemented within one year of Project-related impacts on waters of the U.S. and/or State to avoid temporal loss of wetland and other water functions and values. The exact mitigation ratio shall be determined in consultation with the applicable permitting agencies, which may include USACE, CDFW, and/or RWQCB. At a minimum, the City shall compensate permanently impacted waters at a ratio no less than 1:1 per USACE and State *no net loss* policy.

Significance After Mitigation: Implementation of **Mitigation Measure BIO-7** would require ensure no net loss of waters of the U.S. by developing a wetland mitigation and monitoring plan and enhancing Belmont Creek. Overall, with implementation of Mitigation Measure BIO-7, the Project would not cause a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means, and this impact would be **less than significant with mitigation.**

Impact BIO-4: 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. (*Less than Significant*)

The Project is located within a mixed-use and residential area interspersed by surface streets, and the small footprint of the Project makes it unlikely to impinge on animal movements. Dense commercial development and major roadways are located immediately west and east of the Project site, and residential development and surface streets are located north and south of the Project site. While wildlife periodically moves along Belmont Creek within the Twin Pines Park, the park is fragmented from larger areas of natural habitat. Anadromous fish passage is blocked by several barriers and culverts downstream of the Project site (California Fish Passage Assessment Database, 2023). There are no known wildlife movement corridors or nursery sites on or in the vicinity of the Project site. Project construction may have a temporary impact on animals moving through the Project site and staging area, but this short-term impact would be less than significant because wildlife movement impacts would be confined to work (daytime) hours over the course of 24 months. The short duration and infrequent timing of operational maintenance would not interfere with wildlife movement during Project operation. Based on the information above, the Project would not substantially interfere with the movement of any native resident or migratory fish or wildlife species, established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites and the construction and operational impact would be **less than significant**.

Mitigation: None required.

Impact BIO-5: Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. (*Less than Significant with Mitigation*)

The City of Belmont's 2035 General Plan includes several policies that pertain to protected biological resources. Impacts BIO-1 through BIO-3 discuss potential impacts of Project construction that could affect special-status species, sensitive vegetation communities, and protected wetlands and other waters of the U.S. and/or State, as well as how mitigation measures identified under these topics would reduce the significance of Project construction and operation on these biological resources to a *less-than-significant level*. Without the implementation of the respective mitigation measures, Project construction would conflict with the General Plan's policies 5.3-1 through 5.3-9 (listed in Table 3.3-2 in Section 3.3.2 above) and would have a significant effect on these resources. Therefore, with the implementation of these mitigation measures (BIO-1 through BIO-5), Project construction and operation would not conflict with the City's General Plan.

Chapter 25 of the City of Belmont Municipal Code requires a Tree Removal Permit from the City for the removal of protected trees with single or aggregate trunks totaling 10 inches or more diameter at breast height (DBH). As indicated in Chapter 2, *Project Description*, seven trees ranging in size from 4 inches to 15 inches DBH would be removed as part of the Project but would be replanted to reestablish landscaping around the existing parking lot. It is therefore assumed that the Project would remove up to seven protected trees. Since the City of Belmont is the implementing entity, the Project would obtain an administrative Tree Removal Permit. Based on the information in this analysis, Project construction and operation would be consistent with the General Plan and the City of Belmont's Municipal Code, and the impact would be **less than significant with mitigation**.

> **Mitigation: Mitigation Measures BIO-1**, **BIO-2**, **BIO-3**, **BIO-4**, and **BIO-**5 (refer to Impact BIO-1)

Significance After Mitigation: Implementation of **Mitigation Measures BIO-1 through BIO-5** would require construction contractors to complete worker awareness training and for qualified biologists to conduct pre-construction for special status species. The measures also requires exclusion fencing for special-status species. Overall, with implementation of Mitigation Measures BIO-1 through BIO-5, the Project would not conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance, and this impact would be **less than significant with mitigation.**

Impact BIO-6: Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. (*No Impact*)

The Project site is not located within the planning area of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. Therefore, there would be **no impact** from Project construction or operation.

Mitigation: None required.

Cumulative Impacts

Impact C-BIO-1: The Project, in combination with past, present, and probable future in the Project area, would not result in significant adverse cumulative impacts on biological resources.

As indicated in the analyses above, potential short-term Project construction impacts could include disturbance to special-status plants, special-status bats, nesting birds and their breeding habitat, riparian habitat, and wetlands and other waters of the U.S. and State. All the projects listed in Table 3.1-1 would be required to comply with applicable regulatory requirements protecting these biological resources, similar to those of the Project.

Project construction may result in impacts to bent-flowered fiddleneck and western leatherwood if these special-status plant species are present. Without mitigation, Project construction would have a significant effect on these species if present. **Mitigation Measure BIO-2** would require a survey to determine if these species are present and, if so, relocate them to suitable habitat elsewhere and conduct monitoring to ensure that established populations survive. The cumulatively considered projects are also expected to implement similar mitigation measures to identify if special-status species are present and, if so, harvest or transplant special-status plant species to suitable habitat outside of the active work areas and conduct multi-year monitoring to ensure successful establishment. The relocation of these species would result in minor disturbance but is expected to be done during their respective dormant periods, which would avoid interrupting a fecundity cycle. Such actions would avoid reductions in the populations of these species and not threaten their persistence in the region. Therefore, with implementation of Mitigation Measure BIO-2, the Project's contribution to the cumulative impact on special-status plants would not be cumulatively considerable, and the impact would be less than significant.

Project construction may result in impacts to pallid bat and Townsend's big-eared bat if these special-status bat species are present and roosting. Without mitigation, Project construction would have a significant effect on these species if roosting (between April 15 to August 31, during bat breeding season, or between October 15 to February 28, when young are incapable of flight or in winter torpor) in or near the Project site. **Mitigation Measure BIO-4** requires a survey to determine if these species are present during these sensitive time periods and, if so, avoid work within 100 feet of any active roosts. The cumulatively considered projects are also expected to implement similar mitigation measures to identify if roosting special-status bats are present and, if so, delay work around a similar buffer until bats leave the roost or can leave the roost. The avoidance of work around active roosts during times where bats are incapable of flight would avoid interrupting a fecundity cycle and prevent reductions in the populations of these species, thereby not threatening their persistence in the region. Therefore, with implementation of **Mitigation Measure BIO-4**, the Project's contribution to the cumulative impact on pallid bat and Townsend's big-eared bat would not be cumulatively considerable, and the impact would be less than significant.

While the Project and several of the cumulative projects could affect nesting birds, many of the cumulative projects are within developed city areas with little habitat for nesting birds and local species likely exhibit high tolerance for baseline noise and human disturbance levels. To have a less-than-significant impact, the Project would implement **Mitigation Measure BIO-5**, which requires a survey to determine if active nests are present within 500 feet of the Project site and, if found, establish of species-specific nest buffers to avoid disturbance until the nests are determined to be inactive or require a qualified biologist to monitor the nest during nearby construction. Cumulatively considered projects are expected to implement similar mitigation that avoids impacting active bird nests. Implementation of this mitigation would avoid violation of the MBTA and California Fish and Game Code, as well as prevent the loss of active nests and individual birds, eggs, and chicks. This mitigation would prevent a reduction in the regional population of nesting birds, while temporarily displacing birds during the non-nesting season when construction near inactive nest sites would occur. Therefore, the Project's contribution to the cumulative impact on nesting birds would not be cumulatively considerable, and the impact would be less than significant.

Regarding impacts on sensitive natural communities (i.e., riparian habitat) and jurisdictional waters (respectively addressed in Impacts BIO-2 and BIO-3), the Project (under **Mitigation Measures BIO-6** and **BIO-7**) and cumulatively considered projects would be required to avoid and minimize direct and indirect impacts on wetlands, waters, and riparian habitat consistent with federal and state laws, executive orders, policies, and regulatory permits. Similarly, the Project and other cumulatively considered projects would be required to provide some form of compensation for any unavoidable impacts on jurisdictional waters and riparian habitat in the form of creation, preservation, restoration, or enhancement to provide for *no net loss* of sensitive natural communities and jurisdictional waters of the U.S. and/or State. Further, following CEQA certification, the Project and cumulatively considered projects are required to obtain regulatory permits (Section 404 CWA, Section 401, and/or a Lake and Streambed Alteration Agreement) before impacting riparian habitat, waters of the U.S., and/or waters of the State. During this process, applicable regulatory agencies could require compensation for the loss of these resources and determine appropriate mitigation ratios. There would be minor degradation in riparian habitat, waters of the U.S., and/or waters of the State temporarily after construction, but this would be mitigated under the regulatory permit conditions. With implementation of **Mitigation Measures BIO-6** and **BIO-7**, the Project's contribution to the cumulative impact would not be cumulatively considerable, and the impact related to sensitive natural communities and jurisdictional waters would be less than significant.

Mitigation: Mitigation Measures BIO-2, BIO-4, BIO-5 (refer to Impact BIO-1) and **Mitigation Measures BIO-6** (refer to Impact BIO-2) and **BIO-7** (refer to Impact BIO-3).

As described in Impact BIO-4, the Project would have a less than significant effect on native fish and wildlife movement and migration, movement corridors, or the use of nursery sites. Therefore, the Project would not have a cumulatively considerable contribution to the overall effect of cumulatively considered projects on these resources, and the impact related to native fish and wildlife movement and migration, movement corridors, or the use of nursery sites would be less than significant.

Mitigation: none.

As described in Impact BIO-5, the Project would have a less than significant with mitigation effect on consistency with local policies and ordinances protecting biological resources. Without implementation of **Mitigation Measures BIO-1, BIO-2, BIO-3, BIO-4,** and **BIO-5**, the Project would conflict with the City of Belmont's General Plan policies 5.3-1 through 5.3-9, but implementation of these measures would make the Project consistent with the General Plan policies. Other cumulatively considered projects are expected to comply with local policies and ordinances protecting biological resources necessary under CEQA for findings of less than significant or less than significant with mitigation. Other cumulatively considered non-municipal projects are expected to be required to adhere to local tree protection requirements that may require compensatory tree planting. The Project would remove up to seven protected trees, but it would replant them to reestablish landscaping around the existing parking lot. Based on this information, the Project would not have a cumulatively considerable contribution to the overall effect of cumulatively considered projects on local policies or ordinances protecting biological resources, and the impact would be less than significant.

Mitigation: Mitigation Measures BIO-1, BIO-2, BIO-3, BIO-4, and **BIO-5,** (refer to Impact BIO-1)

As described in Impact BIO-6, the Project would have a less than significant effect on consistency with an adopted Habitat Conservation Plan; Natural Community Conservation Plan; or other approved local, regional, or state habitat conservation plan, because no such plans exist covering the Project site. Therefore, the Project would not have a cumulatively considerable contribution to the overall effect of cumulatively considered projects on these resources, and the impact related to with an adopted Habitat Conservation Plan; Natural Community Conservation Plan; or other approved local, regional, or state habitat conservation plan would be less than significant.

Mitigation: none.

3.3.4 References

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3.4 Cultural Resources

This section presents an analysis of potential impacts related to cultural resources that could result from implementation of the proposed Twin Pines Park Stormwater Detention Basin Project (Project). This section relies on the information and findings presented in the two cultural resources technical reports developed for the Project:

- *Twin Pines Park, San Mateo County, California: Archaeological and Architectural Resources Inventory Report (Sims et al., 2022); and*
- *Twin Pines Park Storm Water Capture Project, San Mateo County, California: Archaeological Testing Results Report (Zimmer and Hoffman, 2023).*

These reports detail the results of the cultural resources study, which examined the environmental, ethnographic, and historic background of the Project area, emphasizing aspects of human occupation.

Comments regarding cultural resources were received in response to the Notice of Preparation (NOP) and were considered in development of the impact analysis presented in this section. The California Native American Heritage Commission (NAHC) provided details on cultural resource regulations pertaining to the Project, suggested types of cultural resources analyses to be completed, and requested that they be contacted for a Sacred Lands File (SLF) search and list of California Native American Tribes in the Project area. Refer to **Appendix A** for NOP comment letters.

3.4.1 Key Terms

For the purposes of this analysis, the term “cultural resource” is defined as follows:

> Native American, and non-Native American historic-era, sites, structures, districts, and landscapes, or other evidence associated with human activity considered important to a culture, a subculture, or a community for scientific, traditional, religious, or other reason. These resources include the following types of California Environmental Quality Act (CEQA)-defined resources: historical resources, archaeological resources, and human remains.

Additional key terms included in this section are defined below.

- **Architectural Resource.** This resource type includes historic-era buildings, structures (e.g., bridges, canals, roads, utility lines, and railroads), objects (e.g., monuments or boundary markers), and districts. Residences, cabins, barns, lighthouses, military-related features, industrial buildings, and bridges are some examples of architectural resources.
- **Archaeological Resource.** This resource type consists of pre-contact and historic-era Native American archaeological resources, as well as non–Native American archaeological resources from the historic era:
  - *Native American archaeological resources* consist of village sites, temporary camps, lithic scatters, roasting pits/hearths, milling features, petroglyphs, rock features, and burials. Associated artifacts include obsidian and chert flaked-stone tools (e.g., projectile points, knives, and scrapers) or toolmaking debris; culturally darkened soil (midden

material) containing heat-affected rocks, artifacts, or shellfish remains; and stone milling equipment (e.g., mortars, pestles, handstones, or milling slabs).

- *Non–Native American historic-era archaeological resources* consist of townsites, homesteads, agricultural or ranching features, mining-related features, refuse concentrations, and features or artifacts associated with early military and industrial land uses. Associated artifacts include stone, concrete, or adobe footings and walls; artifact-filled wells or privies; and deposits of metal, glass, and/or ceramic refuse.

If a resource is considered a ruin (e.g., a building lacking structural elements, or a structure lacking a historic configuration), it is classified as an archaeological resource.

3.4.2 Environmental Setting

The following provides a summary of pre-contact setting, ethnographic setting, and historic-era water development resources in the Project area. Additional details for pre-contact and regional historic setting are provided in Sims et al. (2022) and Zimmer and Hoffman (2023).

Physiography

The Project area lies in the Coast Range Physiographic Province, a region characterized by northwest-trending faults, mountain ranges, and valleys. Movement along the San Andreas, Hayward, and Calaveras Faults and down-warping of the area in between the fault zones has formed the physiography of the San Francisco Bay Area. The Project area is located in the middle of the San Francisco Peninsula on slopes facing San Francisco Bay. From the hills west of Belmont, surface streams flow to the east, where they deposit transported sediment as alluvial fans and marsh at the edge of San Francisco Bay. The area is near the southwestern shore of the San Francisco Bay; salt ponds and tidal marshes mark the edge of the Bay east of the Project area (Norris and Webb, 1990).

The dominant drainage feature of the Project area and vicinity is Belmont Creek, which flows from the western edge of Belmont through Twin Pines Park through Belmont Channel and Belmont Slough, where it meets the San Francisco Bay (USGS, 1993). Ralston Avenue runs parallel to the creek in this area. The Project area and vicinity are suburban in character and its natural environment has been heavily influenced by modern development of nearby homes, city infrastructure, and park facilities.

Geology and Soils

The surficial geology of the central two-thirds of the Project area around Belmont Creek consists of Pleistocene-age alluvial fan deposits (Qoa), while the surficial geology of the slope on the south side of the creek is Holocene-age slope wash, ravine fill, and colluvium (Qsr). Franciscan chert and sandstone dating to the Cretaceous and Jurassic periods (fs, fc) underlie the upper banks of the creek at the edges of the Project area. Mapped soils in the western three-quarters of the Project area consist of Los Gatos series shallow, well-drained, light clay loams, formed on mountain slopes over weathered sedimentary bedrock. In the northeastern quarter of the Project area and in a small portion along the southeastern edge, the soils consist of orthents, which in this area are cut and fill-Urban land complex soils with no cohesive stratigraphy (USDA, 2022). The Belmont Hill fault bisects the Project area in a northwest by southeast direction (Pampeyan, 1994). Historic-era and modern engineering of the landscape, notably through the construction of the buildings and structures, has occurred in the eastern portion of the Project area.

Cultural Context

Pre-contact Period

Chronological frameworks facilitate the comparison of pre-contact regional archaeological trends and differences. For the San Francisco Bay area, Scheme D, which is based on stylistic temporal variation in shell bead types, is the most recent and refined chronology (Groza et al., 2011). Scheme D uses a general three-part sequence (Early, Middle, and Late Periods), supplemented by two transition periods (Early/Middle and Middle/Late Periods). The following discussion of the San Francisco Bay area pre-contact chronology uses a generalized geologic time−based scheme, as presented by Milliken et al. (2007), with Groza et al.'s (2011) Scheme D supplementing the Late Holocene (4200 to 180 years before present [BP]) period. The geologic periods used are Terminal Pleistocene (13500 to 11700 BP), Early Holocene (11700 to 8200 BP), Middle Holocene (8200 to 4200 BP), and Late Holocene (4200 to 180 BP).

Terminal Pleistocene (13500 to 11700 BP)

To date, there is general agreement among archaeologists that multiple human migrations to North America occurred, via both inland and coastal routes. The Terminal Pleistocene was characterized by highly mobile hunter-gatherers who occupied broad geographic areas and who occasionally exploited large game. Archaeological evidence from this period is mostly represented by isolated fluted projectile points; artifacts from this era are rare throughout California, and nothing from this period has been discovered in the San Francisco Bay area to date (Milliken et al., 2007; Byrd et al., 2017).

Early Holocene (11700 to 8200 BP)

Similar to Terminal Pleistocene populations, Early Holocene human occupation in the overall region was characterized by highly mobile groups exploiting a wide variety of plant and animal resources. Assemblages from this period are dominated by stemmed projectile points, flake tools, core tools, cobble tools, and crescents, with those in California distinguished by high numbers of handstones and millingslabs. In the San Francisco Bay area, only four archaeological deposits from this period have been documented: two in the East Bay (at Los Vaqueros Reservoir), one in the North Delta (near Vacaville), and one in the South Bay (in Fremont). Two additional deposits from the period have been documented adjacent to the San Francisco Bay area: one in the Santa Clara Valley and one in the Santa Cruz Mountains. All of the abovementioned sites were in buried contexts (Milliken et al., 2007; Byrd et al., 2017).

Middle Holocene (8200 to 4200 BP)

When compared with the Early Holocene, there is much more archaeological data from the Middle Holocene for the San Francisco Bay area, including abundant surface and buried deposits. Assemblages from this period indicate increased sedentism and population size, and include a wide variety of side-notched dart points, cobble tools, flake tools, shell beads, ornaments, and ground stone tools such as handstones, millingslabs, mortars, and pestles. Notable among technological developments of the period is the appearance of the mortar and pestle; these appear by 6000 BP and would become the dominant milling tools in the region in subsequent periods. Extensive inter-regional trade is indicated by the presence of distinct shell beads (Type N grooved rectangular *Olivella*) and Napa Valley and eastern Sierra Nevada obsidian at period sites in the area. With the expansion of the San Francisco Bay mud flats and tidal marshes during the period, human populations increasingly exploited estuarine resources such oysters and mussels, reflected in the presence of shell middens. A diverse set of other animal resources was used, likely through local specialized strategies. Middle Holocene archaeobotanical assemblages include a large number of nuts, seeds, and fruit pits; these suggest year-round exploitation of a range of habitats, again reflecting increased sedentism (Milliken et al., 2007; Byrd et al., 2017).

Late Holocene (4200 to 180 BP)

By far the best represented archaeological period in the San Francisco Bay area is the Late Holocene, which is typically separated into five additional periods: Early (4200 to 2550 BP), Early/Middle Transition (2550 to 2150 BP), Middle (2150 to 930 BP), Middle/Late Transition (930 to 685 BP), and Late (685 to 180 BP). During the Late Holocene, population size and social, political, and economic complexity increased throughout the region. These developments were accompanied by resource intensification throughout the region. Late Holocene archaeological sites are the first in which large cemeteries appear. Most decedents were buried in flexed positions, and grave goods were common.

A notable development of the Early Period is the creation of numerous large shell mounds along the San Francisco Bay, which have yielded assemblages with stemmed leaf-shaped projectile points, flaked-stone knives, mortars, pestles, crescents, perforated charmstones, bone awls and other bone tools, new sinkers, and shell beads and pendants, among other artifacts. As would be expected, marine resource exploitation dominated the sites along the Bay shore, while interior sites appear to have focused on freshwater fish, shellfish, and terrestrial mammals; a variety of nuts, berries, and seeds were also eaten at sites throughout the region.

Increasing sedentism is seen in the Middle Period, which saw the height of mound building in the area and more social complexity compared with earlier periods. New artifacts found in Middle Period sites include large, shaped mortars and pestles, ear spools, bone fishing spears, and a greater variety of shell beads and ornaments. The Middle Period saw use of greater terrestrial resources such as deer and acorns. Evidence also shows that some Central Valley groups migrated to the East Bay during the Middle Period; called the Meganos Intrusion, settlements of this group are distinct and include a high proportion of extended burials.

Increased population size and resource intensification continued during the Late Period, which is by far the best documented pre-contact period in the region. New artifact types appearing during the Late Period include the clamshell disk bead, flanged steatite pipes, more elaborate mortars, and new shell bead and pendant forms. Though first appearing around 700 BP, at the end of the Middle Period, the bow and arrow becomes widespread at Late Period sites and is reflected by locally invented and distinct serrated Stockton arrow point. Populations of the Late Period apparently relied on small seeds more than people had during the preceding periods, and a large variety of terrestrial and estuarine faunal species (e.g., sea otters, deer, rabbits, and clams) were used. Flexed interments, occasional cremations, and intentionally broken grave goods characterized burial practices of the period. Trade with groups from neighboring areas, particularly with those in Napa Valley (for obsidian) and other regions north of the San Francisco Bay (for clamshell beads), was seemingly widespread and highly developed (Milliken et al., 2007; Byrd et al., 2017).

Ethnographic Setting

Ethnohistorical, historical, and archaeological data indicates that, prior to Euroamerican settlement of the area, the Project area and vicinity was inhabited by a group known as the Ohlone (Milliken, 1995; Milliken et al., 2009; Levy, 1978). The Ohlone territory extended along the Pacific Coast from south of Monterey Bay to the north end of the San Francisco Peninsula, and inland to the Coast Ranges, from the east side of San Francisco Bay to the Carquinez Strait (Milliken et al., 2007; Milliken, 1995). Contact-era population estimates for the Ohlone range from between 7,000 and 16,000 (Kroeber, 1925 [1976]). Ethnographic accounts show that the Ramaytush group lived in the Project area and vicinity (Milliken et al., 2009; Milliken, 1995).

Linguistically, Ohlone (also known as Costanoan) is a subfamily of the Penutian stock (Milliken et al., 2009; Levy, 1978), with an estimated six separate languages or dialect clusters, including *San Francisco Costanoan*, the *Tamyen* variety of which was spoken by the group living in the Project area and vicinity (Milliken et al., 2009; Golla, 2011). Though traditional anthropological literature portrayed the Ohlone cultural as static, today it is better understood that many variations of culture and ideology existed within and between villages. The use of static descriptions allowed for easier ethnographic classification of California Native cultures, but inherently masked Native adaptability and self-identity; California Native Americans rarely viewed themselves as members of larger cultural groups, as defined by anthropologists. Rather, the village tended to be the primary identifier of origin, with marriage and kinship providing additional sources (Milliken, 1995; Milliken et al., 2007; Milliken et al., 2009).

Ohlone regional communities consisted of fairly autonomous units of between 150 and 400 people led by a chief (man or woman) and council (Levy, 1978). Other key roles in the community were shamans and war leaders. Permanent villages tended to be situated along or near waterbodies, with temporary camps in prime resource-processing areas (Levy, 1978; Milliken et al., 2009).

Economically, the Ohlone engaged in hunting, fishing, and gathering. Their territory included coastal as well as open valley environments that yielded a wide variety of resources such as acorns, grasses, bulbs, tubers, deer, elk, antelope, bears, birds, fish, shellfish, and small mammals. Private ownership of natural and cultural resources was acknowledged, with ownership at the village level. The Ohlone apparently aggressively protected territories, requiring monetary payment (e.g., clam shell beads) for access rights (Milliken, 1995; Milliken et al., 2007; Milliken et al., 2009).

The most common Ohlone house type was circular and grass-/rush-thatched (Kroeber, 1925 [1976]). Other common structures were the sweathouse, dance plazas, and assembly house. The Ohlone used a variety of stone tools, ranging from flaked-stone knives, arrow points, and spear points, to ground-stone handstones, millingslabs, mortars, pestles, net sinkers, anchors, and pipes.

Flaked-stone tools were most often made from locally available chert or imported obsidian. Other common Ohlone material goods included tule canoes, mats, and baskets; plant fiber cordage, nets, and baskets; animal skin blankets and other coverings made from animals such as sea otters, rabbits, and ducks; wood bows and arrow shafts; and shell beads and ornaments. There is no evidence that the Ohlone used or made ceramics prior to Euroamerican contact. The Ohlone traded extensively with neighboring groups (Milliken, 1995; Milliken et al., 2007; Milliken et al., 2009).

During the Mission Period (1770 to 1835), California Native Americans, particularly along the coast, were brought, usually by force, to the missions by Spanish missionaries to supply labor demands. The missionization resulted in immediate and devastating changing to Ohlone lives and traditional lifeways, including a massive population decline due to declining birth rates and introduced diseases such as the measles epidemic of 1806, during which almost 25 percent of the indigenous population died. Following the secularization of the missions by the Mexican government in the 1830s, most Native Americans gradually left the missions and established rancherias in the surrounding areas (Milliken et al., 2007; Milliken et al., 2009; Levy, 1978). After European contact, Ohlone life ways were severely disrupted by missionization, disease, and displacement. Today the Ohlone still have a strong presence in the San Francisco Bay Area and are very interested in their past and in maintaining their culture (Milliken, 1995; Milliken et al., 2007; Milliken et al., 2009).

Historic Setting

Regional

The first European expedition into the San Francisco Bay area occurred in 1772 when Pedro Fages and his party explored the eastern shore of San Francisco Bay north to San Pablo Bay, then traveled east along the south shore of the Carquinez Strait and returned to the San José area through the Diablo and Livermore valleys south of Concord. The Fages expedition encountered numerous Native American villages, and diarist Juan Crespí reported that the villagers welcomed the Spaniards, giving them food and gifts. Three years later, the ship *San Carlos* sailed through the Golden Gate, tasked with charting the bay. The ship's commander, Lieutenant Juan Manuel de Ayala, and his crew encountered many Ohlone, as well as neighboring Coast Miwok villagers from the Marin County shore. In August 1775, Huchuin-Aguasto speakers greeted the ship's longboat. They recounted the earlier visit by Fages and provided food and gifts to the new arrivals (Milliken, 1995).

The Spanish established Mission San Francisco de Asís (also known as Mission Dolores) and Presidio de San Francisco in 1776. Mission Dolores was located west of Mission Bay on land occupied seasonally by the Yelamu people, a small village community composed of approximately 160 people, while the Presidio was situated along the northern edge of the peninsula. In the 1790s, the Spanish established an outpost ("Hospice") in San Mateo County to produce grain and livestock for the Mission and Presidio (Milliken, 1995).

In 1822, Spain ceded their North American colonial outposts to the newly independent Republic of Mexico and Upper California became a province of the Republic of Mexico. The Project area is within the boundaries of one of the earliest Mexican land grants in the area, Rancho Buri. In

1835, then Mexican governor José Castro issued the 14,639-acre grant to José Antonio Sánchez, who used the land for agriculture and grazing (Hoover, 1990).

During the 1840s, relations between the United States and Mexico became strained, with Mexico fearing American encroachment into their territories. The political situation became unstable and war between the two nations broke out in 1846. American attempts to seize control of California ensued, and within two months California was taken by the United States. Skirmishes between the two sides continued until the United States officially annexed California on February 2, 1848.

The discovery of gold in the Sierra Nevada in 1848 produced a population increase in northern California as immigrants poured into the territory seeking gold or associated opportunities. Before the Gold Rush, San Francisco was a small community with a population of approximately 800. With the discovery of gold and the sudden influx of thousands of newcomers, a city of canvas and wood sprang up around Yerba Buena Cove and on the surrounding sand dunes and hills. To accommodate the growing population, the city soon spread out in all directions, including south and west beyond the outskirts of the burgeoning city that was centered on Yerba Buena Cove.

In 1795, José Darío Argüello had been granted 35,000 acres of land for his service to the Mexican government, referred to as the Rancho de las Pulgas. Argüello acted as Commandante of the Presidio in San Francisco (1787–91, 1796–1806) and Monterey (1791–96), as well as Governor of Alta California (1814–1815). Upon Argüello’s death in 1835, the land was divided equally among his heirs. Following the American annexation of California after the Mexican-American War, the Treaty of Guadalupe Hidalgo guaranteed that the U.S. government would honor and guarantee all land grants to former citizens of Mexico. However, those land grants were required to be proven in court. In 1852 the Argüello family hired the San Francisco law firm Ranke, Cipriani, and Mezes to attempted to retain ownership of their land. Simon Mezes successfully represented the family in securing their 35,000 acres, and for his services received 15 percent of the las Pulgas holdings, including what would later become the City of Belmont (referred to as “the City” or “Belmont”) and the Project area (City of Belmont, 1991).

Local

In 1850, with the statehood of California, Charles Angelo opened a roadhouse at the junction of Cañada del Diablo and the San Francisco-San Jose Road (El Camino Real) to serve the San Francisco to San Jose stage line. This began the settlement of what would eventually become Belmont, with Mezes dividing his property in the area into the town’s first subdivision in the fall/winter of 1853. Mezes established his home in Belmont and encouraged his San Francisco acquaintances to build country houses in the area. These large country homes characterized the land use from the mid-1860s through the turn of the 20th century. In 1863 the San Francisco and San Jose Railroad line was established; it ran the length of the peninsula, with a stop in Belmont. The arrival of the railroad opened up access to Belmont and San Francisco from that which had previously been restricted to wagon or boat. In 1867, a railroad station was constructed in Belmont, and the village experienced a gradual expansion in population and development (City of Belmont, 1991).

In 1854, John McDougal purchased property south of Ralston Avenue that included the current footprint of Twin Pines Park. In 1864, German immigrant Carl Janke purchased a portion of the property from McDougal that included the Project area. Dorothea and Carl Janke sailed around Cape Horn from Hamburg, Germany, in 1848, landing in San Francisco. They settled in Belmont in 1860, and in 1865 they opened Belmont Park as a biergarten and picnic ground. Modeled after German biergartens in Janke's native Hamburg, the facility had a 300-person dance pavilion and drew crowds of thousands to picnics. His pavilion was also equipped with a bar, an ice cream parlor, and a restaurant. Outside the pavilion, the park provided a carousel, a shooting gallery, footpaths with bridges crossing the meandering creeks, picnic benches, and lathe houses situated about the shady grounds. Brass bands performing from bandstands could be heard all around the woodland (Daily Journal, April 5, 2004; Buchanan, 2001). People would travel from San Francisco and the peninsula via train for picnics on Wednesdays, Saturdays, and Sundays through the end of the century when the Janke property was divided and sold (City of Belmont, 1991).

During the first half of the twentieth century, Belmont was home to five sanitariums that treated nervous disorders. The quiet, scenic ambiance, coupled with the presence of the railroad and close proximity to nearby larger cities, made Belmont a popular setting for sanitariums (City of Belmont, n.d.).

The first sanitarium in Belmont, the Gardiner Nerve Sanitarium, originally part of Ralston Manor, opened in 1901. The sanitarium building was purchased in 1922 by the Sisters of Notre Dame de Namur as the site of their College of Notre Dame. The California Sanitarium for lung-related issues was opened in 1910.

In 1915, Annette S. Alexander purchased land just west of what is now Twin Pines Park; in 1924, the Alexander Sanitarium to treat mental disorders was built on the site. In 1948, the Alexander Sanitarium had housing for seventy-five patients, a swimming pool, a bowling green, and tennis courts. The Alexander Sanitarium operated until 1973, when it was closed and taken over by the Belmont Hills Psychiatric Center.

Nerve Rest Sanitarium was founded by Maude Reed in 1918. Nerve Rest was later sold and renamed Hillwell Sanitarium, then later renamed Buena Campbell Sanitarium; it was demolished in the 1970s (City of Belmont, 1991; City of Belmont, n.d.). With the exception of the Alexander Sanitarium, all the Belmont sanitariums of the early twentieth century were converted residential buildings.

Project Area

George L. Center, a San Francisco real estate developer and banker, built the first reinforced concrete residence in Belmont on property purchased from Janke in 1907 (City of Belmont, 1991). Center had migrated from Scotland to San Francisco with his uncle John Center in 1859, and the Centers quickly became influential real estate developers in the Mission District. George Center was the senior member of Center & Spader, one of the City's oldest real estate companies. He was also president of the John Center Company and California Cotton Mills and was a director in two banks: Mission and Mission Savings. The damage of the San Francisco earthquake in April of 1906 prompted Center's relocation out of San Francisco, as well as his use of the new reinforced concrete building material in his Mission Revival style home, known as the Manor House. Center resided in Belmont from 1910 until his death in 1923 at the age of 78 (Seavey, 1991; San Francisco Examiner, September 13, 1923).

After Center died, the Manor House was purchased by Doctor Norbert J. Gottbrath in March 1925, and the 3-acre site was transferred in August that year to Twin Pines Inc. (Redwood City Tribune, March 9, 1925, and August 4, 1925). Twin Pines Inc. was incorporated August 13, 1925, to "manage and operate health resorts [and] buy and sell property," with capital stock totaling $75,000 divided into 750 shares. The original subscribers and directors were Walter Frank Schaller, Henry G. Mehrtens (head of Stanford Medical School), and Norbert J. Gottbrath (Redwood City Tribune, August 13, 1925). Dr. Gottbrath and colleagues were based in San Francisco but operated a sanitarium out of the Manor House with a limited number of patients (between 15 and 20). In August 1928, a serial arsonist set a fire in the coal cellar which cause limited damage (Napa Daily Register, August 15, 1928). That same year, Gottbrath's wife died in December (Redwood City Tribune, December 10, 1928)

In 1929, Gottbrath sold the sanitarium to Dr. William H. Rebec (City of Belmont, 1991). Dr. Rebec was from Michigan and had studied medicine for 10 years in Europe before relocating to Belmont. During his practice in Belmont, Dr. Rebec acted as a member of the San Mateo County Health and Welfare Board, the State Medical Association, and the American Psychiatric Association. Dr. Rebec also acted as director of the National Association of Private Psychiatric Hospitals (Estep, 1991; The San Francisco Examiner, September 11, 1941).

Twin Pines Sanitarium was described in advertisements of the period as having a central hospital unit surrounded by cottages. It was billed as a place to "live comfortably in a tiny cottage nestled among the trees" where patients could "play golf, go bowling on the green, or play tennis" with a "forty-foot yacht" at their disposal, all the while receiving treatment for "nervous disorders or exhaustion" (Redwood City Times, September 18, 1940). During his tenure, Rebec expanded the sanitarium's footprint to include the land just west of the Manor House, known as "3 Acres" (Estep, 1978; City of Belmont, 2013).

In 1939, Dr. Rebec submitted a building permit to the County for a $5,000 rustic and stucco architectural style home adjoining the sanitarium, although it is unclear if the building was in fact constructed (San Mateo Times, September 12, 1939). Dr. Rebec never married, but rather attended to his patients and his mother, Elizabeth Rebec, who lived in a cottage on sanitarium grounds. In 1941, at the age of 45, Dr. Rebec died from influenza at Mills Memorial Hospital (San Mateo Times, September 10, 1941). After Dr. Rebec's death, he willed half of the estate be given to his 10 associates and assistants at the sanitarium, his "loyal coworkers who had assisted in building up the sanitarium" (Redwood City Tribune, September 22, 1941). The other half of his estate was left to his mother, who helped manage the sanitarium while contributing to local charitable organizations. In November 1958, she passed away in her cottage at the age of 96 (Redwood City Tribune, November 11, 1958).

The Twin Pines Sanitarium closed in March 1972 as a result of the final implementation of the 1967 Lanterman-Petris-Short Act. The Lanterman-Petris-Short Act ended involuntary civil confinement of mental patients in California, as well as state funding for public mental health facilities. Following the closure of the facility, City zoning laws could have resulted in the property being converted to offices, apartments, or a senior care facility (San Mateo Times, November 4, 1972). These potential outcomes led to local citizens leading an effort to “Save Twin Pines” and convert the land into a city park. In November 1972, a special municipal election passed a $680,000 bond act to purchase 17 acres of the land for city park use. The City dedicated the park in March 1975. In 1976, the City entered negotiations with Dr. Albert Voris, who owned the remaining two parcels of land, totaling approximately 3 acres, adjacent to the park. In 1977, the City finalized its purchase of the property for $470,000.

The buildings on the site required extensive restoration to be sufficient for public use. In October 1977, the City undertook renovation of the Manor House and attached “Rebec Hall” to be used as an art center and Belmont Police Department headquarters (San Mateo Times, March 19, 1975). “Rebec Hall” was demolished in 2003; it had been in the space behind the Manor House occupied by the Twin Pines Senior & Community Center and Meadow Picnic Area. The City Parks and Recreation Department also moved into the Fisher House (Ziegler, 1982). The Lodge and cottage buildings were converted for use as public gathering space, including use by the senior citizens of the community (San Mateo Times, January 1, 1985). The City dedicated the Keith Davey Grove on March 9, 1974, and the Belmont Rotary Club raised funds and donated the equipment in the Buckeye Picnic Area in 1980. The Meadow Picnic Area was established after the demolition of the old police station in that location in 2003, and the Redwood Picnic Area is also modern.

Existing Cultural Environment

California Historical Resources Information System Records Search

In November 2021, Environmental Science Associates (ESA) completed a cultural resources records search for the Project area and vicinity at the Northwest Information Center at Sonoma State University. An update was performed in August 2022 to determine if additional resources or reports had been completed since the initial record search. The analysis boundary for the records searches consisted of the Project area with a 0.25-mile buffer. The Northwest Information Center maintains the California Historical Resources Information System (CHRIS) records for the Project area.

The CHRIS has record of six previously recorded cultural resources mapped within 0.25 mile of the Project area, two of which (P-41-000152, C-331) are mapped within the Project area. All four cultural resources previously recorded outside but within 0.25 mile of the Project area (P-41-001878, -002006, -002361, -002496) are historic-era architectural resources. The two previously recorded cultural resources mapped within the Project area consist of one indigenous archaeological site (P-41-000152) and an historic-era architectural resource that has only been informally documented (C-331). C-331 is the informally documented location of Twin Pines in Belmont, with the only description for this resource as “a very historic picnic and park area. Sanitarium constructed in 1930” (M.W., 1988); no site record documentation or maps have been prepared for the resource. P-41-000152 is discussed in detail later in this section.

Ethnographic Literature Review

ESA's review of ethnographic literature revealed that no documented Native American villages are mapped within or in the immediate vicinity of the Project area, although ethnographic maps are at a large scale and the exact locations of villages are not easily determined. The nearest ethnographic village appears to have been the Lamchin Ramaytush Ohlone village of *Cachanigtac* or *Chachanegtac*, mapped near San Carlos, approximately 1.5 miles southeast of the Project area (Engelhardt, 1924). Ethnographic data on the Ramaytush Ohlone people of the Project area and vicinity is somewhat poor, so these village locations are approximate.

As previously discussed, most of the ethnographic accounts that were reviewed date to the early twentieth century and, given the rapid decimation of and displacement of Ohlone people by the Spanish Missions and other European settlers, the relatively few Native American settlements described in the vicinity of the Project should not be taken as definitive evidence as an absence of other villages or lack of use of the area.

Field Surveys

Archaeological Monitoring of Geotechnical Investigations

On August 3, 11, and 12, 2022, ESA archaeologists monitored four geotechnical borings within the Project area, specifically within the parking lot between Belmont City Hall, Twin Pines Park's Meadow Picnic Area, and Belmont Creek. The borings were all drilled to between 25.0 and 35.0 feet below surface, with archaeological monitoring terminated once the drilling had reached 20.0 feet due to the lack of archaeological sensitivity beyond this depth. Potential cultural material, trace shell fragments, was identified in one of borings monitored; this material was identified at approximately 0 to 3 feet deep on the east side of Belmont Creek between the Redwood Picnic Area and the Buckeye Picnic Area. No other cultural material was identified during the geotechnical monitoring.

Archaeological Pedestrian Survey

On August 11 and September 20, 2022, ESA archaeologists conducted a pedestrian surface survey of all accessible portions of the Project area. Intensive pedestrian methods were used during the survey, consisting of walking the ground surface in parallel transects no greater than 10 meters apart and inspecting the ground surface for evidence of cultural material. Field methods were augmented for close inspection of the locations of the previously recorded archaeological resource; these augmented methods entailed reducing parallel transect spacing to no greater than 5 meters and examining surface sediments for evidence of pre-contact or historic-era archaeological material. During the pedestrian survey, no archaeological material was observed, including any evidence of P-41-000152.

Archaeological Subsurface Survey

On June 12, 2023, ESA archaeologists completed an archaeological subsurface survey of the Project area via mechanical trenching, within the site boundary of P-41-000152. Trenches were excavated in successive, shallow lifts using a 3-foot-wide, flat-bladed excavator bucket to avoid impacting cultural deposits or seriously compromising any feature associations, and approximately 3 to 5 gallons of soil were sample screened through 1/8-inch hardware cloth every 10 to 20 centimeters (cm). ESA documented all test trenches with field notes, field forms, and photographs. A representative from The Ohlone Indian Tribe was present during the trenching. Nine trenches were proposed but due to the discovery of human remains (see below), only two trenches were completed.

During the archaeological subsurface survey, midden material was identified in both trenches from approximately 50 to 150 cm below ground surface (bgs). The midden was characterized by very dark grayish-brown clay loam with fragmentary and whole oyster shell (*Ostrea lurida*), angular fragments of fire-affected chert, and sparse quantities of California hornsnail (*Cerithideopsis californica*) and chert debitage, representing late-stage reduction practices. Human remains were encountered during excavation of the second trench. The NAHC appointed Chairperson Monica Arellano of the Muwekma Ohlone Tribe of the San Francisco Bay Area (Muwekma) as the Most Likely Descendant (MLD) for the human remains. On June 14, 2023, ESA and City representatives met with Chairperson Arellano to discuss the finds and to establish treatment for the burial. Based on that discussion, the burial was left in place and all artifacts recovered during testing were reburied with the remains. The material identified in the Project area during the archaeological subsurface survey is consistent with those previously documented at P-41-000152.

Architectural Survey

On August 11 and September 20, 2022, ESA architectural historians conducted an intensive-level architectural resources survey of the Project area. ESA inspected architectural features that had been identified in the Project area through review of modern and historic maps and photographs, as well as those identified by the City. Resource recordation methods were the same as those used during the archaeological pedestrian survey. During the survey, one historic-era architectural resource, the Twin Pines Park, was identified in the Project area. This resource is discussed in detail later in this section.

Native American Correspondence

ESA contacted the NAHC on August 17, 2022, in request of a search of the NAHC's SLF and a list of Native American representatives who may have interest in the Project. The NAHC replied to ESA's SLF and Native American contacts request on September 29, 2022, in which they stated that the SLF has no record of sacred sites in the Project area. The reply also included a list of eight Native American individuals, representing six California Native American Tribes who may be interested in the Project area.

On February 13, 2023, on behalf of the City, ESA archaeologist Robin Hoffman sent emails to representatives from the six California Native American Tribes indicated in the NAHC reply. The letters provided information on the Project, including the results of the cultural resources background research and pedestrian survey, and requested that the recipients notify the City if they would like to participate in the archaeological subsurface survey or have any concerns regarding Project impacts on cultural resources and tribal cultural resources. On April 17, 2023, on behalf of the City, Hoffman made a phone call and sent an email to Chairperson Monica Arellano, of Muwekma, to discuss the Project and any concerns; Arellano's voicemail box was full and Hoffman received an automated email stating that the email was undeliverable. On April 17, 2023, on behalf of the City, Hoffman made a phone call and sent an email to Chairperson

Andrew Galvan, of The Ohlone Indian Tribe, to discuss the Project and any concerns. Galvan called Hoffman, stating that The Ohlone Indian Tribe is interested in the Project. Subsequent conversations between Hoffman and Galvan resulted in The Ohlone Indian Tribe participating as a compensated monitor during the archaeological subsurface survey for the Project.

As a result of the discovery of human remains during the archaeological subsurface survey, and subsequent appointing of Arellano as MLD by the NAHC, Arellano provided treatment recommendations for the human remains, and P-41-000152, in general, with respect to mitigating significant impacts on the resource. The cultural resources mitigation measures for the Project, presented herein, are heavily based on Arellano's recommendations. The treatment recommendations consisted of reburial of artifacts and human remains identified during the subsurface survey at the location where they were found until Project implementation and then, prior to Project implementation, the following: recovery, analysis, and reburial of the artifacts and human remains identified during the subsurface survey and any during Project implementation, with participation by Muwekma representatives; development of a (data recovery/treatment) plan to guide recovery of archaeological material and human remains prior to Project implementation; and installation of public informational signage, developed by Muwekma in coordination with the City.

Summary of Existing Cultural Environment

Through archival research, a CHRIS records search, the pedestrian survey, the archaeological subsurface survey, and consultation with California Native American Tribes, two cultural resources have been identified in the Project area: P-41-000152 and the Twin Pines Park. These resources are detailed below. P-41-000152 is present throughout most of the Project area, and Twin Pines Park is present in the western portion of the Project area. P-41-000152 has been recommended as California Register of Historical Resources (California Register)-eligible and, therefore, qualifies as an historical resource for CEQA purposes. Twin Pines Park has been recommended not eligible for the California Register and, therefore, does not qualify as an historical resource for CEQA purposes.

P-41-000152

This indigenous archaeological site was first recorded in 1973 by Hansen and Salzman (1973), who described the cultural materials identified as one mortar fragment, worked chert, and several *Olivella* shell beads. In 1984, Holman excavated with augers at the site, identifying midden material in the current Project area (Holman, 1984). In 1986, Wiberg excavated with augers at the western end of Twin Pines Park, observing midden material with shell, bone, fire-affected rock, and flaked-stone debitage. Wiberg noted that previous hand-excavated units, burial removal work, and monitoring had been conducted at P-41-000152 for the "Creekside Office Building and the Belmont Senior's Community Center," the results of which demonstrate that the site is California Register-eligible (Wiberg, 1986). A report from a later project nearby references unpublished information regarding the excavations and burial recovery from the aforementioned construction, including radiocarbon dates from the Senior Center demolition project dating the site to more than 4000 BP, with likely occupation up to approximately 200 BP (Holman, 2000). In personal communications with ESA in 2022, former City staff stated that Native American burials had been removed as part of the Senior Community Center construction and relocated to somewhere within Twin Pines Park (K. Mittelstadt, personal communication, August 29, 2022).

In 2003, Cartier conducted an auger survey at P-41-000152 around City Hall and the parking lot south of the building. Cultural material observed consisted of midden soil, shell, baked clay, charcoal, and fire-affected rock (Cartier, 2003). In 2004, Cartier conducted archaeological monitoring and a burial recovery program at P-41-000152 and burial recovery for the Belmont City Hall Expansion Project just east of Twin Pines Park and the current Project area. During the monitoring, Native American human burials and isolated human remains were identified and excavated, along with a dense shell midden, flaked-stone tools and debitage, ground-stone tools, bone and shell ornaments and tools, faunal bone, and fire-affected rock. Radiocarbon dates from that study resulted in dates of 3260 and 3120 BP. In personal communications with ESA in 2022, former City staff stated that the reburial location was likely the Twin Pines Park Meadow Picnic Area, west of the parking lot (K. Mittelstadt, personal communication, August 29, 2022). Based on their results, Cartier recommended P-41-000152 eligible for the California Register (Cartier, 2004).

During ESA's pedestrian survey conducted for the Project, no archaeological material was identified within the site boundary of P-41-000152. During ESA's archaeological subsurface survey, the following archaeological material was identified in the Project area, at depths of 50 to 150 cm bgs: human remains, midden material (very dark grayish-brown clay loam with fragmentary and whole oyster shell, and other shell), angular fragments of fire-affected chert, and sparse quantities of chert debitage, representing late stage reduction practices. The material identified in the Project area during the archaeological subsurface survey is consistent with artifacts previously documented at P-41-000152.

In summary, P-41-000152 is an indigenous archaeological habitation site along the banks of Belmont Creek near the mouth of its canyon, with components ranging in depth from 0 to at least 150 cm bgs and dating to between 4000 and 200 BP (Early through Late Period Late Holocene). The site consists of extensive midden material (with shell and mammalian dietary remains), at least 10 burials and isolated human remains, sparse flaked- and ground-stone tools, several shell beads and pendants, at least one bone tool, charcoal, and fire-affected rock. The site boundary is unclear, as it no longer has a surficial component and minimal subsurface exploration has been undertaken to define its western and southern boundaries; however, the area used for the current Project encompasses 9.92 acres, including most of the Project area, and is based on the boundary documented by Wiberg (1986), as it encompasses all areas where indigenous archaeological material associated with the site has been documented to date, per the CHRIS. The site appears to represent a pre-contact seasonal camp used for generalized habitation activities over a significant period of time, between 4000 and 200 BP, with inhabitants focusing on marine-based resource procurement and some (mostly stone) tool manufacture and use. The site is fairly representative of San Francisco Bay area pre-contact midden sites in similar settings.

The site was previously recommended California Register-eligible (Cartier, 2004). Zimmer and Hoffman (2023) also recommended the site as California Register-eligible under Criterion 4 due to its data potential. As such, the resource qualifies as an historical resource, for CEQA purposes.

Twin Pines Park

This architectural resource, within the western portion of the Project area, consists of the Twin Pines Park, a 19.55-acre municipal park in the City of Belmont. The park was informally documented as cultural resource C-331 as "a very historic picnic and park area…[s]anitarium constructed in 1930" (M.W., 1988). The park as a resource, which was established in 1975, abuts Belmont Creek, and includes picnic areas, a playground, trails, and the 2003 Belmont Senior and Community Center. While the Belmont Historical Society Museum in the Manor House, the Belmont Parks and Recreation Building, Cottage, Lodge Building, and Creekside Studios associated with the Twin Pines Sanitarium are within the boundary of the park, they are outside of the Project area and significantly predate the establishment of the park as a recreation facility. As such, they were treated as resources distinct from the park and are not included in the current analysis.

Research did not indicate any significant association between Twin Pines Park and known historical events (California Register Criterion 1), as it reflects typical suburban municipal development in the late twentieth century and does not possess any unique significance for this association. While the community of Belmont did make a concerted effort to preserve the former Twin Pines Sanitarium property as a park, rather than allow further development, this event does not rise to a level of significance at the local, state, or national level. Archival research also did not identify any specific individual associated with the establishment, use, or management of Twin Pines Park. Multiple civic groups have been associated with the park through its use as a meeting place, but none appear to rise to a level of significance for this association (California Register Criterion 2). Twin Pines Park is a vernacular, late twentieth century park, and is not significant for its design. No landscape architect or designer appears connected to the park, nor do its facilities reflect a unifying aesthetic. Rather, the park reflects its ongoing development over the past 50 years and does not appear to rise to a level of significance as a property that embodies distinctive characteristics of the style, nor reflect high artistic value (California Register Criterion 3). Because the elements of the park are examples of a common construction type built using readily available materials, and not designed in any particular unifying style, it has little to no potential to yield information important to the prehistory or history of the local area, California, or the nation (California Register Criterion 4). For these reasons, Sims et al. (2022) evaluated Twin Pines Park as not eligible for the California Register. Therefore, the resource does not qualify as a historical resource for CEQA purposes.

3.4.3 Regulatory Framework

Although tribal cultural resources are discussed separately in Section 3.6, *Tribal Cultural Resources*, this section provides associated regulatory framework due to mitigation measures in Section 3.4.4 applying to both types of resources.

State

California Environmental Quality Act

CEQA (codified at California Public Resources Code [PRC] Section 21000 *et seq.*) is the principal statute governing environmental review of projects occurring in the state. CEQA requires lead agencies to determine if a project would have a significant effect on historical resources or unique archaeological resources. Under CEQA (PRC Section 21084.1), a project that may cause a substantial adverse change in the significance of a historical resource or unique archaeological resource is a project that may have a significant effect on the environment.

The Office of Historic Preservation, an office of the California Department of Parks and Recreation, oversees adherence to CEQA regulations and maintains the California Historical Resource Inventory. Typically, a resource must be more than 50 years old to be considered a potential historical resource. The Office of Historic Preservation advises recording any resource 45 years or older, because there is commonly a 5-year lag between identification of a resource and the date that planning decisions are made.

Historical Resources

The CEQA Guidelines (codified at California Code of Regulations [CCR] Section 15000 *et seq*.) recognize that an *historical resource* consists of any of the following:

- A resource listed in or eligible for listing in the California Register of Historical Resources.
- A resource included in a local register of historical resources, as defined in PRC Section 5020.1(k), or identified as significant in a historical resource survey meeting the requirements of PRC Section 5024.1(g).
- Any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California by the lead agency, provided the lead agency's determination is supported by substantial evidence in light of the whole record.

If a lead agency determines that an archaeological site is a historical resource, the provisions of PRC Section 21084.1 and CCR Section 15064.5 apply. If an archaeological site does not meet the criteria for a historical resource contained in the CEQA *Guidelines*, then the site may be treated in accordance with the provisions of PRC Section 21083, pertaining to unique archaeological resources.

Unique Archaeological Resources

As defined in PRC Section 21083.2, a *unique archaeological resource* is an archaeological artifact, object, or site, about which it can be clearly demonstrated that without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

- Contains information needed to answer important scientific research questions and there is a demonstrable public interest in that information.
- Has a special and particular quality such as being the oldest of its type or the best available example of its type.
- Is directly associated with a scientifically recognized important prehistoric or historic event or person.

The CEQA *Guidelines* note that if an archaeological resource is not a unique archaeological resource, historical resource, or tribal cultural resource, the effects of the project on those cultural resources shall not be considered a significant effect on the environment (CCR Section 15064.5[c][4]).

Tribal Cultural Resources

Impacts on tribal cultural resources are also considered under CEQA (PRC Section 21084.2). CEQA recognizes that California Native American Tribes have expertise with regard to their tribal history and practices. PRC Section 21074(a) defines a *tribal cultural resource* as any of the following:

- Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American Tribe that are either of the following:
  - Included or determined to be eligible for inclusion in the California Register.
  - Included in a local register of historical resources, as defined in PRC Section 5020.1(k).
- A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of [PRC] Section 5024.1.

In applying these criteria, the lead agency would consider the significance of the resource to a California Native American Tribe.

A cultural landscape that meets the criteria of PRC Section 21074(a) is also a tribal cultural resource if the landscape is geographically defined in terms of the size and scope. A historical resource as described in PRC Section 21084.1, a unique archaeological resource as defined in PRC Section 21083.2, or a non-unique archaeological resource as defined in PRC Section 21083.2 may also be a tribal cultural resource under CEQA if it meets the criteria identified in PRC Section 21074(a).

CEQA requires lead agencies to analyze the impacts of projects on tribal cultural resources separately from impacts on archaeological resources (PRC Sections 21074 and 21083.09) because tribal cultural resources have cultural values beyond their ability to yield data important to prehistory or history. Tribal consultation pursuant to PRC Section 21080.3.1 applies to projects for which an NOP or notice of negative declaration/mitigated negative declaration was filed on or after July 1, 2015 and for which the CEQA lead agency has received formal requests from California Native American Tribes to be notified of that agency's projects subject to review under CEQA, and such California Native American Tribes respond in writing within 30 days of receiving the project notification from the CEQA lead agency. Refer to Section 3.6, *Tribal Cultural Resources*, for a full analysis of tribal cultural resources.

California Register of Historical Resources

The California Register is "an authoritative listing and guide to be used by State and local agencies, private groups, and citizens in identifying the existing historical resources of the State and to indicate which resources deserve to be protected, to the extent prudent and feasible, from substantial adverse change" (PRC Section 5024.1[a]). The criteria for eligibility for the California Register are based upon the criteria for listing in the National Register (PRC Section 5024.1[b]). Certain resources are determined by the statute to be automatically included in the California Register, including California properties formally determined eligible for, or listed in, the National Register.

To be eligible for the California Register, a cultural resource must be significant at the local, state, and/or federal level under one or more of the following four criteria:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
2. Is associated with the lives of persons important in our past.
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.
4. Has yielded, or may be likely to yield, information important in prehistory or history.

A resource eligible for the California Register must be of sufficient age and retain enough of its historic character or appearance (integrity) to convey the reason for its significance. Additionally, the California Register consists of resources that are listed automatically and those that must be nominated through an application and public hearing process. The California Register automatically includes the following:

- California properties listed in the National Register (and those formally determined eligible for the National Register).
- California Registered Historical Landmarks from No. 770 onward.
- Those California Points of Historical Interest that have been evaluated by the Office of Historic Preservation and have been recommended to the State Historical Resources Commission for inclusion in the California Register.

Other resources that may be nominated to the California Register include:

- Historical resources with a significance rating of Category 3 through 5 (those properties identified as eligible for listing in the National Register, the California Register, and/or a local jurisdiction register);
- Individual historic resources;
- Historic resources contributing to historic districts;
- Historic resources designated or listed as local landmarks, or designated under any local ordinance, such as a historic preservation overlay zone; and/or
- Tribal cultural resources.

California Public Resources Code Sections 5024 and 5024.5

The State Legislature enacted PRC Sections 5024 and 5024.5 as part of a larger effort to establish a State program to preserve historical resources. These code sections require state agencies to take several actions to ensure preservation of state-owned historical resources under their jurisdictions. These actions include: evaluating resources for eligibility for listing in the National Register and designation as California Historical Landmarks; maintaining an inventory of eligible and listed resources; and managing these historical resources so that that they will retain their historic characteristics.

PRC Section 5024(f) states that a state agency shall submit for comment to the State Historic Preservation Officer at the Office of Historic Preservation documentation for any project having the potential to affect historical resources listed in or potentially eligible for listing in the National Register, or registered as or eligible for registration as a California Historical Landmark. PRC Section 5024.5 requires State agencies to notify and consult with the State Historic Preservation Officer regarding adverse effects to historical resources and measures to eliminate or mitigate the adverse effect.

California Public Resources Code Section 5097

PRC Section 5097.98 provides procedures in the event human remains of Native American origin are discovered during project implementation on non-federal land. PRC Section 5097.98 requires that no further disturbances occur in the immediate vicinity of the discovery, that the discovery is adequately protected according to generally accepted cultural and archaeological standards, and that further activities take into account the possibility of multiple burials. PRC Section 5097.98 further requires the NAHC, upon notification by a county coroner, designate and notify an MLD regarding the discovery of Native American human remains. The MLD has 48 hours from the time of being granted access to the site by the landowner to inspect the discovery and provide recommendations to the landowner for the treatment of the human remains and any associated grave goods.

PRC Section 5097.99, as amended, states that no person shall obtain or possess any Native American artifacts or human remains that are taken from a Native American grave or cairn. Any person who knowingly or willfully obtains or possesses any Native American artifacts or human remains is guilty of a felony, which is punishable by imprisonment. Any person who removes, without authority of law, any such items with an intent to sell or dissect or with malice or wantonness is also guilty of a felony, which is punishable by imprisonment.

California Health and Safety Code Section 7050.5

Section 7050.5 of the California Health and Safety Code (HSC) protects human remains by prohibiting the disinterring, disturbing, or removing of human remains from any location other than a dedicated cemetery. PRC Section 5097.98 (and reiterated in CCR Section 15064.59[e]) also identifies steps to follow in the event of the accidental discovery or recognition of any human remains in any location other than a dedicated cemetery.

California Native American Historic Resource Protection Act

The California Native American Historic Resource Protection Act of 2002 imposes civil penalties, including imprisonment and fines up to $50,000 per violation, for persons who unlawfully and maliciously excavate upon, remove, destroy, injure, or deface a Native American historic, cultural, or sacred site that is listed or may be listed in the California Register.

California Government Code Section 27460 and 27491

California Government Code Section 27460 requires that human remains be “interred decently” in the event that no person takes charge of them when an inquest is held by a coroner. California Government Code Section 27491 requires that, in the case of unattended deaths, the person in charge of the human remains notify the coroner, and that the coroner inquire into the death.

California Executive Order B-10-11

California Executive Order B-10-11 was issued by Governor Edmund G. Brown, Jr., on September 19, 2011. The order affirms that all State agencies shall encourage communication and consultation with California Indian Tribes.

Local

Refer to **Table 3.4-1** for goals, actions, and policies from the City of Belmont's 2035 General Plan Conservation Element that relate to cultural resources.

TABLE 3.4-1
CULTURAL RESOURCES–RELATED POLICIES IN LOCAL GENERAL PLAN

City of Belmont 2035 General Plan
Goal 5.12 Preserve and protect areas and sites of prehistoric, cultural, and archaeological significance.
Policy 5.12-1 Ensure that development avoids potential impacts to sites suspected of being archeologically, paleontologically, or culturally significant, tribal or otherwise, or of concern by requiring appropriate and feasible mitigation.
Policy 5.12-2 If cultural, archaeological, paleontological, or cultural resources, tribal or otherwise, are discovered during construction, grading activity in the immediate area shall cease and materials and their surroundings shall not be altered or collected until evaluation by a qualified professional is completed.
Sources: City of Belmont, 2017a.

3.4.4 Impacts and Mitigation Measures

Significance Criteria

In accordance with the CEQA, CEQA *Guidelines* (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Project could have a significant impact if it were to:

- Cause a substantial adverse change in the significance of a historical resource pursuant to CEQA *Guidelines* Section 15064.5.
- Cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA *Guidelines* Section 15064.5.
- Disturb any human remains, including those interred outside of dedicated cemeteries.

Methodology

Historical Resources

Impacts on historical resources are assessed by identifying any activities that would affect them, such as new construction, demolition, or substantial alteration. Individual properties and districts identified as historical resources under CEQA include those that are significant because of their association with important events, people, or architectural styles or master architects, or for their informational value (California Register Criteria 1, 2, 3, and 4) and that retain sufficient historic integrity to convey their significance. Criterion 4 is typically applied to the evaluation of archaeological resources and not to architectural resources. Historical resources may include architectural resources and archaeological resources.

Once a resource has been identified as significant, it must be determined whether the impacts of the project would "cause a substantial adverse change in the significance" of the resource (CCR Section 15064.5[b]). A "substantial adverse change in the significance" of a historical resource means "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of [the] historical resource would be materially impaired" (CCR Section 15064.5[b][1]). A historical resource is materially impaired through the demolition or alteration of the resource's physical characteristics that convey its historical significance and that justify its inclusion in (or eligibility for inclusion in) the California Register or a qualified local register (CCR Section 15064.5[b][2]). Therefore, material impairment of historical resources constitutes a significant impact.

Archaeological Resources

The significance of most pre-contact and historic-era archaeological sites is typically assessed relative to California Register Criterion 4. This criterion stresses the importance of the information potential contained within an archaeological site, rather than the significance of the site as a surviving example of a type or its association with an important person or event. Archaeological resources may qualify as historical resources under the definition provided in CCR Section 15064.5(a). Alternatively, they may be assessed under CEQA as unique archaeological resources. *Unique archaeological resources* are defined as archaeological artifacts, objects, or sites that contain information needed to answer important scientific research questions (PRC Section 21083.2).

A substantial adverse change in the significance of an archaeological resource is assessed similarly to such changes to other historical resources; that is, a "substantial adverse change in significance" means "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of [the] historical resource would be materially impaired" (CCR Section 15064.5[b][1]). As stated previously, a historical resource is materially impaired when a project demolishes or materially alters the resource's physical characteristics that convey its historical significance and that justify its inclusion (or eligibility for inclusion) in the California Register or a qualified local register (CCR Section 15064.5[b][2]). Therefore, material impairment of archaeological resources that are considered historical resources or unique archaeological resources would be a significant impact.

Human Remains

Human remains, including those buried outside of formal cemeteries, are protected under several state laws, including PRC Section 5097.98 and HSC Section 7050.5. For the purposes of this analysis, intentional disturbance, mutilation, or removal of interred human remains without following the notification and consultation procedures outlined in PRC Section 5097.89 and HSC Section 7050.5 would be a significant impact.

Impacts and Mitigation Measures

Table 3.4-2 summarizes the impact conclusions presented in this section.

TABLE 3.4-2
CULTURAL RESOURCES IMPACT CONCLUSIONS

Impact Statement	Level of Significance
Impact CUL-1: Implementation of the Project could cause a substantial adverse change in the significance of a historical resource pursuant to CEQA *Guidelines* Section 15064.5.	NI
Impact CUL-2: Implementation of the Project could cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA *Guidelines* Section 15064.5.	LTSM
Impact CUL-3: Implementation of the Project could disturb human remains, including those interred outside of dedicated cemeteries.	LTSM

NOTES:
NI = no impact, LTSM = less than significant with mitigation

Impact CUL-1: Cause a substantial adverse change in the significance of a historical resource pursuant to CEQA *Guidelines* Section 15064.5. *(No Impact)*

The following discussion focuses on architectural resources. Archaeological resources, including archaeological resources that are potentially historical resources according to CEQA *Guidelines* Section 15064.5, are addressed under Impact CUL-2.

One architectural resource 50 years of age or older, the Twin Pines Park, has been identified in the Project area. The resource has been evaluated as not eligible for the California Register and, therefore, does not qualify as an historical resource according to CEQA *Guidelines* Section 15064.5. As a result, the Project would have no impact on historical resources and no mitigation measures would be required.

Mitigation: None required.

Impact CUL-2: Cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA *Guidelines* Section 15064.5. *(Less than Significant with Mitigation)*

The following analysis describes archaeological resources, both as historical resources according to CEQA *Guidelines* Section 15064.5, and as unique archaeological resources as defined in PRC Section 21083.2(g).

One archaeological resource, P-41-000152, has been identified in the Project area. The resource is an indigenous archaeological habitation site with components ranging in depth from 0 to at least 150 cm bgs and dating to between 4000 and 200 BP. The site consists of extensive midden material (with shell and mammalian dietary remains), at least 10 burials and isolated human remains, sparse flaked- and ground-stone tools, several shell beads and pendants, bone tools, charcoal, and fire-affected rock. The site is present throughout most of the Project area and appears to represent a pre-contact seasonal camp used for generalized habitation activities over a significant period of time, between 4000 and 200 BP, with inhabitants focusing on marine-based resource procurement and some (mostly stone) tool manufacture and use. P-41-000152 was recommended California Register-eligible and, therefore, qualifies as an historical resource for CEQA purposes.

The Project would consist of a substantial amount of ground disturbance within P-41-000152, including throughout all depths where cultural material has been identified at the site to date. The following Project-related activities would involve this ground disturbance: construction of a below-ground stormwater storage facility under an existing parking lot; construction of a high flow diversion weir along the creek bank; construction of a sediment chamber between the creek and diversion weir; construction of concrete retaining walls along the creek adjacent to the sediment chamber; construction of a stone or concrete in-stream check structure across the creek near the sediment chamber; and installation of an outlet pipe at the creek downstream of the in-stream check structure. Project implementation, specifically excavation and grading activities, would result in physical demolition, destruction, or alteration of P-41-000152. This physical demolition/destruction/alteration to P-41-000152, an historical resource, would materially impair the resource's physical characteristics that convey its historical significance and that justify its eligibility for inclusion in the California Register. Therefore, the Project would result in a significant impact on P-41-000152. Implementation of **Mitigation Measures CUL-1** to **CUL-4** would reduce this impact to a less-than-significant level.

Mitigation Measure CUL-1: Development and Implementation of an Archaeological Resources Data Recovery and Treatment Plan

A qualified archaeologist, defined as one meeting the Secretary of the Interior's Professional Qualifications Standards for Archeology and with experience in California archaeology, in coordination with the Muwekma Ohlone Tribe of the San Francisco Bay Area (Muwekma) and the City, shall prepare and implement an Archaeological Resources Data Recovery and Treatment Plan (ARDRTP) for the Project and, specifically, P-41-000152. The ARDRTP shall be approved by the City at least 60 days prior to Project construction. The ARDRTP shall be heavily based on Muwekma's MLD treatment recommendations and shall include and require the following:

- **Research Design**: The ARDRTP shall outline the applicable cultural context for P-41-000152, within a regional context, identify research goals and questions that are applicable to P-41-000152, and list the data needs (types, quantities, quality) required to answer each research question. The research design shall address all four California Register Criteria (1 to 4) and identify the methods that will be required to inform treatment, such as subsurface investigation, documentary/archival research, and/or oral history.
- **Data Recovery Plan**: The ARDRTP shall outline the field and laboratory methods to be employed, and any specialized studies that will be conducted, as part of the data recovery effort. These methods will likely include controlled volume archaeological excavations and artifact/feature analyses. The latter will be dependent on the specific archaeological material encountered but will likely include osteological analyses, faunal analyses, flaked-stone and ground-stone analyses, and radiocarbon dating, among others.
- **Protocols for Native American Monitoring and Input**: The ARDRTP shall outline the role and responsibilities of Native American Tribal representatives. It shall include communication protocols and an opportunity and timelines for review of the

ARDRR. The ARDRTP shall include provisions for full-time Native American monitoring during field work (see **Mitigation Measure CUL-2**).

- **Cultural Resources Monitoring Plan**: The Cultural Resources Monitoring Plan shall outline the archaeological and Native American monitors responsibilities and requirements, communications protocol, treatment protocol, and reporting requirements (see **Mitigation Measure CUL-2**).
- **Security Measures**: The ARDRTP shall include recommended security measures to protect P-41-000152 from vandalism, looting, and non-intentionally damaging activities during field work.
- **Procedures for Treatment of Human Remains and Associated Funerary Objects**: The ARDRTP shall outline the protocols and procedures to be followed for treatment of human remains and associated funerary objects. These shall include stop-work and protective measures, notification protocols, and compliance with HSC Section 7050.5, and PRC Section 5097.98.
- **Curation Requirements**: The ARDRTP shall stipulate the protocol and specifics for curation of archaeological materials. Disposition of Native American archaeological materials and human remains shall be determined through consultation between the qualified archaeologist, Muwekma, and the City. Any significant non-indigenous archaeological materials shall be curated at a repository accredited by the American Association of Museums that meets the standards outlined in Code of Federal Regulations Title 36 Section 79.9. If no accredited repository accepts the collection, then it may be curated at a non-accredited repository as long as it meets the minimum standards set forth by 36 Code of Federal Regulations Section 79.9. If neither an accredited nor a non-accredited repository accepts the collection, then it may be offered to a public, non-profit institution with a research interest in the materials, or donated to a local school or historical society in the area for educational purposes, to be determined by the qualified archaeologist in consultation with Muwekma and the City.
- **Reporting Requirements**: Upon completion of data recovery for P-41-000152, the qualified archaeologist shall document the findings in an Archaeological Resources Data Recovery Report (ARDRR), whose development shall include participation and approval by Muwekma. The draft ARDRR shall be submitted to the City within 360 calendar days after completion of the data recovery, including laboratory analysis, and the final ARDRR shall be submitted to the City within 60 days after the receipt of City comments. The ARDRR shall meet the Secretary of the Interior's Standards for archaeological technical reporting and shall be submitted to the Northwest Information Center upon approval by the City unless the document contains information that any California Native American Tribes involved in its development determine should not be filed with the Northwest Information Center, in which case the report shall be submitted to the California Native American Heritage Commission.

Mitigation Measure CUL-2: Development and Implementation of a Cultural Resources Monitoring Plan

A qualified archaeologist, defined as one meeting the Secretary of the Interior's Professional Qualifications Standards for Archeology and with experience in California archaeology, in coordination with the Muwekma Ohlone Tribe of the San Francisco Bay Area (Muwekma) and the City, shall prepare and implement a Cultural Resources

Monitoring Plan (CRMP) based on the final approved Project design. The CRMP shall be a component of the Archaeological Resources Data Recovery and Treatment Plan (see **Mitigation Measure CUL-1**), which shall be approved by the City at least 60 days prior to Project construction. The CRMP shall include:

- **Provisions for Archaeological Monitoring**: The CRMP shall outline the archaeological monitor(s) responsibilities and requirements.
- **Provisions for Native American Monitoring and Input**: The CRMP shall outline the Native American monitor(s) responsibilities and requirements. The CRMP shall include provisions for full-time Native American monitoring during field work (see Mitigation Measure CUL-1).
- **Procedures for Discovery of Archaeological Resources**: Procedures to be implemented in the event of an archaeological discovery (outside of data recovery; see **Mitigation Measure CUL-1**) shall be fully defined in the CRMP, and shall include stop-work and protective measures, notification protocols, procedures for significance assessments, and appropriate treatment measures.
- **Procedures for Discovery of Human Remains and Associated Funerary Objects**: The CRMP shall outline the protocols and procedures to be followed in the event that human remains and associated funerary objects are encountered during construction (outside of data recovery; see **Mitigation Measure CUL-1**). These shall include stop-work and protective measures, notification protocols, and compliance with California Health and Safety Code Section 7050.5 and PRC Section 5097.98.
- **Curation Requirements**: The CRMP shall stipulate the protocol and specifics for curation of archaeological materials in accordance with the ARDRTP (see **Mitigation Measure CUL-1**).
- **Reporting Requirements**: Upon completion of cultural resources monitoring, the qualified archaeologist shall document the findings in a Cultural Resources Monitoring Report (CRMR), whose development shall include participation and approval by Muwekma. The draft CRMR shall be submitted to the City within 360 calendar days after completion of the construction monitoring, and the final CRMR shall be submitted to the City within 60 days after the receipt of City comments. The CRMR shall meet the Secretary of the Interior's Standards for archaeological technical reporting and shall be submitted to the Northwest Information Center upon approval by the City unless the document contains information that any California Native American Tribes involved in its development determine should not be filed with the Northwest Information Center, in which case the report shall be submitted to the California Native American Heritage Commission.

Mitigation Measure CUL-3: Development and Implementation of a Cultural Resources Awareness and Sensitivity Training Program

A qualified archaeologist, defined as one meeting the Secretary of the Interior's Professional Qualifications Standards for Archeology and with experience in California archaeology, in coordination with the Muwekma Ohlone Tribe of the San Francisco Bay Area and the City, shall prepare and implement a Cultural Resources Awareness and Sensitivity Training Program (Program) for all construction and field workers involved in Project ground-disturbing activities. The Program shall include a presentation that covers, at a minimum, the types of cultural resources common to the area, regulatory protections for cultural resources, and the protocol for unanticipated discovery of archaeological resources and human remains (see **Mitigation Measures CUL-1 and CUL-2**). Personnel working in areas of Project ground-disturbing activities shall receive the training prior to working in these areas. Written materials associated with the Program shall be provided to Project personnel as appropriate. Documentation of the training attendance shall be maintained by the City.

Mitigation Measure CUL-4: Development and Installation of Public Informational Signage

A qualified archaeologist, defined as one meeting the Secretary of the Interior's Professional Qualifications Standards for Archeology and with experience in California archaeology, in coordination with the Muwekma Ohlone Tribe of the San Francisco Bay Area and the City, shall develop public informational signage with respect to P-41-000152 that shall: further educate the general public about the history and heritage of the California Native American Tribes that are culturally and geographically associated with the Project area; provide information about the ancestral San Francisco Bay Ohlone–speaking tribal groups that were brought under the sphere of influence of Missions San Francisco, Santa Clara, and San Jose; emphasize the ensuing adverse impacts to California Native Americans through the colonial eras of Spanish and American conquests and destruction; provide non-confidential information obtained through archaeological data recovery of P-41-000152 (see **Mitigation Measure CUL-1**); and provide a name for P-41-000152 in an Ohlone language. The City shall install, in coordination with the Muwekma and other California Native American Tribes, the signage at or near the Project area, if feasible.

Significance After Mitigation: Mitigation Measures CUL-1 to CUL-4 would be implemented to reduce the impacts of Project on archaeological resources, pursuant to CEQA *Guidelines* Section 15064.5, through development and implementation of an ARDRTP, CRMP, Cultural Resources Awareness and Sensitivity Training Program, and public informational signage, which, collectively, would require archaeological data recovery of portions of P-41-000152 in the Project area, cultural resources construction monitoring for the Project, cultural resources sensitivity training of Project construction personnel, implementation of unanticipated discovery protocol for archaeological resources, and public signage with information on P-41-000152 and the presence of California Native American Tribes in the area. These measures would reduce any potential impacts on archaeological resources resulting from the Project to a less-than-significant level by realizing the data potential of P-41-000152 for listing in the California Register under Criterion 4. Therefore, this impact would be reduced to a **less-than-significant level**.

Impact CUL-3: Disturb any human remains, including those interred outside of dedicated cemeteries. *(Less than Significant with Mitigation)*

Human remains interred outside of a dedicated cemetery have been identified in the Project area at indigenous archaeological resource P-41-000152. The Project would consist of a substantial amount of ground disturbance within P-41-000152, including throughout all depths where cultural material, including human remains, have been identified at the site to date. The following Project-related activities would involve this ground disturbance: construction of a below-ground stormwater storage facility under an existing parking lot; construction of a high flow diversion weir along the creek bank; construction of a sediment chamber between the creek and diversion weir; construction of concrete retaining walls along the creek adjacent to the sediment chamber; construction of a stone or concrete in-stream check structure across the creek near the sediment chamber; and installation of an outlet pipe at the creek downstream of the in-stream check structure. Project implementation, specifically excavation and grading activities, would unearth, expose, or disturb the previously recorded human remains in the Project area and have a high probability of unearthing, exposing, or disturbing previously unrecorded human remains in the Project area. In the event that Project construction activities do result in such disturbance of human remains, impacts on the human remains resulting from the Project would be significant. Implementation of **Mitigation Measures CUL-1** and **CUL-2** would reduce this impact to a **less-than-significant level** through adherence to State regulations regarding treatment of human remains and coordination with Native American representatives, in the case of any potential indigenous human remains.

Mitigation: Mitigation Measures CUL-1 and CUL-2 (refer to Impact CUL-1)

Significance After Mitigation: Implementation of **Mitigation Measures CUL-1 and CUL-2** would be implemented to reduce the impacts of Project on human remains through development and implementation, in coordination with Muwekma, of an ARDRTP, CRMP, and Cultural Resources Awareness and Sensitivity Training Program, which, collectively, would require archaeological data recovery of portions of P-41-000152 in the Project area, cultural resources construction monitoring for the Project, cultural resources sensitivity training of Project construction personnel, and implementation of unanticipated discovery protocol for human remains, pursuant to State law and other Project-specific measures developed by the City and Muwekma. These measures would reduce any potential impacts on human remains resulting from the Project to a less-than-significant level because the ARDRTP would outline the protocols and procedures to be followed for treatment of human remains and associated funerary objects, and would include stop-work and protective measures, notification protocols, and compliance with HSC Section 7050.5, PRC Section 5097.98. Therefore, this impact would be reduced to a **less-than-significant level**.

Cumulative Impacts

Impact C-CUL-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse cumulative cultural resources impacts. (*Less than Significant with Mitigation*)

The geographic scope for cumulative effects on historical resources, archaeological resources, and human remains consists of the Project area. The cumulative analysis evaluates historical resources, archeological resources, and human remains as a single, nonrenewable resource base. It considers the additive effect of potential Project impacts on architectural resources or archaeological resources that qualify as historical resources (as defined in CEQA *Guidelines* Section 15064.5) and human remains. The Project would result in a cumulatively considerable (significant) impact if Project impacts after mitigation, combined with the impacts of one or more cumulative projects, were to cause a substantial adverse effect on the same cultural resource. Continued development in the region runs the inherent risk of damaging or destroying unknown significant cultural resources that could yield information important to history or prehistory or unearthing previously unidentified human remains, resulting in a significant cumulative impact. Construction and operation of the projects listed in Table 3.1-1 would introduce new structures and features and/or modified operations that could potentially impact architectural resources that qualify as historical resources and/or archaeological resources, as defined in CEQA *Guidelines* Section 15064.5, or disturb or damage any human remains. This could result in a potentially cumulatively significant impact.

Federal, state, and local laws protect archaeological resources in most instances. Even so, it is not always feasible to entirely avoid archaeological sites or retain them *in situ*. Because all significant cultural resources are unique and nonrenewable members of finite classes, any adverse effects or negative impacts erode a dwindling resource base.

No known historical resources would be impacted by the Project; therefore, the Project would not result in impacts on any historical resources and any cumulative impacts resulting from the Project would be less than significant. Project construction would result in a significant impact on archaeological resources and human remains from partial or complete destruction of indigenous archaeological resource P-41-000152, resulting in a considerable contribution to a potentially significant cumulative impact on archaeological resources and human remains. Implementation of **Mitigation Measures CUL-1** to **CUL-4** would reduce Project impacts on archaeological resources and human remains, pursuant to CEQA *Guidelines* Section 15064.5. Therefore, implementing these mitigation measures would reduce the contribution of the Project to cumulative impacts on archaeological resources and human remains to less than cumulatively considerable, and this cumulative impact would be **less than significant**.

> **Mitigation: Mitigation Measures CUL-1, CUL-2, CUL-3, and CUL-4** (refer to Impact CUL-1)

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3.5 Hydrology and Water Quality

This section presents an analysis of potential impacts related to hydrology and water quality that would result from implementation of the proposed Twin Pines Park Stormwater Detention Basin Project (Project).

3.5.1 Environmental Setting

Belmont Creek consists of both natural and urbanized creek reaches that drain an approximately 1,900-acre watershed from west to east on the eastern side of the Coast Ranges on the San Francisco Peninsula. The headwaters of Belmont Creek are at an elevation of 700 feet on Pulgas Ridge, east of Interstate 280. Belmont Creek drains to south San Francisco Bay through O'Neill and Belmont sloughs, and ultimately to the San Francisco Bay. Land uses in the watershed include open space and parks, residential, commercial/office, and industrial. Lands in the Belmont Creek watershed are incorporated into the cities of Belmont and San Carlos, or are part of unincorporated San Mateo County.

The Belmont area has a Mediterranean climate, with moderate to warm summers and mild winters. The average daily maximum temperature in September, the warmest month, is about 78 degrees Fahrenheit, and the average minimum temperature in January, the coolest month, is about 42 degrees. The area receives an average of 18 to 19 inches of rainfall annually, primarily during winter and spring (City of Belmont, 2017a).

Water Quality

Stormwater runoff from urban and developed land uses, such as those in the Belmont Creek watershed, can contain various pollutants that affect water quality, including heavy metals, excessive sediment, petroleum hydrocarbons, pesticides, trash, and excessive nutrient loads. Water quality in the nation's waters, including Belmont Creek, is regulated under the Clean Water Act (CWA) of 1977, which seeks to restore and maintain the chemical, physical, and biological integrity of the nation's waters by implementing water quality regulations. Multiple sections of the CWA apply to activities near or within surface or groundwater. Consistent with Section 402 of the CWA, and pursuant to authority delegated to the California State Water Resources Control Board (State Water Board) and the associated regional water boards, each incorporated city and town in the county and the County of San Mateo share a common National Pollutant Discharge Elimination System (NPDES) stormwater permit for Bay Area municipalities referred to as the Municipal Regional Permit (MRP). The MRP was first adopted by the San Francisco Bay Regional Water Quality Control Board (RWQCB) on October 14, 2009, as Order R2-2009-0074. The MRP was reissued in 2015 as MRP 2 and again in May 2022, effective July 1, 2023, as MRP 3 (Order R2-2022-0018). MRP 3 was amended in October 2023 and is comprised of Orders R2-2022-0018 and R2-2023-0019 (San Francisco Bay RWQCB, 2023a).

Section 303(d) of the CWA requires that each state identify water bodies or segments of water bodies that are *impaired* (i.e., do not meet one or more of the water quality standards established by the state, even after point sources of pollution have been equipped with the minimum required levels of pollution control technology). Belmont Creek is not listed on the 303(d) list of impaired water bodies.

Water quality in Belmont Creek is also regulated under the State of California’s Porter-Cologne Water Quality Control Act (Porter-Cologne Act), which provides the basis for water quality regulation in California and assigns primary responsibility for the protection and enhancement of water quality to the State Water Board and the nine regional water boards. The Porter-Cologne Act allows the State Water Board to adopt statewide water quality control plans and the regional water boards to adopt basin plans, which serve as the legal, technical, and programmatic basis of water quality regulation statewide or for a particular region. These plans limit impacts on water quality from a variety of sources. The *San Francisco Bay Basin Water Quality Control Plan* (Basin Plan) is the master policy document that contains descriptions of the legal, technical, and programmatic bases of water quality regulation in the San Francisco Bay region. The Basin Plan includes a statement of beneficial water uses that the San Francisco Bay RWQCB will protect, the water quality objectives needed to protect the designated beneficial water uses, and the strategies and time schedules for achieving the water quality objectives. Beneficial uses for Belmont Creek identified in the Basin Plan are warm freshwater habitat, wildlife habitat, water contact recreation, and noncontact water recreation (San Francisco Bay RWQCB, 2023b).

Geomorphology

Belmont Creek drains the eastern side of the coast ranges, near the San Andreas Fault zone. Movement along the San Andreas Fault crushes rock and causes uplift of the surrounding mountains; both processes contribute to natural erosion. Patterns of erosion and sediment deposition in Belmont Creek vary through the watershed and are influenced by geology and hydrology as well as land development.

Soils in the upstream area of the watershed are erosive and could contribute substantially to sedimentation downstream (Wood Rogers, 2023). The natural reaches of Belmont Creek have vegetated channel banks, but in developed areas, the channel banks of Belmont Creek can include rock lining, concrete-rubble lining, concrete lining, and concrete culverts (County of San Mateo et al., 2019). These factors, along with other hardscaping and channel straightening, have resulted in new areas of erosion and instability. Portions of the channel have been progressively narrowed by sediment deposition, while other areas without bank protection have widened significantly. Channel velocities during more intense storm events have increased, leading to erosion of the un-vegetated stream banks (Wood Rogers, 2023). It is likely that sediment is transported in pulses during higher flow events when the creek has sufficient energy to cause bed and bank erosion, as well as sufficient transport capacity to move the sediment to downstream reaches (County of San Mateo et al., 2019). Within the Project reach of Belmont Creek, sand is transported in suspension and as bed load, and gravel is transported as bed load (Wood Rogers, 2023).

The Project area includes a portion of Belmont Creek at the eastern end of Twin Pines Park. Within the park, Belmont Creek is an incised channel approximately 12 to 25 feet deep, and is hydraulically disconnected from its historical floodplain (e.g., high magnitude flows are conveyed within the active channel; Wood Rogers, 2023). Portions of the reach are armored to prevent bank failure (County of San Mateo et al., 2019). While the creek incision and associated bank failure in this area may be achieving stability, some additional bank failure and associated delivery of sediment could occur in the future (County of San Mateo et al., 2019). Previous studies identified restoration activities within Twin Pines Park to widen the existing top of bank to form terrace features that would create a stable slope and reduce the risk of slope failure and sediment deposition (County of San Mateo et al., 2019). As described in Chapter 2, Section 2.7, restoration activities including widening of the top of bank are proposed as part of a separate project. Approximately 200 feet downstream of the Project area, near the intersection of 6th Avenue and O'Neill Avenue, Belmont Creek enters an approximately 1,100-foot-long underground culvert (County of San Mateo et al., 2019).

Flooding

Floodplains are areas of land located adjacent to rivers or streams that are subject to recurring inundation or flooding. Floods are typically described in terms of their statistical frequency. For example, a 100-year floodplain describes an area within which there is a one percent probability of a flood occurring in any given year. The Federal Emergency Management Agency (FEMA) prepares Flood Insurance Rate Maps, which identify 100-year and 500-year flood zones. The portion of Belmont Creek within the Project site is mapped within the 1 percent annual chance flood hazard zone by FEMA (FEMA, 2019). Regional flooding in the watershed historically occurs downstream of El Camino Real, where the creek enters the flat, tidally influenced, Harbor/Industrial Area before discharging into Belmont Slough (Wood Rogers, 2023). The Project site is not within a tsunami or seiche hazard zone (CGS, 2023).

Similar to many creeks around San Francisco Bay, urbanization of the watershed, including significant rerouting of the creek into culvert pipe networks, channelizing, straightening, and relocating the creek; increasing the impervious area; and installing infrastructure associated with urbanization continue to impede stream channel function (County of San Mateo et al., 2019). One result of these alterations is an increase in frequency and severity of flooding in the lower reaches of Belmont Creek east of El Camino Real. This flooding is caused by channels having insufficient conveyance capacity that is exacerbated by sediment deposition, overgrown vegetation, and high tides (Wood Rogers, 2023). The downstream portion of the creek was designed to convey a 10-year storm. However, because eroded soil and debris are deposited downstream, more frequent events currently exceed the capacity of the system downstream (Wood Rogers, 2023).

In efforts to reduce flooding, Lower Belmont Creek has been dredged at least nine times over the last two decades to retain flood conveyance capacity (in 2005, 2006, 2012, 2013, 2014, 2015, 2017, 2020, and 2021; Wood Rogers, 2023).

Groundwater

Groundwater consists of water within underground aquifers that is recharged from the land surface. The San Francisco Bay Hydrologic Region includes 47 groundwater basins and subbasins. The Project is in the Santa Clara Valley Groundwater Basin, San Mateo Plain Subbasin, identified as Basin 2-09.03. The San Mateo Plain Subbasin covers 37,708 acres from the Santa Cruz Mountains on the west to San Francisco Bay on the east (County of San Mateo, 2018). A portion of the San Mateo Plain Subbasin underlies Belmont Creek. Approximately

2,300 acre-feet per year are pumped from the San Mateo Plain Subbasin, primarily for small public water systems and irrigation (County of San Mateo, 2018). The nearest known public water supply well is over 1 mile south of the Project site (County of San Mateo, 2018). The San Mateo Plain Subbasin is designated as a very-low-priority groundwater basin. A groundwater sustainability agency has not yet been designated for the San Mateo Plain Subbasin, and no groundwater sustainability plan has been developed for the subbasin (DWR, 2022).

The overall groundwater storage capacity and storage levels are currently unknown. The Santa Clara Formation of Plio-Pleistocene age and Quaternary age alluvial deposits are the water-bearing formations in the subbasin (City of Belmont, 2017a). Inflows and outflows of groundwater in the San Mateo Plain Subbasin average approximately 7,900 acre-feet per year under current land and water use conditions. The largest sources of recharge are deep percolation of rain and applied irrigation water in irrigated areas, deep percolation of rain in non-irrigated areas, percolation from creeks, and water pipe leaks. The largest outflows are groundwater seepage to creek and tidal wetlands, groundwater pumping for water supply, groundwater infiltration into sewers, and dewatering pumping. Inflows and outflows of groundwater are approximately balanced in the San Mateo Subbasin (County of San Mateo, 2018). Some private residences in Belmont may have private wells, which are addressed in Section 26 of the Belmont Municipal Code (City of Belmont, 2017b).

3.5.2 Regulatory Framework

Federal

Federal Clean Water Act

The U.S. Environmental Protection Agency (EPA) is the lead federal agency responsible for managing water quality. The CWA of 1972 is the primary federal law that governs and authorizes the EPA to implement activities to control water quality. The EPA has delegated to the State of California the authority to implement and oversee most of the programs authorized or adopted for CWA compliance, through the State's Porter-Cologne Act.

National Flood Insurance Program

The U.S. Congress established the National Flood Insurance Program (NFIP) with the passage of the National Flood Insurance Act of 1968. The NFIP, administered by FEMA, is a federal program for property owners in NFIP-participating communities to purchase insurance as a protection against flood losses in exchange for state and community adoption and implementation of land use criteria that reduce future flood damages. Participation in the NFIP is based on an agreement between communities and the federal government. If a community adopts and enforces a FEMA-approved floodplain management ordinance to reduce future flood risk to new construction in regulated floodplains, the federal government will make flood insurance available to individuals within the community as financial protection against flood losses. This insurance is designed to provide a financial alternative and reduce the escalating costs of federal disaster assistance for flood-damaged buildings and their contents.

The Federal Insurance and Mitigation Administration, a part of FEMA, manages the NFIP. In addition to providing flood insurance and reducing flood damages through floodplain management regulations, the NFIP identifies and maps the nation's regulated floodplains. FEMA's Flood Insurance Rate Maps or Flood Hazard Boundary Maps show flood hazard areas and provide flood zone designations according to varying levels of flood risk for geographic areas within a community. Flood hazard areas that are shown on the Flood Insurance Rate Map are identified as Special Flood Hazard Areas, defined as the areas that will be inundated by a flood event having a 1 percent chance of being equaled or exceeded in any given year. The 1 percent annual chance flood also is referred to as the base flood or 100-year flood. Moderate flood hazard areas are the areas between the limits of the base flood and the 0.2 percent annual chance (or 500-year) flood. The areas of minimal flood hazard are the areas outside a Special Flood Hazard Area and higher than the elevation of the 0.2 percent annual chance flood.

State

Porter-Cologne Water Quality Control Act (Section 402)

The State Water Board and regional water boards regulate discharges of waste into waters of the United States through NPDES permits, authorized under Section 402 of the CWA, and regulate discharges of waste into waters of the State through waste discharge requirements (WDRs) authorized under the Porter-Cologne Act. RWQCB issues NPDES permits and WDRs so that projects that may discharge wastes to land or waters conform to the regional water quality objectives, policies, and procedures of the applicable water quality control plans (basin plans). The act defines waters of the State as "any surface water or ground water, including saline waters, within the boundaries of the state."

NPDES permits require submittal of a notice of intent to discharge to the RWQCB and implementation of best management practices (BMPs) to minimize those discharges. The RWQCB also may issue site-specific WDRs or waivers to WDRs for certain waste discharges to land or waters of the State.

California State Antidegradation Policy

In 1968, as required under the Federal Antidegradation Policy, the State Water Board adopted an antidegradation policy aimed at maintaining high quality waters in California under Resolution No. 68-16. The California Antidegradation Policy applies to high quality (i.e., tier 2) surface and ground waters only, and states that the disposal of wastes into State waters are to be regulated to achieve the highest water quality consistent with maximum benefit to the people of the State and to promote the peace, health, safety, and welfare of the people of the State. The policy includes the following provisions:

- Where the existing quality of water is better than required under existing water quality control plans, such quality would be maintained until it has been demonstrated that any change would be consistent with maximum benefit to the people of the State and would not unreasonably affect present and anticipated beneficial uses of such water.
- Any activity which produces waste or increases the volume or concentration of waste and which discharges to existing high-quality waters would be required to meet WDRs discharge requirements, which would ensure (1) pollution or nuisance would not occur and (2) the highest water quality consistent with the maximum benefit to the people of the State would be maintained.

Cobey-Alquist Floodplain Management Act

The Cobey-Alquist Floodplain Management Act (California Water Code 8400-8415) and Executive Order B-39-77 give support to the NFIP. The Act encourages local governments to plan, adopt, and enforce land use regulations for floodplain management to protect people and property from flooding hazards. The Act also identifies requirements that jurisdictions must meet to receive State financial assistance for flood control. In 2002, the California Floodplain Management Task Force created and recommended a proposed revised Executive Order for the State's consideration.

California Water Code and Regional Water Quality Control Boards

The California Water Code established the State Water Board and the RWQCBs as the principal State agencies having primary responsibility in coordinating and controlling water quality in California. The Code establishes the responsibility of the RWQCBs for adopting, implementing, and enforcing water quality control plans (i.e. Basin Plans), which set forth the State's water quality standards (i.e. beneficial uses of surface waters and groundwater) and the objectives or criteria necessary to protect those beneficial uses. The Planning Area lies within the jurisdiction of the San Francisco Bay RWQCB, which has adopted the Basin Plan for the San Francisco Bay Region, including the San Francisco Bay Estuary, to implement plans, policies, and provisions for water quality management.

California Department of Public Health

The Drinking Water Program, which regulates public water supply systems, is a major component of the State Department of Public Health Division of Drinking Water and Environmental Management. Regulatory responsibilities include the enforcement of the federal and State Safe Drinking Water Acts, the regulatory oversight of public water systems, issuance of water treatment permits, and certification of drinking water treatment and distribution operators. State regulations for potable water are contained primarily within the Food and Agricultural Code, the Government Code, the Health and Safety Code, the Public Resources Code, and the Water Code. Regulations are from Title 17 and Title 22 of the California Code of Regulations.

The regulations governing recycled water are found in a combination of sources including the Health and Safety Code, Water Code, and Titles 22 and 17 of the California Code of Regulations. Issues related to treatment and distribution of recycled water are generally under the influence of the RWQCB, while issues related to use and quality of recycled water are the responsibility of the California Department of Public Health.

State Water Quality Certification Program

The RWQCBs also coordinate the State Water Quality Certification Program, or Section 401 of the CWA. Under Section 401, states have the authority to review any permit or license that will result in a discharge or disruption to wetlands and other waters under state jurisdiction, to ensure that the actions will be consistent with the state's water quality requirements. This program is most often associated with Section 404 of the CWA, which obligates the U.S. Army Corps of Engineers to issue permits for the movement of dredge and fill material into and from the "waters of the United States." Additionally, Section 404 requires permits for activities affecting wetlands.

Prospective construction-related alteration of hydrologic features such as wetlands, rivers, and ephemeral creek beds requires Section 404 permits.

California Construction Stormwater General Permit

The California Construction Stormwater General Permit (CGP)[1], adopted by the State Water Board, regulates construction activities that include clearing, grading, and excavation resulting in soil disturbance of at least 1 acre of total land area (from either the project site or sites that are part of a common plan of development that would disturb more than 1 acre of land). The CGP authorizes and regulates the discharge of stormwater to surface waters (waters of the United States and State) from construction activities. It prohibits the discharge of materials other than stormwater and authorized non-stormwater discharges and all discharges that contain a hazardous substance in excess of reportable quantities established at 40 Code of Federal Regulations 117.3 or 40 Code of Federal Regulations 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

The CGP requires that all developers of land where construction activities will occur over more than 1 acre do the following:

- Complete a Risk Assessment to determine pollution prevention requirements pursuant to the three Risk Levels established in the General Permit;
- Eliminate or reduce non-stormwater discharges to storm sewer systems and other waters of the Nation;
- Develop and implement a Stormwater Pollution Prevention Plan (SWPPP), which specifies BMPs that will reduce pollution in stormwater discharges to the Best Available Technology Economically Achievable/Best Conventional Pollutant Control Technology standards; and
- Perform inspections and maintenance of all BMPs.

Typical BMPs contained in SWPPPs are designed to minimize erosion during construction, stabilize construction areas, control sediment, control pollutants from construction materials, and address post-construction runoff quantity (volume) and quality (treatment). The SWPPP must also include a discussion of the program to inspect and maintain all BMPs.

Local

Refer to **Table 3.5-1** for goals, actions, and policies from the City of Belmont's 2035 General Plan Conservation Element that relate to hydrology and water quality.

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[1] General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, Order No. 2009-0009-DWQ, as amended by Order No. 2010-0014-DWQ, National Pollutant Discharge Elimination System No. CAS000002.

TABLE 3.5-1
HYDROLOGY AND WATER QUALITY–RELATED POLICIES IN LOCAL GENERAL PLAN

City of Belmont 2035 General Plan
Goal 5.4 Preserve and restore Belmont’s waterways and adjacent corridors as valuable community resources that serve as plant and wildlife habitats, groundwater recharge facilities, flood control and irrigation components, and connections between open space areas.
Policy 5.4-1 Restore Belmont Creek to enhance ecological functions, biological resources, hydrology function, and flood control.
Action 5.4-1a Continue to work in collaboration with the Department of Fish and Wildlife, U.S. Army Corp[s] of Engineers, the San Francisco Bay Regional Water Quality Control Board, the cities of San Carlos and Redwood City, San Mateo County, Caltrans, and other entities as needed, to identify and implement a long-term approach to address ongoing maintenance and creek improvements.
Action 5.4-1b Consider implementing potential improvements to Belmont Creek as is feasible and appropriate, including but not limited to projects such as enlarging the bypass culvert on Harbor Boulevard; restoring the floodplain at Twin Pines Park without reducing existing park uses; constructing an off-line basin; building flood walls through lower Belmont Creek; daylighting sections of the eastern portion of the creek; improving the operations and design of Water Dog Lake; or installing tide gates at Marine Parkway.
Policy 5.4-2 Preserve, where possible, natural watercourses or provide naturalized drainage channels within the city. Where necessary and feasible, implement restoration and rehabilitation measures.
Policy 5.4-3 Protect, restore, and enhance a continuous corridor of native riparian vegetation and wildlife habitat along Belmont’s waterways, water bodies, and wetlands.
Policy 5.4-4 Preserve and enhance the natural riparian environment along waterway corridors, including Belmont Creek, by minimizing environmental and visual impacts. *See also Policy 4.5-2 in the Parks, Recreation, and Open Space Element.*
Action 5.4-4a Establish design and development standards for new development near waterway corridors to preserve and enhance the natural riparian environment along these corridors and ensure that building and vehicle service areas, loading docks, trash enclosures, and storage areas are set back from waterways and/or screened from view from the Belmont Creek corridor to minimize environmental and visual impacts.
Goal5.5 Preserve water quality by promoting the protection of Belmont’s creeks and other natural water bodies from pollution.
Policy 5.5-1 Continue to participate in the San Mateo Countywide Water Pollution Prevention Program.
Policy 5.5-3 Require development projects to incorporate structural and non-structural best management practices (BMPs) to mitigate or reduce the projected increases in pollutant loads, in accordance with the NPDES permit guidelines.
Policy 5.5-4 Ensure that the design and construction of new infrastructure elements does not contribute to stream bank or hillside erosion or creek or wetland siltation, and incorporates site design and source control BMPs, construction phase BMPs, and treatment control BMPs to minimize impacts to water quality.
Policy 5.5-5 Implement water pollution prevention methods to the maximum extent practicable, supplemented by pollutant source controls and treatment.
Sources: City of Belmont, 2017a

3.5.3 Impacts and Mitigation Measures

Significance Criteria

In accordance with CEQA and the CEQA *Guidelines* (including Appendix G); relevant plans, policies, and/or guidelines; and agency standards, the Project could have a significant impact if it were to:

- Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?

- Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:
  - Result in substantial erosion or siltation on- or off-site;
  - Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;
  - Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or
  - Impede or redirect flood flows?
- In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?
- Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Methodology

To evaluate whether Project implementation could result in violations of water quality standards or waste discharge requirements, increase the risk of releasing pollutants, or otherwise degrade water quality (i.e., Impacts HYD-1, HYD-7, and HYD-8), the analysis first identifies activities that could release water pollutants. The analysis then considers whether, with existing regulatory requirements, such activities could exceed established water quality objectives or otherwise degrade water quality and thus result in significant impacts.

Impacts of changes in surface water hydrology were evaluated by using hydrologic and hydraulic modeling conducted by Wood Rodgers (2023) to assess the extent to which the Project could alter the locations, seasonality, or magnitude of surface water discharge and sedimentation or erosion in the watershed (i.e., Impacts HYD-3, HYD-4, HYD-5 and HYD-6).

To evaluate the effects of the project on groundwater, the analysis considers whether the project could permanently increase groundwater extraction or increase the impervious area overlying the groundwater subbasin (HYD-2).

Impacts and Mitigation Measures

Table 3.5-2 summarizes the impact conclusions presented in this section.

TABLE 3.5-2
HYDROLOGY AND WATER QUALITY IMPACT CONCLUSIONS

Impact	Level of Significance
Impact HYD-1: Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality	LTSM
Impact HYD-2: Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin	LTS
Impact HYD-3: Result in substantial erosion or siltation on- or off-site	LTSM
Impact HYD-4: Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite	LTS
Impact HYD-5: Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff	LTS
Impact HYD-6: Impede or redirect flood flows	LTS
Impact HYD-7: In flood hazard, tsunami, or seiche zones, risk release of pollutants due to Project inundation	LTS
Impact HYD-8: Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan	LTSM

NOTES:
LTS = less than significant, LTSM = less than significant with mitigation

Impact HYD-1: Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality. *(Less than Significant with Mitigation)*

The Project would construct a stormwater storage facility, a sediment chamber, and associated bank stabilization in and adjacent to Belmont Creek, which drains to Belmont Slough and San Francisco Bay. As discussed above, Belmont Creek is not listed as an impaired waterbody. However, urban runoff contributes substantial quantities of total suspended solids, heavy metals, petroleum hydrocarbons, and other pollutants to waters of the region. The Basin Plan identifies warm freshwater habitat, wildlife habitat, contact water creation, and noncontact water recreation as beneficial uses of Belmont Creek.

Construction

Construction activities would require excavation and grading within and north of Belmont Creek and would result in more than one acre of ground disturbance within the Project site. Without proper controls, grading and ground disturbance could release sediment and other pollutants into Belmont Creek and downstream waterbodies that could adversely affect beneficial uses. Construction equipment and activities, if not properly managed, could also release pollutants such as fuels and grease into Belmont Creek.

For work areas that are not in water, the City of Belmont (the City) must obtain coverage under the NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Order 2022-0057-DWQ, NPDES No. CAS000002), also referred to as the CGP. As indicated in Section 3.5.2, the CGP regulates discharges of pollutants in stormwater associated with construction activities that would disturb one or more acres of land and mandates the development and implementation of a SWPPP. The SWPPP would be prepared by a Qualified SWPPP Developer and, along with the required permit registration documents, would be submitted electronically to the State Water Board before Project implementation. The SWPPP would include standard BMPs required for all projects and any additional measures determined necessary by the Qualified SWPPP Developer to control stormwater run-on/runoff and avoid water quality effects during construction. (Examples of such measures include using check dams and fiber rolls to reduce erosion on slopes and retain sediment in stormwater.) Good housekeeping and equipment operation/maintenance BMPs required as part of CGP compliance would avoid the release of potential pollutants to groundwater from upland construction activities. Implementation of the BMPs required under the CGP would therefore reduce the risk of releasing water quality pollutants during Project construction.

If water is present in Belmont Creek during construction of the sediment detention basin or during bank stabilization activities, concrete used for the sediment detention basin or excavation and equipment access associated with bank stabilization could release pollutants directly into Belmont Creek and degrade water quality, resulting in a significant impact. In addition, if work areas must be isolated and dewatered, installation of coffer dams and dewatering without proper management could release pollutants into Belmont Creek. Implementation of **Mitigation Measure HYD-1, In-Water Construction Measures**, would reduce potential impacts by requiring the City to develop and implement a dewatering plan for in-water concrete use and dewatering. With implementation of Mitigation Measure HYD-1, water quality impacts of Project construction would be **less than significant with mitigation**.

Operation

Under the MRP, uncovered parking lots that are stand-alone or part of any other development project, and that create and/or replace 5,000 square feet or more of impervious surface, are considered “Regulated Projects” that are required to implement low-impact development techniques to address both soluble and insoluble stormwater runoff pollutant discharges and prevent increases in runoff flows from these projects. Low-impact development treatment measures treat stormwater using harvesting and reuse, infiltration, evapotranspiration, or biotreatment methods. As noted in Chapter 2, *Project Description*, the restored parking lot would include permeable pavement that would filter stormwater into the ground.

As indicated in Section 2.6, *Project Operations and Maintenance*, maintenance would include periodic sediment removal from the sediment chamber during the dry season to maintain capacity; this has the potential to discharge sediment into surrounding waters. Routine sediment clearing may require permits which would regulate the release of pollutants. Removed sediment would be hauled to a site within San Mateo County for beneficial reuse or to Ox Mountain Landfill.

The City would be required to develop and implement low-impact development treatment measures for the Project consistent with the requirements of the MRP. Implementation of these measures would reduce the risk of releasing pollutants into stormwater or groundwater during Project operation. Therefore, Project operation would not violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality, a **less-than-significant impact**.

Mitigation Measure HYD-1: In-Water Construction Measures

To the extent feasible, work below top of bank in Belmont Creek shall be completed during the dry season and when the channel is dry or contains little water. If construction activities must occur in the wetted channel of Belmont Creek, the City shall develop an in-water construction plan consisting of measures that reduce or avoid the release of pollutants into Belmont Creek. The City shall implement the in-water construction plan for the duration of construction activities in Belmont Creek. The in-water construction plan shall include, but not be limited to, the following types of measures:

- *In-Water Concrete Use Measures*. Where possible, poured concrete shall be excluded from contact with surface or groundwater during initial curing. During that time, runoff from the concrete shall not be allowed to enter surface or groundwater. If this is not feasible, commercial sealants that are non-toxic to aquatic life shall be applied before poured concrete comes into contact with flowing water.
- *Cofferdam Construction Measures*. Construction of cofferdams shall begin in the upstream area and continue in a downstream direction, allowing water to drain from the area being isolated by the cofferdam prior to closure. Cofferdams and stream diversion systems shall remain in place and be fully functional throughout the construction period. Stream diversions shall be limited to the shortest duration necessary to complete in-water work. In-water cofferdams shall be built in a manner that minimizes siltation and/or turbidity. Where possible, cofferdams shall be pushed into place. When appropriate, cofferdams shall be removed so surface elevations of water impounded above the cofferdam shall not be reduced at a rate greater than one inch per hour. All dewatering/diversion facilities shall be installed such that natural flow is maintained upstream and downstream of Project areas.
- *Dewatering Plan*. If dewatering is required to create a dry work area, the area to be dewatered shall encompass the minimum area and be in place for the minimum amount of time necessary to perform construction activities. The City shall prepare a dewatering plan with a description of the proposed dewatering structures and appropriate types of best management practices for the installation, operation, maintenance, and removal of those structures. The best management practices shall be selected to allow water to flow through or around the dewatered area while avoiding increased stream velocity and preventing scour or turbidity during dewatering and bypass. Water pumped or removed from dewatered areas shall be conveyed in a manner that does not contribute turbidity to nearby receiving waters. If dewatering pumps are required, pumps shall be refueled in an area well away from the stream channel.

  Upon completion of construction activities, any diversions or barriers to flow shall be removed in a manner that will allow flow to resume with the least disturbance to the channel bed and banks to avoid creating turbidity.

- *In-Water Pile Driving Measures*. If in-water pile driving is required, caissons or a continuous length of silt curtain shall be implemented surrounding the pile driving area to provide sediment containment and avoid the release of turbid water during pile driving. The silt curtain will restrict the surface visible turbidity plume to the area of pile construction and will control and contain the migration of re-suspended sediments at the water surface and at depth.

- *Bank Stabilization Materials Placement Measures*. Material used for bank stabilization or in-water restoration will minimize discharges of sediment or other forms of waste. Equipment shall not operate in standing or flowing waters. All materials placed in Belmont Creek shall be nontoxic.

Significance After Mitigation: Implementation of **Mitigation Measure HYD-1** would require construction contractors to complete work below the top of bank in Belmont Creek during the dry season. If construction activities must occur in the wetted channel of Belmont Creek, an in-water construction plan will be developed and implemented to reduce or avoid the release of pollutants into Belmont Creek. Overall, with implementation of **Mitigation Measure HYD-1**, in addition to implementation of the required SWPPP BMPs, the Project would not violate water quality standards or waste discharge requirements, and this impact would be **less than significant with mitigation**.

Impact HYD-2: Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the Project may impede sustainable groundwater management of the basin. *(Less than Significant)*

The Project would create an underground stormwater storage facility beneath an existing impervious parking lot. During construction, groundwater could be temporarily pumped from the excavated area to create a dry work surface. Pumping groundwater during construction would be temporary and would be located over 1 mile from the nearest public water supply well, and therefore would not substantially decrease groundwater supplies. After construction is complete, the impervious parking lot would be replaced with permeable pavers; therefore, the Project would not interfere substantially with groundwater recharge because the amount of impervious area would decrease compared to existing conditions. For these reasons, the Project would not substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that sustainable management of the groundwater basin would be impeded, a **less-than-significant impact**.

Mitigation: None required.

Impact HYD-3: Result in substantial erosion or siltation on- or off-site. *(Less than Significant with Mitigation)*

The Project would alter the course of Belmont Creek such that water would pass through a sediment chamber and, during higher flows, fill the stormwater storage facility instead of flooding downstream areas. As described in Section 2.4.6, *Outlet Pipe*, water in the stormwater storage facility would be released over 72 hours through a new outlet pipeline that would discharge into Belmont Creek. Riprap would be placed in the creek at the downstream end of the outlet pipe to prevent scour. A new check structure across Belmont Creek would direct water and sediment into the sediment chamber inlet. The Project also includes construction of concrete retaining walls along the northern creek banks upstream and downstream of the sediment chamber and placement of bank stabilization along the southern bank in the same area.

Impacts associated with temporary changes in drainage patterns during construction activities are discussed in Impact HYD-1.

The Project components described above would capture sediment that currently flows downstream. The check structure and sediment chamber would slow and reduce the volume of sediment transported downstream from the Project site. The sediment chamber was designed to capture up to 60 percent of the estimated sand and gravel bed load during a frequent high flow event (1 year recurrence interval; Wood Rogers, 2023). Directly downstream of the Project site, there is less than 200 feet of open creek channel on privately owned land before the transition to an underground culvert at 6th Avenue and O’Neill Avenue. The Project would reduce the sediment load along the 200-foot-long reach of Belmont Creek, which could erode the unarmored banks downstream of the Project, resulting in a significant impact. Implementation of **Mitigation Measure HYD-2, Geomorphic Monitoring and Adaptive Management Plan**, would reduce the impact by monitoring the downstream reach for increased erosion due to Project operations and modifying Project operations to avoid further exacerbating erosion. With implementation of Mitigation Measure HYD-2, the Project would reduce the extent of erosion and sedimentation offsite, a **less-than-significant impact with mitigation.**

Mitigation Measure HYD-2: Geomorphic Monitoring and Adaptive Management Plan

Prior to Project construction, the City shall develop a geomorphic monitoring and adaptive management plan, which shall specify an approach to monitoring Belmont Creek for accelerated channel erosion between the outlet of the sediment chamber and the culvert at 6th Avenue and O’Neill Avenue. The City shall complete baseline monitoring as part of the geomorphic monitoring and adaptive management plan prior to Project construction.

Upon Project completion the City shall implement monitoring consistent with the geomorphic monitoring and adaptive management plan. If monitoring identifies accelerated channel erosion, at the end of the dry season the City shall place a portion of removed sediment from the sediment chamber on the toe of the creek bank at the downstream edge of the Project area near the outlet pipe to passively augment sediment in the downstream reach. The City shall conduct a sediment study to estimate the amount of sediment that should be placed to provide sufficient passive augmentation.

The City shall monitor the placed sediment and downstream reach to assess whether sediment placement has reduced channel erosion to rates similar to current conditions. If sediment placement has not reduced the channel erosion attributable to the Project, additional sediment placement would be required. The City shall review the geomorphic monitoring and adaptive management plan annually to ensure it has been implemented or revised appropriately. After three consecutive years without sediment augmentation during which channel erosion rates in the downstream reach are similar to pre-Project conditions, the City shall no longer monitor the downstream reach for Project-related erosion.

Significance After Mitigation: Implementation of **Mitigation Measure HYD-2** would require development of a geomorphic monitoring and adaptive management plan. Implementation of the plan would reduce the impact related to erosion by monitoring the downstream reach for increased erosion due to Project operations and modifying Project operations to avoid further exacerbating erosion. With implementation of Mitigation Measure HYD-2, the Project would reduce the extent of erosion and sedimentation offsite, and the impact would be reduced to **less-than-significant impact with mitigation**.

Impact HYD-4: Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site. (*Less than Significant*)

The Project is designed to capture stormwater to reduce flooding off-site and includes replacement of existing impervious surfaces (parking lot) and installation of bank stabilization in Belmont Creek. While the bank stabilization would slightly increase the amount of impervious area in the Belmont Creek watershed, the Project's function as a stormwater storage facility would offset any increase in runoff from the Project's increased impervious area. Therefore, the Project would not substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site, a **less-than-significant impact**.

Mitigation: None required.

Impact HYD-5: Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff. (*Less than Significant*)

The Project is designed to reduce the amount of runoff in Belmont Creek during high flow events and would not create new land uses that could provide sources of additional polluted runoff. The Project would replace the existing parking lot after construction. Therefore, the Project would not create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage system or provide substantial additional sources of polluted runoff, a **less-than-significant impact**.

Mitigation: None required.

Impact HYD-6: Impede or redirect flood flows. (*Less than Significant*)

As indicated in Section 3.5.1, the portion of Belmont Creek within the Project site is mapped within the 1 percent annual chance flood hazard zone by FEMA. However, regional flooding in the Belmont Creek watershed historically occurs downstream of El Camino Real where the creek becomes tidally influenced. The Project is designed to intentionally impede and redirect flood flows from Belmont Creek into the stormwater storage facility in a manner that would reduce flooding downstream. As shown in Table 2-1 (refer to Chapter 2, *Project Description*), the Project would reduce the total floodplain area in lower Belmont Creek by up to 12 acres compared to existing conditions. Therefore, while the Project would impede or redirect flood flows, by doing so the Project would reduce flooding and therefore would result in **less-than-significant impacts** related to this criterion.

Mitigation: None required.

Impact HYD-7: In flood hazard, tsunami, or seiche zones, risk release of pollutants due to Project inundation. (*Less than Significant*)

As indicated in Section 3.5.1, the Project site is not within a tsunami or seiche zone. The portion of Belmont Creek within the Project site is mapped within a flood hazard zone. However, during operations the Project would not store or use potential water quality pollutants within the area mapped as a flood hazard zone. Materials used for maintenance of the tilting weir gate and sump pump would not be stored within the flood hazard zone. The tilting weir gate and sump pump would operate using electrical power. Therefore, the Project would not increase the risk of releasing pollutants due to Project inundation, a **less-than-significant impact**.

Mitigation: None required.

Impact HYD-8: Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan. (*Less than Significant with Mitigation*)

As discussed in Impact HYD-1, Project construction would include work in Belmont Creek channel that could adversely affect water quality by increasing turbidity and potentially releasing fuels and other chemicals associated with construction equipment into Belmont Creek. The increase in turbidity and potential release of pollutants could harm aquatic life. Because the water quality standards for Belmont Creek are based on aquatic species beneficial uses, this constitutes a potential conflict with the Basin Plan. Preparation and implementation of site-specific, effective stormwater BMPs and Mitigation Measure HYD-1 would reduce this impact to a less-than-significant level. With implementation of Mitigation Measure HYD-1, the Project would not obstruct implementation of the water quality control plan, and the impact would be **less than significant with mitigation**.

As indicated in the discussion under Impact HYD-2, the Project would not substantially decrease groundwater supplies or interfere substantially with groundwater recharge. Consequently, implementation of the Project would not conflict with or obstruct implementation of a sustainable groundwater management plan, and the impact related to sustainable groundwater management would be **less than significant**.

Mitigation: Mitigation Measure HYD-1 (refer to Impact HYD-1).

Cumulative Impacts

Impact C-HYD-1: Contribute to a cumulative impact related to substantially degrading surface or groundwater quality, conflicting with or obstructing implementation of a water quality control plan or sustainable groundwater management plan, or resulting in substantial erosion or siltation on-or off-site.

The geographic scope for impacts on hydrology and water quality is Belmont Creek watershed. The Twin Pines Park Belmont Creek Restoration Project (Restoration Project) described in Section 2.7 and Table 3.1-1 could affect water quality in Belmont Creek, similar to the Project. Construction of both the Project and the Restoration Project could release sediment and other pollutants into Belmont Creek during construction, potentially harming aquatic life. Because the water quality standards for Belmont Creek are based on aquatic species beneficial uses, this constitutes a potential conflict with the Basin Plan, which could result in a cumulatively considerable significant impact. However, the City of Belmont would implement the requirements of the CGP and prepare and implement site-specific, effective stormwater BMPs during construction of both projects to reduce adverse water quality effects. Mitigation Measure HYD-1 would also be implemented during Project construction to further reduce impacts on water quality. As a result, impacts from the Project related to water quality would not be cumulatively considerable in combination with the other cumulative projects, and the impact would be **less than significant**.

Mitigation: Mitigation Measure HYD-1 (refer to Impact HYD-1).

Impact C-HYD-2: Contribute to a cumulative impact related to substantial erosion or siltation on-or off-site.

The Project and the Restoration Project are designed to alter drainage patterns in Belmont Creek watershed. The Restoration Project is designed to reduce sediment loading to Belmont Creek by stabilizing exposed and eroding creek banks. As discussed in Impact HYD-3, during operation, the Project's removal of sediment from Belmont Creek at the sediment chamber could cause increased erosion downstream of the Project. The reduction in sediment caused by the Restoration Project was estimated as part of design of the proposed sediment chamber, and the Project and Restoration Project could combine to result in the same potential for scour in the downstream reach as the Project. Therefore, the Project's contribution to impacts related to erosion or siltation would be cumulatively considerable, resulting in a potentially significant impact; however, implementation of Mitigation Measure HYD-2 would reduce potential impacts to a **less-than-significant level.**

Mitigation: Mitigation Measure HYD-2 (refer to Impact HYD-3).

3.5.4 References

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3.6 Tribal Cultural Resources

This section presents an analysis of potential impacts related to tribal cultural resources that would result from implementation of the proposed Twin Pines Park Stormwater Detention Basin Project (Project). Much of the background context and methods used for the analysis of potential impacts of the Project on tribal cultural resources are the same as for cultural resources (Section 3.4, *Cultural Resources*).

This section relies on the information and findings presented in the two cultural resources technical reports developed for the Project:

- *Twin Pines Park, San Mateo County, California: Archaeological and Architectural Resources Inventory Report* (Sims et al., 2022); and
- *Twin Pines Park Storm Water Capture Project, San Mateo County, California: Archaeological Testing Results Report* (Zimmer and Hoffman, 2023).

These reports detail the results of the cultural resources study, which examined the environmental, ethnographic, and historic background of the Project area, emphasizing aspects of human occupation.

Comments regarding cultural resources were received in response to the Notice of Preparation (NOP) and were considered in development of the impact analysis presented in this section. The California Native American Heritage Commission (NAHC) provided details on cultural resource regulations pertaining to the Project, suggested types of cultural resources analyses to be completed, and requested that they be contacted for a Sacred Lands File (SLF) search and list of California Native American Tribes in the Project area. Refer to **Appendix A** for NOP comment letters.

3.6.1 Key Terms

This section includes the key term defined below.

- **Tribal Cultural Resource.** This resource type consists of sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American Tribe that are listed, or determined to be eligible for listing, in the National Register of Historic Places (National Register), California Register of Historical Resources (California Register), or a local register of historical resources. A tribal cultural resource may also qualify as an historical resource, pursuant to California Public Resources Code (PRC) Section 21084.1, a unique archaeological resource, as defined in PRC Section 21083.2, or non-unique archaeological resource, as defined in PRC Section 21083.2.

3.6.2 Environmental Setting

The following provides a summary of the setting of the Project area with respect to indigenous presence. Additional details for pre-contact and regional historic setting are provided in Sims et al. (2022) and Zimmer and Hoffman (2023). Refer to Section 3.4 Cultural Resources, for information on Physiography, Geology and Soils, Cultural Context, and Field Surveys.

Existing Tribal Cultural Resource Environment

California Historical Resources Information System Records Search

In November 2021, Environmental Science Associates (ESA) completed a cultural resources records search for the Project area and vicinity at the Northwest Information Center at Sonoma State University. An update was performed in August 2022 to determine if additional resources or reports had been completed since the initial record search. The analysis boundary for the records searches consisted of the Project area with a 0.25-mile buffer. The Northwest Information Center maintains the California Historical Resources Information System (CHRIS) records for the Project area.

The CHRIS has records of six previously recorded cultural resources mapped within 0.25 mile of the Project area, two of which (P-41-000152, C-331) are mapped within the Project area. All of these except for P-41-000152 are historic-era architectural resources. P-41-000152 is discussed in detail later in this section.

Ethnographic Literature Review

ESA's review of ethnographic literature revealed that no documented Native American villages are mapped within or in the immediate vicinity of the Project area, although ethnographic maps are at a large scale and the exact locations of villages are not easily determined. The nearest ethnographic village appears to have been the Lamchin Ramaytush Ohlone village of *Cachanigtac?* or *Chachanegtac*, mapped near San Carlos, approximately 1.5 miles southeast of the Project area (Engelhardt, 1924). Ethnographic data on Ramaytush Ohlone people of the Project area and vicinity is somewhat poor, so these village locations are approximate. Most of the ethnographic accounts that were reviewed date to the early 20th century and, given the rapid decimation of and displacement of Ohlone people with the arrival of the Spanish, who established multiple missions in the San Francisco Bay Area, the relatively few Native American settlements described in the vicinity of the Project area should not be taken as definitive evidence as an absence of other villages or lack of use of the area.

Native American Correspondence

ESA contacted the NAHC on August 17, 2022, in request of a search of the NAHC's SLF and a list of Native American representatives who may have interest in the Project. The NAHC replied to ESA's SLF and Native American contacts request on September 29, 2022, in which they stated that the SLF has no record of sacred sites in the Project area. The reply also included a list of eight Native American individuals, representing six California Native American Tribes, who may be interested in the Project area.

On February 13, 2023, on behalf of the City, ESA archaeologist Robin Hoffman sent emails to representatives from the six California Native American Tribes indicated in the NAHC reply. The letters provided information on the Project, including the results of the cultural resources background research and pedestrian survey, and requested that the recipients notify the City if they would like to participate in the archaeological subsurface survey or have any concerns regarding Project impacts on cultural resources and tribal cultural resources. On April 17, 2023, on behalf of the City, Hoffman made a phone call and sent an email to Vice-Chairperson Monica

Arellano, of Muwekma, to discuss the Project and any concerns; Arellano's voicemail box was full and Hoffman received an automated email stating that the email was undeliverable. On April 17, 2023, on behalf of the City, Hoffman made a phone call and sent an email to Chairperson Andrew Galvan, of The Ohlone Indian Tribe, to discuss the Project and any concerns. Galvan called Hoffman, stating that The Ohlone Indian Tribe is interested in the Project. Subsequent conversations between Hoffman and Galvan resulted in The Ohlone Indian Tribe participating as a compensated monitor during the archaeological subsurface survey for the Project.

As a result of the discovery of human remains during the archaeological subsurface survey, and subsequent appointing of Arellano as MLD by the NAHC, Arellano provided treatment recommendations for the human remains, and P-41-000152, in general, with respect to mitigating significant impacts on the resource. Arellano's recommendations point to the significance of the human remains present to the Muwekma, as well as the Muwekma's view that, if the Project would require destruction of the site, information obtained from the site could be important to the Muwekma as well as other area California Native American Tribes.

The tribal cultural resources mitigation measures for the Project, presented herein, are heavily based on Arellano's recommendations. The treatment recommendations consisted of initial reburial of artifacts and human remains identified during the subsurface survey at the location where they were found until Project implementation. Then, prior to Project implementation, the following: recovery, analysis, and reburial of the artifacts and human remains identified during the subsurface survey and any during Project implementation, with participation by Muwekma representatives; development of a (data recovery/treatment) plan to guide recovery of archaeological material and human remains prior to Project implementation; and installation of public informational signage, developed by Muwekma in coordination with the City.

Summary of Existing Tribal Cultural Resource Environment

Through archival research, a CHRIS records search, a pedestrian survey, an archaeological subsurface survey, and consultation with California Native American Tribes, one indigenous archaeological resource, P-41-000152, has been identified in the Project area. This archaeological resource has been determined to also qualify as a tribal cultural resource, as defined in PRC Section 21074. This resource is discussed in detail below. P-41-000152 is present throughout most of the Project area and has been recommended California Register-eligible.

P-41-000152

This indigenous archaeological site was first recorded in 1973 by Hansen and Salzman (1973). In 1984, Holman excavated augers at the site, identifying cultural material in the current Project area (Holman, 1984). In 1986, Wiberg excavated augers at the western end of Twin Pines Park, observing cultural material. Wiberg noted that previous hand-excavated units, burial removal work, and monitoring had been conducted at P-41-000152 for the "Creekside Office Building and the Belmont Senior's Community Center," the results of which demonstrate that the site is California Register-eligible (Wiberg, 1986). A report from a later project nearby references unpublished information regarding the excavations and burial recovery from the aforementioned construction, including radiocarbon dates from the Senior Center demolition project dating the site to more than 4000 BP, with likely occupation up to approximately 200 BP (Holman, 2000).

In personal communications with ESA in 2022, former City staff stated that Native American burials had been removed as part of the Senior Community Center construction (K. Mittelstadt, personal communication, August 29, 2022).

In 2003, Cartier conducted an auger survey at P-41-000152 around City Hall and the parking lot south of the building, observing cultural material (Cartier, 2003). In 2004, Cartier conducted archaeological monitoring and a burial recovery program at P-41-000152 and burial recovery for the Belmont City Hall Expansion Project just east of Twin Pines Park and the current Project area. During the monitoring, Native American human remains were identified and excavated, along with associated cultural material. Radiocarbon dates from that study resulted in dates of 3260 and 3120 BP. Based on their results, Cartier recommended P-41-000152 eligible for the California Register (Cartier, 2004).

During ESA's pedestrian survey conducted for the Project, no cultural material was identified within the site boundary of P-41-000152. During ESA's archaeological subsurface survey, human remains and associated cultural material was observed. The material identified in the Project area during the archaeological subsurface survey is consistent with the material previously documented at P-41-000152. As a result of the discovery of human remains during the archaeological subsurface survey, and subsequent appointing of Arellano as the MLD by the NAHC, Arellano provided treatment recommendations for the human remains, and P-41-000152, in general, with respect to mitigating significant impacts on the resource. Arellano's recommendations point to the significance of the human remains present to the Muwekma, as well as the Muwekma's view that, if the Project would require destruction of the site, information obtained from the site could be important to the Muwekma as well as other area California Native American Tribes.

In summary, P-41-000152 is an indigenous archaeological habitation site along the banks of Belmont Creek near the mouth of its canyon, with components dating to between 4000 and 200 BP (Early through Late Period Late Holocene). The site consists of extensive midden (with shell and mammalian dietary remains), human remains, and a variety of artifact types. The site boundary is unclear, as it no longer has a surficial component and minimal subsurface survey has been undertaken to define its western and southern boundaries; however, the boundary used for the current Project encompasses 9.92 acres, including most of the Project area, and is based on the boundary documented by Wiberg (1986), as it encompasses all areas where indigenous archaeological material associated with the site has been documented to date, per the CHRIS. The site appears to represent a pre-contact seasonal camp used for generalized habitation activities over a significant period of time, between 4000 and 200 BP, with inhabitants focusing on marine-based resource procurement and some (mostly stone) tool manufacture and use. The site is fairly representative of San Francisco Bay Area pre-contact midden sites in similar settings.

The site was previously recommended California Register-eligible (Cartier, 2004). Zimmer and Hoffman (2023) also recommended the site as California Register-eligible under Criterion 4 due to its data potential, including MLD Arellano's information stating that human remains present are significant to the Muwekma, and that information obtained from the site could be important to the Muwekma as well as other area California Native American Tribes. As such, the resource qualifies as a tribal cultural resource, for CEQA purposes.

3.6.3 Regulatory Framework

State

California Environmental Quality Act

CEQA (codified at PRC Section 21000 *et seq*.) is the principal statute governing environmental review of projects occurring in California. CEQA requires lead agencies to determine whether a proposed project would have a significant effect on the environment, including a significant effect on tribal cultural resources. Under CEQA (PRC Section 21084.1), a project that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment.

Tribal Cultural Resources

CEQA recognizes that California Native American Tribes have expertise with regard to their tribal history and practices. PRC Section 21074(a) defines a *tribal cultural resource* as any of the following:

- Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American Tribe that are either of the following:
  - included or determined to be eligible for inclusion in the California Register; or
  - included in a local register of historical resources, as defined in PRC Section 5020.1(k).
- A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of [PRC] Section 5024.1.

In applying these criteria, the lead agency would consider the significance of the resource to a California Native American Tribe.

A cultural landscape that meets the criteria of PRC Section 21074(a) is also a tribal cultural resource if the landscape is geographically defined in terms of the size and scope. A historical resource as described in PRC Section 21084.1, a unique archaeological resource as defined in PRC Section 21083.2, or a non-unique archaeological resource as defined in PRC Section 21083.2 may also be a tribal cultural resource under CEQA if it meets the criteria identified in PRC Section 21074(a).

CEQA requires lead agencies to analyze the impacts of projects on tribal cultural resources separately from impacts on archaeological resources (PRC Section 21074 and 21083.09) because tribal cultural resources have cultural values beyond their ability to yield data important to prehistory or history. Tribal consultation pursuant to PRC Section 21080.3.1 applies to projects for which an NOP or notice of negative declaration/mitigated negative declaration was filed on or after July 1, 2015; therefore, these provisions apply to the Project.

California Register of Historical Resources

The California Register is "an authoritative listing and guide to be used by State and local agencies, private groups, and citizens in identifying the existing historical resources of the State and to indicate which resources deserve to be protected, to the extent prudent and feasible, from substantial adverse change" (PRC Section 5024.1[a]). The criteria for eligibility for the California Register are based upon the criteria for listing in the National Register (PRC Section 5024.1[b]). Certain resources are determined by the statute to be automatically included in the California Register, including California properties formally determined eligible for, or listed in, the National Register.

To be eligible for the California Register, a cultural resource must be significant at the local, state, and/or federal level under one or more of the following four criteria:

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2. Is associated with the lives of persons important in our past;
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
4. Has yielded, or may be likely to yield, information important in prehistory or history.

A resource eligible for the California Register must be of sufficient age and retain enough of its historic character or appearance (integrity) to convey the reason for its significance. Additionally, the California Register consists of resources that are listed automatically and those that must be nominated through an application and public hearing process. The California Register automatically includes the following:

- California properties listed in the National Register (and those formally determined eligible for the National Register).
- California Registered Historical Landmarks from No. 770 onward; and
- Those California Points of Historical Interest that have been evaluated by the Office of Historic Preservation and have been recommended to the State Historical Resources Commission for inclusion in the California Register.

Other resources that may be nominated to the California Register include:

- Historical resources with a significance rating of Category 3 through 5 (those properties identified as eligible for listing in the National Register, the California Register, and/or a local jurisdiction register);
- Individual historic resources;
- Historic resources contributing to historic districts;
- Historic resources designated or listed as local landmarks, or designated under any local ordinance, such as a historic preservation overlay zone; and/or
- Tribal cultural resources.

California Public Resources Code Section 5097

PRC Section 5097.98 provides procedures in the event that human remains of Native American origin are discovered during project implementation on non-federal land. PRC Section 5097.98 requires that no further disturbances occur in the immediate vicinity of the discovery, that the discovery is adequately protected according to generally accepted cultural and archaeological standards, and that further activities take into account the possibility of multiple burials. PRC Section 5097.98 further requires the NAHC, upon notification by a County Coroner, designate and notify a MLD regarding the discovery of Native American human remains. The MLD has 48 hours from the time of being granted access to the site by the landowner to inspect the discovery and provide recommendations to the landowner for the treatment of the human remains and any associated grave goods.

PRC Section 5097.99, as amended, states that no person shall obtain or possess any Native American artifacts or human remains that are taken from a Native American grave or cairn. Any person who knowingly or willfully obtains or possesses any Native American artifacts or human remains is guilty of a felony, which is punishable by imprisonment. Any person who removes, without authority of law, any such items with an intent to sell or dissect or with malice or wantonness is also guilty of a felony, which is punishable by imprisonment.

California Health and Safety Code Section 7050.5

Section 7050.5 of the California Health and Safety Code (HSC) protects human remains by prohibiting the disinterring, disturbing, or removing of human remains from any location other than a dedicated cemetery. PRC Section 5097.98 (and reiterated in California Code of Regulations Section 15064.59[e]) also identifies steps to follow in the event of the accidental discovery or recognition of any human remains in any location other than a dedicated cemetery.

California Native American Historic Resource Protection Act

The California Native American Historic Resource Protection Act of 2002 imposes civil penalties, including imprisonment and fines up to $50,000 per violation, for persons who unlawfully and maliciously excavate upon, remove, destroy, injure, or deface a Native American historic, cultural, or sacred site that is listed or may be listed in the California Register.

California Government Code Section 27460 and 27491

California Government Code Section 27460 requires that human remains be “interred decently” in the event that no person takes charge of them when an inquest is held by a coroner. California Government Code Section 27491 requires that, in the case of unattended deaths, the person in charge of the human remains notify the coroner, and that the coroner inquire into the death.

California Executive Order B-10-11

California Executive Order B-10-11 was issued by Governor Edmund G. Brown, Jr. on September 19, 2011. The order affirms that all State agencies shall encourage communication and consultation with California Indian Tribes.

Local

Refer to **Table 3.6-1** for goals, and policies from the City of Belmont's 2035 General Plan Conservation Element that relates to tribal cultural resources.

TABLE 3.6-1
TRIBAL CULTURAL RESOURCES–RELATED POLICIES IN LOCAL GENERAL PLAN

City of Belmont 2035 General Plan
Goal 5.12 Preserve and protect areas and sites of prehistoric, cultural, and archaeological significance.
Policy 5.12-1 Ensure that development avoids potential impacts to sites suspected of being archeologically, paleontologically, or culturally significant, tribal or otherwise, or of concern by requiring appropriate and feasible mitigation.
Policy 5.12-2 If cultural, archaeological, paleontological, or cultural resources, tribal or otherwise, are discovered during construction, grading activity in the immediate area shall cease and materials and their surroundings shall not be altered or collected until evaluation by a qualified professional is completed.

Sources: City of Belmont, 2017.

3.6.4 Impacts and Mitigation Measures

Significance Criteria

In accordance with the CEQA, CEQA *Guidelines* (including Appendix G), relevant plans, policies, and/or guidelines, and agency standards, the Project could have a significant impact if it were to:

- Cause a substantial adverse change in the significance of a tribal cultural resource, defined in PRC Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:
  - Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in PRC Section 5020.1(k), or
  - A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of PRC Section 5024.1. In applying the criteria set forth in subdivision (c) of PRC Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

Methodology

Effective for projects for which an NOP or a notice of negative declaration/mitigated negative declaration was filed on or after July 1, 2015, CEQA requires that a project's impacts on tribal cultural resources be considered as part of the overall analysis of project impacts (PRC Sections 21080.3.1, 21084.2, and 21084.3). The significance of a resource as a tribal cultural resource is assessed by evaluating all of the following:

- Its eligibility for listing in the California Register.
- Its eligibility as a unique archaeological resource pursuant to PRC Section 21083.2.

- Its listing status in the NAHC's SLF.

In addition, a lead agency can independently determine a resource to be a tribal cultural resource. California Native American Tribes are considered experts with respect to tribal cultural resources. Thus, the analysis of whether project impacts may result in a substantial adverse change to the significance of a tribal cultural resource depends heavily on consultation between the lead agency and culturally and geographically affiliated California Native American Tribes during the CEQA process.

Impacts and Mitigation Measures

Table 3.6-2 summarizes the impact conclusions presented in this section.

TABLE 3.6-2
TRIBAL CULTURAL RESOURCES IMPACT CONCLUSIONS

Impact Statement	Level of Significance
Impact TCR-1: Cause a substantial adverse change in the significance of a tribal cultural resource, as defined in PRC Section 21074.	SU

NOTES:
SU: significant and unavoidable

Impact TCR-1: Cause a substantial adverse change in the significance of a tribal cultural resource, as defined in PRC Section 21074. *(Significant and Unavoidable)*

One archaeological resource, P-41-000152, that also qualifies as a tribal cultural resource, has been identified in the Project area. The resource is an indigenous archaeological habitation site with components dating to between 4000 and 200 BP. The site consists of extensive midden (with shell and mammalian dietary remains), human remains, flaked- and ground-stone tools, shell artifacts, bone artifacts, charcoal, and fire-affected rock. The site is present throughout most of the Project area and appears to represent a pre-contact seasonal camp used for generalized habitation activities over a significant period of time, between 4000 and 200 BP, with inhabitants focusing on marine-based resource procurement and some (mostly stone) tool manufacture and use. P-41-000152 was recommended California Register-eligible under Criterion 4 due to its data potential, including MLD Arellano's information stating that human remains present are significant to the Muwekma, and that information obtained from the site could be important to the Muwekma as well as other area California Native American Tribes. As such, for CEQA purposes, the resource qualifies as a tribal cultural resource.

The Project would consist of a substantial amount of ground disturbance within P-41-000152, including throughout all depths where cultural material has been identified at the site to date. The following Project-related activities would involve this ground disturbance: construction of a below-ground stormwater storage facility under an existing parking lot; construction a high flow diversion weir along the creek bank; construction of a sediment chamber between the creek and diversion weir; construction of concrete retaining walls along the creek adjacent to the sediment chamber; construction of a stone or concrete in-stream check structure across the creek near the sediment chamber; and installation of an outlet pipe at the creek downstream of the in-stream check structure. Implementation of the Project, specifically excavation and grading activities, would clearly result in physical demolition, destruction, or alteration of the P-41-000152. This physical demolition, destruction, and alteration to P-41-000152, a tribal cultural resource, would result in a **significant impact** on P-41-000152. Implementation of **Mitigation Measures CUL-1** to **CUL-4** (refer to Section 3.4, *Cultural Resources*) would reduce this impact, but the impact would remain significant and unavoidable, as the Project would result in permanent damage to ancestral human remains that are of significance to the Muwekma, and likely other California Native American Tribes.

> **Mitigation: Mitigation Measures CUL-1, CUL-2, CUL-3,** and **CUL-4** (refer to Impact CUL-2)

Significance After Mitigation: Implementation of **Mitigation Measures CUL-1** to **CUL-4** would be implemented to reduce the impacts of Project on tribal cultural resource, as defined in PRC Section 21074, through development and implementation of an ARDRTP, CRMP, Cultural Resources Awareness and Sensitivity Training Program, and public informational signage, which, collectively, would require archaeological data recovery of portions of P-41-000152 in the Project area, cultural resources construction monitoring for the Project, cultural resources sensitivity training of Project construction personnel, implementation of unanticipated discovery protocol for archaeological resources, and education of the public with information on P-41-000152 and the presence of California Native American Tribes in the area. These measures would reduce impacts on tribal cultural resource P-41-000152 resulting from the Project, but the impact would remain **significant and unavoidable**, as the Project would result in permanent damage to ancestral human remains that are of significance to the Muwekma, and likely other California Native American Tribes.

Cumulative Impacts

Impact C-TCR-1: The Project, in combination with past, present, and probable future projects in the Project area, would not result in significant adverse cumulative tribal cultural resources impacts. (*Significant and Unavoidable*)

The geographic scope for cumulative effects on tribal cultural resources consists of the Project area. The cumulative analysis evaluates tribal cultural resources as a nonrenewable resource base. It considers the additive effect of potential Project impacts on tribal cultural resources, as defined in PRC Section 21074. The Project would result in a cumulatively considerable (significant) impact if Project impacts after mitigation, combined with the impacts of one or more cumulative projects, were to cause a substantial adverse effect on the same tribal cultural resource. Continued development in the region runs the inherent risk of damaging or destroying tribal cultural resources, resulting in a significant cumulative impact. Construction and operation of the projects listed in Table 3.1-1 would introduce new structures, features, and/or modified operations that could potentially impact tribal cultural resources. This could result in a potentially cumulatively significant impact.

Federal, state, and local laws protect tribal cultural resources in most instances. Even so, it is not always feasible to entirely avoid impacts on tribal cultural resources. Because all tribal cultural resources are unique and nonrenewable members of finite classes, any adverse effects or negative impacts erode a dwindling resource base.

Project construction would result in a significant impact on tribal cultural resources from partial or complete destruction of tribal cultural resource P-41-000152, resulting in a considerable contribution to a potentially significant cumulative impact on tribal cultural resources. Implementation of **Mitigation Measures CUL-1** to **CUL-4** would reduce Project impacts on tribal cultural resources but the impact would remain significant and unavoidable. Therefore, the Project's contribution to the cumulative impact on tribal cultural resources would be cumulatively considerable, and this cumulative impact would be **significant and unavoidable**.

> **Mitigation:** Mitigation Measures CUL-1, CUL-2, CUL-3, and CUL-4 (refer to Impact CUL-2)

3.6.5 References

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CHAPTER 4
Other CEQA Issues

4.1 Significant Unavoidable Impacts

In accordance with the California Environmental Quality Act (CEQA) Section 21100(b)(2)(A) and with CEQA *Guidelines* Sections 15126(b) and 15126.2(b), the purpose of this section is to identify Twin Pines Park Stormwater Detention Basin Project (Project)-related environmental impacts that could not be eliminated or reduced to a less-than-significant level with implementation of mitigation measures identified in Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures*. With the exceptions described below, all Project impacts would either be less than significant or reduced to less-than-significant levels with implementation of the identified mitigation measures:

- **Tribal Cultural Resources**. The Project would cause a substantial adverse change in the significance of a tribal cultural resource, as defined in PRC Section 21074.

Construction and operational impacts associated with Project implementation would result in a significant impact on tribal cultural resources through resulting in permanent damage to ancestral human remains that are of significance to the Muwekma Ohlone Tribe of the San Francisco Bay Area, and likely other California Native American Tribes.

4.2 Significant Irreversible Environmental Changes

In accordance with CEQA Section 21100(b)(2)(B) and CEQA *Guidelines* Sections 15126(c) and 15126.2(c), the purpose of this section is to identify significant irreversible environmental changes that would be caused by the Project.

Project construction would result in an irretrievable and irreversible commitment of natural resources though direct consumption of fossil fuels and use of materials. Construction would include the short-term use of electricity and refined petroleum products during the operation of construction equipment (primarily gas, diesel, and motor oil). However, the energy consumption for construction would not result in long-term depletion of non-renewable energy resources and would not permanently increase reliance on energy resources that are not renewable. Construction activities would not reduce or interrupt existing electrical or natural gas services such that existing supplies would be constrained.

Project operations that would affect irretrievable resources would be limited to annual maintenance activities. Maintenance activities would result in irreversible and irretrievable use of energy and material resources in the following forms:

1. Energy expended in the form of electricity, gasoline, diesel fuel, and oil for construction equipment;
2. Electricity to power the motors that control the weirs, which would be less than one hour per week during operation; and
3. Labor.

The use of the nonrenewable resources is expected to account for a minimal portion of the region's resources and would not affect the availability of these resources for other needs within the region. Additional information on irreversible changes or resource use is available in **Appendix B**, Initial Study.

4.3 Areas of Known Controversy and Issues to be Resolved

Pursuant to CEQA *Guidelines* Section 15123(b)(1), environmental impact reports (EIRs) are required to identify areas of controversy known to the lead agency, including issues raised by agencies and the public. On October 4, 2023, the City of Belmont distributed a Notice of Preparation (NOP) to agencies and interested parties to begin the formal 30-day CEQA scoping process to receive comments on the scope of the EIR. No known areas of controversy were raised during the scoping period. Refer to **Appendix A**, which contains written comments received on the NOP.

4.4 Growth Inducement Potential and Secondary Effects of Growth

CEQA *Guidelines* Section 15126.2(d) requires that an EIR discuss "the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment."

As discussed in **Appendix B**, Initial Study (*Section 14, Population and Housing*), the Project would not involve any housing construction and therefore would not induce substantial unplanned growth. Project construction would not extend roads or other infrastructure that could indirectly induce unplanned growth. Given the size and availability of the regional workforce, Project construction would not be expected to induce demand for housing by attracting a substantial number of workers from outside the region, nor would the Project provide new permanent employment opportunities that could attract workers to the area. Project operation would not increase the number of workers employed by the City of Belmont.

In some cases, a flood risk reduction project can remove an obstacle to growth. However, in this case, the Project would reduce flood risk in existing developed areas and for growth areas already anticipated in the Belmont General Plan (City of Belmont, 2017). The Project would not allow more growth to occur than what has already been planned, nor would it change the locations where this growth is planned to occur. Consequently, Project implementation would not affect current and/or projected population growth patterns within Belmont as already evaluated and planned for in the General Plan and, therefore, would not have a growth-inducing impact.

For these reasons, the Project would not have a substantial growth-inducing impact.

4.5 References

City of Belmont, 2017. *City of Belmont 2035 General Plan*. Adopted November 14, 2017. Available online at: https://www.belmont.gov/departments/community-development/2035-general-plan-update/final-adopted-general-plan. Accessed November 2023.

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CHAPTER 5

Alternatives

5.1 CEQA Requirements

This chapter presents the California Environmental Quality Act (CEQA) alternatives analysis for the proposed Twin Pines Park Stormwater Detention Basin Project (Project). The overarching purpose of the Project is to provide flood protection for nearby neighbors while maintaining habitat and natural surface water features. As described in Section 2.3, *Project Objectives*, the Project objectives are to develop a reasonable and cost effective project that:

- Reduces downstream flooding and maximizes flood protection in Lower Belmont Creek watershed;
- Reduces erosion and prevent failure of stream banks;
- Reduces downstream sedimentation and need for dredging;
- Minimizes disruption and damage to public and private landowners; and
- Improves water quality through pollutant capture and removal.

The CEQA *Guidelines* Section 15126.6(a), state that an environmental impact report (EIR) must describe and evaluate a reasonable range of alternatives to the Project that would feasibly attain most of the Project’s basic objectives but would avoid or substantially lessen any identified significant adverse environmental effects of the Project. Specifically, the CEQA *Guidelines* Section 15126.6 set forth the following criteria for selecting and evaluating alternatives:

- **Identifying Alternatives.** The selection of alternatives is limited to those that would avoid or substantially lessen any of the significant environmental effects of the Project, are feasible, and would attain most of the basic objectives of the Project. Factors that may be considered when addressing the feasibility of an alternative include site suitability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries, economic viability, and whether the proponent can reasonably acquire, control, or otherwise have access to an alternative site. An EIR need not consider an alternative whose impact cannot be reasonably ascertained and whose implementation is remote and speculative. The specific alternative of “no project” must also be evaluated.
- **Range of Alternatives.** An EIR need not consider every conceivable alternative, but must consider and discuss a reasonable range of feasible alternatives in a manner that will foster informed decision-making and public participation. The “rule of reason” governs the selection and consideration of EIR alternatives, requiring that an EIR set forth only those alternatives necessary to permit a reasoned choice. The lead agency (the City of Belmont [City]) is responsible for selecting a range of project alternatives to be examined and for disclosing its reasons for the selection of the alternatives.

- **Evaluation of Alternatives.** EIRs are required to include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the Project. Matrices may be used to display the major characteristics and the potential environmental effects of each alternative. If an alternative would cause one or more significant effects that would not result from the Project as proposed, the significant effects of the alternative must be discussed, but in less detail than the significant effects of the Project.

5.1.1 Feasibility

CEQA *Guidelines* Section 15364 define feasibility as "...capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors." The alternatives screening analysis mainly is governed by what CEQA terms the "rule of reason," meaning that the analysis should remain focused not on every possible eventuality but rather on the alternatives necessary to permit a reasoned choice. Alternatives that are potentially feasible, while still meeting most project objectives, are to be fully analyzed in the EIR if they also reduce a project's environmental impacts.

According to CEQA *Guidelines* Section 15126.6(f)(1), the factors that may be considered when addressing the potential feasibility of alternatives include site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or other regulatory limitations, jurisdictional boundaries, and the project proponent's control over alternative sites. For the screening analysis, the potential feasibility of alternatives was assessed by considering the following factors:

- **Legal Feasibility**. Would the alternative have the potential to avoid land with uses having legal protection that may prohibit or substantially limit the feasibility of permitting the project? Land use afforded legal protections that would prohibit project construction or would require an act of Congress for permitting is considered to be a less feasible location for the project. Such land use designations include wilderness areas, wilderness study areas, restricted military bases, airports, and Native American reservations.
- **Regulatory Feasibility**. Would regulatory restrictions substantially limit the likelihood of successful permitting of the project? Is the alternative consistent with regulatory standards for design, operation, and maintenance?
- **Technical Feasibility**. Would the alternative be potentially feasible from a technological perspective, considering available technology? Would any construction, operation, or maintenance constraints be likely to occur that could not be overcome?
- **Economic Feasibility**. Would the alternative be so costly that its implementation would be prohibitive? CEQA *Guidelines* Section 15126.6(b) requires consideration of alternatives capable of eliminating or reducing significant environmental effects, although they may "impede to some degree the attainment of the project objectives, or would be more costly." In 1988, the Court of Appeals determined in Citizens of Goleta Valley v. Board of Supervisors: ". . .The fact that an alternative may be more expensive or less profitable is not sufficient to show that the alternative is financially infeasible. What is required is evidence that the additional costs or lost profitability would be severe enough to render it impractical to proceed with the project."

- **Environmental Feasibility**. Would implementation of the alternative cause substantially greater environmental damage than the project, thereby making the alternative clearly inferior from an environmental standpoint? Would the alternative reduce any potentially significant project impact? This issue primarily is to be addressed in terms of the alternative's potential to eliminate potentially significant project effects.

5.1.2 Potential to Eliminate Significant Environmental Effects

A key CEQA requirement for an alternative is that it must have the potential to "avoid or substantially lessen any of the significant effects of the project" (CEQA *Guidelines* Section 15126.6[a]). At the screening stage, evaluating or quantifying all the impacts of the alternatives in comparison to the project would not be possible. However, identifying elements of an alternative that are likely to be the sources of impacts and relating them, to the extent possible, to general conditions in the project area would be possible.

Potentially significant environmental impacts that would result from the proposed Project are evaluated in Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures*, of this EIR, as well as the Initial Study (**Appendix B**). With implementation of standard conditions and requirements, as well as mitigation measures identified for each resource area significantly impacted, many of the potentially significant impacts resulting from the Project would be reduced to a less-than-significant level. The Project impacts listed below would be either reduced through implementation of mitigation measures or remain significant and unavoidable even after mitigation. The alternatives evaluated in this EIR were selected because they are anticipated to reduce and/or eliminate one or more of the significant impacts associated with the Project.

Air Quality Impact AIR-1: Implementation of the Project could conflict with or obstruct implementation of the applicable air quality plan. (*Less than Significant with Mitigation*)

Air Quality Impact AIR-2: Implementation of the Project could 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. (*Less than Significant with Mitigation*)

Air Quality Impact AIR-3: Implementation of the Project could expose sensitive receptors to substantial pollutant concentrations. (*Less than Significant with Mitigation*)

Biological Resources Impact BIO-1: Implementation of the Project could have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service. (*Less than Significant with Mitigation*)

Biological Resources Impact BIO-2: Implementation of the Project could have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service or on state or federally protected wetlands through direct removal, filling, hydrological interruption, or other means. (*Less than Significant with Mitigation*)

Cultural Resources Impact CUL-2: Implementation of the Project could cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA Guidelines Section 15064.5. (*Less than Significant with Mitigation*)

Cultural Resources Impact CUL-3: Implementation of the Project could disturb human remains, including those interred outside of dedicated cemeteries. (*Less than Significant with Mitigation*)

Geology and Soils Impact GEO-1: Implementation of the Project could directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. (*Less than Significant with Mitigation*)

Hydrology and Water Quality Impact HYD-1: Implementation of the Project could violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality. (*Less than Significant with Mitigation*)

Hydrology and Water Quality Impact HYD-3: Implementation of the Project could result in substantial erosion or siltation on- or off-site. (*Less than Significant with Mitigation*)

Hydrology and Water Quality Impact HYD-8: Implementation of the Project could conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan. (*Less than Significant with Mitigation*)

Noise Impact NOI-1: Implementation of the Project could generate 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. (*Less than Significant with Mitigation*)

Noise Impact NOI-2: Implementation of the Project could generate excessive groundborne vibration or groundborne noise levels. (*Less than Significant with Mitigation*)

Tribal Cultural Resources Impact TCR-1: Implementation of the Project could cause a substantial adverse change in the significance of a tribal cultural resource, as defined in PRC Section 21074. (*Significant and Unavoidable*)

5.2 Alternatives Screening and Selection

As described below, the alternatives selected for environmental analysis were selected for their ability to meet the Project's objectives, as well as the CEQA requirements of reducing or avoiding significant environmental impacts. During the scoping process, the California Department of Fish and Wildlife (CDFW) recommended analyzing an alternative that would avoid entrainment of fish, would not reduce streamflow and available fish habitat, would not produce high velocity inundation of stream habitat at the outlet, would not block or impair movement of fish and aquatic organisms, and would reduce impacts to water quality and temperature (see **Appendix A** for CDFW scoping comments). Those environmental impacts were not identified in the analysis to be significant (see Section 3.3, *Biological Resources*).

5.2.1 Alternatives Considered During Project Planning

The 2019 Belmont Creek Watershed Management Plan (BCWMP) was developed to analyze preliminary alternatives to build flood resiliency in the Belmont Creek watershed (see

Appendix E). The BCWMP objectives include flood protection, cost, protecting and enhancing water quality, public support, environmental permitting and constructability, enhancing ecosystems and habitats, social benefits, operations and maintenance, and resiliency to climate change. The BCWMP includes two alternatives that are categorized into conveyance improvements and detention basins as described below:

Conveyance Improvements

Conveyance improvements are a conceptual alternative that would provide 3-hour flood protection during a 50-year flood event downstream of El Camino Real. This alternative would construct a 3,200-linear-foot bypass reinforced concrete box culvert along Harbor Boulevard from Old County Road to Belmont Creek. This alternative would also include a 3-foot-high floodwall on the left (west) bank of Belmont Creek from approximately 80 feet upstream of Industrial Boulevard to Industrial Boulevard matching the existing floodwall on the opposite bank. This design alternative would improve the performance of existing conveyance facilities but would not include any stormwater detention storage options. This alternative would cause traffic control and local business concerns as it could require road closures.

Detention Basins

Detention basins at various locations are a conceptual alternative that would capture flood flows for short durations to reduce the volume of water in Belmont Creek during storm events. This alternative would consist of one or more detention basins located in proximity to Belmont Creek and its tributaries, and on available open space (parking lots and fields). Five locations for detention basins were considered: Hidden Canyon Park, Notre Dame Belmont High School softball field, Notre Dame de Namur soccer field, Carlmont High School softball field, and Twin Pines Park.

The BCWMP identified a series of conveyance improvements and detention basins that when implemented in full would provide the desired flood protection to the Lower Belmont Creek community. The City chose the detention basin alternative in Twin Pines Park rather than the conveyance alternative due to logistical requirements and project cost effectiveness. The City proceeded with designing the Twin Pines Park Stormwater Detention Basin Project and analyzing its potential environmental impacts. It should be noted that the conveyance improvements and other detention projects within the BCWMP are needed to meet the long-term 50-year, 3-hour storm event flood protection goals but would require all other detention basins and conveyance improvement alternatives implemented.

For purposes of CEQA and the requirement to consider a reasonable range of alternatives to the Project that would feasibly attain most of the Project's basic objectives but would avoid or substantially lessen any identified significant adverse environmental effects of the Project, this EIR analyzes the other four locations for stormwater detention, rather than the conveyance alternative. The conveyance alternative does not meet the requirements of CEQA as discussed in Section 5.5, *Alternatives Considered but Eliminated from Further Analysis*.

5.3 CEQA Alternatives Evaluated

The alternatives selected for analysis are:

- Alternative 1: No Project
- Alternative 2: Hidden Canyon Park
- Alternative 3: Notre Dame Belmont High School Softball Field
- Alternative 4: Notre Dame de Namur Soccer Field
- Alternative 5: Carlmont High School Softball Field

Table 5-1 describes Alternatives 2 through 5 in terms of total stormwater storage capacity, footprint, estimated excavation, and estimated costs, as well as the Project, and **Figure 5-1** shows the locations of Alternatives 2 through 5 compared with the Project.

TABLE 5-1
DESCRIPTION OF PROJECT ALTERNATIVES

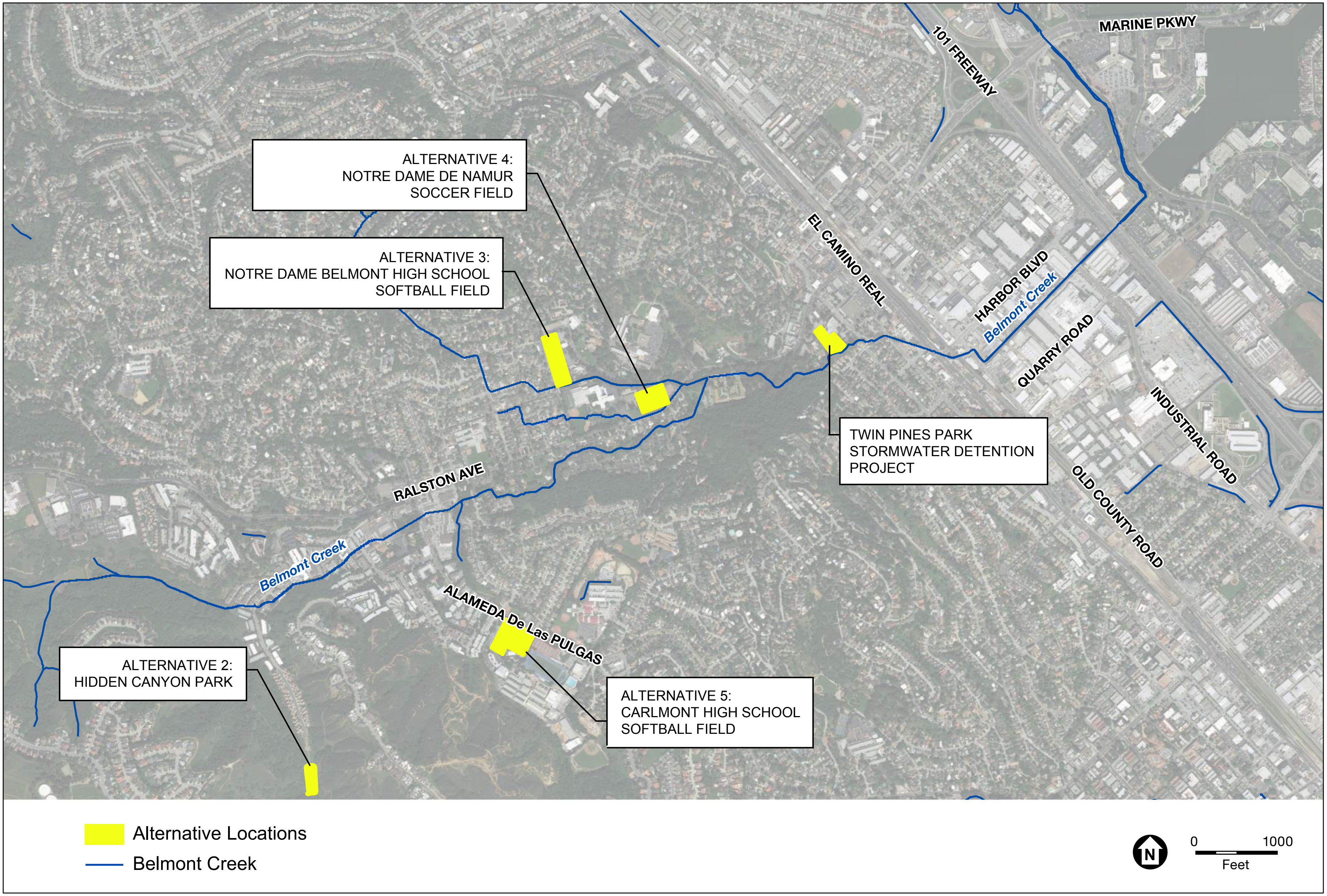
Alternative	Storage (acre feet)	Footprint of Basin (square feet)	Excavation (cubic yards)	Cost (million)
2. Hidden Canyon Park	4.14	27,300	9,100	$3.9
3. Notre Dame Belmont High School Softball Field	11.12	102,840	38,089	$10.3
4. Notre Dame de Namur Soccer Field	8.77	72,000	26,667	$8.1
5. Carlmont High School Softball Field	13.08	131,574	38,985	$13.0
Project: Twin Pines Park	21.52	43,000	37,481	$17.6

Source: County of San Mateo et al., 2019 (Appendix E)

5.3.1 Alternative 1 – No Project

Description

CEQA *Guidelines* Section 15126.6 requires an analysis of a "no project" alternative. Specifically, the CEQA *Guidelines* state that "[t]he purpose of describing and analyzing a 'no project' alternative is to allow decision makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project." The "no project" alternative is not necessarily the same as the baseline used to determine the environmental impacts of the proposed program. The analysis of the no project alternative includes the existing baseline environmental conditions as well as "what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services" (CEQA *Guidelines* Section 15126.6(e)(2)). The analysis of impacts related to the no project alternative includes projecting what would reasonably be expected to occur "in the foreseeable future if the project were not approved."



SOURCE: Michael Baker International, 2019

Twin Pines Park Stormwater Detention Basin Project

Figure 5-1
Project Alternatives Locations

ESA

Under the No Project Alternative, none of the actions described in Chapter 2, including construction and operation of the underground stormwater storage facility, diversion weir, outlet pipe, sediment chamber, bank stabilization measures, or in-stream check structure would occur. Continued flooding along Belmont Creek, particularly downstream of the Project, would continue to occur and could increase in subsequent years if the Project is not implemented.

Ability to Meet the Project Objectives

The No Project Alternative would fail to meet most of the Project objectives. As described in Chapter 2, *Project Description*, regional flooding in the watershed historically occurs downstream of El Camino Real, where the creek enters the flat, tidally influenced Harbor/Industrial Area before discharging into Belmont Slough. The downstream portion of the creek was designed to convey a 10-year storm; however, due to sedimentation in the downstream channel, more frequent events currently exceed the capacity of the system downstream. In California, nearly all major historic flood events have been associated with the presence of atmospheric rivers along the Pacific coast, which under climate change are projected to greatly increase the frequency of heavy- and extreme-precipitation events (Gershunov et al., 2019). Changes in the frequency and magnitude of extreme precipitation events may result in further increased flood risk (Ralph and Dettinger, 2011). A recent study suggests that floods with a current likelihood of occurring once every 200 years will become floods with a likelihood of occurring once every 50 years by the end of the century (Swain et al., 2018). During large rainstorms, channel levees constrict high runoff flows, which increases water surface elevations and causes overtopping of the levees and inundation of near-channel areas (Philip Williams & Associates, 2005). The No Project Alternative would not reduce downstream flooding (which is anticipated to increase with climate change) and maximize flood protection in Lower Belmont Creek watershed, would not reduce downstream sedimentation and dredging, and would not improve water quality through pollutant capture and removal. The No Project Alternative would meet the objective to minimize disruption to public and private landowners; however, it would not protect public and private landowners from flooding effects and would fail to meet any of the flood control objectives.

Evaluation

Air Quality and Greenhouse Gas Emissions

Under the No Project Alternative, there would be no air pollutants or greenhouse gas (GHG) emissions caused by construction activities. Criteria air pollutant emissions would not increase, and the risk to sensitive receptors would remain the same as under baseline conditions. The ambient air quality of the project site would not be affected by the No Project Alternative, and there would be no increase in GHG emissions. However, in the probable event of flooding, construction activities associated with the cleanup of the flooded areas and repair of damaged facilities would result in temporary effects on air quality. Construction equipment, similar to the equipment used for the Project, would be used to repair areas damaged during flooding and would result in similar emissions of fugitive dust and criteria pollutants during construction as for the Project and on a cumulatively considerable level. The area that would be flooded is difficult to estimate, but it could be assumed to cover a larger area than Lower Belmont Creek, exposing more sensitive receptors to potential air quality and GHG impacts compared with the Project.

There is greater potential for long term exposure to criteria pollutants compared to the Project because flooding is expected to occur on a regular basis under the No Project Alternative. Overall, air quality and GHG emission impacts under the No Project Alternative could be similar to impacts under the Project.

Biological Resources

Under the No Project Alternative, no special-status species and their habitats would be affected either directly or indirectly by construction activities. In addition, common (i.e., non-special-status) nesting raptors and migratory birds would not be affected by construction. The No Project Alternative would not have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service. However, in the probable event of flooding, there could be permanent effects on biological resources. The area that would be flooded is difficult to estimate, but it could be assumed to cover a larger area than Lower Belmont Creek, possibly impacting more special-status species and their habitats compared with the Project. Overall, biological resources impacts under the No Project Alternative could be greater than impacts under the Project, depending on the frequency of uncontrolled flooding.

Cultural Resources

The No Project Alternative would not involve ground-disturbing activities, and thus no impacts would occur on historical resources, archaeological resources, or human remains. The No Project Alternative would avoid potential Project impacts from inadvertent discovery and impacts on cultural resources during Project construction. However, in the probable event of increased flooding due to sedimentation and climate change, there could be permanent effects from related scouring on historical resources, archaeological resources, or human remains. The area that would be flooded is difficult to estimate, but it could be assumed to cover a larger area than Lower Belmont Creek, possibly impacting more cultural resources compared with the Project. Overall, cultural resources impacts under the No Project Alternative could be greater than those under the Project depending on the frequency and location of uncontrolled flooding, as such flooding and related scouring could result in damage or destruction to historical resources, archaeological resources, and/or human remains; the potentially large extent of such flooding could result in such impacts on multiple such resources.

Geology and Soils

The No Project Alternative would not involve ground-disturbing activities that would result in impacts to paleontological resources. The No Project Alternative would not require excavation below ground surface. There would be no installations beneath the existing parking lot and other areas of Twin Pines Park. However, in the probable event of increased flooding due to sedimentation and climate change, there could be permanent effects on paleontological resources. The area that would be flooded is difficult to estimate, but it could be assumed to cover a larger area than Lower Belmont Creek, possibly impacting more paleontological resources compared with the Project, as scouring could damage or destroy paleontological resources; the potentially large extent of such flooding could result in such impacts on multiple paleontological resources.

Overall, paleontological resources impacts under the No Project Alternative could be greater than under the Project depending on the frequency of uncontrolled flooding.

Hydrology and Water Quality

The No Project Alternative would not involve ground-disturbing activities that would result in impacts on hydrology and water quality or construction activities that could result in the risk of pollutant release because of inundation. The No Project Alternative would not use groundwater, alter the existing drainage pattern of the project area, or change the amount of surface water or flow of water in Belmont Creek. Under the No Project Alternative, the destructive flooding that has occurred historically at Belmont Creek would continue to occur and would expose people and property to flooding and other water-related hazards. The cumulative flood control projects would provide some reduction in flooding in the City, but the ongoing flooding consequences in the cities of Belmont and San Carlos and unincorporated areas of San Mateo generally would remain.

The No Project Alternative would not achieve the widespread Project benefits from reduction in flooding throughout the Belmont Creek Watershed. Therefore, there would be significant impacts relating to hydrology and water quality and impacts would be increased when compared to the Project.

Noise

The No Project Alternative would not generate construction noise. There would be no use of heavy construction equipment (such as excavators, loaders, or cranes) or construction activities involving demolition, grading, building, and paving that would generate varying noise levels. There would also be no impacts related to groundborne vibration generated during construction by impact equipment or earth moving equipment. However, in the probable event of flooding, construction activities associated with the cleanup of the flooded areas and repair of damaged facilities would result in temporary noise effects on sensitive receptors. Construction equipment similar to the equipment used for the Project would be used to repair areas damaged during flooding and would result in similar noise and vibration effects during construction as for the Project. The area that would be flooded is difficult to estimate, but it could be assumed to cover a larger area than Lower Belmont Creek, exposing more sensitive receptors to potential noise and vibration impacts compared with the Project. Overall, noise impacts under the No Project Alternative would be similar to those under the Project.

Tribal Cultural Resources

The No Project Alternative would not involve ground-disturbing activities, and no potential impacts on tribal cultural resources would occur. The No Project Alternative would avoid the Project's potential for inadvertent discovery of tribal cultural resources. However, in the probable event of increased flooding due to sedimentation and climate change, there could be permanent effects on tribal cultural resources. The area that would be flooded is difficult to estimate, but it could be assumed to cover a larger area than Lower Belmont Creek, possibly impacting more tribal cultural resources compared with the Project. Overall, tribal cultural resources impacts under the No Project Alternative could be greater than impacts under the Project depending on the frequency and location of uncontrolled flooding as such flooding and related scouring could result in damage or destruction to tribal cultural resources; the potentially large extent of such flooding could result in such impacts on multiple tribal cultural resources.

5.3.2 Alternative 2 – Hidden Canyon Park

Description

Hidden Canyon Park is a City-owned and operated public park located at 2642 Carlmont Drive. The park is approximately 140 acres, and includes a public parking lot and the Elevator Trail. The detention basin would store approximately 4.14 acre-feet of stormwater by replacing an existing 60-inch reinforced concrete pipe and installing an 18-inch outfall pipe and an emergency overflow structure. The 27,300-square-foot underground detention basin would require 9,100 cubic yards of excavation, along with landscaping and surface restoration. Overall, this alternative would reduce peak flow during a 50-year, 3-hour storm event by 37 cubic feet per second (cfs).

Ability to Meet the Project Objectives

Alternative 2 would reduce downstream flooding and provide flood protection in Lower Belmont Creek watershed, reduce downstream sedimentation and dredging, improve water quality through pollutant capture and removal, minimize disruption to public and private landowners, and improve water quality through pollutant capture and removal. However, Alternative 2 would not maximize flood protection because it would only store approximately 4.14 acre-feet of stormwater, which is about 20 percent of what the Project could store. Additionally, given that this alternative is located on a tributary upstream of the Project, it would not reduce flooding downstream in Lower Belmont Creek as much as the Project would. Under Alternative 2, most of the project objectives would be met but it would not maximize flood protection in Lower Belmont Creek.

Evaluation

Air Quality and Greenhouse Gas Emissions

Alternative 2 would involve the use of construction equipment and vehicles that would result in temporary construction emissions. Construction of this alternative could result in exposure of nearby residents on Carlmont Drive to toxic air contaminants in excess of thresholds set by the Bay Area Air Quality Management District (BAAQMD). Alternative 2 would have a smaller construction footprint than the Project (see Table 5-1), which would entail less excavation and would have a shorter construction duration. However, significant emissions would be generated and, under Alternative 2, implementation of **Mitigation Measure AIR-1**: **BAAQMD Basic Construction Mitigation Measures,** and **Mitigation Measure AIR-2: Require Tier 4 Engines on Construction Equipment** would be required to reduce air quality emissions and GHG emissions impacts to less-than-significant levels, similar to the Project.

Biological Resources

Alternative 2 would have the same types of construction impacts on biological resources as the Project, largely because the nature of the work (construct an underground stormwater storage facility, diversion weir, sediment chamber, bank stabilization, in-stream check structure, and outlet pipe) would be similar and thus use of the same or similar construction approaches and environmental protection measures would be warranted. The magnitude of impacts to aquatic and riparian habitat and associated special-status species, to jurisdictional wetlands and other waters of the U.S., and to nesting birds would be similar to those of the Project because it would require vegetation removal and work in the streambank to build an inlet/outlet structure for the detention basin. The long-term operational impacts to aquatic habitats and habitats in Belmont Creek are not expected to be substantially different than they would be for the Project. The same types of standard stream maintenance program activities would be performed as take place currently and as would under the Project.

Under Alternative 2, implementation of **Mitigation Measure BIO-1: Worker Awareness Environmental Training, Mitigation Measure BIO-2: Pre-Construction Survey for Special Status Plants, Mitigation Measure BIO-3: Wildlife Exclusion Fencing, Mitigation Measure BIO-4: Pre-construction Surveys for Special-status Bats, Mitigation Measure BIO-5: Pre-Construction/Activity Surveys for Common Nesting Birds**, **Mitigation Measure BIO-6: Compensation of Affected Riparian Habitat,** and **Mitigation Measure BIO-7: No Net Loss of Waters of U.S. and/or State** would be required to reduce impacts relating to biological resources less-than-significant levels, similar to the Project.

Cultural Resources

Alternative 2 could have the same type of or greater construction and operational impacts on cultural resources as the Project. This is because there may be as-yet undocumented cultural resources in the Alternative 2 project area, as it appears to have only been subject to one previous cultural resources survey, this survey did not include an archaeological subsurface survey, and this survey was conducted over 30 years ago. Despite this, a review of aerial imagery suggests that there are no architectural resources in the Alternative 2 project area and it appears unlikely that any architectural resources are present in the Alternative 2 project area. As such, impacts on architectural resources from Alternative 2 would be similar to those of the Project.

Alternative 2 would entail substantially less ground disturbance than the Project and its project area is less archaeological sensitive than the Project area, considering that the former is not adjacent to a perennial freshwater body, so the potential impact on archaeological resources from Alternative 2 would be less than that of the Project. However, if any archaeological resources were identified in the Alternative 2 project area and found to be California Register-eligible, impacts from Alternative 2 on archaeological resources would be significant. Implementation of mitigation measures similar to **Mitigation Measures CUL-1** to **CUL-4** would reduce such impacts on archaeological resources to a less-than-significant level and impacts would be similar to those under the Project. Similarly, such as-yet undocumented archaeological resources, if present in the Alternative 2 project area, could contain human remains and any impacts on them from Alternative 2 would be significant. Implementation of mitigation measures similar to **Mitigation Measures CUL-1** and **CUL-2** would reduce such impacts on human remains to a less-than-significant level, and impacts would be similar to those of the Project.

Geology and Soils

Alternative 2 would involve ground-disturbing activities that would result in impacts to paleontological resources. Alternative 2 would require excavation below ground surface to complete installations beneath Hidden Canyon Park. Under Alternative 2, implementation of **Mitigation Measure GEO-1: Paleontological Monitoring** would be required to reduce impacts relating to paleontological resources to less than significant, similar to those of the Project.

Hydrology and Water Quality

Alternative 2 would have the same types of construction impacts on hydrology and water quality as the Project, largely because the nature of the work (construct an underground stormwater storage facility, diversion weir, sediment chamber, bank stabilization, in-stream check structure, and outlet pipe) would be similar. Alternative 2 would involve the same ground-disturbing activities that would result in impacts on hydrology and water quality or construction activities that could result in the risk of pollutant release because of inundation. Alternative 2 could temporarily pump groundwater from the excavated area to create a dry work surface. The Alternative would also alter the existing drainage pattern of the Project area, and change the amount of surface water or flow of water in Belmont Creek. Alternative 2 would alter the course of Belmont Creek such that water would pass through a sediment chamber and, during higher flows, fill the stormwater storage facility instead of flooding downstream areas. Under Alternative 2, implementation of **Mitigation Measure HYD-1: In-Water Construction Measures** and **Mitigation Measure HYD-2: Geomorphic Monitoring and Adaptive Management Plan** would be required to reduce impacts relating to hydrology and water quality to less than significant, similar to those under the Project.

Noise

Alternative 2 would generate less noise from construction because its construction duration would be shorter than the Project. There would be use of heavy construction equipment (such as excavators, loaders, and cranes) and construction activities involving demolition, grading, building, and paving that would generate varying noise levels. There would also be impacts related to groundborne vibration generated during construction by impact equipment or earth moving equipment. Under Alterative 2, implementation of **Mitigation Measure NOI-1: Construction Noise Reduction Measures** and **Mitigation Measure NOI-2: Vibration Avoidance from Compaction** would be required to reduce impacts relating to noise and groundborne vibration to less than significant, similar to impacts under the Project.

Tribal Cultural Resources

Alternative 2 could have the same type of construction and operational impacts on tribal cultural resources as the Project. This is because there may be as-yet undocumented archaeological resources in the Alternative 2 project area, as it appears to have only been subject to one previous cultural resources survey, that did not include an archaeological subsurface survey, and no consultation with California Native American Tribes (Tribes) specific to Alternative 2 has been conducted. If any indigenous archaeological resources were identified in the Alternative 2 project area and were found to qualify as a tribal cultural resource or if any Tribes identified a non-archaeological tribal cultural resource that may be impacted by Alternative 2, impacts from

Alternative 2 on tribal cultural resources would be significant. Implementation of mitigation measures similar to **Mitigation Measures CUL-1** to **CUL-4** would reduce such impacts on tribal cultural resources, but the impact would remain significant and unavoidable, and impacts would be similar to those of the Project.

5.3.3 Alternative 3 – Notre Dame Belmont High School Softball Field

Description

Notre Dame Belmont High School is a Catholic women's college preparatory high school located at 1540 Ralston Ave. The softball field is located on the high school's campus just outside the Moore Pavilion. The Alternative 3 area is approximately 2.6 acres and contains an existing play court, parking lot, and softball field. The detention basin would store approximately 11.12 acre-feet of stormwater and would include the installation of 24-inch inlet and outlet pipes and an emergency overflow structure. The 102,840-square-foot underground detention basin would require 38,089 cubic yards of excavation, along with softball field-specific surface improvements. Overall, this alternative would reduce peak flow during a 50-year, 3-hour storm event by 70 cfs.

Ability to Meet the Project Objectives

Alternative 3 would reduce downstream flooding and provide flood protection in Lower Belmont Creek watershed, reduce downstream sedimentation and dredging, improve water quality through pollutant capture and removal, minimize disruption to public and private landowners, and improve water quality through pollutant capture and removal. However, Alternative 3 would not maximize flood protection because it would only store approximately 11.12 acre feet of stormwater, which is about 50 percent of what the Project could store. Additionally, given that this alternative is located upstream of the Project, it would not reduce flooding downstream in Lower Belmont Creek as much as the Project would. Under Alternative 3, most of the project objectives would be met, but it would not maximize flood protection in Lower Belmont Creek.

Evaluation

Air Quality and Greenhouse Gas Emissions

Alternative 3 would involve use of construction equipment and vehicles that would result in temporary construction emissions. Construction of this alternative could result in exposure of nearby residents on Ralston Ave. and students attending Notre Dame Belmont High School to toxic air contaminants in excess of thresholds set by the BAAQMD. Alternative 3 would have a larger construction footprint than the Project (see Table 5-1), which would entail more excavation and would have a longer construction duration. This would increase overall air quality and GHG emissions. Significant emissions would be generated and, under Alternative 3, implementation of **Mitigation Measure AIR-1**, **BAAQMD Basic Construction Mitigation Measures,** and **Mitigation Measure AIR-2: Require Tier 4 Engines on Construction Equipment** would be required to reduce air quality emissions and GHG emissions impacts to less-than-significant levels, similar to those under the Project.

Biological Resources

Alternative 3 would have the same types of construction impacts on biological resources as the Project, largely because the nature of the work (construct an underground stormwater storage facility, diversion weir, sediment chamber, bank stabilization measures, in-stream check structure, and outlet pipe) would be similar and thus use of the same or similar construction approaches and environmental protection measures would be warranted. However, the magnitude of impacts to aquatic and riparian habitat and associated special-status species, to jurisdictional wetlands and other waters of the U.S., and to nesting birds would be greater because the footprint would be larger than the Project, and it would also require vegetation removal and work in the streambank to build an inlet/outlet structure for the detention basin. The long-term operational impacts to aquatic habitats and habitats in Belmont Creek are not expected to be substantially different than they would be for the Project. The same types of standard stream maintenance program activities would be performed as take place currently and as they would under the Project.

Under Alternative 3, implementation of **Mitigation Measure BIO-1: Worker Awareness Environmental Training, Mitigation Measure BIO-2: Pre-Construction Survey for Special Status Plants, Mitigation Measure BIO-3: Wildlife Exclusion Fencing, Mitigation Measure BIO-4: Pre-construction Surveys for Special-status Bats, Mitigation Measure BIO-5: Pre-Construction/Activity Surveys for Common Nesting Birds**, **Mitigation Measure BIO-6: Compensation of Affected Riparian Habitat,** and **Mitigation Measure BIO-7: No Net Loss of Waters of U.S. and/or State** would be required to reduce impacts relating to biological resources less-than-significant levels, similar to the Project.

Cultural Resources

Alternative 3 could have the same type of or greater construction and operational impacts on cultural resources as the Project, as there may be as-yet undocumented cultural resources in the Alternative 3 project area, as it appears to have never been comprehensively covered by previous cultural resources investigations. The Alternative 3 project area is within the property of the Notre Dame Belmont High School, which was constructed in the 1920s, and which has apparently never been formally recorded or evaluated for California Register-eligibility. However, a review of aerial imagery indicates that none of the architectural resources in the Alternative 3 project area are of historic age (older than 50 years); therefore, even if the Notre Dame Belmont High School were found to be California Register-eligible, Alternative 3 would not result in a significant impact on historical resources. As such, impacts on architectural resources from Alternative 3 would be similar to those of the Project.

The Alternative 3 project area is less archaeologically sensitive than the Project area, considering that the former is not adjacent to a perennial freshwater body, so the potential impacts on archaeological resources from Alternative 3 would be reduced compared to the Project. However, if any archaeological resources were identified in the Alternative 3 project area and found to be California Register-eligible, impacts from Alternative 3 on archaeological resources would be significant. Implementation of mitigation measures similar to **Mitigation Measures CUL-1** to **CUL-4** would reduce such impacts on archaeological resources to a less-than-significant level, and the impacts would be similar to those of the Project. Similarly, such as-yet undocumented archaeological resources, if present in the Alternative 3 project area, could contain human remains and any impacts on them from Alternative 3 would be significant. Implementation of mitigation measures similar to **Mitigation Measures CUL-1** and **CUL-2** would reduce such impacts on human remains to a less-than-significant level, and impacts would be similar to those of the Project.

Geology and Soils

Alternative 3 would involve greater ground-disturbing activities that would result in impacts to paleontological resources. This alternative would require more excavation below ground surface to complete installations beneath the existing softball field, which could result in a greater impact on paleontological resources. Under Alternative 3, implementation of **Mitigation Measure GEO-1: Paleontological Monitoring** would be required to reduce impacts relating to paleontological resources to less than significant, similar to those under the Project.

Hydrology and Water Quality

Alternative 3 would have the same types of construction impacts on hydrology and water quality as the Project, largely because the nature of the work (construct an underground stormwater storage facility, diversion weir, sediment chamber, bank stabilization, in-stream check structure, and outlet pipe) would be similar. Alternative 3 would involve more ground-disturbing activities since the basin footprint would be larger than the Project, which would result in impacts on hydrology and water quality or construction activities that could result in the risk of pollutant release because of inundation. Alternative 3 could temporarily pump groundwater from the excavated area to create a dry work surface. The Alternative would also alter the existing drainage pattern of the Project area, which would change the amount of surface water or flow of water in Belmont Creek. Alternative 3 would alter the course of Belmont Creek such that water would pass through a sediment chamber and, during higher flows, fill the stormwater storage facility instead of flooding downstream areas. Under Alternative 3, implementation of **Mitigation Measure HYD-1, In-Water Construction Measures** and **Mitigation Measure HYD-2: Geomorphic Monitoring and Adaptive Management Plan** would be required to reduce impacts relating to hydrology and water quality to less than significant, similar to those under the Project.

Noise

Alternative 3 would generate more noise from construction because its construction duration would be longer than the Project. There would be use of heavy construction equipment (such as excavators, loaders, and cranes) and construction activities involving demolition, grading, building, and paving that would generate varying noise levels. There would also be impacts related to groundborne vibration generated during construction by impact equipment or earth moving equipment. Under Alterative 3, implementation of **Mitigation Measure NOI-1: Construction Noise Reduction Measures** and **Mitigation Measure NOI-2: Vibration Avoidance from Compaction** would be required to reduce impacts relating to noise and groundborne vibration to less than significant, similar to those under the Project.

Tribal Cultural Resources

Alternative 3 could have the same type of construction and operational impacts on tribal cultural resources as the Project, as there may be as-yet undocumented archaeological resources in the Alternative 3 project area, as it appears to have not been comprehensively covered by previous cultural resources investigations and no consultation with Tribes specific to Alternative 3 has been conducted. If any indigenous archaeological resources were identified in the Alternative 3 project area that were found to qualify as a tribal cultural resource or if any Tribes identified a non-archaeological tribal cultural resource that may be impacted by Alternative 3, impacts from Alternative 3 on tribal cultural resources would be significant. Implementation of mitigation measures similar to **Mitigation Measures CUL-1** to **CUL-4** would reduce such impacts on tribal cultural resources, but the impact would remain significant and unavoidable, and impacts would be similar to those under the Project.

5.3.4 Alternative 4 – Notre Dame de Namur Soccer Field

Description

Notre Dame de Namur University College is a private Catholic university located at 1500 Ralston Ave. The Koret soccer field is located on the southern corner of the University campus. The Alternative 4 area is approximately 1.7 acres and contains an existing soccer field, bleachers, and fencing. The detention basin would store 8.77 acre feet of stormwater and would involve the installation of 24-inch inlet and outlet pipes and an emergency overflow structure. The 72,000-square-foot underground detention basin would require 26,667 cubic yards of excavation, along with soccer field–specific surface improvements. Overall, this alternative would reduce peak flow during a 50-year, 3-hour storm event by 68 cfs.

Ability to Meet the Project Objectives

Alternative 4 would reduce downstream flooding and provide flood protection in Lower Belmont Creek watershed, reduce downstream sedimentation and dredging, improve water quality through pollutant capture and removal, minimize disruption to public and private landowners, and improve water quality through pollutant capture and removal. However, Alternative 4 would not maximize flood protection because it would only store approximately 8.77 acre feet of stormwater, which is about 40 percent of what the Project could store. Additionally, given that this alternative is located upstream of the Project, it would not reduce flooding downstream in Lower Belmont Creek as much as the Project would. Under Alternative 4, most of the project objectives would be met, but it would not maximize flood protection in Lower Belmont Creek.

Evaluation

Air Quality and Greenhouse Gas Emissions

Alternative 4 would involve the use of construction equipment and vehicles that would result in temporary construction emissions. Construction of this alternative could result in exposure of nearby residents on Ralston Ave. and students, faculty, and staff on the Notre Dame de Namur University campus to toxic air contaminants in excess of thresholds set by the BAAQMD. Alternative 4 would have a larger construction footprint than the Project (see Table 5-1), which would entail more excavation and would have a longer construction duration. This would increase overall air quality and GHG emissions. Significant emissions would be generated and, under Alternative 4, implementation of **Mitigation Measure AIR-1**, **BAAQMD Basic Construction Mitigation Measures,** and **Mitigation Measure AIR-2: Require Tier 4 Engines on Construction Equipment** would be required to reduce air quality emissions and GHG emissions impacts to less-than-significant levels, similar to those of the Project.

Biological Resources

Alternative 4 would have the same types of construction impacts on biological resources as the Project, largely because the nature of the work (construct an underground stormwater storage facility, diversion weir, sediment chamber, bank stabilization measures, in-stream check structure, and outlet pipe) would be similar and thus use of the same or similar construction approaches and environmental protection measures would be warranted. The magnitude of impacts to aquatic and riparian habitat and associated special-status species, to jurisdictional wetlands and other waters of the U.S., and to nesting birds would be greater because the footprint would be larger than that of the Project, and it would require vegetation removal and work in the streambank to build an inlet/outlet structure for the detention basin. The long-term operational impacts to aquatic habitats and habitats in Belmont Creek would not be expected to be substantially different than they would be for the Project. The same types of standard stream maintenance program activities would be performed as take place currently, and as they would under the Project.

Under Alternative 4, implementation of **Mitigation Measure BIO-1: Worker Awareness Environmental Training, Mitigation Measure BIO-2: Pre-Construction Survey for Special Status Plants, Mitigation Measure BIO-3: Wildlife Exclusion Fencing, Mitigation Measure BIO-4: Pre-construction Surveys for Special-status Bats, Mitigation Measure BIO-5: Pre-Construction/Activity Surveys for Common Nesting Birds**, **Mitigation Measure BIO-6: Compensation of Affected Riparian Habitat,** and **Mitigation Measure BIO-7: No Net Loss of Waters of U.S. and/or State** would be required to reduce impacts relating to biological resources less-than-significant levels, similar to the Project.

Cultural Resources

Alternative 4 could have the same type of or greater construction and operational impacts on cultural resources as the Project, as there may be as-yet undocumented cultural resources in the Alternative 4 project area, as the area appears to have never been covered by previous cultural resources investigations. The Alternative 4 project area is within the property of the Notre Dame de Namur University itself, which was established in 1853, and has apparently never been formally recorded or evaluated for California Register-eligibility. However, a review of aerial imagery indicates that none of the architectural resources in the Alternative 4 project area are of historic age (older than 50 years); therefore, even if the Notre Dame de Namur University were found to be California Register-eligible, Alternative 4 would not result in a significant impact on historical resources. As such, impacts on architectural resources from Alternative 4 would be similar to those of the Project.

Alternative 4 would entail more ground disturbance than the Project and its project area is less archaeologically sensitive than the Project area, considering that the former is not adjacent to a perennial freshwater body, so the potential impacts on archaeological resources from Alternative 4 would be reduced compared to the Project. However, if any archaeological resources were identified in the Alternative 4 project area and found to be California Register-eligible, impacts from Alternative 4 on archaeological resources would be significant. Implementation of mitigation measures similar to **Mitigation Measures CUL-1** to **CUL-4** would reduce such impacts on archaeological resources to a less-than-significant level and impacts would be similar to those of the Project. Similarly, such as-yet undocumented archaeological resources, if present in the Alternative 4 project area, could contain human remains and any impacts on them from Alternative 4 would be significant. Implementation of mitigation measures similar to **Mitigation Measures CUL-1** and **CUL-2** would reduce such impacts on human remains to a less-than-significant level, and impacts would be similar to those of the Project.

Geology and Soils

Alternative 4 would involve greater ground-disturbing activities that would result in impacts to paleontological resources. This alternative would require more excavation below ground surface to complete installations beneath the existing soccer field, which would be a greater impact on paleontological resources. Under Alternative 4, implementation of **Mitigation Measure GEO-1: Paleontological Monitoring** would be required to reduce impacts relating to paleontological resources to less than significant, similar to those of the Project.

Hydrology and Water Quality

Alternative 4 would have the same types of construction impacts on hydrology and water quality as the Project, largely because the nature of the work (construct an underground stormwater storage facility, diversion weir, sediment chamber, bank stabilization, in-stream check structure, and outlet pipe) would be similar. Alternative 4 would involve more ground-disturbing activities since the basin footprint would be larger than the Project, which would result in impacts on hydrology and water quality or construction activities that could result in the risk of pollutant release because of inundation. Alternative 4 could temporarily pump groundwater from the excavated area to create a dry work surface. The Alternative would also alter the existing drainage pattern of the Project area, which would change the amount of surface water or flow of water in Belmont Creek. Alternative 4 would alter the course of Belmont Creek such that water would pass through a sediment chamber and, during higher flows, fill the stormwater storage facility instead of flooding downstream areas. Under Alternative 4, implementation of **Mitigation Measure HYD-1, In-Water Construction Measures** and **Mitigation Measure HYD-2: Geomorphic Monitoring and Adaptive Management Plan** would be required to reduce impacts relating to hydrology and water quality to less than significant, similar to those under the Project.

Noise

Alternative 4 would generate more noise from construction because its construction duration would be longer than the Project. There would be use of heavy construction equipment (such as excavators, loaders, and cranes) and construction activities involving demolition, grading, building, and paving that would generate varying noise levels. There would also be impacts related to groundborne vibration generated during construction by impact equipment or earth moving equipment. Under Alterative 4, implementation of **Mitigation Measure NOI-1: Construction Noise Reduction Measures** and **Mitigation Measure NOI-2: Vibration Avoidance from Compaction** would be required to reduce impacts relating to noise and groundborne vibration to less than significant, similar to those under the Project.

Tribal Cultural Resources

Alternative 4 could have the same type of construction and operational impacts on tribal cultural resources as the Project, as there may be as-yet undocumented archaeological resources in the Alternative 4 project area. The area appears to have not been covered by previous cultural resources investigations and no consultation with Tribes specific to Alternative 4 has been conducted. If any indigenous archaeological resources were identified in the Alternative 4 project area that were found to qualify as a tribal cultural resource or if any Tribes identified a non-archaeological tribal cultural resource that may be impacted by Alternative 4, impacts from Alternative 4 on tribal cultural resources would be significant. Implementation of mitigation measures similar to **Mitigation Measures CUL-1** to **CUL-4** would reduce such impacts on tribal cultural resources, but the impact would remain significant and unavoidable, and impacts would be similar to those of the Project.

5.3.5 Alternative 5 – Carlmont High School Softball Field

Description

Carlmont High School is a public high school managed by the Sequioa Union High School District, and located at 1400 Alameda de Las Pulgas in Belmont. The softball field is in the northern portion of campus, adjacent to a surface parking lot and the performing arts center. The detention basin would store 13.08 acre feet of stormwater and would require the installation of a 36-inch inlet pipe, a 24-inch outlet pipe, and an emergency overflow structure. The 131,574-square-foot underground detention basin would require 38,985 cubic yards of excavation, along with softball field–specific surface improvements. Overall, this alternative would reduce peak flow during a 50-year, 3-hour storm event by 16 cfs.

Ability to Meet the Project Objectives

Alternative 5 would reduce downstream flooding and provide flood protection in Lower Belmont Creek watershed, reduce downstream sedimentation and dredging, improve water quality through pollutant capture and removal, minimize disruption to public and private landowners, and improve water quality through pollutant capture and removal. However, Alternative 5 would not maximize flood protection because it would only store approximately 13.08 acre feet of stormwater, which is about 60 percent of what the Project could store. Additionally, given that this alternative is located on a tributary upstream of the Project, it would not reduce flooding downstream in Lower Belmont Creek as much as the Project could. Under Alternative 5, most of the project objectives would be met, but it would not maximize flood protection in Lower Belmont Creek.

Evaluation

Air Quality and Greenhouse Gas Emissions

Alternative 5 would involve the use of construction equipment and vehicles that would result in temporary construction emissions. Construction of this alternative could result in exposure of nearby residents on Alameda de las Pulgas and students, faculty, and staff on the Carlmont High School campus to toxic air contaminants in excess of thresholds set by the BAAQMD. Alternative 5 would have a larger construction footprint than the Project (see Table 5-1), which would entail more excavation and would have a longer construction duration. This would increase overall air quality and GHG emissions. Significant emissions would be generated and, under Alternative 5, implementation of **Mitigation Measure AIR-1**, **BAAQMD Basic Construction Mitigation Measures,** and **Mitigation Measure AIR-2: Require Tier 4 Engines on Construction Equipment** would be required to reduce air quality emissions and GHG emissions impacts to less than significant, similar to those of the Project.

Biological Resources

Alternative 5 would have the same types of construction impacts on biological resources as the Project, largely because the nature of the work (construct an underground stormwater storage facility, diversion weir, sediment chamber, bank stabilization measures, in-stream check structure, and outlet pipe) would be similar and thus use of the same or similar construction approaches and environmental protection measures would be warranted. The magnitude of impacts to aquatic and riparian habitat and associated special status species, to jurisdictional wetlands and other waters of the U.S., and to nesting birds would be greater because the footprint would be larger than the Project, and it would require vegetation removal and work in the streambank to build an inlet/outlet structure for the detention basin. The long-term operational impacts to aquatic habitats and habitats in Belmont Creek would not be be substantially different than they would be for the Project. The same types of standard stream maintenance program activities would be performed as take place currently and as would under the Project.

Under Alternative 5, implementation of **Mitigation Measure BIO-1: Worker Awareness Environmental Training, Mitigation Measure BIO-2: Pre-Construction Survey for Special Status Plants, Mitigation Measure BIO-3: Wildlife Exclusion Fencing, Mitigation Measure BIO-4: Pre-construction Surveys for Special-status Bats, Mitigation Measure BIO-5: Pre-Construction/Activity Surveys for Common Nesting Birds**, **Mitigation Measure BIO-6: Compensation of Affected Riparian Habitat,** and **Mitigation Measure BIO-7: No Net Loss of Waters of U.S. and/or State** would be required to reduce impacts relating to biological resources less-than-significant levels, similar to the Project.

Cultural Resources

Alternative 5 could have the same construction and operational impacts on cultural resources as the Project would, as there may be as-yet undocumented cultural resources in the Alternative 5 project area, and the area appears to have never been covered by previous cultural resources investigations. If any architectural resources (such as the Carlmont High School itself, which was constructed in the 1950s) were identified in the Alternative 5 project area and found to be California Register-eligible, impacts from Alternative 5 on historical resources would be significant, and it is unknown whether mitigation measures would reduce the impact to a less-than-significant level. As such, impacts on architectural resources from Alternative 5 would be greater than the Project. If any archaeological resources were identified in the Alternative 5 project area and found to be California Register-eligible, impacts from Alternative 5 on archaeological resources would be significant.

Alternative 5 would entail more ground disturbance than the Project, and its project area is less archaeologically sensitive than the Project area, considering that the former is not adjacent to a perennial freshwater body, so the potential impacts on archaeological resources from Alternative 5 would be reduced compared to the Project. However, implementation of mitigation measures similar to **Mitigation Measures CUL-1** to **CUL-4** would reduce such impacts on archaeological resources to a less-than-significant level and impacts would be similar to those of the Project. Similarly, such as-yet undocumented archaeological resources, if present in the Alternative 5 project area, could contain human remains and any impacts on them from Alternative 5 would be significant. Implementation of mitigation measures similar to **Mitigation Measures CUL-1** and **CUL-2** would reduce such impacts on human remains to a less-than-significant level, and impacts would be similar to those of the Project.

Geology and Soils

Alternative 5 would involve greater ground-disturbing activities that could result in impacts to paleontological resources. This alternative would require more excavation below ground surface to complete installations beneath the existing softball field, which would be a greater impact on paleontological resources. Under Alternative 5, implementation of **Mitigation Measure GEO-1: Paleontological Monitoring** would be required to reduce impacts relating to paleontological resources to less than significant, similar to those of the Project.

Hydrology and Water Quality

Alternative 5 would have the same types of construction impacts on hydrology and water quality as the Project, largely because the nature of the work (construct an underground stormwater storage facility, diversion weir, sediment chamber, bank stabilization, in-stream check structure, and outlet pipe) would be similar. Alternative 5 would involve more ground-disturbing activities since the basin footprint would be larger than the Project, that could result in impacts on hydrology and water quality or construction activities that could result in the risk of pollutant release because of inundation. Alternative 5 could temporarily pump groundwater from the excavated area to create a dry work surface. The Alternative would also alter the existing drainage pattern of the Project area and change the amount of surface water or flow of water in Belmont Creek. Alternative 5 would alter the course of Belmont Creek such that water would pass through a sediment chamber and, during higher flows, fill the stormwater storage facility instead of flooding downstream areas. Under Alternative 5, implementation of **Mitigation Measure HYD-1, In-Water Construction Measures** and **Mitigation Measure HYD-2: Geomorphic Monitoring and Adaptive Management Plan** would be required to reduce impacts relating to hydrology and water quality to less than significant, similar to those of the Project.

Noise

Alternative 5 would generate more noise from construction because its construction duration would be longer than the Project. There would be use of heavy construction equipment (such as excavators, loaders, and cranes) and construction activities involving demolition, grading, building, and paving that would generate varying noise levels. There would also be impacts related to groundborne vibration generated during construction by impact equipment or earth moving equipment. Under Alterative 5, implementation of **Mitigation Measure NOI-1: Construction Noise Reduction Measures** and **Mitigation Measure NOI-2: Vibration Avoidance from Compaction** would be required to reduce impacts relating to noise and groundborne vibration to less than significant, similar to those of the Project.

Tribal Cultural Resources

Alternative 5 could have the same type of construction and operational impacts on tribal cultural resources as the Project, as there may be as-yet undocumented archaeological resources in the Alternative 5 project area, as it appears to have never been covered by previous cultural resources investigations and no consultation with Tribes specific to Alternative 5 has been conducted. If any indigenous archaeological resources were identified in the Alternative 5 project area that were found to qualify as a tribal cultural resource or if any Tribes identified a non-archaeological tribal cultural resource that may be impacted by Alternative 3, impacts from Alternative 5 on tribal cultural resources would be significant. Implementation of mitigation measures similar to **Mitigation Measures CUL-1** to **CUL-4** would reduce such impacts on tribal cultural resources, but the impact would remain significant and unavoidable, and impacts would be similar to those of the Project.

5.4 Comparison of Alternatives

5.4.1 Comparison of Project Alternative

Table 5-2 compares the Project's potential impacts with the alternatives in terms of potential environmental impacts.

5.4.2 Environmentally Superior Alternative

The CEQA *Guidelines* require the identification of an environmentally superior alternative to the Project. If it is determined that the "no project" alternative would be the environmentally superior alternative, then the EIR shall also identify an environmentally superior alternative among the other project alternatives (CEQA *Guidelines* Section 15126.6[e]).

Compared to the Project, the No Project Alternative could result in significant unavoidable impacts on tribal cultural resources, and significant but mitigatable impacts on biological resources, cultural resources, and air quality and GHG emissions given more frequent and larger flooding events. Therefore, the No Project Alternative would not be considered the environmentally superior alternative. Because Alternatives 2 through 5 would meet most of the Project objectives to some degree, but the extent of construction impacts would vary, Alternative 2 would have least ground disturbance and would be considered the environmentally superior alternative. Alternative 2 would continue to have significant unavoidable impacts on tribal cultural resources, similar to the Project, but would not maximize stormwater storage capacity since this alternative could sequester approximately 20 percent of the stormwater as the Project could during storm events. This would limit the amount of downstream flooding that Alternative 2 would be able to prevent.

Alternatives 3 and 4 would require acquiring private property leading to substantial delays in realizing project benefits of flood reduction. Those sites' existing uses would be diminished by requiring continued maintenance access to the site and reconfiguring the playing fields to accommodate large maintenance vehicles. Alternative 5 would require coordination with the school district for a joint use agreement with the City. The current uses of the fields would be disrupted and altered as access roads would need to be installed for maintenance. In contrast, the Project site is owned by the City and would require no acquisition or use agreements.

Maintenance of the detention basin would require vacuum truck and small earth moving equipment to be at the site on a consistent basis. Alternative 2 would require regular disruptions to the nearby neighborhood for maintenance access as it is accessed through an existing residential cul-de-sac. Alternatives 3 through 5 would alter the surface and subsurface soils to ensure sufficient strength to support heavy vehicle loads which can alter the existing use of the fields. Project maintenance would access through the existing parking lot on Twin Pines Lane, minimizing impacts to residents and maintaining the current uses of the park areas.

Overall, the proposed Project would be the environmentally superior alternative because it would detain the most stormwater since it would be located furthest down the watershed and would capture water from various tributaries, the Water Dog Lake subwatershed and Belmont Creek itself. No other alternative would capture and retain as much water and meet the Project objectives to the same degree.

TABLE 5-2
COMPARISON OF PROJECT ALTERNATIVES

Impact	Project: Twin Pines Park	1. No Project	2. Hidden Canyon Park	3. Notre Dame Belmont High School Softball Field	4. Notre Dame de Namur Soccer Field	5. Carlmont High School Softball Field
Air Quality/Greenhouse Gas Emissions						
Conflict with or obstruct implementation of the applicable air quality plan. 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. Expose sensitive receptors to substantial pollutant concentrations.	**Significant**	**Increased** Periodic flooding within Lower Belmont Creek could require clean up and repair. These activities would result in recurring but temporary increases of criteria pollutants emissions, and exposure of sensitive receptors to criteria pollutants.	**Decreased** Smaller construction footprint would entail less excavation and a shorter construction duration. Emissions of criteria pollutants would be decreased compared to the Project.	**Increased** Larger construction footprint would entail more excavation and a longer construction duration. Emissions of criteria pollutants would be increased compared to the Project.	**Increased** Larger construction footprint would entail more excavation and a longer construction duration. Emissions of criteria pollutants would be increased compared to the Project.	**Increased** Larger construction footprint would entail more excavation and a longer construction duration. Emissions of criteria pollutants would be increased compared to the Project.
Biological Resources						
Have a substantial adverse effect on any species identified as a candidate, sensitive, or special-status species. Have a substantial adverse effect on any riparian habitat or other sensitive natural community on state or federally protected wetlands through direct removal, filling, hydrological interruption, or other means. Have a substantial adverse effect on state or federally protected wetlands including, but not limited to, marsh, vernal pool, coastal, etc. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.	**Significant**	**Increased** Periodic flooding within Lower Belmont Creek could cause permanent effects on biological resources. It could be a larger area than Lower Belmont Creek, possibly impacting more special-status species and their habitats compared with the Project.	**Similar** Although construction footprint would be smaller than the Project, construction impacts would be similar to the Project because the nature of the work would be the same and vegetation removal and work in the streambank to build an inlet/outlet structure for the detention basin would be required. Operational impacts on sensitive species, habitats, and wetlands would be similar to the Project because it would entail similar stream maintenance activities.	**Increased/Similar** Construction impacts would be greater than those of the Project because the construction footprint is larger; however, the nature of the work would be the same and vegetation removal and work in the streambank to build an inlet/outlet structure for the detention basin would be required. Operational impacts on sensitive species, habitats, and wetlands would be similar to the Project because it would entail similar stream maintenance activities.	**Increased/Similar** Construction impacts would be greater than to the Project because the construction footprint is larger; however, the nature of the work would be the same and vegetation removal and work in the streambank to build an inlet/outlet structure for the detention basin would be required. Operational impacts on sensitive species, habitats, and wetlands would be similar to the Project because it would entail similar stream maintenance activities.	**Increased/Similar** Construction impacts would be greater than to the Project because the construction footprint is larger; however, the nature of the work would be the same and vegetation removal and work in the streambank to build an inlet/outlet structure for the detention basin would be required. Operational impacts on sensitive species, habitats, and wetlands would be similar to the Project because it would entail similar stream maintenance activities.
Cultural Resources						
Cause a substantial adverse change in the significance of an archaeological resource pursuant to CEQA *Guidelines* Section 15064.5. Disturb human remains, including those interred outside of dedicated cemeteries.	**Significant**	**Increased** Periodic flooding within Lower Belmont Creek could cause permanent effects on historic resources, archaeological resources, or human remains. The area could be larger than Lower Belmont Creek, possibly impacting more cultural resources as compared with the Project.	**Similar/Decreased** Similar to the Project, there would be no impacts on historic resources on this alternative site. This alternative area is less archaeologically sensitive than the Project area because it is not adjacent to a perennial freshwater body. The impacts on archaeological resources would be reduced compared to the Project.	**Similar/Decreased** Similar to the Project, there would be no impacts on historic resources on this alternative site. This alternative area is less archaeologically sensitive than the Project area because it is not adjacent to a perennial freshwater body. The impacts on archaeological resources would be reduced compared to the Project.	**Similar/Decreased** Similar to the Project, there would be no impacts on historic resources on this alternative site. This alternative area is less archaeologically sensitive than the Project area because it is not adjacent to a perennial freshwater body. The impacts on archaeological resources would be reduced compared to the Project.	**Increased/Decreased** This site contains potential historic resources and would have a greater impact on those than the Project. This alternative area is less archaeologically sensitive than the Project area because it is not adjacent to a perennial freshwater body. The impacts on archaeological resources would be reduced compared to the Project.
Geology and Soils						
Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.	**Significant**	**Increased** Periodic flooding within Lower Belmont Creek could cause permanent effects on paleontological resources. The area could be larger area than Lower Belmont Creek, possibly impacting more paleontological resources compared with the Project.	**Similar** Ground-disturbing activities could impact paleontological resources, similar to the Project.	**Similar** Ground-disturbing activities could impact paleontological resources, similar to the Project.	**Similar** Ground-disturbing activities could impact paleontological resources, similar to the Project.	**Similar** Ground-disturbing activities could impact paleontological resources, similar to the Project.

Impact	Project: Twin Pines Park	1. No Project	2. Hidden Canyon Park	3. Notre Dame Belmont High School Softball Field	4. Notre Dame de Namur Soccer Field	5. Carlmont High School Softball Field
Hydrology and Water Quality						
Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality. Result in substantial erosion or siltation on- or off-site. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.	**Significant**	**Increased** Periodic flooding within Lower Belmont Creek would continue and could expose people and property to flooding and other water-related hazards.	**Similar** This alternative would require the same construction techniques as the Project, and would reduce downstream flooding and sedimentation in Belmont Creek.	**Similar** This alternative would require the same construction techniques as the Project, and would reduce downstream flooding and sedimentation in Belmont Creek.	**Similar** This alternative would require the same construction techniques as the Project, and would reduce downstream flooding and sedimentation in Belmont Creek.	**Similar** This alternative would require the same construction techniques as the Project, and would reduce downstream flooding and sedimentation in Belmont Creek.
Noise						
Generation of a substantial temporary or permanent increase in ambient noise levels in excess of standards. Generation of excessive groundborne vibration or groundborne noise levels.	**Significant**	**Similar** Periodic flooding within Lower Belmont Creek could require clean up and repair. Construction activities associated with the cleanup of the flooded areas would result in temporary noise effects on sensitive receptors. Construction equipment, would be used to repair areas damaged during flooding and would result in similar noise and vibration effects during construction as for the Project.	**Decreased** Temporary increases in noise levels would be decreased compared to the Project because construction duration would be shorter.	**Increased** Temporary increases in noise levels would be increased compared to the Project because construction duration would be longer.	**Increased** Temporary increases in noise levels would be increased compared to the Project because construction duration would be longer.	**Increased** Temporary increases in noise levels would be increased compared to the Project because construction duration would be longer.
Tribal Cultural Resources						
Cause a substantial adverse change in the significance of a tribal cultural resource, as defined in PRC Section 21074.	**Significant**	**Increased** Periodic flooding within Lower Belmont Creek could cause permanent effects on tribal cultural resources. The area could be larger than Lower Belmont Creek, possibly impacting more tribal cultural resources compared with the Project.	**Similar** No consultation with Tribes has been conducted for this site. Unknown indigenous archaeological resources could be identified and found to qualify as a tribal cultural resource, and impacts would be similar to the Project.	**Similar** No consultation with Tribes has been conducted for this site. Unknown indigenous archaeological resources could be identified and found to qualify as a tribal cultural resource, and impacts would be similar to the Project.	**Similar** No consultation with Tribes has been conducted for this site. Unknown indigenous archaeological resources could be identified and found to qualify as a tribal cultural resource, and impacts would be similar to the Project.	**Similar** No consultation with Tribes has been conducted for this site. Unknown indigenous archaeological resources could be identified and found to qualify as a tribal cultural resource, and impacts would be similar to the Project.

5.5 Alternatives Considered but Eliminated from Further Analysis

In the BCWMP, an alternative to develop a project at Water Dog Lake was explored (see **Appendix E**). Water Dog Lake and the existing dam currently provide enough capacity to contain the 50-year, 6-hour storm (approximately 25 cubic feet per second) of the contributing 306-acre subwatershed; the Water Dog Lake subwatershed contributes approximately 2 percent of flows to the Belmont Creek WMP watershed. This determination is based on City-provided maintenance, operation, and design information. City maintenance does not involve dredging; future studies may consider dredging in Water Dog Lake to increase capacity. The City currently opens the dam's 24-inch outlet pipe from November 1 to April 1 to convey the rainy season flows. While the City operates and maintains Water Dog Lake, Notre Dame de Namur University controls approximately 50 acres surrounding the dam, which presents additional construction, permitting, and coordination efforts. Due to the lake's low contributions to the Belmont Creek WMP watershed (about 2 percent), it would fail to meet the basic Project objectives. Therefore, an alternative project at Water Dog Lake was rejected from further environmental analysis.

Additional alternative sites were considered during the development of the BCWMP; however, none of the other locations met the engineering or land ownership criteria for constructing a detention basin. These alternative sites were eliminated from further environmental analysis because they were considered infeasible.

The conveyance alternative was not considered as a CEQA alternative because it would cause additional environmental impacts due to the duration and length of construction. In addition, the construction would impact multiple businesses and require road closures, which would not meet the objective to minimize disruption to public and private landowners. Therefore, this alternative does not meet the requirements of CEQA because it would not reduce or avoid environmental impacts of the Project and was eliminated from further analysis.

5.6 References

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CHAPTER 6
Report Preparers

6.1 Lead Agency

6.1.1 City of Belmont

Elizabeth Wada, PE: Project Manager, Senior Civil Engineer
Peter Brown: former Public Works Director

6.2 Consultants

6.2.1 Environmental Science Associates

Alisa Moore: Project Director
Darcy Kremin: Project Manager
Karen Lancelle: Senior Advisor
Alena Norcott: CEQA Lead
Stephanie Villegas: Deputy Project Manager
Jyothi Iyer: Air Quality, Energy, Greenhouse Gas Emissions Lead
Jiemin Guo: Biological Resources
Priya Finnemore: Senior Biological Resources
Robin Hoffman: Cultural and Tribal Cultural Resources
Karen Lancelle: Hydrology and Water Quality
Nick Reynoso: Noise and Vibration
Chris Sanchez: Senior Noise and Vibration
Ron Teitel: Graphics/GIS
Kristine Olsen: Publications
Brooke McDonald: Technical Editing

6.2.2 Craft Water Engineering, Inc.

Merrill Taylor, PE: Senior Project Manager
Oliver Galang, PE: Principal

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Appendix A

NOP and Scoping Comments

CITY OF
BELMONT
One Twin Pines Lane
Belmont, CA 94002

Notice of Preparation

City of Belmont

Twin Pines Park Stormwater Detention Project

Date	October 4, 2023
To	Reviewing Agencies, Interested Parties, and Organizations
Subject	Notice of Preparation of a Draft Environmental Impact Report for the City of Belmont Twin Pines Park Stormwater Detention project.

The City of Belmont (City) is designing the Twin Pines Park Stormwater Detention project (project) and has determined that a focused Environmental Impact Report (EIR) will be necessary to evaluate environmental impacts of the project pursuant to the California Environmental Quality Act (CEQA). In compliance with CEQA, the City will be the Lead Agency and will prepare the EIR. The City is requesting comments and guidance on the scope and content of the EIR from responsible and trustee agencies, interested public agencies, organizations, and the general public (CEQA Guidelines Section 15082).

This Notice of Preparation (NOP) provides a summary of the project, includes the City's preliminary identification of the potential environmental issues to be analyzed in the EIR, and provides information on how to comment on the scope of the EIR.

Notice of Preparation Public Review Period: October 4 to November 3, 2023

The City requests your careful review and consideration of this notice, and it invites any and all input and comments from interested agencies, persons, and organizations regarding the preparation of the EIR. Comments and responses to this notice must be in writing and submitted to the Lead Agency Contact through the close of business on November 3, 2023. If applicable, please indicate a contact person for your agency or organization. If your agency is a responsible agency as defined by CEQA Guidelines Section 15381, your agency may use the environmental documents prepared by the City when considering permits or approvals for action regarding the project.

Written Comments: Please submit written comments by 5:00 p.m. on November 3, 2023:

- Email: ewada@belmont.gov
- Regular Mail: Elizabeth Wada, Associate Civil Engineer, City of Belmont, One Twin Pines Lane, Suite 385, Belmont, CA 94002

Project Background

The Belmont Creek watershed encompasses approximately 1,900 acres, originating at an elevation of 700 feet from Pulgas Ridge, with three substantial tributaries, near Carlmont Drive, Alameda de las Pulgas, and University of Notre Dame de Namur. Regional flooding in the watershed historically occurs downstream of El Camino Real, where the creek enters the flat, tidally influenced, Harbor/Industrial Area before discharging into Belmont Slough. The *Belmont Creek Watershed Management Plan* proposed a 21.5-acre-foot underground stormwater detention basin within Twin Pines Park to reduce peak flow in Belmont Creek and subsequently reduce flooding downstream.

Project Location

Twin Pines Park is located at 1 Twin Pines Lane in Belmont, California (refer to **Figure 1**). The project site is located on four parcels (Accessor Parcel Numbers 045-170-080, 045-181-250, 045-181-230, and 045-181-280) adjacent to Twin Pines Lane east of Ralston Avenue, and south of 6th Avenue in Belmont.

Proposed Project

The project would include construction of an underground stormwater storage facility beneath the parking lots or other areas of the 10-acre Twin Pines Park. The project is designed to attenuate the peak stormwater flow of Belmont Creek, to trap sediment and debris, to reduce flood risk in the flood-prone lower creek reach, downstream of El Camino Real, and to provide ancillary water quality benefits. A diversion weir would divert high flows from Belmont Creek to the 9-acre-foot underground storage facility, where water would remain before flowing back into Belmont Creek through a 12-inch outlet pipe. The project would also include a sediment chamber, bank stabilization along Belmont Creek, and an in-stream check structure in Belmont Creek. Refer to **Figure 1** for a depiction of these project components.

Project Alternatives

The EIR will evaluate a reasonable range of project alternatives that, consistent with CEQA, meet most of the project objectives and reduce or avoid potential environmental effects, including a required No Project Alternative.

Potential Environmental Effect Areas

The EIR will describe the reasonably foreseeable and potentially significant adverse effects of the proposed project (both direct and indirect). The EIR also will evaluate the cumulative impacts of the project when considered in conjunction with other related past, present, and reasonably foreseeable future projects. The City anticipates that the project could result in potentially significant environmental impacts to air quality, biological resources, cultural resources, hydrology and water quality, and Tribal cultural resources, which will be further evaluated in the EIR. Other CEQA Guidelines Appendix G topics will be addressed in an Initial Study that will be appended to the Draft EIR.

When the Draft EIR is complete, it will be available for review at the City's offices located at 1 Twin Pines Lane, Suite 385, Belmont, CA 94002 and online at: www.belmont.gov/StormwaterBasin. The City will issue a Notice of Availability of a Draft EIR at that time to inform the public and interested agencies, groups and individuals of how to access the Draft EIR and provide comments.

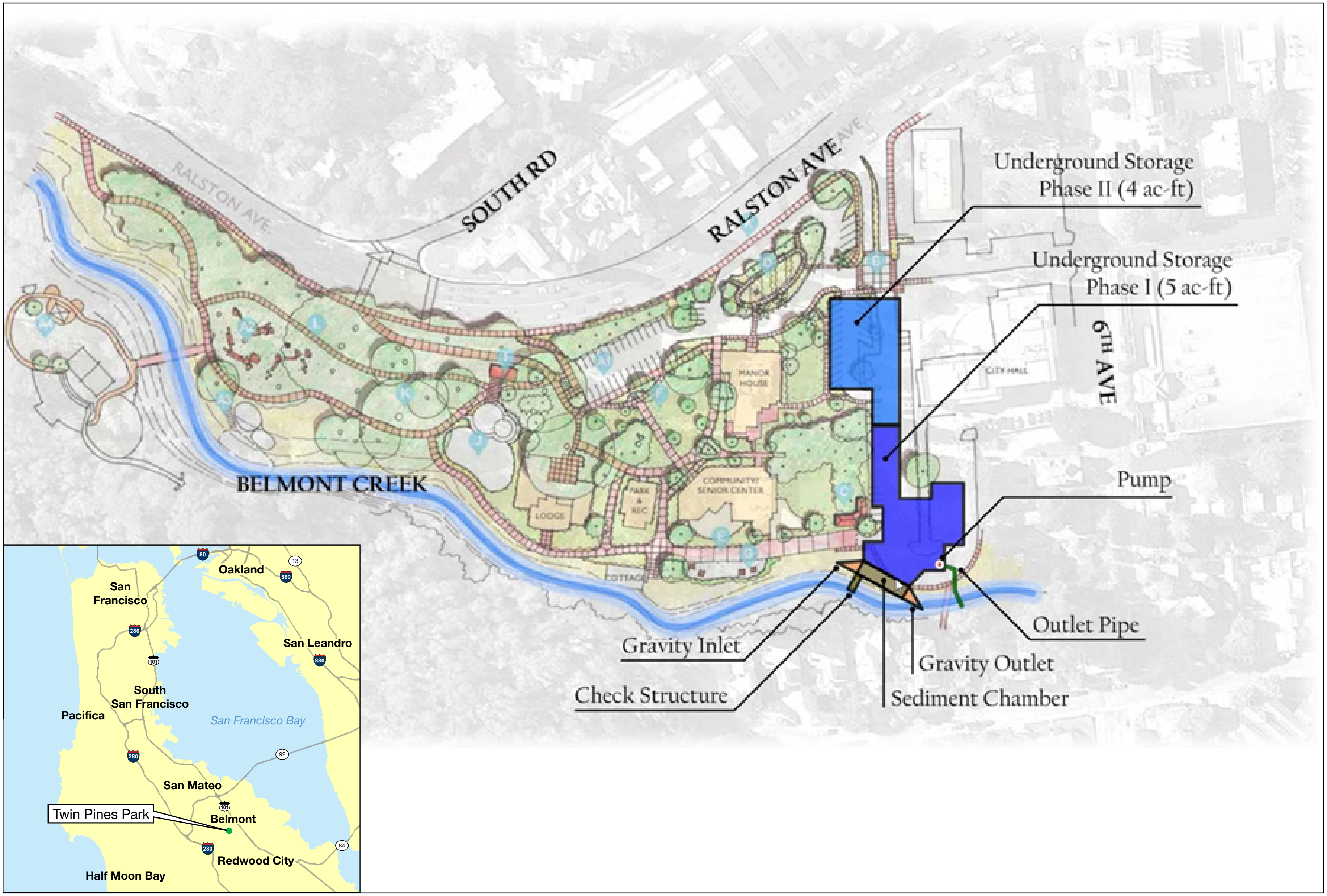
If you have any questions regarding this NOP, please contact Elizabeth Wada at (650) 595-7468 or via email at ewada@belmont.gov.

Elizabeth Wada

Elizabeth Wada, P.E., Associate Civil Engineer

October 2, 2023

Date



SOURCE: Craftwater, 2023

Twin Pines Park Stormwater Detention Project

Figure 1
Project Location and Components

2021\D202101220.00 - Twin Pines Park Storm Water Capture\05 Graphics-GIS-Modeling-USE AZURE\05 Graphics-GIS-Modeling/Illustrator

STATE OF CALIFORNIA Gavin Newsom, Governor

NATIVE AMERICAN HERITAGE COMMISSION

NAHC HEADQUARTERS
1550 Harbor Boulevard
Suite 100
West Sacramento,
California 95691
(916) 373-3710
nahc@nahc.ca.gov
NAHC.ca.gov

October 4, 2023

Elizabeth Wada
City of Belmont
1 Twin Pines Lane
Belmont, CA 94002

Re: 2023100139, Twin Pines Park Stormwater Detention Project, San Mateo County

Dear Ms. Wada:

The Native American Heritage Commission (NAHC) has received the Notice of Preparation (NOP), Draft Environmental Impact Report (DEIR) or Early Consultation for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code §21000 et seq.), specifically Public Resources Code §21084.1, states that a project that may cause a substantial adverse change in the significance of a historical resource, is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, §15064.5 (b) (CEQA Guidelines §15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an Environmental Impact Report (EIR) shall be prepared. (Pub. Resources Code §21080 (d); Cal. Code Regs., tit. 14, § 5064 subd.(a)(1) (CEQA Guidelines §15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources within the area of potential effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a separate category of cultural resources, "tribal cultural resources" (Pub. Resources Code §21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment. (Pub. Resources Code §21084.2). Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code §21084.3 (a)). **AB 52 applies to any project for which a notice of preparation, a notice of negative declaration, or a mitigated negative declaration is filed on or after July 1, 2015.** If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). **Both SB 18 and AB 52 have tribal consultation requirements.** If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. §800 et seq.) may also apply.

The NAHC recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments.

Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws.

AB 52

AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a lead agency shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:

  a. A brief description of the project.
  b. The lead agency contact information.
  c. Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code §21080.3.1 (d)).
  d. A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code §21073).

2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A lead agency shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code §21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or Environmental Impact Report. (Pub. Resources Code §21080.3.1(b)).

  a. For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code §65352.4 (SB 18). (Pub. Resources Code §21080.3.1 (b)).

3. Mandatory Topics of Consultation If Requested by a Tribe: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:

  a. Alternatives to the project.
  b. Recommended mitigation measures.
  c. Significant effects. (Pub. Resources Code §21080.3.2 (a)).

4. Discretionary Topics of Consultation: The following topics are discretionary topics of consultation:

  a. Type of environmental review necessary.
  b. Significance of the tribal cultural resources.
  c. Significance of the project's impacts on tribal cultural resources.
  d. If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code §21080.3.2 (a)).

5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code §6254 (r) and §6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code §21082.3 (c)(1)).

6. Discussion of Impacts to Tribal Cultural Resources in the Environmental Document: If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:

  a. Whether the proposed project has a significant impact on an identified tribal cultural resource.
  b. Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code §21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code §21082.3 (b)).

7. Conclusion of Consultation: Consultation with a tribe shall be considered concluded when either of the following occurs:

- **a.** The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or
- **b.** A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code §21080.3.2 (b)).

8. Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code §21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code §21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code §21082.3 (a)).

9. Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code §21084.3 (b). (Pub. Resources Code §21082.3 (e)).

10. Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:

- **a.** Avoidance and preservation of the resources in place, including, but not limited to:
  - **i.** Planning and construction to avoid the resources and protect the cultural and natural context.
  - **ii.** Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.
- **b.** Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:
  - **i.** Protecting the cultural character and integrity of the resource.
  - **ii.** Protecting the traditional use of the resource.
  - **iii.** Protecting the confidentiality of the resource.
- **c.** Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.
- **d.** Protecting the resource. (Pub. Resource Code §21084.3 (b)).
- **e.** Please note that a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code §815.3 (c)).
- **f.** Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code §5097.991).

11. Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An Environmental Impact Report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:

- **a.** The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code §21080.3.1 and §21080.3.2 and concluded pursuant to Public Resources Code §21080.3.2.
- **b.** The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.
- **c.** The lead agency provided notice of the project to the tribe in compliance with Public Resources Code §21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code §21082.3 (d)).

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf

SB 18

SB 18 applies to local governments and requires local governments to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code §65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf.

Some of SB 18's provisions include:

1. Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. **A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe.** (Gov. Code §65352.3 (a)(2)).
2. No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.
3. Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code §65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code §5097.9 and §5097.993 that are within the city's or county's jurisdiction. (Gov. Code §65352.3 (b)).
4. Conclusion of SB 18 Tribal Consultation: Consultation should be concluded at the point in which:
    - **a.** The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
    - **b.** Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/.

NAHC Recommendations for Cultural Resources Assessments

To adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources, the NAHC recommends the following actions:

1. Contact the appropriate regional California Historical Research Information System (CHRIS) Center (https://ohp.parks.ca.gov/?page_id=30331) for an archaeological records search. The records search will determine:
    - **a.** If part or all of the APE has been previously surveyed for cultural resources.
    - **b.** If any known cultural resources have already been recorded on or adjacent to the APE.
    - **c.** If the probability is low, moderate, or high that cultural resources are located in the APE.
    - **d.** If a survey is required to determine whether previously unrecorded cultural resources are present.

2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
    - **a.** The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.
    - **b.** The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

3. Contact the NAHC for:

- **a.** A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.
- **b.** A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.

- **a.** Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, §15064.5(f) (CEQA Guidelines §15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.
- **b.** Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.
- **c.** Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code §7050.5, Public Resources Code §5097.98, and Cal. Code Regs., tit. 14, §15064.5, subdivisions (d) and (e) (CEQA Guidelines §15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

If you have any questions or need additional information, please contact me at my email address: Cody.Campagne@nahc.ca.gov.

Sincerely,

Cody Campagne

Cody Campagne
Cultural Resources Analyst

cc: State Clearinghouse

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Bay Delta Region
2825 Cordelia Rd, Suite 100
Fairfield, CA 94534
(707) 428-2002
www.wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

October 31, 2023

Elizabeth Wada
City of Belmont
One Twin Pines Lane, Suite 385
Belmont, CA, 94002
EWada@belmont.gov

Subject: Twin Pines Stormwater Detention Project, Notice of Preparation of a Draft Environmental Impact Report, SCH No. 2023100139, City of Belmont, San Mateo County

Dear Ms. Wada:

The California Department of Fish and Wildlife (CDFW) received a Notice of Preparation (NOP) of a Draft Environmental Impact Report (EIR) from the City of Belmont (City) for the Twin Pines Stormwater Detention Project (Project) pursuant to the California Environmental Quality Act (CEQA) and CEQA Guidelines.[1]

CDFW is providing the City, as the Lead Agency, with specific detail about the scope and content of the environmental information related to CDFW's area of statutory responsibility that must be included in the EIR (Cal. Code Regs., tit. 14, § 15082, subd. (b)).

CDFW ROLE

CDFW is a **Trustee Agency** with responsibility under CEQA for commenting on projects that could impact fish, plant, and wildlife resources (Pub. Resources Code, § 21000 et seq.; Cal. Code Regs., tit. 14, § 15386). CDFW is also considered a **Responsible Agency** if a project would require discretionary approval, such as a permit pursuant to the California Endangered Species Act (CESA), Native Plant Protection Act (NPPA), the Lake and Streambed Alteration (LSA) Program, and other provisions of the Fish and Game Code that afford protection to the state's fish and wildlife trust resources. Pursuant to our authority, CDFW has the following concerns, comments, and recommendations regarding the Project.

PROJECT DESCRIPTION AND LOCATION

Proponent: City of Belmont

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[1] CEQA is codified in the California Public Resources Code in section 21000 et seq. The "CEQA Guidelines" are found in Title 14 of the California Code of Regulations, commencing with section 15000.

Objective: The objective of the Project is to construct an underground stormwater storage facility beneath the parking lots and other areas of the 10-acre Twin Pines Park. The Project is designed to reduce the peak stormwater flow of Belmont Creek, to trap sediment and debris, to reduce flood risk in the flood-prone lower creek reach downstream of El Camino Real, and to provide ancillary water quality benefits. Primary Project activities include installation of a diversion weir that would divert high flows from Belmont Creek to a 9-acre-foot underground storage facility, where water would remain before flowing back into Belmont Creek through a 12-inch outlet pipe, a sediment chamber, bank stabilization along Belmont Creek, and an instream check structure in Belmont Creek.

Location: City of Belmont, San Mateo County, Twin Pines Lane east of Ralston Avenue, and south of 6th Avenue, at 37.51727, -122.27756.

Timeframe: There are no known Project start and end dates.

The CEQA Guidelines (Cal. Code Regs., tit. 14, § 15000 et seq.) require that the EIR incorporate a full Project description, including reasonably foreseeable future phases of the Project, that contains sufficient information to evaluate and review the Project's environmental impact (CEQA Guidelines, §§ 15124 & 15378). Please include a complete description of the following Project components in the Project description:

- Land use changes resulting from, for example, rezoning certain areas;
- Footprints of permanent Project features and temporarily impacted areas, such as staging areas and access routes;
- Area and plans for any proposed buildings/structures, ground-disturbing activities, fencing, paving, stationary machinery, landscaping, and stormwater systems;
- Operational features of the Project, including level of anticipated human presence (describe seasonal or daily peaks in activity, if relevant), artificial lighting/light reflection, noise, traffic generation, and other features; and
- Construction schedule, activities, equipment, and crew sizes.

REGULATORY REQUIREMENTS

California Endangered Species Act

Please be advised that a CESA Incidental Take Permit (ITP) must be obtained if the Project has the potential to result in "take" of plants or animals listed under CESA, either during construction or over the life of the Project. Under CESA, "take" means "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." (Fish & G. Code, § 86). If the Project will impact CESA listed species, early consultation is encouraged, as significant modification to the Project and mitigation measures may be required in order to obtain a CESA ITP. CDFW's issuance of an ITP is subject to CEQA and to facilitate permit issuance, any such project modifications and mitigation measures must be incorporated into the EIR's analysis, discussion, and mitigation monitoring and reporting program.

CEQA requires a Mandatory Finding of Significance if a project is likely to substantially restrict the range or reduce the population of a threatened or endangered species (Pub. Resources Code, §§ 21001, subd. (c) & 21083; CEQA Guidelines, §§ 15380, 15064, & 15065). In addition, pursuant to CEQA, the Lead Agency cannot approve a project unless all impacts to the environment are avoided or mitigated to less-than-significant levels, or the Lead Agency makes and supports Findings of Overriding Consideration (FOC) for impacts that remain significant despite the implementation of all feasible mitigation. FOC under CEQA, however, does not eliminate the Project proponent's obligation to comply with Fish and Game Code.

Lake and Streambed Alteration

An LSA Notification, pursuant to Fish and Game Code sections 1600 et. seq., is required for Project activities affecting lakes or streams and associated riparian habitat. Notification is required for any activity that will substantially divert or obstruct the natural flow; change or use material from the bed, channel, or bank including associated riparian or wetland habitat; or deposit or dispose of material where it may pass into a river, lake or stream. Work within ephemeral streams, washes, watercourses with a subsurface flow, and floodplains are subject to notification requirements. CDFW may not execute the final LSA Agreement until it has considered the final EIR and complied with its responsibilities as a Responsible Agency under CEQA.

ENVIRONMENTAL SETTING

The EIR should provide sufficient information regarding the environmental setting ("baseline") to understand the Project's, and its alternative's (if applicable), potentially significant impacts on the environment (CEQA Guidelines, §§ 15125 & 15360).

CDFW recommends the CEQA document prepared for the Project provide baseline habitat assessments for special-status plant, fish and wildlife species located and potentially located within the Project area and surrounding lands, including, but not limited to, all rare, threatened, or endangered species (CEQA Guidelines, § 15380). The EIR should describe aquatic habitats, such as wetlands or waters of the U.S. or state, and any sensitive natural communities or riparian habitat occurring on or adjacent to the Project site (for sensitive natural communities see:

https://wildlife.ca.gov/Data/VegCAMP/NaturalCommunities#sensitive%20natural%20communities), and any stream or wetland set back distances the City may require.

Habitat descriptions and the potential for species occurrence included in the EIR should include robust information from multiple sources: aerial imagery, historical and recent survey data, field reconnaissance, scientific literature and reports, U.S. Fish and Wildlife Service's (USFWS) Information, Planning, and Consultation System, California Aquatic Resources Inventory, and findings from "positive occurrence" databases such as CDFW's California Natural Diversity Database (CNDDB). Only with sufficient data and information from the habitat assessment, can the City adequately assess which special-status species are likely to occur on or near the Project site, and whether they could be impacted by the Project.

CDFW recommends that prior to Project implementation, surveys be conducted for special-status species with potential to occur, following recommended survey protocols, if available. Survey and monitoring protocols and guidelines are available at: https://www.wildlife.ca.gov/Conservation/Survey-Protocol.

Botanical surveys for special-status plant species, including those with a California Rare Plant Rank (http://www.cnps.org/cnps/rareplants/inventory/)[2], must be conducted during the blooming period within the Project area and adjacent habitats that may be indirectly impacted by, for example, changes to hydrological conditions, and require the identification of reference populations. More than one year of surveys may be necessary based on environmental conditions. Please refer to CDFW protocols for surveying and evaluating impacts to special-status plants available at: https://www.wildlife.ca.gov/Conservation/Plants.

Surveys for special-status species should consider the potential for impacting species outside of the Project area. For example, the Project may cause auditory or visual disturbances above ambient levels that may result in nest abandonment and loss of eggs, even if the nest is outside of the Project footprint.

IMPACT ANALYSIS AND MITIGATION MEASURES

The EIR should discuss all direct and indirect impacts (temporary and permanent) that may occur with implementation of the Project (CEQA Guidelines, § 15126.2). This includes evaluating and describing impacts such as:

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[2] California Rare Plant Rank (CRPR) 1B and 2B plants are considered rare, threatened, or endangered in California. Further information on CRPR ranks is available in CDFW's *Special Vascular Plants, Bryophytes, and Lichens List* (https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=109383&inline) and on the California Native Plant Society website (https://www.cnps.org/rare-plants/california-rare-plant-ranks).

- Land use changes that would reduce open space or agricultural land uses and increase residential or other land use involving increased development;
- Encroachments into riparian habitats, wetlands or other sensitive areas;
- Potential for impacts to special-status species;
- Loss or modification of breeding, nesting, dispersal and foraging habitat, including vegetation removal, alteration of soils and hydrology, and removal of habitat structural features (e.g., snags, roosts, vegetation overhanging banks);
- Permanent and temporary habitat disturbances associated with ground disturbance, noise, lighting, reflection, air pollution, traffic or human presence; including impacts to migratory birds caused by lighting and reflective building surfaces; and
- Obstruction of movement corridors, fish passage, or access to water sources and other core habitat features.

The EIR should also identify existing and reasonably foreseeable future projects in the Project vicinity, disclose any cumulative impacts associated with these projects, determine the significance of each cumulative impact, and assess the significance of the Project's contribution to each impact (CEQA Guidelines, §15355). Although a project's impacts may be insignificant individually, its contributions to a cumulative impact may be considerable; a contribution to a significant cumulative impact – e.g., reduction of available habitat for a special-status species – should be considered cumulatively considerable without mitigation to minimize or avoid the impact.

The CEQA Guidelines direct the City, as the Lead Agency, to consider and describe in the EIR all feasible mitigation measures to avoid and/or mitigate potentially significant impacts of the Project on the environment based on a comprehensive analysis of the direct, indirect, and cumulative impacts of the Project (CEQA Guidelines, §§ 15021, 15063, 15071, 15126.2, 15126.4 & 15370). This should include a discussion of impact avoidance and minimization measures for special-status species, which are recommended to be developed in early consultation with CDFW, USFWS, and the National Marine Fisheries Service (NMFS). These measures can then be incorporated as enforceable Project conditions to reduce potential impacts to biological resources to less-than-significant levels.

SPECIFIC COMMENTS AND RECOMMENDATIONS

Comment 1: Riparian Setbacks

Issue: The Project has the potential to encroach into the riparian zone from development of an underground stormwater storage facility near Belmont Creek. Encroachment into the riparian zone can negatively impact sensitive riparian and aquatic species through reduction of habitat and decreased water quality. Additionally, the NOP states the bank along Belmont Creek will be stabilized as part of the Project. The Project could cause altered channel bed material mobilization and distribution and increased channel scour, which could affect native fish, aquatic organisms, and riparian communities. The Project's construction and operation activities could also cause significant alteration of substrate and increased stream sedimentation that could disrupt or deter fish spawning, other aquatic fauna reproduction, and impair aquatic habitat diversity.

Evidence impact would be significant: Riparian trees and vegetation, and associated floodplains, provide many essential benefits to stream and aquatic species habitat, including thermal protection, cover, and large woody debris (Moyle 2002, CDFW 2007). Development adjacent to the riparian zone can result in fragmentation of riparian habitat and decreases in native species abundance and biodiversity (Davies et al. 2001, Hansen et al. 2005, CDFW 2007). An estimated two to seven percent of California's riparian habitat remains intact and has not been converted to other land uses (Katibah 1984, Dawdy 1989). Riparian buffers help keep pollutants from entering adjacent waters through a combination of processes including dilution, sequestration by plants and microbes, biodegradation, chemical degradation, volatilization, and entrapment within soil particles. Narrow riparian buffers are considerably less effective in minimizing the effects of adjacent development than wider buffers (Castelle et al. 1992, Brosofske et al. 1997, Dong et al. 1998, Kiffney et al. 2003, Moore et al. 2005).

Recommendation 1: CDFW recommends the Project establish and the EIR incorporate riparian buffer zones to limit development and vegetation clearing to outside of and away from riparian areas. CDFW is available to consult with the City to determine appropriate site-specific riparian buffers to reduce impacts to sensitive species and riparian habitat to less-than-significant. At a minimum, CDFW recommends a 50-foot riparian buffer as measured from the top of streambank to the nearest Project infrastructure.

Recommendation 2: CDFW recommends the Project perform an assessment to determine if bank stabilization is necessary. If the assessment determines that bank stabilization is necessary to protect existing infrastructure, CDFW recommends that it 1) does not include concrete, 2) limits the amount of rock or other hardscape, and 3) focuses on a bioengineered approach with appropriate native plantings.

Comment 2: Impervious Surfaces & Impacts to Streamflow

Issue: The Project could increase impervious surfaces at the Project site. Impervious surfaces, stormwater systems, and storm drain outfalls have the potential to significantly affect fish and wildlife resources by altering the hydrograph of natural streamflow patterns via concentrated run-off and reducing water quality. In addition, the Project's construction, operation, and maintenance activities may also affect existing streamflow and induce changes in timing and quantity of streamflow released downstream of the Project's 12-inch outlet in the Belmont Creek watershed.

Evidence impact would be significant: Urbanization (e.g., impervious surfaces, stormwater systems, storm drain outfalls) can modify natural streamflow patterns by increasing the magnitude and frequency of high flow events and storm flows (Hollis 1975, Konrad and Booth 2005). Streamflow diverted from Belmont Creek, stored in a holding tank, and then released back into Belmont Creek could also affect chemical constituents, such as dissolved oxygen, pH, salinity, and water temperature. Stormwater runoff pollutants are transported to receiving waters through physical and chemical processes (Mikkelson et al. 1994). Urban stormwater is typically characterized by four pollutant categories: (1) total suspended solids (TSS), (2) heavy metals, (3) polycyclic aromatic hydrocarbons, and (4) nutrients; these pollutants often go through various physio-chemical processes before they impact aquatic habitat (Aryal et al. 2010). Suspended solids increase turbidity and decrease light penetration, reducing activity and growth of photosynthetic organisms. In addition, suspended solids have been attributed to clogging fish gills (Aryal et al. 2010).

Water diversions can also impact flow regimes, decreasing the frequency of high flows. Prolonged low flows can cause streams to become graded and cause channels to become disconnected from floodplains (Poss et al. 1997). This process decreases available habitat for aquatic species including fish that utilize floodplains for nursery grounds. Prolonged low flows can also increase mortality for species that rely on specific flow regimes, such as endangered salmonids (Moyle 2002). For example, water diversions have been shown to increase mortality of both juvenile and adult coho salmon (*Oncorhynchus kisutch*; CDFG 2004, CDFW 2015). Reduced flows can also lead to stagnant water conditions, a situation that allows the growth of harmful cyanobacteria resulting in mortality of aquatic animals.

Amphibians can also be sensitive to decreased flows. For example, plethodontid salamanders are intolerant to desiccation and thus vulnerable to headwater stream diversions (Ray 1958). Furthermore, Kupferberg et al. (2012) reported that low flows were strongly correlated with early life stage mortality and decreased adult densities of foothill yellow-legged frogs (*Rana boylii*) and California red-legged frogs (*Rana draytonii*). Plant cover and diversity can be decreased by reduced flows (Busch and Smith 1995, Stromberg et al. 1996), likely as a result of physiological stress leading to reduced growth rates and recruitment, morphological changes, and mortality (Reily and Johnson 1982, Perkins et al. 1984, Fenner et al. 1985, Kondolf and Curry 1986, Rood and Mahoney 1990). Additionally, diversions can be barriers to fish passage if they are not properly designed.

Recommendation 1: CDFW recommends the storm runoff be dispersed rather than concentrated to a stormwater outfall or other receiving waters. CDFW recommends implementation of low impact development and the use of bioswales and bioretention features to intercept storm runoff. CDFW also recommends incorporating permeable surfaces throughout the Project to allow stormwater to percolate to the ground and prevent stream hydromodification (see *Evaluating the potential benefits of permeable pavement on the quantity and quality of stormwater runoff* (USGS 2019)).

Recommendation 2: CDFW recommends the City identify, analyze, and impose (where feasible) Project alternatives and mitigation measures to minimize or avoid potential impacts caused by the operation of the underground stormwater facility structure, including, but not limited to: (1) entrainment of fish; (2) reduced streamflow and available fish habitat in the Project's diverted reach and downstream reaches; (3) high velocity inundation of stream habitat at the outlet; (4) blocked or impaired movement of fish and aquatic organisms; and (5) impacts to water quality and temperature.

Recommendation 3: The EIR should study and evaluate potential impacts from rapid fluctuating flows and increased diversions caused by the Project. If it is determined that aquatic organisms would be significantly affected by the Project-induced flow fluctuations or diversions, appropriate avoidance, minimizations and/or mitigation should be provided. Any modified streamflow regime should protect and maintain existing aquatic habitat. The frequency, timing, magnitude, and duration of streamflow release and diversion recommendations should be based on site-specific hydrologic and biological information. An appropriate minimum streamflow should be evaluated using a combination of critical riffle analysis and applying the California Environmental Flows Framework in consultation with CDFW and NMFS.

Recommendation 4: CDFW recommends a study be conducted to characterize water quality at different flow levels to detect changes in water chemistry and to evaluate the associated Project effects on biological resources. Any changes in water temperature should also be evaluated to determine how aquatic organisms may be affected.

ENVIRONMENTAL DATA

CEQA requires that information developed in EIRs and negative declarations be incorporated into a database which may be used to make subsequent or supplemental environmental determinations (Pub. Resources Code, § 21003, subd. (e)). Accordingly, please report any special status species and natural communities detected during Project surveys to CNDDB. The CNDDB field survey form can be filled out and submitted online at the following link: https://wildlife.ca.gov/Data/CNDDB/Submitting-Data. The types of information reported to CNDDB can be found at the following link: https://www.wildlife.ca.gov/Data/CNDDB/Plants-and-Animals.

FILING FEES

The Project, as proposed, would have an impact on fish and/or wildlife, and assessment of environmental document filing fees is necessary. Fees are payable upon filing of the Notice of Determination by the Lead Agency and serve to help defray the cost of environmental review by CDFW. Payment of the environmental document filing fee is required in order for the underlying project approval to be operative, vested, and final (Cal. Code Regs, tit. 14, § 753.5; Fish & G. Code, § 711.4; Pub. Resources Code, § 21089).

CONCLUSION

CDFW appreciates the opportunity to comment on the NOP to assist the City in identifying and mitigating Project impacts on biological resources.

Questions regarding this letter or further coordination should be directed to Mr. Wesley Stokes, Senior Environmental Scientist (Supervisory), at Wesley.Stokes@wildlife.ca.gov.

Sincerely,

DocuSigned by:
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Appendix B

Initial Study

INITIAL STUDY CHECKLIST

Environmental Factors Potentially Affected

The environmental factors checked below would be potentially affected by the Twin Pines Park Stormwater Detention Basin Project (Project), involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

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

DETERMINATION: (To be completed by the Lead Agency)

On the basis of this initial study:

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

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

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

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

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

Signature	Date

1 Aesthetics

Issues:	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
Except as provided in Public Resources Code Section 21099, would the project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☒	☐
d) Create a new source of substantial light or glare which would adversely affect daytime or nighttime views in the area?	☐	☐	☒	☐

Discussion

a) For purposes of analysis, a scenic vista is defined as a distant view encompassing valued natural or built landscape features such as ridgelines, water bodies, or landmark features. Views of the San Francisco Bay to the east of the Project site and the ridgeline to the west of the site may be considered scenic vistas. However, the Project site within Twin Pines Park is surrounded by development, mature trees, and intervening landscapes. Thus, the site is not visible from these scenic vistas and is not within the viewshed of a scenic vista. Additionally, the existing parking lot would be restored to a similar condition after Project construction is complete. Therefore, there would be no effect on scenic vistas, and there would be **no impact**.

b) The Project site is not within proximity to a California State Scenic Highway (Caltrans, 2018). Construction site preparation would require removal of vegetation and approximately seven trees ranging in size from 4 inches to 15 inches in diameter at breast height from along the edge of the Project site and could disturb trees and other vegetation along Belmont Creek. However, once Project construction is complete, landscaping, stream restoration, and ancillary park improvements would be implemented. The stormwater storage facility would be underground and would not be visible to the public after construction. Impacts on scenic resources would therefore be temporary and **less than significant**.

c) The Project site is within an urbanized area and spans four parcels that are on land zoned as Public Space, Park/Plaza, and Public Facility by the City of Belmont (City of Belmont, 2023). Construction activities (excavation, grading, haul road, open trenches, equipment, and vehicle storage) would have a temporary effect on the visual quality at the Project site. However, once construction is complete, as described in detail in Section 2.5.1, *Construction Activities*, the existing parking lot would be reconfigured and restored, landscaping would be installed, and other ancillary park improvements would occur. These improvements would be consistent with the existing visual character of the park and would not conflict with applicable zoning and other regulations governing scenic quality. Therefore, the impact would be **less than significant**.

d) As indicated in Chapter 2, *Project Description* of the EIR, because nighttime construction is not expected, no temporary security lighting would be needed on site. Additionally, no permanent on-site lighting would be installed. While glare can occur from surfacing materials, the Project would not include materials such as glass or metal that could cause a glare. Once construction was complete, as described in detail in Section 2.5.1, *Construction Activities*, the existing parking lot would be reconfigured and restored, landscaping would be installed, and other ancillary park improvements would occur. The park would appear similar to existing conditions and no new permanent lighting would be installed. Therefore, there would be no new source of substantial light or glare which would affect daytime or nighttime views in the area and there would be **no impact**.

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2 Agriculture and Forestry Resources

Issues:	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

Discussion

a) The Project site is on land designed as Urban and Built-Up Land by the California Department of Conservation and is not on or adjacent to land designated as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (CDC, 2022). Implementation of the Project would therefore not convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to non-agricultural use, and there would be **no impact**.

b) A Williamson Act contract allows local governments to enter contracts with private landowners to restrict specific parcels of land for the use of open space or agricultural. The Project site is not zoned for agricultural use or on land that is restricted under a Williamson Act contract (CDC, 2016). Therefore, there would be **no impact**.

c, d) While the Project site is on land zoned as Public Space, Park/Plaza, and Public Facility by the City of Belmont (City of Belmont, 2023), the *City of Belmont 2035 General Plan* (City of Belmont, 2017) and CAL FIRE (CAL FIRE, 2022) classify portions of Twin Pines Park and surrounding areas as Hardwood Forest/Woodland, with Valley Oak Woodland and Coastal Oak Woodland near or in the Project area. While the Project would remove seven trees, those trees are outside of areas classified as Hardwood Forest/ Woodland. While a portion of the construction staging area would be within Valley Oak

Woodland, equipment and vehicle storage would occur on land that is already paved, and minimal tree removal and vegetation disturbance would occur. Implementation of the Project would not alter the use of the site once operational. Therefore, Project implementation would not conflict with existing zoning for, or cause rezoning of, forest land, timberland, or timberland zoned Timberland Production or result in the loss of forest land or conversion of forest land to non-forest use. There would be **no impact**.

e) The Project area is not currently used for farmland or agricultural uses. For this reason and the reasons described in the impacts above, the Project would not involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agriculture use or conversion of forest land to non-forest use. Therefore, there would be **no impact**.

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3 Air Quality

Issues:	***Potentially Significant Impact***	***Less Than Significant with Mitigation Incorporated***	***Less Than Significant Impact***	***No Impact***
Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☒	☐	☐	☐
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☒	☐	☐	☐
c) Expose sensitive receptors to substantial pollutant concentrations?	☒	☐	☐	☐
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☒	☐	☐	☐

Project construction could result in environmental impacts related to air quality. Refer to Section 3.2 of the Draft EIR for a detailed evaluation of potential impacts and mitigation measures.

4 Biological Resources

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

Project construction and operation could result in environmental impacts related to biological resources. Refer to Section 3.3 of the Draft EIR for a detailed evaluation of potential impacts and mitigation measures.

5 Cultural Resources

Issues:	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	☒	☐	☐	☐
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☒	☐	☐	☐
c) Disturb any human remains, including those interred outside of dedicated cemeteries?	☒	☐	☐	☐

Project construction and operation could result in environmental impacts related to cultural resources. Refer to Section 3.4 of the Draft EIR for a detailed evaluation of potential impacts and mitigation measures.

6 Energy

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

Discussion

a) Construction of the Project would involve both direct and indirect uses of energy, primarily in the form of fuel. The volume of diesel and gasoline fuels that would be consumed during construction was calculated based on the estimated greenhouse gas emissions for the Project and the gasoline and diesel CO_2 emission factors from The Climate Registry (TCR, 2022). Project construction is estimated to consume a total of approximately 3,700 gallons of gasoline and 32,900 gallons of diesel fuel over the 2-year construction period. Fuel use during construction would represent approximately 0.001 percent of gasoline and less than 0.2 percent of diesel sold in San Mateo County in 2021 (CEC, 2023). Overall, the fuel use during construction would be minimal in comparison to the overall fuel use within San Mateo County.

Project construction activities would comply with state and local regulations, such as 13 CCR Sections 2485 and 2449, that require equipment and commercial vehicle operators to limit idling to no more than five minutes. Compliance with the state's regulation for in-use off-road diesel vehicles would ensure that fuel energy consumed in the construction phase would not be wasted through unnecessary idling. In addition, all vehicles used during construction and operation would be required to comply with Corporate Average Fuel Economy (CAFE) standards, which reduce energy consumption by increasing the fuel economy of cars and light trucks. Therefore, energy use would not be wasteful, inefficient, or unnecessary during construction or operation of the Project and the impact would be less than significant.

Operation and maintenance of the Project would require the use of diesel and gasoline fuels to remove sediment annually and to conduct regular inspections. Vehicles used by operation and maintenance workers travelling to and from the Project area would be required to comply with the CAFE standards. A nominal amount of electricity from Pacific Gas and Electricity (PG&E) would be needed to power the motors that control the weirs, which are anticipated to only operate for less than one hour per week. No generators or permanent on-site lighting would be required as part of the Project. The new motors would be energy efficient and meet Department of Energy (DOE) standards, and would not result in wasteful or inefficient use of electricity. Therefore, the impact would be **less than significant**.

b) Construction of the Project would temporarily increase energy use. Construction activities would comply with state and local requirements designed to minimize idling and associated emissions, which would also minimize the use of fuel. Fuel use for Project construction would be consistent with typical construction and manufacturing practices, and energy standards such as the Energy Policy Acts of 1975 and 2005, which promote strategic planning and building standards that reduce consumption of fossil fuels, increase use of renewable resources, and enhance energy efficiency.

Once operational, the Project would not include any infrastructure that would increase energy use. A minimal amount of electricity would be used to power the weirs and sump pump during operation. Electricity to the Project site would be provided by PG&E, which is subjected to the requirements of SB 100 and the Renewables Portfolio Standard (RPS) program. RPS requires California utilities to provide 60 percent renewable power by 2030 and 100 percent renewable, carbon-free power by 2045 with the goal of increasing the percentage of renewable energy in the state’s electricity mix to ultimately reach the carbon neutrality goal by 2045. The Project would not result in a permanent increase in the use of nonrenewable energy resources, and thus, would not conflict with the RPS.

Furthermore, vehicles used by construction workers and operation and maintenance workers travelling to and from the Project area would be required to comply with the CAFE standards, which would increase fuel consumption efficiency. Motors used for the diversion weirs and sump pump would be energy efficient to comply with DOE standards. Therefore, neither construction nor operation of the Project would conflict with renewable energy plans or energy efficiency plans applicable to the Project and the impact would be **less than significant**.

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7 Geology and Soils

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

Discussion

a.i) The State Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act) prohibits the development of structures for human occupancy across Holocene-active[1] fault traces. Under this Act, the California Geological Survey (CGS) has established “Zones of Required Investigation” on either side of an active fault that delimits areas susceptible to surface fault rupture. The zones are referred to as Earthquake Fault Zones (EFZs) and are shown on official maps published by the CGS. Surface rupture occurs when the ground surface is broken due to a fault movement during an earthquake; typically, these types of hazards occur within 50 feet of an active fault.

According to the California Earthquake Hazards Zone Application (EQ ZAPP), the Project site is not within an established EFZ (CGS, 2023). The nearest EFZs to the

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[1] Holocene-active faults refer to faults that have displayed surface rupture during the Holocene Epoch (the last 11,700 years).

Project site are the Peninsula Section of the San Andreas fault zone (approximately 3.5 miles to the southwest of the Project site) and the Southern Hayward Section of the Hayward fault zone (approximately 15 miles northeast of the Project site; CGS, 2023). While not considered an EFZ, the Monte Vista-Shannon fault zone (approximately 10 miles southeast of the Project site) is considered a Holocene-active fault. The Project would not directly or indirectly cause potential substantial adverse effects related to surface fault rupture and there would be **no impact** under this criterion.

a.ii) The San Francisco Bay Area is a historically seismically active area of California due to the presence of several Holocene-active faults; as discussed above, the San Andreas, Monte Vista-Shannon, and Hayward fault zones are the closest Holocene-active faults to the Project site. Due to the proximity to the San Andreas, Monte Vista-Shannon, and Hayward fault zones, the Project site could experience strong ground shaking in the event of an earthquake within any of these fault zones. If the Project were to directly or indirectly cause or exacerbate the risk of loss, injury, or death involving strong seismic ground shaking, this would result in a significant impact.

However, the Project would be subject to the seismic design criteria of the California Building Code (CBC), which requires that all structures be constructed to withstand anticipated ground shaking from regional fault sources. The CBC requires that a licensed geotechnical engineer be retained to design the Project components to withstand probable seismically induced ground shaking and consolidate recommendations into a site-specific geotechnical report. In the case of the Project, this requirement was fulfilled by the Geotechnical Exploration prepared by ENGEO Incorporated, which contains seismic design criteria and other recommendations which will inform the design of the Project components (ENGEO, 2022). As stated in Section 2.5.6 *Geotechnical Recommendation* of the Project Description, construction would be required to adhere to the specifications, procedures, and site conditions contained in the final design plans; these would comply with the seismic recommendations contained in the geotechnical report and must be made by a California-registered, professional geotechnical engineer, in accordance with the CBC. Adherence to the applicable CBC requirements and local agency enforcement would reduce the risk that the Project would directly or indirectly cause substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking. Therefore, impacts related to ground shaking during Project construction and operation would be **less than significant**.

a.iii) Liquefaction is a phenomenon in which unconsolidated, water-saturated sediments become unstable due to the effects of strong seismic shaking. During an earthquake, these sediments can behave like a liquid, potentially causing severe damage to overlying structures. Lateral spreading is a variety of minor landslide that occurs when unconsolidated liquefiable material breaks and spreads due to the effects of gravity, usually down gentle slopes. Liquefaction-induced lateral spreading is defined as the finite, lateral displacement of gently sloping ground as a result of pore-pressure buildup or liquefaction in a shallow underlying deposit during an earthquake. The occurrence of this phenomenon is dependent on many complex factors, including the intensity and duration of ground shaking, particle-size distribution, and density of the soil.

The potential damaging effects of liquefaction include differential settlement, loss of ground support for foundations, ground cracking, heaving and cracking of structure slabs due to sand boiling, and buckling of deep foundations due to ground settlement. Dynamic settlement (i.e., pronounced consolidation and settlement from seismic shaking) may also occur in loose, dry sands above the water table, resulting in settlement of and possible damage to overlying structures. In general, a relatively high potential for liquefaction exists in loose, sandy soils that are within 50 feet of the ground surface and are saturated (below the groundwater table). Lateral spreading can move blocks of soil, placing strain on buried pipelines that can lead to leaks or pipe failure.

According to the EQ ZAPP, the Project site is within an area known to be susceptible to liquefaction (CGS, 2023). Additionally, the Geotechnical Exploration indicates that the Project site is susceptible to liquefaction, although the report further states that the risk is relatively low (ENGEO, 2022).

Even though the liquefaction potential is considered low, the Project would still be subject to the seismic design criteria of the CBC, which requires that all structures be constructed to withstand the effects of liquefaction. As such, the Geotechnical Exploration contains earthwork recommendations to be applied during construction to ensure that the Project components would be able to withstand the effects of liquefaction (see Section 2.5.6 *Geotechnical Recommendation* of the Project Description). Adherence to the applicable CBC requirements and local agency enforcement would reduce the risk that the Project would not directly or indirectly cause substantial adverse effects, including the risk of loss, injury, or death involving liquefaction. Therefore, impacts related to liquefaction during Project construction and operation would be **less than significant**.

a.iv) Landslides are one of the various types of downslope movements in which rock, soil, and other debris are displaced due to the effects of gravity. The potential for material to detach and move downslope depends on multiple factors including the type of material, water content, and steepness of terrain.

According to EQ ZAPP, the Project site is not within an earthquake-induced landslide zone (CGS, 2023). Additionally, geologic mapping indicated that there have been no documented historic landslides within or in the vicinity of the Project site (Brabb et al., 1998). The Project site is within an urbanized area of Belmont and the topography is relatively flat.

As there are no habitable structures proposed as part of the Project, and the surrounding area has a low susceptibility to landslides, the Project would not directly or indirectly cause substantial adverse effects involving landslides and there would be **no impact** related to landslides, either seismic or gravity-induced.

b) Project construction would include ground disturbance activities, such as site clearing, grading, or mass excavation that could contribute to substantial soil erosion or the loss of topsoil. Erosion of exposed soils can occur as a result of the forces of wind or water and could be worsened during ground disturbance activities. Any new development that would require the disturbance of one or more acres during construction would be subject to the requirements of the National Pollutant Discharge Elimination System (NPDES) *General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities* (Order 2022-0057-DWQ, NPDES No. CAS000002), referred to as the Construction General Permit. The Construction General Permit requires the preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP), which would include Best Management Practices (BMPs) designed to control and reduce soil erosion. The BMPs may include dewatering procedures, stormwater runoff quality control measures, watering for dust control, and the use of silt fences, straw wattles, and sand/gravel bags, as needed.

As discussed in Chapter 2, *Project Description* of the EIR, as part of the Project, the contractor would establish and maintain BMPs for erosion control to minimize runoff into storm drains and surrounding properties. These measures would generally consist of gravel bags and stormwater control devices at storm drains, as specified by the Project's SWPPP. These BMPs would help reduce siltation and other environmental impacts. Implementation of the mandatory requirements of the SWPPP and established BMPs would avoid the potential for significant impacts associated with loss of topsoil and erosion; thus, the impact would be **less than significant**.

c) As discussed above, the Project site is not within an area susceptible to landslides. However, the Project would be located on a geologic unit that is potentially liquifiable.

As previously discussed above, the Project would be subject to the requirements of the CBC and recommendations provided in the Geotechnical Exploration report (see Section 2.5.6 *Geotechnical Recommendation* of the Project Description), which includes soil engineering recommendations for managing unstable soils, including liquefiable soils. Compliance with the CBC and implementation of recommendations provided in the Geotechnical Exploration report would avoid or reduce impacts related to unstable soils to **less than significant**.

d) Expansive soils are soils that possess a "shrink-swell" characteristic, also referred to as linear extensibility. Shrink-swell is the cyclic change in volume (expansion and contraction) that occurs in fine-grained clay sediments from the process of wetting and drying; the volume change is reported as a percent change for the whole soil. Changes in soil moisture can result from rainfall, landscape irrigation, utility leakage, roof drainage, and/or perched groundwater.[2] Structural damage may occur incrementally over a long

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[2] Perched groundwater is a local saturated zone above the water table that typically exists above an impervious layer (such as clay) of limited extent.

period of time, usually as a result of inadequate soil and foundation engineering or the placement of structures directly on expansive soils.

The Geotechnical Exploration report indicated that the Project site is underlain with soil that has a moderate to high expansion potential (ENGEO, 2022). The report provides soil engineering recommendations to manage the on-site expansive soils. Soil engineering is used to adjust the existing problematic properties of certain soils so that they are suitable for new developments. The Geotechnical Exploration report recommends the use of non-expansive fill under foundations, and moisture conditioning and compaction of native soils under the fill. Adherence to the requirements of the CBC and the recommendations in the Geotechnical Exploration report, as described in Section 2.5.6 *Geotechnical Recommendation* of the Project Description, would avoid impacts resulting from potentially expansive soils, and the impact would therefore be **less than significant**.

e) The Project would not install any septic tanks or alternative wastewater disposal systems. Therefore, there would be **no impact** related to adequate soil to support such systems.

f) Paleontological resources are the fossilized evidence of past life found in the geologic record. Despite the tremendous volume of sedimentary rock deposits preserved worldwide, and the enormous number of organisms that have lived through time, preservation of plant or animal remains as fossils is an extremely rare occurrence. Because of the infrequency of fossil preservation, fossils—particularly vertebrate fossils—are considered nonrenewable resources. Because of their rarity, and the scientific information they can provide, fossils are highly significant records of ancient life. A significant impact would occur if a project destroyed a unique paleontological resource or site, or a unique geologic feature.

Paleontological sensitivity is defined as the potential for a geologic formation to produce scientifically significant fossils. This is determined by rock type, past history of the geologic unit in producing significant fossils, and fossil localities recorded from that unit. Paleontological sensitivity is derived from the known fossil data collected from the entire geologic unit, not just from a specific survey. In its “Standard Guidelines for the Assessment and Mitigation of Adverse Impacts to Non-renewable Paleontological Resources,” the Society for Vertebrate Paleontology (SVP, 2010) has identified four categories of paleontological sensitivity (potential) for rock units: high, low, undetermined, and no potential. These categories are defined as follows:

- **High Potential**: Rock units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered are considered to have a high potential for containing additional significant paleontological resources.
- **Low Potential**: Rock units that are poorly represented by fossil specimens in institutional collections, or based on general scientific consensus only preserve fossils in rare circumstances and the presence of fossils is the exception not the rule.
- **Undetermined Potential**: Rock units for which little information is available concerning their paleontological content, geologic age, and depositional environment.

- **No Potential**: Rock units like high-grade metamorphic rocks (such as gneisses and schists) and plutonic igneous rocks (such as granites and diorites) that will not preserve fossil resources.

The most current geologic map (Brabb et al., 1998) indicates that the Project site is underlain by Holocene-age alluvial fan and fluvial deposits (Qhaf) and, while not mapped at the surface at the Project site, Pleistocene-age alluvial fan and fluvial deposits (Qpaf) are mapped in the vicinity and are likely present in the subsurface. Slightly older geologic mapping (Pampeyan, 1994) indicates that the Project site is underlain by Pleistocene-age alluvium. The discrepancy between maps could be due to updated information on the age of these deposits.

In general, the uppermost layers of Holocene-age deposits are considered to have a low potential to contain significant paleontological resources, as they are not old enough to have preserved fossils. However, the potential of these deposits increases with increased depth into the subsurface (i.e., deposits that date to the middle Holocene or older), and fossils may be encountered at these depths. While the exact depth at which the transition to older sediments is not known in the Project site, fossils have been discovered in central California as shallow as 5 to 10 feet below ground surface (Jefferson, 1991a; Jefferson, 1991b). Pleistocene-age deposits throughout California generally have a high paleontological potential to contain significant paleontological resources, as is evident from the numerous fossil discoveries from deposits of this age (Jefferson, 1991a; Jefferson, 1991b; Sub Terra Consulting, 2017; UCMP, 2023).

The University of California Museum of Paleontology online locality database contains records of various fossil discoveries throughout California and was consulted to ascertain fossil locality data in San Mateo County. Based on the database search, there are no recorded fossil localities from within the Project site. In addition, approximately 4,000-year-old cultural resources have been encountered in the site vicinity at depths of approximately 7 feet below ground surface, indicating that the upper 7 feet of material is younger than 5,000 years old. However, there are 14 Pleistocene-age vertebrate fossil localities from within San Mateo County. Common specimens from these localities include mammoths, bison, horses, ground sloths, birds, camels, moose, and sea otters. Due to the previous significant fossil discoveries from Pleistocene-age deposits in San Mateo County, the Pleistocene-age deposits that may be present in the subsurface underling the Project site are considered to have a high potential to contain significant paleontological resources. As stated above, the exact depth at which the alluvium becomes old enough to preserve fossils deeper than 7 feet below ground surface is unknown at the Project site. While there is no indication of previous fossil discoveries within the Project site, due to the presence of the Holocene- and Pleistocene-age deposits underlying the Project site, the potential to encounter significant paleontological resources would be high.

Project construction would require excavation up to 20 feet below ground surface. The Project would be installed beneath the existing parking lot and other areas of Twin Pines Park.

If significant paleontological resources are encountered and inadvertently destroyed during Project construction, that would be a significant impact. Therefore, **Mitigation Measure GEO-1** would be required to reduce the Project's impacts on significant paleontological resources to a **less-than-significant** level.

Mitigation Measure GEO-1: Paleontological Monitoring

a) **Project Paleontologist**: The City shall retain a qualified professional paleontologist (qualified paleontologist) meeting the Society of Vertebrate Paleontology (SVP) standards as set forth in the "Definitions" section of Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources prior to demolition or grading. The qualified paleontologist shall attend the Project kick-off meeting and Project progress meetings on a regular basis, shall report to the site in the event potential paleontological resources are encountered, and shall implement the outlined duties.

b) **Worker Training**: Prior to the start of any ground-disturbing activity, the qualified paleontologist shall prepare paleontological resources sensitivity training materials for use during project-wide Worker Environmental Awareness Training (or equivalent). The paleontological resources sensitivity training shall be conducted by a qualified environmental trainer working under the supervision of the qualified paleontologist. In the event construction crews are phased in, additional trainings shall be conducted for new construction personnel. The training session shall focus on the recognition of the types of paleontological resources that could be encountered within the Project site and the procedures to be followed if they are found, as outlined in an approved Paleontological Resources Monitoring and Mitigation Plan (discussed below). The City shall retain documentation demonstrating that all construction personnel attended the training prior to the start of work on the site.

c) **Paleontological Resources Discovery and Monitoring**: The qualified paleontologist shall prepare a Paleontological Resources Monitoring and Mitigation Plan applicable to excavation deeper than 7 feet below ground surface. The City shall review and approve the plan at least 30 days prior to the start of construction. This plan shall address specifics of monitoring and mitigation and comply with the recommendations of the SVP, as follows:

    i. The Paleontological Resources Monitoring and Mitigation Plan shall clearly map portions of the Project which will excavate below 7 feet below ground surface in previously undisturbed sediments within the Project site that have high paleontological sensitivity, based on final Project design.

    ii. The qualified paleontologist shall establish in the Plan the type of paleontological resources monitoring for ground-disturbing activities which will excavate below 7 feet below ground surface, based on site observations, subsurface stratigraphy, or other factors. Monitoring shall be conducted either by trained workers or by qualified paleontological resource monitors meeting the SVP standards. If necessary, the qualified paleontologist shall identify and retain qualified paleontological resource monitors (qualified monitors) meeting the SVP standards.

iii. Monitoring under the direction of the qualified paleontologist shall be conducted for all ground-disturbing activities which will excavate below 7 feet below ground surface in previously undisturbed sediments within the Project site that have high paleontological sensitivity, or as otherwise specified in the Plan.

iv. The qualified paleontologist (based on site observations, subsurface stratigraphy, or other factors) may reduce or discontinue monitoring, as warranted, if they determine that the possibility of encountering significant paleontological resources is low.

v. If many pieces of heavy equipment are in use simultaneously but at diverse locations, each location will need to be individually monitored, if recommended by the qualified paleontologist.

vi. Monitors shall have the authority to temporarily halt or divert work away from exposed fossils to evaluate and recover the fossil specimens, establishing a 50-foot buffer around fossils.

vii. If construction or other personnel discover any potential fossils during construction, regardless of the depth of work or location and regardless of whether the site is being monitored, work at the discovery location shall cease in a 50-foot radius of the discovery until the qualified paleontologist has assessed the discovery and made recommendations as to the appropriate treatment.

viii. The qualified paleontologist shall determine the significance of any fossils discovered and shall determine the appropriate treatment for significant fossils in accordance with the SVP standards.

ix. Monitors shall prepare daily logs detailing the types of activities and soils observed as well as any discoveries. The qualified paleontologist shall prepare a final monitoring and mitigation report to document the results of the monitoring effort and any curation of fossils and shall submit this report to the City for their records.

d) **Significant Fossil Treatment.** If any find is deemed significant, as defined in the SVP standards, the qualified paleontologist shall salvage and prepare the fossil for permanent curation with a certified repository with retrievable storage following the SVP standards. The city shall retain a repository receipt from the curation facility.

Significance After Mitigation: Implementation of **Mitigation Measure GEO-1** would require construction contractors to retain a qualified professional paleontologist, train construction crews about paleontological sensitivity, prepare and implement a Paleontological Resources Monitoring and Mitigation Plan, and salvage and curate any significant finds. These measures would reduce the potential for construction activities to impact paleontology resources by having a monitor onsite to monitor and halt ground disturbing activities if necessary and ensuring that crew members know how to recognize a resource and what to do in the case of a discovery. Overall, impacts associated with the potential for construction and operation to directly or indirectly destroy a unique paleontological resource or site or unique geologic feature would be less than significant with mitigation.

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8 Greenhouse Gas Emissions

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

Project construction could result in environmental impacts related to greenhouse gas emissions. Refer to Section 3.2 of the Draft EIR for a detailed evaluation of potential impacts and mitigation measures.

9 Hazards and Hazardous Materials

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

Discussion

a, b) During construction, equipment and materials used would include fuels, oils and lubricants, solvents and cleaners, cement and concrete, and asphalt mixtures, which are all commonly used in construction. The routine use or an accidental spill of hazardous materials could result in inadvertent releases, which could adversely affect construction workers, the public, and the environment, resulting in a potentially significant impact.

Construction activities would be required to comply with numerous hazardous materials regulations designed to ensure that hazardous materials are transported, used, stored, and disposed of in a safe manner to protect worker safety, and to reduce the potential for a release of construction-related fuels or other hazardous materials into the environment, including stormwater and downstream receiving water bodies. The California Occupational Safety and Health Administration (Cal/OSHA) is responsible for developing and enforcing workplace safety standards, including standards for handling and using hazardous materials during operations. The United States Department of Transportation and the California Department of Transportation (Caltrans) regulate transportation of hazardous materials. Every contractor that would handle hazardous materials during construction must prepare and implement a hazardous materials management plan for review and approval by the local Certified Unified Program Agency, in this case, San Mateo County Environmental Health Services. The hazardous materials management plan must identify the hazardous materials to be used, training provided to workers on the proper handling of the materials, and procedures for responding to any spills.

As discussed above in Section 7, Geology and Soils, construction contractors would be required to prepare a SWPPP for construction activities according to the General Construction Permit requirements. The SWPPP would list the hazardous materials (including petroleum products) proposed for use during construction; describe spill prevention measures, equipment inspections, and equipment and fuel storage; protocols for responding immediately to spills; and describe BMPs for controlling site runoff.

Together, federal, state, and local regulations regulate the storage, handling, transportation, and disposal of hazardous materials, including hazardous building materials, to minimize the risk of accidental release and exposure. Therefore, the transport, use, storage, handling, and disposal of hazardous materials for the Project would be adequately controlled through compliance with existing regulatory requirements during construction. This impact would be **less than significant**.

c) There are no schools within 0.25 miles of the Project site. Therefore, the Project would not produce hazardous emissions or handle hazardous materials in the vicinity of an existing or planned school, and there would be **no impact**.

d) A review of the Department of Toxic Substances Control EnviroStor database and the State Water Resource Control Board GeoTracker database records indicate that the Project site is not located on a list of hazardous materials sites (compiled pursuant to Government Code Section 65962.5, known as the “Cortese List”), nor are there any sites in the vicinity of the Project site (DTSC, 2023; SWRCB, 2023). There would be **no impact** under this criterion.

e) The Project site is approximately 1.3 miles northwest of San Carlos Airport. According to the *Comprehensive Airport Land Use Compatibility Plan for the Environs of San Carlos Airport*, the Project site is not within any safety zones or noise contours (C/CAG, 2015). As the Project site is not within any of the safety zones or noise contours established for the San Carlos Airport, there would be **no impact** related to safety or noise hazards to people that may be working or residing in the area.

f) While the *2021 Multijurisdictional Local Hazard Mitigation Plan* for San Mateo County does not delineate specific evacuation routes that would be used during an emergency, it notes that major arterial roadways and highways would be used in an emergency, if appropriate (Tetra Tech, 2021).

Construction vehicles and equipment would access the Project site from Ralston Avenue, Emmett Avenue, or 6th Avenue via Twin Pines Lane. The Project would use local and regional roadways to haul construction materials. The Project would not require temporary lane closures. As discussed in Section 17, Transportation, construction would cause a less-than-significant increase in congestion on area roadways, though slow-moving construction-related vehicles could temporarily interfere with emergency response to the Project site (e.g., emergency service vehicles traveling behind a slow truck). However, all vehicles are required by law to yield to responding emergency vehicles that have warning apparatus in operation, and it is not considered likely that heavy construction-related traffic would result in inadequate emergency access. Adherence to existing traffic rules-of-the-road would ensure that the Project does not impair or interfere with an emergency response or evacuation plan, and the impact would be **less than significant**.

g) The Project site is not within a Local Responsibility Area (CAL FIRE, 2022) and is not designated by the City of Belmont as a High Fire Hazard Area or Very High Fire Hazard Area (Belmont Fire Protection District, 2012). Therefore, there would be **no impact** related to wildland fires.

References

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State Water Resources Control Board (SWRCB). 2023. GeoTracker database. Hazardous materials sites near Belmont, CA. Accessed December 30, 2022.

Tetra Tech. 2021. *2021 Multijurisdictional Local Hazard Mitigation Plan*, October 2021. Prepared for County of San Mateo Department of Emergency Management.

10 Hydrology and Water Quality

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

Project construction and operation could result in environmental impacts related to hydrology and water quality. Refer to Section 3.5 of the Draft EIR for a detailed evaluation of potential impacts and mitigation measures.

11 Land Use and Planning

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

Discussion

a) Project construction and operation would occur within the Project site at Twin Pines Park. Due to the location and nature of the Project described in Chapter 2, *Project Description* of the EIR, the Project would not result in the physical division or isolation of an established community and there would be **no impact**.

b) The Project site is on land zoned as Public Space, Park/Plaza, and Public Facility by the City of Belmont (City of Belmont, 2023). The General Plan designation for the Project site is Open Space and Belmont Village Mixed Use (City of Belmont, 2017). While portions of Twin Pines Park would be temporarily impacted during construction, once construction is complete, the existing parking lot would be restored to a similar condition and the park would function as it currently does. The Project would not conflict with any applicable land use plan, policy, or regulation, and the impact would be **less than significant**.

References

City of Belmont. 2017. *2035 General Plan*, Land Use Element. Adopted November 14, 2017.

_____. 2023. Belmont Parcel Viewer, 2023. Available: https://belmontca.maps.arcgis.com/apps/webappviewer/index.html?id=9ffa8ad5f945405a9fc7f3f7a4fe61f1. Accessed January 25, 2023.

12 Mineral Resources

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

Discussion

a, b) According to the United States Geological Survey, there are no known mineral resources located in the Project vicinity that would be of value to the region and the residents of the state (USGS, 2023). The General Plan (City of Belmont, 2017) did not identify any locally important mineral resource recovery sites on or near the Project site. There would be **no impact**.

References

City of Belmont. 2017. *2035 General Plan*, Land Use Element. Adopted November 14, 2017.

United States Geological Survey (USGS). 2023. *Mineral Resources On-Line Spatial Data Interactive Map*. Available: http://mrdata.usgs.gov/general/map.html. Accessed January 25, 2023.

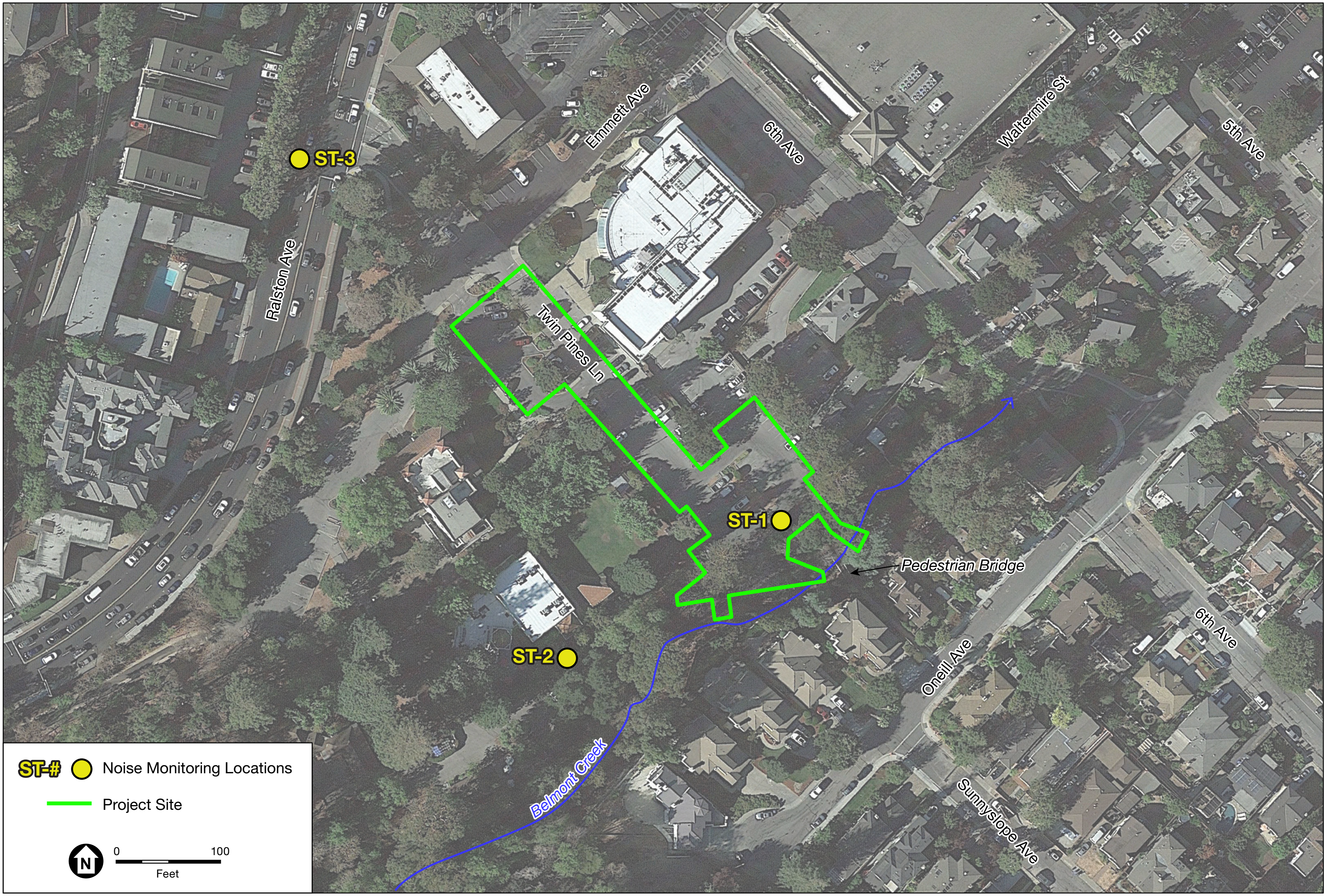
13 Noise

Issues:		*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
Would the project result 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?	☐	☒	☐	☐
b)	Generation of excessive groundborne vibration or groundborne noise levels?	☐	☒	☐	☐
c)	For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

The Project is located adjacent to recreational and residential uses. While recreational use is not typically considered a noise-sensitive use, residential land uses are noise-sensitive uses that could be affected by short-term construction and long-term operational activities. Residences are as close as 40 feet from the Project site (south of the site on O’Neill Avenue and north on Ralston Avenue).

The primary existing noise sources in the Project vicinity include recreationalists and vehicle movement within Twin Pines Park, vehicles on surrounding roadways, and activities at nearby residences. To characterize the existing ambient noise environment in the Project vicinity, three short-term (15-minute) ambient noise level measurements were collected mid-morning on February 1, 2023, at locations adjacent to the Project site (refer to **Figure 1** for an illustration of the noise measurement locations). These locations were chosen to best represent the ambient

2021\D202101220.00 - Twin Pines Park Storm Water Capture\05 Graphics-GIS-Modeling-USE AZURE\05 Graphics-GIS-Modeling/Illustrator



SOURCE: ESA, 2023; Google Earth, 2022

Twin Pines Park Stormwater Detention Basin Project

Figure 1
Noise Monitoring Locations

ESA

noise environments at the closest noise-sensitive uses to the Project site. The short-term measurements are characterized in terms of the equivalent sound level (L_{eq}) to describe the average noise exposure level for the given time period (in this case 15 minutes), as well as the L_{max} and L_{min}, which represent the instantaneous maximum and minimum noise levels, respectively, measured during the 15-minute measurement periods. **Table 1** shows the results of the short-term noise monitoring survey.

TABLE 1
SHORT-TERM AMBIENT NOISE MEASUREMENT RESULTS

No.	Location Description	Time Period	Noise Level (dBA)			Sources
			L_{eq}	L_{max}	L_{min}	
ST-1	South parking lot of Twin Pines Park behind residences on O'Neill Avenue	10:38 a.m.–10:53 a.m.	55.1	65.3	47.2	Bird vocalization, aircraft flyover, and backyard construction.
ST-2	South side of Belmont Senior & Community Center on Cottage Lane	10:56 a.m.–11:12 a.m.	49.3	63.7	44.3	Bird vocalization and vehicle passage.
ST-3	Along Ralston Avenue, entrance to Woodmont Apartment Homes	11:16 a.m.–11:31 a.m.	60.9	75.6	39.8	Traffic on Ralston Avenue.

NOTES: dBA = A-weighted decibels; L_{eq} = equivalent sound level; L_{max} = maximum sound level; L_{min} = minimum sound level.
Measurements were short-term, collected over 15-minute periods on Wednesday, February 1, 2023.
SOURCE: ESA, 2023.

Discussion

a) The Project would include equipment that could generate noise during construction and operation.

Construction

Project construction would occur over two years and would result in temporary increases in ambient noise levels. Onsite construction activities would require the use of heavy construction equipment (e.g., excavator, loader, crane) that would generate varying noise levels. Offsite construction noise sources would consist of passing trucks and other construction-related vehicles. The City of Belmont Noise Ordinance, Section 15-102 Noise Limitations, regulates construction noise by allowing construction work to occur between the hours 8:00 a.m. and 5:00 p.m. Monday through Friday (except holidays) and 10:00 a.m. to 5:00 p.m. on Saturdays. Pursuant to the City's ordinance, all gasoline-powered construction equipment must be equipped with an operating muffler or baffling system as originally provided by the manufacturer, and no modification to these systems is permitted (City of Belmont, 2016). As indicated in Chapter 2, *Project Description* of the EIR, the City's construction work hours would be adhered to, and no nighttime construction would be required.

Project construction would involve demolition, grading, building construction, and paving. Operation of each piece of equipment involved in these activities would not be constant throughout the day, as equipment would be turned off when not in use. Over a typical workday, the equipment would be operated at different locations and all the equipment would not operate concurrently at the same location of the Project site. **Table 2** presents noise levels at 40 feet (distance of the nearest sensitive receptors) associated with typical construction equipment that is expected to be used for the Project (consistent with equipment listed in Section 2.5 of the EIR).

TABLE 2
TYPICAL NOISE LEVELS FROM CONSTRUCTION EQUIPMENT AT 40 FEET

Type of Equipment	L_{max}, dBA
Backhoe	80
Excavator	83
Grader	87
Concrete/Industrial Saw	92
Forklift	85
Crane	83
Skid Steer Loader	81
Water Pump	83
Roller	82
Trencher	82
Cement and Mortar Mixer	82
Paver	79
Paving Equipment	79
Impact Pile Driver	103
Tractor	86
Loder	93
Signal Board	75

Source: FHWA, 2008

In addition to on-site construction equipment, the Project would also result in short-term increases in local daytime traffic volumes to access the Project site, primarily on Ralston Avenue. Construction activities are anticipated to generate up to approximately 14 one-way off-haul truck trips per day, up to 22 one-way construction material delivery trips per day, and up to 36 one-way worker trips per day. The 14 off-haul truck trips would be distributed over an eight-hour workday, resulting in fewer than two truck pass-by events in an hour, and would not meaningfully increase noise levels on Ralston Avenue, which accommodated over 1,000 peak hour trips in 2016 (City of Belmont, 2017a). While worker and delivery trips would likely be concentrated in the morning commute hours and evening hours (for workers), their contribution to existing roadway noise on Ralston Avenue would not result in a significant noise increase.

As shown in Table 2, at 40 feet from the source, noise levels from most construction activities would be above 90 dBA for some construction equipment, including the potential use of pile driving equipment for approximately 20 days. Because construction activities could substantially increase ambient noise levels at noise-sensitive locations, construction could result in a noticeable noise increase in the vicinity of sensitive receptors that could result in speech interference. There are no quantitative standards for construction noise specified by either the City of Belmont General Plan or the municipal code. However, General Plan Policy 7.1-1a limits hours for certain construction and demolition work to reduce construction-related noise exposure (City of Belmont, 2017b) and the City of Belmont Municipal code, Section 15-102 Noise Limitations, states all gasoline-powered construction equipment shall be equipped with an operating muffler or baffling system as originally provided by the manufacturer, and no modification to these systems is permitted (City of Belmont, 2016). Implementation of noise reduction measures outlined in **Mitigation Measure NOI-1: Construction Noise Reduction Measures** would mitigate noise exposure to sensitive receptors from construction activities to the extent feasible to be consistent with the General Plan and Municipal code. Therefore, with the implementation of Mitigation Measure NOI-1, the Project would not generate 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. This impact would be **less than significant with mitigation**.

Mitigation Measure NOI-1: Construction Noise Reduction Measures.

The construction contractor shall implement the following noise reduction measures to reduce the impact of temporary construction-related noise on sensitive receptors:

1. Require construction equipment and trucks used for Project construction to utilize the best available noise control techniques (including mufflers, use of intake silencers, ducts, engine enclosures, and acoustically attenuating shields or shrouds).

2. Turn off construction equipment when not in use.

3. Locate stationary equipment, construction staging areas, and construction material areas as far from sensitive receptors as possible.

4. Require any impact equipment (e.g., jack hammers, pavement breakers, etc.) used for Project construction be hydraulically or electrically powered wherever feasible to avoid noise associated with compressed air exhaust from pneumatically powered tools. Where use of pneumatically powered tools is unavoidable, the use of an exhaust muffler on the compressed air exhaust is recommended to lower noise levels from the exhaust by up to about 10 dBA. When feasible, external jackets on the impact equipment should also be incorporated to achieve a further reduction of 5 dBA. In the event that external jackets on impact equipment are not feasible, other best management practices shall be employed to reduce noise by 5 dBA. Whenever feasible, require the use of quieter procedures.

5. When construction takes place within 100 feet of sensitive receptors, use specific techniques such as, but not limited to, restrictions on construction timing, use of sound blankets on construction equipment, and the use of temporary walls and noise barriers to block and deflect noise.

Significance After Mitigation: Implementation of Mitigation Measure NOI-1 would require construction contractors to use the best available noise control techniques, turn off equipment when not in use, stage construction materials away from sensitive receptors, prioritize the use of hydraulically or electrically powered equipment, and use techniques to block and deflect noise when around sensitive receptors. These measures would reduce the potential for construction activities to cause noise impacts by reducing the generation of noise and implementing buffers to protect sensitive receptors. Overall, impacts associated with the potential for construction and operation to generate 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 would be **less than significant with mitigation**.

Operation

The primary source of noise during Project operation would be the use of a sump pump to drain the stormwater basin. The electric sump pump would operate for up to 72 hours after significant storm events and would have an operational capacity of 318 gpm. Environmental Science Associates performed noise monitoring of two large capacity (200 hp) submersible pumps within a non-insulated enclosure, which indicated a combined steady-state operational noise level of 42 to 48 dBA at a distance of 30 feet (ESA, 2019). It is assumed that the Project's sump pump would be expected to generate a similar noise level, which corresponds to a noise level of 38 dBA at 90 feet, the approximate distance from the property line of the nearest residential use. Pump operations would be below the stationary noise sources standard of 50 dBA and 45 dBA for daytime and nighttime, respectively (City of Belmont, 2017b).

Other operational noise sources would include an excavator and a dumper to periodically remove sediment from the underground storage facility. Sediment removal is likely to be an annual occurrence and would vary depending on storm events and sediment moving through the creek each year. Excavator and dumper (truck) noise would be infrequent, and would occur mostly during the weekdays when there are fewer users in the park and residents at home. Therefore, the operational noise impact would be **less than significant**.

b) The Project would include equipment that could generate vibration during construction and operation.

Construction

Construction activities can result in varying degrees of ground-borne vibration, depending on the type of soil, equipment, and methods employed. Operation of impact equipment (i.e., jack hammer, drill rig) or heavy compact equipment (i.e., vibratory roller) can cause ground vibrations that spread through the ground and diminish in strength with distance. Buildings on the soil near the construction site respond to these vibrations with varying results, ranging from no perceptible effects at the lowest levels, low rumbling sounds and perceptible vibrations at moderate levels, and slight damage at the highest levels. While ground vibrations from construction activities do not often reach the levels that can damage structures, fragile buildings must receive special consideration. Because construction activities would be restricted to daytime hours over a relatively short construction period, construction-related vibration would not be expected to result in human annoyance.

There are structures of historical significance in the Project vicinity (the Manor Building) that could be impacted by vibrations (refer to Section 3.4, *Cultural Resources* of the Draft EIR for additional details about historic resources). The Manor Building is approximately 60 feet from the Project site. Therefore, the analysis below uses a vibration threshold of 0.12 in/sec which is consistent with the Federal Transit Administration (FTA) construction vibration criterion for buildings susceptible to vibration damage. Existing structures that do not have historical significance (e.g., Oneil Avenue residences) are located as close as 60 feet from the Project site. The analysis uses a vibration threshold of 0.5 in/sec which is consistent with the FTA's construction vibration criteria for buildings of conventional construction.

Vibration levels generated during construction by impact equipment or earth moving equipment at a reference distance of 60 feet is shown in **Table 3**. Table 3 also shows the distance from equipment necessary for vibration generated by these pieces of equipment to be attenuated by distance to a vibration level below the applicable threshold, as well as the resultant vibration levels at the nearest structures. As shown in Table 3, vibration levels from construction equipment would be well below FTA's vibration thresholds for building damage of 0.12 PPV in/sec and for 0.5 in/sec for historic and modern structures, respectively.

TABLE 3
CONSTRUCTION EQUIPMENT VIBRATION LEVELS AT 60 FEET

Construction Equipment	Reference Vibration Level at 25 feet (PPV, in/sec)	FTA Building Damage Threshold (PPV)	Distance to Nearest Structure	PPV at Nearest Structure (in/sec)
Vibratory Roller	0.21	0.12	60	0.056
Loaded trucks	0.076	0.12	60	0.001
Pile Driver (Impact)*	0.65	0.5	60	0.175

NOTES:
* Pile driving would occur near the sediment chamber and would be nearest to Oneil Avenue residences.
SOURCE: ESA, 2023 (based on FTA, 2018)

Other existing structures that do not have historical significance (e.g., Belmont City Hall) are located as close as 10 feet from the Project site. The analysis below uses a vibration threshold of 0.5 in/sec which is consistent with the FTA's construction vibration criteria for buildings of conventional construction.

Vibration levels generated during construction by impact equipment or earth-moving equipment at a reference distance of 25 feet are shown in **Table 4**. Table 4 also shows the distance from equipment that is necessary for vibration generated by operation of these pieces of equipment to be attenuated (reduced) to a vibration level below the applicable threshold, as well as the resultant vibration levels at the nearest structures.

TABLE 4
CONSTRUCTION EQUIPMENT VIBRATION LEVELS AT 10 FEET

Construction Equipment	Reference Vibration Level at 25 feet (PPV, in/sec)	FTA Building Damage Threshold (PPV)	Distance to Attenuate to FTA's Threshold for Building Damage (feet)	Distance to Nearest Structure	PPV at Nearest Structure (in/sec)
Vibratory Roller	0.21	0.5	26	10	0.83
Loaded trucks	0.076	0.5	14	10	0.3

SOURCE: ESA, 2023 (based on FTA, 2018)

As shown in Table 4, construction equipment with the highest vibration source level (e.g., vibratory roller) generates vibration levels of 0.21 PPV in/sec at a distance of 25 feet. Groundborne vibration attenuates rapidly with distance and would not be perceptible beyond 100 feet from the Project site. The FTA's vibration thresholds for building damage is 0.5 PPV in/sec for modern structures, which would be exceeded if vibratory rollers were to be used for compaction at distances closer than15. As discussed above, the nearest structure (Belmont City Hall) would be within 10 feet of Project construction and vibrations from the highest vibration source during construction (i.e., vibratory roller) would be 0.83 PPV in/sec. Therefore, the potential exists for building damage to nearby structures if certain equipment is operated too closely. **Mitigation Measure NOI-2**, **Vibration Avoidance from Compaction**, would ensure that vibration avoidance and reduction measures are implemented to address potential impacts. With implementation of Mitigation Measure NOI-2, impacts related to groundborne vibration or noise from construction would be reduced to **less than significant with mitigation**.

Mitigation Measure NOI-2: Vibration Avoidance from Compaction.

The construction contractor shall implement the following noise reduction measures to reduce the impact of temporary construction-related noise on nearby receptors:

1. Use non-vibratory, excavator-mounted compaction wheels and small, smooth drum rollers for final compaction of asphalt base and asphalt concrete, if within 50 feet of a historic structure or 15 feet of a conventionally constructed structure. If needed to meet compaction requirements, smaller vibratory rollers shall be used to minimize vibration levels during repaving activities where needed to meet vibration standards.

2. Avoid using vibratory rollers and clam shovel drops within 15 feet of buildings of conventional construction.

3. Construction methods shall be modified, or alternative construction methods shall be identified, and designed to reduce vibration levels below the limits of 0.5 PPV in/sec for modern structures.

Significance After Mitigation: Implementation of **Mitigation Measure NOI-2** would require construction contractors to use non-vibratory equipment when near a historic or conventionally constructed structure, avoid vibratory rollers near sensitive receptors, and modify construction methods to reduce vibration levels. These measures would reduce the potential for construction activities to impact vibration levels by reducing the use of vibratory equipment and implementing buffers around sensitive receptors and structures. Overall, impacts associated with the potential for construction and operation to generate excessive groundborne vibration or groundborne noise levels would be l**ess than significant with mitigation**.

Operation

While routine operations would require monitoring and maintenance activities, as described in Section 2.6, *Project Operations and Maintenance* of the Draft EIR, these activities would likely only be required once a year and would result in a minor increase in motor vehicle trips and use of an excavator and dumper, which are not vibration-inducing activities. Therefore, operation and maintenance of the Project would not result in a new source of vibration and the impact would be **less than significant**.

c) The Project is located approximately 1.2 miles northwest of the San Carlos Airport and is not located within the 60 dBA CNEL noise contours for the San Carlos Airport (San Mateo County, 2015). The Project would not involve the development of noise-sensitive land uses that would be exposed to excessive aircraft noise. Construction workers for the Project may be exposed to periodic short-term aircraft overflight noise associated with this airport; however, the average construction activity noise levels that the workers would be exposed to would be greater than the average overflight noise levels that they would be exposed to. Therefore, there would be **no impact**.

References

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Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment Manual. September 2018. Available: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf. Accessed January 30, 2022.

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14 Population and Housing

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

Discussion

a, b) The Project would not construct residences or businesses or extend roads or other infrastructure that would induce substantial unplanned population growth. Construction and operation would occur within Twin Pines Park and therefore would not displace substantial numbers of existing people or housing. Additionally, the construction workforce would be minimal (between 6 and 18 people) and would likely come from surrounding areas or the Bay Area in general. Therefore, the Project would not induce population growth or displace existing housing or people, necessitating the construction of replacement housing elsewhere. There would be **no impact**.

15 Public Services

Issues:	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporated*	*Less Than Significant Impact*	*No Impact*
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the following public services:				
i) Fire protection?	☐	☐	☐	☒
ii) Police protection?	☐	☐	☐	☒
iii) Schools?	☐	☐	☐	☒
iv) Parks?	☐	☐	☐	☒
v) Other public facilities?	☐	☐	☐	☒

Discussion

a) The Project site is served by the following public service providers: San Mateo Consolidated Fire Department, Belmont Fire Protection District, Belmont Police Department, Belmont Redwood Shores School District, and the City of Belmont's Park and Recreation Department. As indicated in Section 14, *Population and Housing*, the Project would not construct residences or other infrastructure that would increase the population and therefore increase the demand for public services. The Project would not require additional fire or police protection, need for schools, or need for other public facilities, such that new or physically altered public facilities would be needed. Twin Pines Park would remain open for public use during construction and would be returned to existing conditions once construction is complete (refer to Section 16, *Recreation*, for more information). Because Project construction and operation would not result in an increase in population, no new or expanded public services would be required and there would be **no impact**.

16 Recreation

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

Discussion

a) The Project would not include construction of recreational facilities. As indicated in Chapter 2, *Project Description* of the EIR, while the City would close the main parking lot, portions of Twin Pines Lane to the west of the Project area, and the pedestrian bridge across Belmont Creek, the rest of Twin Pines Park would remain open for public use during construction and would be returned to conditions similar to those that currently exist once construction is complete. Construction activities at the park may discourage members of the public from visiting, potentially shifting usage temporarily to other recreational facilities in the area. The City of Belmont offers 14 developed parks on 31 acres along with 337 acres of open space for hiking, running, and bike riding (City of Belmont, 2023). Additionally, San Mateo County's Department of Parks operates 24 separate parks encompassing more than 16,000 acres as well as 190 miles of county and local trails, including three regional trails (San Mateo County, 2023). Due to the temporary nature of construction and the availability of other facilities in the area, the Project would not increase the use of recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated. The impact would be **less than significant**.

b) While the Project would occur at Twin Pines Park, it does not include construction of recreational facilities. Therefore, there would be **no impact** related to the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.

References

City of Belmont, Parks and Open Space. 2023. Available: https://www.belmont.gov/departments/parks-and-recreation/parks-open-space. Accessed March 10, 2023.

San Mateo County, Parks. 2023. About the San Mateo County Parks Department. Available: http://www.smcgov.org/parks/about-san-mateo-county-parks-department. Accessed March 10, 2023.

17 Transportation

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

Discussion

a) ***Local and Regional Roadways***

Project construction would temporarily increase local traffic due to the transport and delivery of construction equipment and materials, as well as from daily worker trips. Regional access to the Project site would occur from U.S. 101 and El Camino Real (State Route 82), with local access occurring via Ralston Avenue, Emmett Avenue, and 6th Avenue. Additionally, trucks hauling excavated material from the Project site would likely travel to the Ox Mountain Landfill near Half Moon Bay via State Route 92.

As described in Section 2.5, *Project Construction* of the Draft EIR, construction is anticipated to occur over approximately two years between May 2025 and April 2027. Construction would generally occur from 8 a.m. to 5 p.m., Monday through Friday, and on Saturdays between 10 a.m. and 5 p.m. Construction activities would generate offsite traffic associated with the delivery of construction vehicles and equipment to the Project site, the daily arrival and departure of construction workers, and the transport of materials throughout the construction period. A detailed traffic plan would be required by San Mateo County for overweight vehicles. Construction staging would occur entirely within the Project site and would not require any temporary lane closures on adjacent roadways.

Construction activities are anticipated to generate between 12 and 36 one-way construction worker trips per day, 0 to 14 one-way off-haul truck trips per day (generally related to underground storage excavation), and 0 to 22 one-way construction material delivery trips per day (generally related to underground storage construction and backfill). In total, peak construction activity could generate approximately 72 one-way vehicle trips to/from the Project site (36 worker trips in passenger vehicles, 14 off-haul truck trips, and 22 material delivery truck trips). While construction activities would increase traffic volume on study area roadways, these increases would not represent a substantial increase in traffic given that trips would be spread over the course of the workday and there would be a relatively low number of vehicle trips in relation to local and regional roadways that would be used to access the Project site.

Once the Project was in operation, it is anticipated that no new staff would be employed specifically to operate or perform routine maintenance on the new facilities. Maintenance at the underground storage facility would include regular inspection and periodic removal of sediment to maintain capacity. The amount of sediment removed during routine (likely annual) maintenance would vary depending on storm events and sediment moving through the creek each year. Removed sediment would be hauled to a site within San Mateo County for beneficial reuse or to Ox Mountain Landfill. Any major repair activities would be episodic and occur only as-needed, and cannot be reliably anticipated or scheduled. Therefore, additional truck trips resulting from maintenance of the Project would be minimal.

Based on the above discussion, construction and operation of the Project would result in **less-than-significant** impacts on roadways.

Congestion Management Plan Facilities

Congestion management programs and level of service (LOS) standards established by congestion management agencies are intended to monitor and address long-term traffic conditions related to future development that generates permanent (on-going) traffic increases, and do not apply to temporary impacts associated with construction projects. San Mateo County's Congestion Management Program (CMP), which is updated every two years, monitors the local multi-modal transportation network level of service for roadways, bicycle and pedestrian facilities, and transit services, and identifies improvements to the performance of these multi-modal systems.

As described above, following construction, traffic increases associated with Project operation and maintenance would be minimal and would consist of regular inspection and periodic removal of sediment. The Project would be operated and maintained by existing staff and would not require additional workers. Thus, there would not be a substantial increase in vehicle trips resulting from the Project. The impact on CMP facilities would be **less than significant**.

Public Transit, Bicycle, and Pedestrian Facilities

Transit access to the Project site is provided along Ralston Avenue via bus stops located adjacent to Twin Pines Park. San Mateo County Transit District (SamTrans) serves these bus stops with three bus routes: Route 60 (Ralston School – Bridge/Bowsprit via Chula Vista), Route 67 (Bridge/Bowsprit – Ralston School), and Route 260 (San Carlos Caltrain – Carlmont Village). The designated bicycle facilities on Ralston Avenue are a Class III Bicycle Route between the Project site and El Camino Real, and a Class II Bicycle Lane west of the Project site. Sidewalks are located on both sides of the street on all local roadways that would be used to access the Project site.

The Project would neither directly nor indirectly eliminate existing or planned alternative transportation corridors or facilities (e.g., bike paths, lanes, etc.), including changes in policies or programs that support alternative transportation, nor construct facilities in locations for which future alternative transportation facilities may be planned. The

Project would not conflict with the policies set forth in the Comprehensive Pedestrian and Bicycle Plan (City of Belmont, 2016) or the Ralston Avenue Corridor Study and Improvements Plan (City of Belmont, 2014) supporting alternative transportation. As described above, construction activities associated with the Project would not generate traffic volume increases that would significantly affect traffic flow on area roadways. The performance of public transit, bicycle, and pedestrian facilities in the area likewise would not be adversely affected. This impact would be **less than significant**.

b) In accordance with Senate Bill (SB) 743, CEQA Guidelines Section 15064.3, subdivision (b) was adopted in December 2018 by the California Natural Resources Agency; this focuses the determination of the significance of transportation on vehicle miles traveled, or VMT, as a measure of the total number of miles driven to or from a development and is sometimes expressed as an average per trip or per person. The Belmont City Council adopted Resolution No. 2021-021 on February 23, 2021, which identifies VMT screening criteria and thresholds. According to Section 3 of that resolution, CEQA Exemptions, any project (housing or non-housing) in Belmont that generates less than 110 daily trips is exempt from a VMT impact analysis, and a less-than-significant transportation impact can be assumed.

Taking the information discussed above into account, the Project would not conflict with or be inconsistent with CEQA Guidelines Section 15064.3(b) during construction. Construction-generated trips would be temporary and would result in fewer than 110 trips per day during the peak construction traffic period, when there would be as many as 36 one-way construction worker trips, 14 one-way off-haul truck trips, and 22 one-way construction material delivery trips. Existing Department of Public Works staff would perform regular operations, maintenance, and inspection of the proposed infrastructure. Periodic sediment removal from the sediment chamber would be conducted by Department of Public Works staff using City-owned vacuum trucks. Approximately 200 cubic yards of sediment would be removed on average via approximately 20 truck trips during each removal event and would be hauled to a site within San Mateo County for beneficial reuse or to Ox Mountain Landfill (approximately 7 miles west of the Project site). For these reasons, VMT generated by the Project would be **less than significant**, and no mitigation would be required.

c) The Project would not substantially increase hazards due to a design feature or incompatible use. Construction employees and delivery trucks would result in a minor increase in vehicle trips in the Project vicinity during construction (and a minor/infrequent increase in vehicle trips during maintenance activities) that would not affect vehicular, bicycle, and pedestrian safety of adjacent roadways. The Project would not make any changes to the design of the existing street network or driveway access points. Therefore, potential transportation hazard impacts related to road design would be **less than significant**.

d) The Project would not change the configuration of the Project area's road network and would not require temporary lane closures which would create reduced traffic capacity issues. As described in Question a) above, construction would cause a less-than-significant increase in congestion on area roadways, though slow construction-related vehicles could temporarily interfere with emergency response to the Project site (e.g., emergency service vehicles traveling behind the slow truck). However, all vehicles are required by law to yield to responding emergency vehicles that have warning apparatus in operation, and it is not considered likely that heavy construction-related traffic would result in inadequate emergency access. Adherence to existing traffic rules-of-the-road would ensure that the Project's construction impacts to emergency access would be **less than significant**.

References

City of Belmont. 2014. The Ralston Avenue Corridor Study and Improvements Plan, August 2014. Available: https://www.belmont.gov/home/showpublisheddocument/14931/636167236470470000. Accessed January 26, 2023.

_____. 2016. Comprehensive Pedestrian and Bicycle Plan, November 2016. Available: www.belmont.gov/home/showpublisheddocument/14951/636179086799900000. Accessed January 26, 2023.

_____. 2021. Resolution No. 2021-021 (SB 743, CEQA VMT Policy), adopted February 23, 2021. Available: https://belmont-ca.granicus.com/MetaViewer.php?view_id=1&clip_id=650&meta_id=40794. Accessed January 26, 2023.

18 Tribal Cultural Resources

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

Project construction and operation could result in environmental impacts related to tribal cultural resources. Refer to Section 3.6 of the Draft EIR for a detailed evaluation of potential impacts and mitigation measures.

19 Utilities and Service Systems

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

Discussion

a) The Project would not require the relocation or construction of water, wastewater treatment, electric power, natural gas, or telecommunication facilities; thus, this impact would be less than significant. Significant environmental impacts associated with construction of the underground stormwater storage facility are analyzed throughout this Initial Study and EIR.

b) As noted in Chapter 2, *Project Description* of the EIR, the Project would require approximately 2,000 gallons of water per day during construction for dust suppression. Water would be obtained from fire hydrants near 1070 6th Avenue or 1090 Ralston Avenue adjacent to the Project site. During operation, stormwater would flow into and out of the underground storage facility. The landscaping installed as part of the Project would need watering and would use the City's existing landscape irrigation system, but no additional potable water would be required during operations. The City of Belmont gets water from the Mid-Peninsula Water District (MPWD), which purchases water from the San Francisco Public Utilities Commission. While MPWD is contracted to supply up to 3.891 million gallons per day, in 2020, the average daily demand in the MPWD's service area was 2.66 million gallons per day (MPWD, 2021). The minimal water needs for the Project would be well within the available water supplies provided by MPWD, and there would therefore be sufficient water supplies available to serve the Project and reasonably foreseeable future development. The impact would be **less than significant**.

c) As previously discussed, the Project would not result in an increase in population or the construction of residences or other infrastructure that could increase demand for water or wastewater treatment facilities. The construction of new water or wastewater treatment facilities or expansion of existing facilities would therefore not be required, and there would be **no impact**.

d) As noted in Chapter 2, *Project Description* of the EIR, Project demolition and earthwork would generate approximately 39,000 cubic yards of excavated materials, with approximately 15,000 cubic yards to be reused onsite as backfill and approximately 24,000 cubic yards of material to be off-hauled in 14-cubic-yard trucks. Waste off-hauled from the Project area would likely be disposed at the Corinda Los Trancos (Ox Mountain) Landfill in Half Moon Bay (about 7 miles west of the Project area) or Shoreway Environmental Center (approximately 2 miles east of the Project area). Corinda Los Trancos is a Class III solid waste landfill with a daily capacity of 3,590 tons per day, a remaining capacity of 22,180,000 cubic yards as of December 31, 2015, and a ceased operation date of January 1, 2034 (CalRecycle, 2015). Shoreway Environmental Center is a large volume transfer/processing facility with a maximum permitting throughput of 3,000 tons per day (CalRecycle, 2019). Based on the daily and remaining capacity of local landfills, the Project would not generate waste in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals, and the impact would be **less than significant**.

e) The facilities identified above for disposal and recycling of excavation materials are permitted for the types of waste that would be generated by Project construction. The California Integrated Waste Management Act of 1989 (AB 939) requires municipalities to divert at least 50 percent of solid waste generated each year. San Mateo County's Countywide Integrated Waste Management Plan is the guiding document for attaining and maintaining the goals of the Integrated Waste Management Act of 1989 in San Mateo County. Additionally, the 2016 California Green Building Standards Code requires nonresidential development to reuse or recycle a minimum of 65 percent of the nonhazardous construction and demolition waste.

Specifications for Project construction would contain requirements for the handling, storage, cleanup, and disposal of hazardous materials, including petroleum-based products or other construction pollutants. Refer to Section 9, *Hazards and Hazardous Materials*, for additional information on hazardous materials associated with Project construction and how hazardous materials would be handled if encountered during construction. The Project would comply with all applicable regulatory requirements related to solid waste, and the impact would be **less than significant**.

References

California Department of Resources Recycling and Recovery (CalRecycle). 2015. SWIS Facility/ Site Activity Details, Corinda Los Trancos Landfill (Ox Mtn) (41-AA-0002), December 31, 2015. Available: https://www2.calrecycle.ca.gov/SolidWaste/SiteActivity/Details/1561?siteID=3223. Accessed January 26, 2023.

_____. 2019. SWIS Facility/Site Activity Details, Shoreway Environmental Center (41-AA-0016). Available: https://www2.calrecycle.ca.gov/SolidWaste/SiteActivity/Details/1575?siteID=3236. Accessed January 26, 2023.

Mid-Peninsula Water District (MPWD). 2021. *2020 Urban Water Management Plan*, September.

20 Wildfire

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

Discussion

a-d) The Project site is within a Local Responsibility Area (CAL FIRE, 2022) and is not designated by the City of Belmont as a High Fire Hazard Area or Very High Fire Hazard Area (Belmont Fire Protection District, 2012). For the reasons described under Question d) in Section 17, *Transportation*, the Project would not impair emergency response or access. Additionally, the Project does not include installation or maintenance of infrastructure that may exacerbate wildfire risks. Therefore, the significance criteria do not apply to the Project, and there would be **no impact**.

References

Belmont Fire Protection District. 2012. Staff Report, Public Hearing to Consider an Ordinance of the Belmont Fire Protection District Designating Very High Fire Hazard Severity Zones and Establishing the Wildland-Urban Interface Area, September 25, 2012. Available: https://www.belmont.gov/home/showdocument?id=4014. Accessed January 26, 2023.

California Department of Forestry and Fire Protection (CAL FIRE). 2022. San Mateo County, State Responsibility Area Fire Hazard Severity Zones, November 21, 2022. Available: https://osfm.fire.ca.gov/media/0izm2t3k/fhsz_county_sra_11x17_2022_sanmateo_ada.pdf. Accessed January 26, 2023.

21 Mandatory Findings of Significance

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

Discussion

a) The Project has the potential to impact biological resources, cultural resources, and Tribal cultural resources. For a detailed analysis, refer to Draft EIR Section 3.3, *Biological Resources*, Section 3.4, *Cultural Resources*, and Section 3.6 *Tribal Cultural Resources*.

b) Cumulative environmental effects are multiple individual effects that, when considered together, are considerable or compound or increase other environmental impacts. The individual effects may result from a single project or a number of separate projects and may occur at the same place and point in time or at different locations and over extended periods of time.

As discussed in the Initial Study Checklist above, individual Project-related significant impacts have been identified, most of which would be reduced to less-than-significant levels through implementation of the mitigation measures. Refer to Table 3.1-1 in Draft EIR Section 3.1, *Overview*, for a description of foreseeable projects are proposed in the Project vicinity. Refer to Draft EIR Chapter 3, *Environmental Setting, Impacts, and Mitigation Measures*, for a detailed analysis of cumulative impacts related to air quality and greenhouse gas emissions, biological resources, cultural resources, hydrology and water quality, and tribal cultural resources.

Geology and Soils. The Project would have potentially significant impacts on paleontological resources, which would be reduced to less than significant with implementation of **Mitigation Measure GEO-1**. The geographic scope of cumulative impacts on paleontological resources includes projects adjacent to the Project that could disturb the same potential fossils, if present, within the same geologic formations. None of the cumulative projects would overlap with activities at the Project site, nor are there any known paleontological resources on the Project site that extend outside of the site and could be affected by nearby development. The potential impact is site-specific and would be generally limited to the immediate construction area. Therefore, the Project would not have a cumulatively considerable impact on paleontological resources, and the cumulative impact would be **less than significant**.

Noise. The geographic scope of analysis for cumulative construction noise and vibration impacts encompasses sensitive receptors within approximately 1,000 feet of the Project site. Beyond 1,000 feet, both distance and intervening topography and/or structures would greatly attenuate the contributions of noise from other projects, and their contribution is expected to be minimal. Of the cumulative projects, only the Twin Pines Park Belmont Creek Restoration Project (Restoration Project) is within the 1,000-foot geographic scope of the cumulative construction noise impact. Conservatively assuming that the Restoration Project is constructed at the same time as the Project, noise from construction activities at the two project sites could be potentially significant. As discussed above in Section 13, *Noise*, City of Belmont General Plan Policy 7.1-1a limits hours for certain construction and demolition work to reduce construction-related noise exposure and the City of Belmont Municipal Code, Section 15-102 Noise Limitations, states that all gasoline-powered construction equipment shall be equipped with an operating muffler or baffling system as originally provided by the manufacturer, and no modification to these systems is permitted. These requirements would apply to equipment used for both projects. In addition, implementation of **Mitigation Measures NOI-1** and **NOI-2** would reduce the Project’s contribution to cumulative construction noise and vibration. With implementation of Mitigation Measures NOI-1 and NOI-2, the Project’s contribution to cumulative noise impacts would not be cumulatively considerable and the impact would be **less than significant with mitigation**.

c) As described in a) above, the Project has the potential to cause significant impacts related to air quality, greenhouse gas emissions, biological resources, geology and soils, hydrology and water quality, and noise. Mitigation measures have been identified to reduce these impacts to less-than-significant levels. Impacts from the Project related to air quality, water quality, and hazardous materials could directly affect human beings, and all CEQA impacts discussed above could indirectly affect human beings. Refer to Sections 1 through 20 for analyses describing the Project’s environmental effects. No further mitigation would be required beyond those described above and in the Draft EIR.

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Appendix C

Air Quality

DETAILS OF CONSTRUCTION EQUIPMENT AND ACTIVITY

Site area	1.95	acres
Buildig demolition area	0.00	square feet
Paved area to be removed	1.20	acres
New paving area	1.20	acres

Overall construction timeline

Construction Phase	Start Date	End Date	Number of workdays in Phase
Site mobilization, clearing, grubbing, and vegetation removal	5/1/2024	7/31/2024	66
Demolition of existing parking lot	8/1/2024	9/30/2024	43
Underground storage excavation	10/1/2024	1/31/2025	89
Underground storage construction and backfill	2/1/2025	7/31/2025	129
Weirs, sedimentation basin, and check structure construction	8/1/2025	8/31/2025	21
Pipeline installation	9/1/2025	9/30/2025	22
Field surface replacement	10/1/2025	10/30/2025	22
Parking Reconstruction	10/31/2025	12/31/2025	44
Landscape and stream restoration	1/1/2026	2/28/2026	42
Ancillary park improvements	3/1/2026	4/30/2026	44

Paved Area Demolition Off-Haul Estimate

acres	squre feet/acre	square feet	Thickness (in)	Estimated Weight (tons)
1.2	43560	52272	4	696.43
Concrete and Asphalt Weight Calculator	https://www.budgetdumpster.com/resources/dumpster-weight-calculator.php			

Construction Vehicle Trips by Phase

Construction Phase	Construction workers/day	One-way Worker trips/day	Truck Trips/day (Off-haul)	Truck Trips/day (fill)	Construction Material delivery trips/day	Total One-way Haul Trips	One-Way Vendor Trips
Site mobilization, clearing, grubbing, and vegetation removal	10	20	0	0	0	0	0
Demolition of existing parking lot	6	12	1	0	0	86	0
Underground storage excavation	14	28	7	0	0	1246	0
Underground storage construction and backfill	14	28	0	0	11	0	22
Weirs, sedimentation basin, and check structure construction	8	16	1	0	2	42	4
Pipeline installation	12	24	0	0	1	0	2
Field surface replacement	6	12	0	0	0	0	0
Parking Reconstruction	18	36	0	0	1	0	2
Landscape and stream restoration	10	20	0	0	1	0	2
Ancillary park improvements	6	12	0	0	0	0	0

Construction Equipment and Activity by Phase

Equipment	Number of Equipment used	Avg Operation (hrs/day)	Number of Work Days in the construction phase equipment is used	Equipment size (hp)	Total Run Time (hours)	Actual Hours Per Day Based on Total Working Days in Phase
Site mobilization, clearing, grubbing, and vegetation removal						
Excavators	1	8	20	163	160	2.4
Skid Steer Loaders	1	8	60	65	480	7.3
Graders	1	8	40	175	320	4.8
Demolition of existing parking lot						
Dumpers/Tenders	1	5	40	400	200	4.7
Concrete/Industrial Saws	1	2	15	81	30	0.7
Skid Steer Loaders	1	8	40	65	320	7.4
Underground storage excavation						
Signal Boards	1	8	89	6	712	8.0
Excavators	2	8	85	163	680	7.6
Tractors/Loaders/Backhoes	1	8	85	98	680	7.6
Skid Steer Loaders	1	8	85	65	680	7.6
Dumpers/Tenders	1	8	85	400	680	7.6
Pumps	1	2	40	84	80	0.9
Underground storage construction and backfill						
Cranes	1	8	90	226	720	5.6
Forklifts	1	8	90	89	720	5.6
Signal Boards	1	8	129	6	1032	8.0
Tractors/Loaders/Backhoes	1	8	120	98	960	7.4
Dumpers/Tenders	1	8	120	400	960	7.4
Rollers	1	4	20	81	80	0.6
Weirs, sedimentation basin, and check structure construction						
Excavators	1	6	15	163	90	4.3
Pumps	1	4	20	84	80	3.8
Cement and Mortar Mixers	1	4	20	9	80	3.8
Cranes	1	4	10	226	40	1.9
Skid Steer Loaders	1	8	10	65	80	3.8
Pipeline installation						
Trenchers	1	6	18	81	108	4.9
Skid Steer Loaders	1	6	18	65	108	4.9
Cranes	1	6	12	226	72	3.3
Field surface replacement						
Skid Steer Loaders	1	6	20	65	120	5.5
Graders	1	8	20	175	160	7.3
Parking Reconstruction						

Skid Steer Loaders	1	8	30	65	240	5.5
Rollers	1	8	40	81	320	7.3
Pavers	1	8	40	126	320	7.3
Paving Equipment	1	8	40	131	320	7.3
Landscape and stream restoration						
Cranes	1	4	15	226	60	1.4
Skid Steer Loaders	1	8	25	65	200	4.8
Cement and Mortar Mixers	1	4	25	9	100	2.4
Ancillary park improvements						
Cement and Mortar Mixers	1	4	35	9	140	3.2
Forklifts	1	6	35	89	210	4.8
Skid Steer Loaders	1	6	35	65	210	4.8

Dust From Matieral Movement	Material Exported	Total Acres Graded
Site Mobilization, Clearning, Grubbing, and Vegetation removal	24070	1.2

CALEEMOD EMISSIONS SUMMARY

CONSTRUCTION EMISSIONS - Criteria Air Pollutants - Uncontrolled

Year	Number of Workdays	Tons per year				Average Pounds per day			
		ROG	NOx	Ex PM-10	Ex PM-2.5	ROG	NOx	Ex PM-10	Ex PM-2.5
2024	175	0.04	0.51	0.016	0.015	0.5	5.8	0.19	0.17
2025	261	0.07	0.69	0.026	0.024	0.5	5.3	0.20	0.18
2026	86	0.01	0.05	0.002	0.002	0.1	1.2	0.04	0.04
Project Average	522	0.12	1.25	0.04	0.04	0.5	4.8	0.17	0.16
BAAQMD THRESHOLDS						54	54	82	54

CONSTRUCTION EMISSIONS - Criteria Air Pollutants - Tier 4F

Year	Number of Workdays	Tons per year				Average Pounds per day			
		ROG	NOx	Ex PM-10	Ex PM-2.5	ROG	NOx	Ex PM-10	Ex PM-2.5
2024	175	0.02	0.32	0.003	0.003	0.2	3.7	0.03	0.03
2025	261	0.03	0.28	0.004	0.004	0.2	2.1	0.03	0.03
2026	86	0.00	0.04	0.000	0.000	0.1	0.9	0.01	0.01
Project Average	522	0.06	0.64	0.01	0.01	0.2	2.4	0.03	0.03
BAAQMD THRESHOLDS						54	54	82	54
% reduction from MM		53%	49%	83%	82%				

Modeled Emissions for Construction HRA

Construction Year	Uncontrolled				Tier 4F			
	PM$_{10}$ Exhaust		PM$_{2.5}$ Total		PM$_{10}$ Exhaust		PM$_{2.5}$ Total	
	On-site	On-road	On-site	On-road	On-site	On-road	On-site	On-road
2024	1.50E-02	1.43E-05	1.53E-02	7.79E-05	1.78E-03	1.43E-05	2.44E-03	7.79E-05
2025	2.50E-02	9.61E-06	2.35E-02	6.65E-05	3.07E-03	9.61E-06	3.19E-03	6.65E-05
2026	1.90E-03	1.20E-07	1.76E-03	1.08E-06	3.70E-04	1.20E-07	3.70E-04	1.08E-06

Twin Pines Project
Construction Health Risk Calculations - Unmitigated

Cancer Risk, Hazard Index and $PM_{2.5}$ Concentration Calculations - Offsite Residential

					Exposure Duration (Days)							
				Start Date	5/1/2024	7/31/2024	8/1/2026		DPM		Total $PM_{2.5}$	
				Stop Date	7/30/2024	7/31/2026			Emisions (tons)	Emission Rate (g/s)	Emisions (tons)	Emission Rate (g/s)
AERMOD Source	Year	Start Date	End Date	Calendar Days	3rd Trimester	0<2	2<9	Exposure Duration	Uncontrolled	Uncontrolled	Uncontrolled	Uncontrolled
PAREA1	2024	5/1/2024	12/31/2024	244	90	153	1	244	0.01	0.002	0.02	0.002
PAREA1	2025	1/1/2025	12/31/2025	364	0	364	0	364	0.03	0.002	0.02	0.002
PAREA1	2026	1/1/2026	4/30/2026	119	0	119	0	119	0.00	0.001	0.00	0.001
ARLN1	2024	5/1/2024	12/31/2024	244	90	153	1	244	0.00	0.000	0.00	0.000
ARLN1	2025	1/1/2025	12/31/2025	364	0	364	0	364	0.00	0.000	0.00	0.000
ARLN1	2026	1/1/2026	4/30/2026	119	0	119	0	119	0.00	0.000	0.00	0.000
									0.04		0.04	

Cancer Risk Factors

	Abbreviation	UOM	3rd Trimester	0<2	2<9
Daily Breathing Rate	DBR	L/kg-day	361	1090	631
Fraction Of Time At Home	FAH	unitless	1	1	1
Exposure Frequency	EF	days/year	0.96	0.96	0.96
Age Sensitivity Factor	ASF	unitless	10	10	3
Inhalation Absorption Factor	A	unitless	1	1	1
Conversion Factor	CF_1	m^3/L	0.001	0.001	0.001
Conversion Factor	CF_2	$\mu g/m^3$	0.001	0.001	0.001
Cancer Potency Factor (diesel exhaust)	CPF	$mg/kg\text{-}day^{-1}$	1.1	1.1	1.1
Averaging Time (for residential exposure)	AT	years	70.00	70.00	70.00

Risk at nearby schools assumed to be >1

SOURCE: Office of Environmental Health Hazard Assessment, 2015. *Air Toxics Hot Spots Program Guidance Manual for the Preparation of Health Risk Assessments* . February 2015

Daily breathing rate for residential receptor is based on the OEHHA 95th percentile moderate intensity breathing rates (OEHHA Table 5.7).

Fraction of time at home is set to values per OEHHA Table 8.4 for residential since the nearest school has an unmitigated cancer risk of <1 per million.

Inhalation cancer potency factor from OEHHA Table 7.1

Hazard Index

Chronic Inhalation	REL	$\mu g/m^3$	5

Intake Factor for Inhalation, IF (m^3/kg-day) = DBR*FAH*EF*ED*ASF*A*CF/AT

AERMOD Source	3rd Trimester	0<2	2<9
PAREA1	0.012	0.063	0.000
PAREA1	0.000	0.149	0.000
PAREA1	0.000	0.049	0.000
ARLN1	0.012	0.063	0.000
ARLN1	0.000	0.149	0.000
ARLN1	0.000	0.049	0.000

Risk Calculation Part 1, R1 = IF*CPF*CF

3rd Trimester	0<2	2<9
1.34E-05	6.88E-05	7.81E-08
0.00E+00	1.64E-04	0.00E+00
0.00E+00	5.35E-05	0.00E+00
1.34E-05	6.88E-05	7.81E-08
0.00E+00	1.64E-04	0.00E+00
0.00E+00	5.35E-05	0.00E+00

	Cancer Risk	UTM X	UTM Y
MAX UNMITIGATED	36.80	563961.3	4152481.57

HI	UTM X	UTM Y
0.03	563961.3	4152481.57

$PM_{2.5}$ Conc.	UTM X	UTM Y
0.138	563961.34	4152481.57

$PM_{2.5}$ concentration, $C_{PM2.5}$ ($\mu g/m^3$) - at max. HI receptor

X (UTM)	Y (UTM)	Project Construction					
		PAREA1	PAREA1	PAREA1	ARLN1	ARLN1	ARLN1
		2024	2025	2026	2024	2025	2026
563961.34	4152481.570	0.135	0.138	0.032	0.000	0.000	0.000

$PM_{2.5}$ Conc.
$\mu g/m^3$
Max. Annual
0.138

Diesel Particulate Matter concentration, C_{DPM} ($\mu g/m^3$)

X (UTM)	Y (UTM)	Project Construction					
		PAREA1	PAREA1	PAREA1	ARLN1	ARLN1	ARLN1

Risk Calculation Part 2

Cancer Risk = $\sum R1 * C_{DPM}$				HI
3rd Trimester	0<2	2<9	Total	C_{DPM}/REL

		2024	2025	2026	2024	2025	2026					unitless
563701.34	4152141.57	0.001	0.001	0.000	0.000	0.000	0.000	1.43E-08	2.83E-07	8.32E-11	0.3	0.000
563721.34	4152141.57	0.001	0.001	0.000	0.000	0.000	0.000	1.60E-08	3.18E-07	9.35E-11	0.3	0.000
563741.34	4152141.57	0.001	0.001	0.000	0.000	0.000	0.000	1.79E-08	3.55E-07	1.04E-10	0.4	0.000
563761.34	4152141.57	0.001	0.002	0.000	0.000	0.000	0.000	1.97E-08	3.90E-07	1.15E-10	0.4	0.000
563781.34	4152141.57	0.002	0.002	0.000	0.000	0.000	0.000	2.14E-08	4.25E-07	1.25E-10	0.4	0.000
563801.34	4152141.57	0.002	0.002	0.000	0.000	0.000	0.000	2.31E-08	4.58E-07	1.35E-10	0.5	0.000
563821.34	4152141.57	0.002	0.002	0.000	0.000	0.000	0.000	2.47E-08	4.91E-07	1.44E-10	0.5	0.000
563841.34	4152141.57	0.002	0.002	0.001	0.000	0.000	0.000	2.61E-08	5.18E-07	1.52E-10	0.5	0.000
563861.34	4152141.57	0.002	0.002	0.001	0.000	0.000	0.000	2.71E-08	5.39E-07	1.58E-10	0.6	0.000
563881.34	4152141.57	0.002	0.002	0.001	0.000	0.000	0.000	2.81E-08	5.57E-07	1.64E-10	0.6	0.000
563901.34	4152141.57	0.002	0.002	0.001	0.000	0.000	0.000	2.88E-08	5.73E-07	1.68E-10	0.6	0.000
563921.34	4152141.57	0.002	0.002	0.001	0.000	0.000	0.000	2.94E-08	5.84E-07	1.71E-10	0.6	0.000
563941.34	4152141.57	0.002	0.002	0.001	0.000	0.000	0.000	2.96E-08	5.89E-07	1.73E-10	0.6	0.000
563961.34	4152141.57	0.002	0.002	0.001	0.000	0.000	0.000	2.98E-08	5.92E-07	1.74E-10	0.6	0.000
563981.34	4152141.57	0.002	0.003	0.001	0.000	0.000	0.000	3.02E-08	6.00E-07	1.76E-10	0.6	0.001
564001.34	4152141.57	0.002	0.003	0.001	0.000	0.000	0.000	3.08E-08	6.12E-07	1.79E-10	0.6	0.001
564021.34	4152141.57	0.002	0.003	0.001	0.000	0.000	0.000	3.13E-08	6.22E-07	1.82E-10	0.7	0.001
564041.34	4152141.57	0.002	0.003	0.001	0.000	0.000	0.000	3.20E-08	6.36E-07	1.87E-10	0.7	0.001
564061.34	4152141.57	0.002	0.003	0.001	0.000	0.000	0.000	3.22E-08	6.39E-07	1.87E-10	0.7	0.001
564081.34	4152141.57	0.002	0.003	0.001	0.000	0.000	0.000	3.03E-08	6.01E-07	1.76E-10	0.6	0.001
564101.34	4152141.57	0.002	0.002	0.001	0.000	0.000	0.000	2.88E-08	5.73E-07	1.68E-10	0.6	0.000
564121.34	4152141.57	0.002	0.002	0.001	0.000	0.000	0.000	2.83E-08	5.62E-07	1.65E-10	0.6	0.000
564141.34	4152141.57	0.002	0.002	0.001	0.000	0.000	0.000	2.69E-08	5.34E-07	1.57E-10	0.6	0.000
564161.34	4152141.57	0.002	0.002	0.000	0.000	0.000	0.000	2.45E-08	4.86E-07	1.43E-10	0.5	0.000
564181.34	4152141.57	0.002	0.002	0.000	0.000	0.000	0.000	2.26E-08	4.48E-07	1.31E-10	0.5	0.000
563741.34	4152161.57	0.001	0.002	0.000	0.000	0.000	0.000	1.91E-08	3.79E-07	1.11E-10	0.4	0.000
563761.34	4152161.57	0.002	0.002	0.000	0.000	0.000	0.000	2.11E-08	4.19E-07	1.23E-10	0.4	0.000
563781.34	4152161.57	0.002	0.002	0.000	0.000	0.000	0.000	2.30E-08	4.57E-07	1.34E-10	0.5	0.000
563801.34	4152161.57	0.002	0.002	0.000	0.000	0.000	0.000	2.49E-08	4.94E-07	1.45E-10	0.5	0.000
563821.34	4152161.57	0.002	0.002	0.001	0.000	0.000	0.000	2.68E-08	5.31E-07	1.56E-10	0.6	0.000
563841.34	4152161.57	0.002	0.002	0.001	0.000	0.000	0.000	2.86E-08	5.68E-07	1.67E-10	0.6	0.000
563861.34	4152161.57	0.002	0.002	0.001	0.000	0.000	0.000	2.99E-08	5.94E-07	1.74E-10	0.6	0.000
563881.34	4152161.57	0.002	0.003	0.001	0.000	0.000	0.000	3.11E-08	6.17E-07	1.81E-10	0.6	0.001
563901.34	4152161.57	0.002	0.003	0.001	0.000	0.000	0.000	3.20E-08	6.35E-07	1.86E-10	0.7	0.001
563921.34	4152161.57	0.002	0.003	0.001	0.000	0.000	0.000	3.25E-08	6.46E-07	1.90E-10	0.7	0.001
563941.34	4152161.57	0.002	0.003	0.001	0.000	0.000	0.000	3.28E-08	6.52E-07	1.91E-10	0.7	0.001
563961.34	4152161.57	0.002	0.003	0.001	0.000	0.000	0.000	3.30E-08	6.55E-07	1.92E-10	0.7	0.001
563981.34	4152161.57	0.002	0.003	0.001	0.000	0.000	0.000	3.33E-08	6.61E-07	1.94E-10	0.7	0.001
564001.34	4152161.57	0.003	0.003	0.001	0.000	0.000	0.000	3.40E-08	6.75E-07	1.98E-10	0.7	0.001
564021.34	4152161.57	0.003	0.003	0.001	0.000	0.000	0.000	3.43E-08	6.81E-07	2.00E-10	0.7	0.001
564041.34	4152161.57	0.003	0.003	0.001	0.000	0.000	0.000	3.48E-08	6.91E-07	2.03E-10	0.7	0.001
564061.34	4152161.57	0.003	0.003	0.001	0.000	0.000	0.000	3.52E-08	7.00E-07	2.05E-10	0.7	0.001
564081.34	4152161.57	0.003	0.003	0.001	0.000	0.000	0.000	3.39E-08	6.72E-07	1.97E-10	0.7	0.001
564101.34	4152161.57	0.002	0.003	0.001	0.000	0.000	0.000	3.22E-08	6.39E-07	1.88E-10	0.7	0.001
564121.34	4152161.57	0.002	0.003	0.001	0.000	0.000	0.000	3.10E-08	6.15E-07	1.81E-10	0.6	0.001
564141.34	4152161.57	0.002	0.002	0.001	0.000	0.000	0.000	2.92E-08	5.79E-07	1.70E-10	0.6	0.000
564161.34	4152161.57	0.002	0.002	0.001	0.000	0.000	0.000	2.65E-08	5.25E-07	1.54E-10	0.6	0.000
564181.34	4152161.57	0.002	0.002	0.000	0.000	0.000	0.000	2.44E-08	4.84E-07	1.42E-10	0.5	0.000
563741.34	4152181.57	0.002	0.002	0.000	0.000	0.000	0.000	2.05E-08	4.06E-07	1.19E-10	0.4	0.000
563761.34	4152181.57	0.002	0.002	0.000	0.000	0.000	0.000	2.28E-08	4.52E-07	1.33E-10	0.5	0.000
563781.34	4152181.57	0.002	0.002	0.000	0.000	0.000	0.000	2.49E-08	4.94E-07	1.45E-10	0.5	0.000
563801.34	4152181.57	0.002	0.002	0.001	0.000	0.000	0.000	2.70E-08	5.36E-07	1.57E-10	0.6	0.000
563821.34	4152181.57	0.002	0.002	0.001	0.000	0.000	0.000	2.93E-08	5.82E-07	1.71E-10	0.6	0.000
563841.34	4152181.57	0.002	0.003	0.001	0.000	0.000	0.000	3.16E-08	6.28E-07	1.84E-10	0.7	0.001
563861.34	4152181.57	0.002	0.003	0.001	0.000	0.000	0.000	3.32E-08	6.59E-07	1.94E-10	0.7	0.001
563881.34	4152181.57	0.003	0.003	0.001	0.000	0.000	0.000	3.47E-08	6.88E-07	2.02E-10	0.7	0.001
563901.34	4152181.57	0.003	0.003	0.001	0.000	0.000	0.000	3.58E-08	7.10E-07	2.08E-10	0.7	0.001
563921.34	4152181.57	0.003	0.003	0.001	0.000	0.000	0.000	3.64E-08	7.22E-07	2.12E-10	0.8	0.001

563941.34	4152181.57	0.003	0.003	0.001	0.000	0.000	0.000	3.66E-08	7.27E-07	2.13E-10	0.8	0.001
563961.34	4152181.57	0.003	0.003	0.001	0.000	0.000	0.000	3.68E-08	7.30E-07	2.14E-10	0.8	0.001
563981.34	4152181.57	0.003	0.003	0.001	0.000	0.000	0.000	3.75E-08	7.44E-07	2.18E-10	0.8	0.001
564001.34	4152181.57	0.003	0.003	0.001	0.000	0.000	0.000	3.82E-08	7.58E-07	2.22E-10	0.8	0.001
564021.34	4152181.57	0.003	0.003	0.001	0.000	0.000	0.000	3.80E-08	7.56E-07	2.22E-10	0.8	0.001
564041.34	4152181.57	0.003	0.003	0.001	0.000	0.000	0.000	3.85E-08	7.64E-07	2.24E-10	0.8	0.001
564061.34	4152181.57	0.003	0.003	0.001	0.000	0.000	0.000	3.86E-08	7.67E-07	2.25E-10	0.8	0.001
564081.34	4152181.57	0.003	0.003	0.001	0.000	0.000	0.000	3.79E-08	7.53E-07	2.21E-10	0.8	0.001
564101.34	4152181.57	0.003	0.003	0.001	0.000	0.000	0.000	3.57E-08	7.10E-07	2.08E-10	0.7	0.001
564121.34	4152181.57	0.003	0.003	0.001	0.000	0.000	0.000	3.36E-08	6.68E-07	1.96E-10	0.7	0.001
564141.34	4152181.57	0.002	0.003	0.001	0.000	0.000	0.000	3.11E-08	6.17E-07	1.81E-10	0.6	0.001
564161.34	4152181.57	0.002	0.002	0.001	0.000	0.000	0.000	2.86E-08	5.68E-07	1.67E-10	0.6	0.000
564181.34	4152181.57	0.002	0.002	0.001	0.000	0.000	0.000	2.64E-08	5.25E-07	1.54E-10	0.6	0.000
563841.34	4152201.57	0.003	0.003	0.001	0.000	0.000	0.000	3.49E-08	6.92E-07	2.03E-10	0.7	0.001
563861.34	4152201.57	0.003	0.003	0.001	0.000	0.000	0.000	3.69E-08	7.32E-07	2.15E-10	0.8	0.001
563881.34	4152201.57	0.003	0.003	0.001	0.000	0.000	0.000	3.90E-08	7.74E-07	2.27E-10	0.8	0.001
563901.34	4152201.57	0.003	0.003	0.001	0.000	0.000	0.000	4.05E-08	8.04E-07	2.36E-10	0.8	0.001
563921.34	4152201.57	0.003	0.003	0.001	0.000	0.000	0.000	4.14E-08	8.21E-07	2.41E-10	0.9	0.001
563941.34	4152201.57	0.003	0.003	0.001	0.000	0.000	0.000	4.14E-08	8.23E-07	2.41E-10	0.9	0.001
563961.34	4152201.57	0.003	0.004	0.001	0.000	0.000	0.000	4.21E-08	8.35E-07	2.45E-10	0.9	0.001
563981.34	4152201.57	0.003	0.004	0.001	0.000	0.000	0.000	4.31E-08	8.55E-07	2.51E-10	0.9	0.001
564001.34	4152201.57	0.003	0.004	0.001	0.000	0.000	0.000	4.32E-08	8.59E-07	2.52E-10	0.9	0.001
564021.34	4152201.57	0.003	0.004	0.001	0.000	0.000	0.000	4.34E-08	8.62E-07	2.53E-10	0.9	0.001
564041.34	4152201.57	0.003	0.004	0.001	0.000	0.000	0.000	4.33E-08	8.60E-07	2.52E-10	0.9	0.001
564061.34	4152201.57	0.003	0.004	0.001	0.000	0.000	0.000	4.26E-08	8.46E-07	2.48E-10	0.9	0.001
564081.34	4152201.57	0.003	0.003	0.001	0.000	0.000	0.000	4.14E-08	8.22E-07	2.41E-10	0.9	0.001
564101.34	4152201.57	0.003	0.003	0.001	0.000	0.000	0.000	3.94E-08	7.82E-07	2.29E-10	0.8	0.001
564121.34	4152201.57	0.003	0.003	0.001	0.000	0.000	0.000	3.66E-08	7.26E-07	2.13E-10	0.8	0.001
564141.34	4152201.57	0.003	0.003	0.001	0.000	0.000	0.000	3.37E-08	6.69E-07	1.96E-10	0.7	0.001
564161.34	4152201.57	0.002	0.003	0.001	0.000	0.000	0.000	3.14E-08	6.24E-07	1.83E-10	0.7	0.001
564181.34	4152201.57	0.002	0.002	0.001	0.000	0.000	0.000	2.88E-08	5.72E-07	1.68E-10	0.6	0.000
563841.34	4152221.57	0.003	0.003	0.001	0.000	0.000	0.000	3.86E-08	7.67E-07	2.25E-10	0.8	0.001
563861.34	4152221.57	0.003	0.003	0.001	0.000	0.000	0.000	4.15E-08	8.24E-07	2.42E-10	0.9	0.001
563881.34	4152221.57	0.003	0.004	0.001	0.000	0.000	0.000	4.43E-08	8.80E-07	2.58E-10	0.9	0.001
563901.34	4152221.57	0.003	0.004	0.001	0.000	0.000	0.000	4.65E-08	9.22E-07	2.71E-10	1.0	0.001
563921.34	4152221.57	0.004	0.004	0.001	0.000	0.000	0.000	4.80E-08	9.52E-07	2.79E-10	1.0	0.001
563941.34	4152221.57	0.004	0.004	0.001	0.000	0.000	0.000	4.86E-08	9.65E-07	2.83E-10	1.0	0.001
563961.34	4152221.57	0.004	0.004	0.001	0.000	0.000	0.000	4.93E-08	9.78E-07	2.87E-10	1.0	0.001
563981.34	4152221.57	0.004	0.004	0.001	0.000	0.000	0.000	4.98E-08	9.88E-07	2.90E-10	1.0	0.001
564001.34	4152221.57	0.004	0.004	0.001	0.000	0.000	0.000	5.05E-08	1.00E-06	2.94E-10	1.1	0.001
564021.34	4152221.57	0.004	0.004	0.001	0.000	0.000	0.000	5.05E-08	1.00E-06	2.94E-10	1.1	0.001
564041.34	4152221.57	0.004	0.004	0.001	0.000	0.000	0.000	4.93E-08	9.80E-07	2.87E-10	1.0	0.001
564081.34	4152221.57	0.003	0.004	0.001	0.000	0.000	0.000	4.56E-08	9.05E-07	2.66E-10	1.0	0.001
564101.34	4152221.57	0.003	0.004	0.001	0.000	0.000	0.000	4.31E-08	8.55E-07	2.51E-10	0.9	0.001
564121.34	4152221.57	0.003	0.003	0.001	0.000	0.000	0.000	4.02E-08	7.99E-07	2.34E-10	0.8	0.001
564141.34	4152221.57	0.003	0.003	0.001	0.000	0.000	0.000	3.74E-08	7.42E-07	2.18E-10	0.8	0.001
564161.34	4152221.57	0.003	0.003	0.001	0.000	0.000	0.000	3.46E-08	6.87E-07	2.02E-10	0.7	0.001
564181.34	4152221.57	0.002	0.003	0.001	0.000	0.000	0.000	3.16E-08	6.28E-07	1.84E-10	0.7	0.001
563821.34	4152241.57	0.003	0.003	0.001	0.000	0.000	0.000	4.01E-08	7.96E-07	2.34E-10	0.8	0.001
563841.34	4152241.57	0.003	0.004	0.001	0.000	0.000	0.000	4.33E-08	8.60E-07	2.52E-10	0.9	0.001
563861.34	4152241.57	0.003	0.004	0.001	0.000	0.000	0.000	4.65E-08	9.23E-07	2.71E-10	1.0	0.001
563881.34	4152241.57	0.004	0.004	0.001	0.000	0.000	0.000	4.96E-08	9.85E-07	2.89E-10	1.0	0.001
563901.34	4152241.57	0.004	0.004	0.001	0.000	0.000	0.000	5.22E-08	1.04E-06	3.04E-10	1.1	0.001
563921.34	4152241.57	0.004	0.005	0.001	0.000	0.000	0.000	5.55E-08	1.10E-06	3.23E-10	1.2	0.001
563941.34	4152241.57	0.004	0.005	0.001	0.000	0.000	0.000	5.71E-08	1.13E-06	3.32E-10	1.2	0.001
563961.34	4152241.57	0.004	0.005	0.001	0.000	0.000	0.000	5.78E-08	1.15E-06	3.37E-10	1.2	0.001
563981.34	4152241.57	0.004	0.005	0.001	0.000	0.000	0.000	5.95E-08	1.18E-06	3.47E-10	1.2	0.001
564001.34	4152241.57	0.004	0.005	0.001	0.000	0.000	0.000	6.00E-08	1.19E-06	3.50E-10	1.3	0.001
564021.34	4152241.57	0.004	0.005	0.001	0.000	0.000	0.000	5.88E-08	1.17E-06	3.43E-10	1.2	0.001

564061.34	4152241.57	0.004	0.005	0.001	0.000	0.000	0.000		5.40E-08	1.07E-06	3.15E-10	1.1	0.001
564081.34	4152241.57	0.004	0.004	0.001	0.000	0.000	0.000		5.17E-08	1.03E-06	3.01E-10	1.1	0.001
564101.34	4152241.57	0.004	0.004	0.001	0.000	0.000	0.000		4.90E-08	9.73E-07	2.85E-10	1.0	0.001
564121.34	4152241.57	0.003	0.004	0.001	0.000	0.000	0.000		4.53E-08	8.99E-07	2.64E-10	0.9	0.001
564141.34	4152241.57	0.003	0.003	0.001	0.000	0.000	0.000		4.14E-08	8.23E-07	2.41E-10	0.9	0.001
564161.34	4152241.57	0.003	0.003	0.001	0.000	0.000	0.000		3.79E-08	7.52E-07	2.21E-10	0.8	0.001
564181.34	4152241.57	0.003	0.003	0.001	0.000	0.000	0.000		3.48E-08	6.90E-07	2.03E-10	0.7	0.001
563821.34	4152261.57	0.003	0.004	0.001	0.000	0.000	0.000		4.47E-08	8.87E-07	2.60E-10	0.9	0.001
563841.34	4152261.57	0.004	0.004	0.001	0.000	0.000	0.000		4.83E-08	9.59E-07	2.81E-10	1.0	0.001
563861.34	4152261.57	0.004	0.004	0.001	0.000	0.000	0.000		5.18E-08	1.03E-06	3.02E-10	1.1	0.001
563881.34	4152261.57	0.004	0.005	0.001	0.000	0.000	0.000		5.52E-08	1.10E-06	3.22E-10	1.2	0.001
563901.34	4152261.57	0.004	0.005	0.001	0.000	0.000	0.000		5.84E-08	1.16E-06	3.40E-10	1.2	0.001
563921.34	4152261.57	0.005	0.005	0.001	0.000	0.000	0.000		6.27E-08	1.25E-06	3.65E-10	1.3	0.001
563941.34	4152261.57	0.005	0.006	0.001	0.000	0.000	0.000		6.61E-08	1.31E-06	3.85E-10	1.4	0.001
563961.34	4152261.57	0.005	0.006	0.001	0.000	0.000	0.000		7.01E-08	1.39E-06	4.08E-10	1.5	0.001
563981.34	4152261.57	0.005	0.006	0.001	0.000	0.000	0.000		7.12E-08	1.41E-06	4.15E-10	1.5	0.001
564041.34	4152261.57	0.005	0.005	0.001	0.000	0.000	0.000		6.53E-08	1.30E-06	3.81E-10	1.4	0.001
564061.34	4152261.57	0.005	0.005	0.001	0.000	0.000	0.000		6.23E-08	1.24E-06	3.63E-10	1.3	0.001
564081.34	4152261.57	0.004	0.005	0.001	0.000	0.000	0.000		5.94E-08	1.18E-06	3.46E-10	1.2	0.001
564101.34	4152261.57	0.004	0.005	0.001	0.000	0.000	0.000		5.60E-08	1.11E-06	3.26E-10	1.2	0.001
564121.34	4152261.57	0.004	0.004	0.001	0.000	0.000	0.000		5.07E-08	1.01E-06	2.95E-10	1.1	0.001
564141.34	4152261.57	0.003	0.004	0.001	0.000	0.000	0.000		4.63E-08	9.18E-07	2.70E-10	1.0	0.001
564161.34	4152261.57	0.003	0.004	0.001	0.000	0.000	0.000		4.24E-08	8.42E-07	2.47E-10	0.9	0.001
564181.34	4152261.57	0.003	0.003	0.001	0.000	0.000	0.000		3.90E-08	7.74E-07	2.27E-10	0.8	0.001
563821.34	4152281.57	0.004	0.004	0.001	0.000	0.000	0.000		5.04E-08	1.00E-06	2.93E-10	1.1	0.001
563841.34	4152281.57	0.004	0.004	0.001	0.000	0.000	0.000		5.36E-08	1.06E-06	3.12E-10	1.1	0.001
563861.34	4152281.57	0.004	0.005	0.001	0.000	0.000	0.000		5.84E-08	1.16E-06	3.40E-10	1.2	0.001
563881.34	4152281.57	0.005	0.005	0.001	0.000	0.000	0.000		6.20E-08	1.23E-06	3.61E-10	1.3	0.001
563901.34	4152281.57	0.005	0.005	0.001	0.000	0.000	0.000		6.55E-08	1.30E-06	3.82E-10	1.4	0.001
563921.34	4152281.57	0.005	0.006	0.001	0.000	0.000	0.000		7.14E-08	1.42E-06	4.16E-10	1.5	0.001
563941.34	4152281.57	0.006	0.006	0.001	0.000	0.000	0.000		7.71E-08	1.53E-06	4.49E-10	1.6	0.001
564001.34	4152281.57	0.006	0.007	0.002	0.000	0.000	0.000		8.30E-08	1.65E-06	4.84E-10	1.7	0.001
564021.34	4152281.57	0.006	0.007	0.002	0.000	0.000	0.000		8.02E-08	1.59E-06	4.68E-10	1.7	0.001
564041.34	4152281.57	0.006	0.006	0.001	0.000	0.000	0.000		7.62E-08	1.51E-06	4.44E-10	1.6	0.001
564061.34	4152281.57	0.005	0.006	0.001	0.000	0.000	0.000		7.18E-08	1.43E-06	4.18E-10	1.5	0.001
564081.34	4152281.57	0.005	0.006	0.001	0.000	0.000	0.000		6.73E-08	1.34E-06	3.92E-10	1.4	0.001
564101.34	4152281.57	0.005	0.005	0.001	0.000	0.000	0.000		6.25E-08	1.24E-06	3.64E-10	1.3	0.001
564121.34	4152281.57	0.004	0.005	0.001	0.000	0.000	0.000		5.69E-08	1.13E-06	3.31E-10	1.2	0.001
564141.34	4152281.57	0.004	0.004	0.001	0.000	0.000	0.000		5.22E-08	1.04E-06	3.04E-10	1.1	0.001
564161.34	4152281.57	0.004	0.004	0.001	0.000	0.000	0.000		4.78E-08	9.49E-07	2.78E-10	1.0	0.001
564181.34	4152281.57	0.003	0.004	0.001	0.000	0.000	0.000		4.40E-08	8.75E-07	2.57E-10	0.9	0.001
563501.34	4152301.57	0.001	0.001	0.000	0.000	0.000	0.000		7.16E-09	1.41E-07	4.17E-11	0.1	0.000
563521.34	4152301.57	0.001	0.001	0.000	0.000	0.000	0.000		7.85E-09	1.55E-07	4.58E-11	0.2	0.000
563541.34	4152301.57	0.001	0.001	0.000	0.000	0.000	0.000		8.69E-09	1.71E-07	5.06E-11	0.2	0.000
563861.34	4152301.57	0.005	0.006	0.001	0.000	0.000	0.000		6.63E-08	1.32E-06	3.86E-10	1.4	0.001
563881.34	4152301.57	0.005	0.006	0.001	0.000	0.000	0.000		7.06E-08	1.40E-06	4.11E-10	1.5	0.001
563901.34	4152301.57	0.006	0.006	0.001	0.000	0.000	0.000		7.65E-08	1.52E-06	4.46E-10	1.6	0.001
563921.34	4152301.57	0.006	0.007	0.002	0.000	0.000	0.000		8.32E-08	1.65E-06	4.85E-10	1.7	0.001
563941.34	4152301.57	0.007	0.007	0.002	0.000	0.000	0.000		8.81E-08	1.75E-06	5.13E-10	1.8	0.001
563981.34	4152301.57	0.007	0.008	0.002	0.000	0.000	0.000		9.90E-08	1.97E-06	5.77E-10	2.1	0.002
564001.34	4152301.57	0.007	0.008	0.002	0.000	0.000	0.000		9.78E-08	1.94E-06	5.70E-10	2.0	0.002
564021.34	4152301.57	0.007	0.008	0.002	0.000	0.000	0.000		9.38E-08	1.86E-06	5.46E-10	2.0	0.002
564041.34	4152301.57	0.007	0.007	0.002	0.000	0.000	0.000		8.85E-08	1.76E-06	5.16E-10	1.8	0.001
564061.34	4152301.57	0.006	0.007	0.002	0.000	0.000	0.000		8.24E-08	1.64E-06	4.80E-10	1.7	0.001
564081.34	4152301.57	0.006	0.006	0.001	0.000	0.000	0.000		7.64E-08	1.52E-06	4.45E-10	1.6	0.001
564101.34	4152301.57	0.005	0.006	0.001	0.000	0.000	0.000		7.05E-08	1.40E-06	4.10E-10	1.5	0.001
564121.34	4152301.57	0.005	0.005	0.001	0.000	0.000	0.000		6.43E-08	1.28E-06	3.75E-10	1.3	0.001
564141.34	4152301.57	0.004	0.005	0.001	0.000	0.000	0.000		5.90E-08	1.17E-06	3.44E-10	1.2	0.001
564161.34	4152301.57	0.004	0.004	0.001	0.000	0.000	0.000		5.36E-08	1.06E-06	3.12E-10	1.1	0.001

564181.34	4152301.57	0.004	0.004	0.001	0.000	0.000	0.000	4.91E-08	9.74E-07	2.86E-10	1.0	0.001
563501.34	4152321.57	0.001	0.001	0.000	0.000	0.000	0.000	7.36E-09	1.44E-07	4.29E-11	0.2	0.000
563521.34	4152321.57	0.001	0.001	0.000	0.000	0.000	0.000	8.15E-09	1.60E-07	4.75E-11	0.2	0.000
563541.34	4152321.57	0.001	0.001	0.000	0.000	0.000	0.000	9.05E-09	1.78E-07	5.27E-11	0.2	0.000
563561.34	4152321.57	0.001	0.001	0.000	0.000	0.000	0.000	1.01E-08	1.99E-07	5.91E-11	0.2	0.000
563581.34	4152321.57	0.001	0.001	0.000	0.000	0.000	0.000	1.15E-08	2.25E-07	6.68E-11	0.2	0.000
563601.34	4152321.57	0.001	0.001	0.000	0.000	0.000	0.000	1.31E-08	2.57E-07	7.61E-11	0.3	0.000
563881.34	4152321.57	0.006	0.007	0.002	0.000	0.000	0.000	8.23E-08	1.63E-06	4.79E-10	1.7	0.001
563961.34	4152321.57	0.009	0.010	0.002	0.000	0.000	0.000	1.18E-07	2.35E-06	6.90E-10	2.5	0.002
563981.34	4152321.57	0.009	0.010	0.002	0.000	0.000	0.000	1.20E-07	2.39E-06	7.02E-10	2.5	0.002
564001.34	4152321.57	0.009	0.010	0.002	0.000	0.000	0.000	1.18E-07	2.35E-06	6.88E-10	2.5	0.002
564021.34	4152321.57	0.008	0.009	0.002	0.000	0.000	0.000	1.12E-07	2.22E-06	6.51E-10	2.3	0.002
564041.34	4152321.57	0.008	0.009	0.002	0.000	0.000	0.000	1.03E-07	2.06E-06	6.03E-10	2.2	0.002
564061.34	4152321.57	0.007	0.008	0.002	0.000	0.000	0.000	9.48E-08	1.88E-06	5.53E-10	2.0	0.002
564081.34	4152321.57	0.006	0.007	0.002	0.000	0.000	0.000	8.70E-08	1.73E-06	5.07E-10	1.8	0.001
564101.34	4152321.57	0.006	0.007	0.002	0.000	0.000	0.000	8.00E-08	1.59E-06	4.66E-10	1.7	0.001
564121.34	4152321.57	0.005	0.006	0.001	0.000	0.000	0.000	7.33E-08	1.46E-06	4.27E-10	1.5	0.001
564141.34	4152321.57	0.005	0.006	0.001	0.000	0.000	0.000	6.69E-08	1.33E-06	3.90E-10	1.4	0.001
564161.34	4152321.57	0.005	0.005	0.001	0.000	0.000	0.000	6.12E-08	1.22E-06	3.57E-10	1.3	0.001
564181.34	4152321.57	0.004	0.005	0.001	0.000	0.000	0.000	5.72E-08	1.14E-06	3.33E-10	1.2	0.001
563501.34	4152341.57	0.001	0.001	0.000	0.000	0.000	0.000	7.51E-09	1.47E-07	4.38E-11	0.2	0.000
563521.34	4152341.57	0.001	0.001	0.000	0.000	0.000	0.000	8.40E-09	1.64E-07	4.90E-11	0.2	0.000
563541.34	4152341.57	0.001	0.001	0.000	0.000	0.000	0.000	9.38E-09	1.83E-07	5.47E-11	0.2	0.000
563561.34	4152341.57	0.001	0.001	0.000	0.000	0.000	0.000	1.05E-08	2.06E-07	6.14E-11	0.2	0.000
563581.34	4152341.57	0.001	0.001	0.000	0.000	0.000	0.000	1.20E-08	2.35E-07	6.97E-11	0.2	0.000
563601.34	4152341.57	0.001	0.001	0.000	0.000	0.000	0.000	1.37E-08	2.69E-07	7.99E-11	0.3	0.000
563881.34	4152341.57	0.007	0.008	0.002	0.000	0.000	0.000	9.86E-08	1.96E-06	5.75E-10	2.1	0.002
563901.34	4152341.57	0.008	0.009	0.002	0.000	0.000	0.000	1.08E-07	2.15E-06	6.32E-10	2.3	0.002
563941.34	4152341.57	0.011	0.012	0.003	0.000	0.000	0.000	1.43E-07	2.83E-06	8.32E-10	3.0	0.002
563961.34	4152341.57	0.011	0.013	0.003	0.000	0.000	0.000	1.50E-07	2.99E-06	8.76E-10	3.1	0.003
563981.34	4152341.57	0.011	0.012	0.003	0.000	0.000	0.000	1.49E-07	2.96E-06	8.69E-10	3.1	0.002
564001.34	4152341.57	0.011	0.012	0.003	0.000	0.000	0.000	1.45E-07	2.89E-06	8.47E-10	3.0	0.002
564021.34	4152341.57	0.010	0.011	0.003	0.000	0.000	0.000	1.36E-07	2.70E-06	7.92E-10	2.8	0.002
564041.34	4152341.57	0.009	0.010	0.002	0.000	0.000	0.000	1.24E-07	2.46E-06	7.21E-10	2.6	0.002
564061.34	4152341.57	0.008	0.009	0.002	0.000	0.000	0.000	1.12E-07	2.21E-06	6.50E-10	2.3	0.002
564081.34	4152341.57	0.008	0.008	0.002	0.000	0.000	0.000	1.01E-07	2.01E-06	5.89E-10	2.1	0.002
564101.34	4152341.57	0.007	0.008	0.002	0.000	0.000	0.000	9.19E-08	1.83E-06	5.36E-10	1.9	0.002
564121.34	4152341.57	0.006	0.007	0.002	0.000	0.000	0.000	8.44E-08	1.68E-06	4.92E-10	1.8	0.001
564141.34	4152341.57	0.006	0.006	0.002	0.000	0.000	0.000	7.76E-08	1.54E-06	4.52E-10	1.6	0.001
564161.34	4152341.57	0.005	0.006	0.001	0.000	0.000	0.000	7.18E-08	1.43E-06	4.18E-10	1.5	0.001
564181.34	4152341.57	0.005	0.006	0.001	0.000	0.000	0.000	6.70E-08	1.33E-06	3.90E-10	1.4	0.001
563501.34	4152361.57	0.001	0.001	0.000	0.000	0.000	0.000	7.69E-09	1.49E-07	4.48E-11	0.2	0.000
563521.34	4152361.57	0.001	0.001	0.000	0.000	0.000	0.000	8.62E-09	1.67E-07	5.03E-11	0.2	0.000
563541.34	4152361.57	0.001	0.001	0.000	0.000	0.000	0.000	9.64E-09	1.88E-07	5.62E-11	0.2	0.000
563561.34	4152361.57	0.001	0.001	0.000	0.000	0.000	0.000	1.09E-08	2.12E-07	6.33E-11	0.2	0.000
563581.34	4152361.57	0.001	0.001	0.000	0.000	0.000	0.000	1.24E-08	2.42E-07	7.21E-11	0.3	0.000
563901.34	4152361.57	0.011	0.012	0.003	0.000	0.000	0.000	1.44E-07	2.85E-06	8.37E-10	3.0	0.002
563921.34	4152361.57	0.013	0.014	0.003	0.000	0.000	0.000	1.72E-07	3.42E-06	1.00E-09	3.6	0.003
563941.34	4152361.57	0.014	0.016	0.004	0.000	0.000	0.000	1.88E-07	3.74E-06	1.10E-09	3.9	0.003
563961.34	4152361.57	0.014	0.016	0.004	0.000	0.000	0.000	1.91E-07	3.80E-06	1.12E-09	4.0	0.003
563981.34	4152361.57	0.014	0.016	0.004	0.000	0.000	0.000	1.92E-07	3.81E-06	1.12E-09	4.0	0.003
564001.34	4152361.57	0.014	0.016	0.004	0.000	0.000	0.000	1.90E-07	3.76E-06	1.10E-09	4.0	0.003
564021.34	4152361.57	0.013	0.014	0.003	0.000	0.000	0.000	1.73E-07	3.43E-06	1.01E-09	3.6	0.003
564041.34	4152361.57	0.011	0.013	0.003	0.000	0.000	0.000	1.51E-07	3.01E-06	8.82E-10	3.2	0.003
564061.34	4152361.57	0.010	0.011	0.003	0.000	0.000	0.000	1.34E-07	2.65E-06	7.79E-10	2.8	0.002
564081.34	4152361.57	0.009	0.010	0.002	0.000	0.000	0.000	1.18E-07	2.34E-06	6.88E-10	2.5	0.002
564101.34	4152361.57	0.008	0.009	0.002	0.000	0.000	0.000	1.06E-07	2.11E-06	6.20E-10	2.2	0.002
564121.34	4152361.57	0.007	0.008	0.002	0.000	0.000	0.000	9.71E-08	1.93E-06	5.66E-10	2.0	0.002
564141.34	4152361.57	0.007	0.007	0.002	0.000	0.000	0.000	8.94E-08	1.78E-06	5.21E-10	1.9	0.001

564161.34	4152361.57	0.006	0.007	0.002	0.000	0.000	0.000		8.18E-08	1.62E-06	4.76E-10	1.7	0.001
564181.34	4152361.57	0.006	0.006	0.001	0.000	0.000	0.000		7.50E-08	1.49E-06	4.37E-10	1.6	0.001
563501.34	4152381.57	0.001	0.001	0.000	0.000	0.000	0.000		7.92E-09	1.52E-07	4.61E-11	0.2	0.000
563521.34	4152381.57	0.001	0.001	0.000	0.000	0.000	0.000		8.89E-09	1.71E-07	5.18E-11	0.2	0.000
563541.34	4152381.57	0.001	0.001	0.000	0.000	0.000	0.000		9.95E-09	1.92E-07	5.80E-11	0.2	0.000
563561.34	4152381.57	0.001	0.001	0.000	0.000	0.000	0.000		1.12E-08	2.17E-07	6.53E-11	0.2	0.000
563581.34	4152381.57	0.001	0.001	0.000	0.000	0.000	0.000		1.27E-08	2.47E-07	7.39E-11	0.3	0.000
563921.34	4152381.57	0.017	0.019	0.005	0.000	0.000	0.000		2.33E-07	4.63E-06	1.36E-09	4.9	0.004
563941.34	4152381.57	0.019	0.021	0.005	0.000	0.000	0.000		2.54E-07	5.04E-06	1.48E-09	5.3	0.004
563961.34	4152381.57	0.020	0.022	0.005	0.000	0.000	0.000		2.69E-07	5.35E-06	1.57E-09	5.6	0.004
563981.34	4152381.57	0.020	0.023	0.005	0.000	0.000	0.000		2.70E-07	5.36E-06	1.57E-09	5.6	0.005
564001.34	4152381.57	0.018	0.021	0.005	0.000	0.000	0.000		2.48E-07	4.93E-06	1.45E-09	5.2	0.004
564021.34	4152381.57	0.016	0.018	0.004	0.000	0.000	0.000		2.15E-07	4.26E-06	1.25E-09	4.5	0.004
564041.34	4152381.57	0.014	0.015	0.004	0.000	0.000	0.000		1.85E-07	3.67E-06	1.08E-09	3.9	0.003
564061.34	4152381.57	0.012	0.013	0.003	0.000	0.000	0.000		1.60E-07	3.18E-06	9.33E-10	3.3	0.003
564081.34	4152381.57	0.010	0.012	0.003	0.000	0.000	0.000		1.39E-07	2.76E-06	8.09E-10	2.9	0.002
564101.34	4152381.57	0.009	0.010	0.002	0.000	0.000	0.000		1.24E-07	2.46E-06	7.22E-10	2.6	0.002
564121.34	4152381.57	0.008	0.009	0.002	0.000	0.000	0.000		1.12E-07	2.23E-06	6.55E-10	2.3	0.002
564141.34	4152381.57	0.008	0.009	0.002	0.000	0.000	0.000		1.02E-07	2.03E-06	5.94E-10	2.1	0.002
564161.34	4152381.57	0.007	0.008	0.002	0.000	0.000	0.000		9.23E-08	1.83E-06	5.38E-10	1.9	0.002
564181.34	4152381.57	0.006	0.007	0.002	0.000	0.000	0.000		8.33E-08	1.65E-06	4.85E-10	1.7	0.001
563501.34	4152401.57	0.001	0.001	0.000	0.000	0.000	0.000		8.37E-09	1.56E-07	4.88E-11	0.2	0.000
563521.34	4152401.57	0.001	0.001	0.000	0.000	0.000	0.000		9.30E-09	1.74E-07	5.42E-11	0.2	0.000
563561.34	4152401.57	0.001	0.001	0.000	0.000	0.000	0.000		1.14E-08	2.19E-07	6.66E-11	0.2	0.000
563581.34	4152401.57	0.001	0.001	0.000	0.000	0.000	0.000		1.29E-08	2.49E-07	7.52E-11	0.3	0.000
563921.34	4152401.57	0.027	0.030	0.007	0.000	0.000	0.000		3.57E-07	7.09E-06	2.08E-09	7.5	0.006
563941.34	4152401.57	0.030	0.034	0.008	0.000	0.000	0.000		4.03E-07	8.00E-06	2.35E-09	8.4	0.007
563961.34	4152401.57	0.030	0.033	0.008	0.000	0.000	0.000		4.00E-07	7.94E-06	2.33E-09	8.3	0.007
563981.34	4152401.57	0.027	0.030	0.007	0.000	0.000	0.000		3.61E-07	7.17E-06	2.10E-09	7.5	0.006
564001.34	4152401.57	0.023	0.026	0.006	0.000	0.000	0.000		3.14E-07	6.24E-06	1.83E-09	6.6	0.005
564021.34	4152401.57	0.020	0.022	0.005	0.000	0.000	0.000		2.68E-07	5.32E-06	1.56E-09	5.6	0.004
564041.34	4152401.57	0.017	0.019	0.004	0.000	0.000	0.000		2.26E-07	4.48E-06	1.32E-09	4.7	0.004
564061.34	4152401.57	0.014	0.016	0.004	0.000	0.000	0.000		1.93E-07	3.84E-06	1.13E-09	4.0	0.003
564081.34	4152401.57	0.012	0.014	0.003	0.000	0.000	0.000		1.66E-07	3.30E-06	9.68E-10	3.5	0.003
564101.34	4152401.57	0.011	0.012	0.003	0.000	0.000	0.000		1.46E-07	2.90E-06	8.52E-10	3.1	0.002
564121.34	4152401.57	0.010	0.011	0.003	0.000	0.000	0.000		1.30E-07	2.58E-06	7.56E-10	2.7	0.002
564141.34	4152401.57	0.009	0.010	0.002	0.000	0.000	0.000		1.17E-07	2.32E-06	6.80E-10	2.4	0.002
564161.34	4152401.57	0.008	0.009	0.002	0.000	0.000	0.000		1.04E-07	2.06E-06	6.04E-10	2.2	0.002
564181.34	4152401.57	0.007	0.008	0.002	0.000	0.000	0.000		9.22E-08	1.83E-06	5.37E-10	1.9	0.002
563501.34	4152421.57	0.001	0.001	0.000	0.000	0.000	0.000		9.23E-09	1.63E-07	5.38E-11	0.2	0.000
563521.34	4152421.57	0.001	0.001	0.000	0.000	0.000	0.000		1.04E-08	1.84E-07	6.09E-11	0.2	0.000
563921.34	4152421.57	0.041	0.046	0.011	0.000	0.000	0.000		5.55E-07	1.10E-05	3.23E-09	11.6	0.009
563941.34	4152421.57	0.044	0.049	0.011	0.000	0.000	0.000		5.90E-07	1.17E-05	3.44E-09	12.3	0.010
563961.34	4152421.57	0.043	0.048	0.011	0.000	0.000	0.000		5.71E-07	1.13E-05	3.32E-09	11.9	0.010
563981.34	4152421.57	0.037	0.042	0.010	0.000	0.000	0.000		4.99E-07	9.92E-06	2.91E-09	10.4	0.008
564001.34	4152421.57	0.031	0.035	0.008	0.000	0.000	0.000		4.17E-07	8.28E-06	2.43E-09	8.7	0.007
564021.34	4152421.57	0.025	0.029	0.007	0.000	0.000	0.000		3.41E-07	6.78E-06	1.99E-09	7.1	0.006
564041.34	4152421.57	0.021	0.024	0.006	0.000	0.000	0.000		2.84E-07	5.65E-06	1.66E-09	5.9	0.005
564061.34	4152421.57	0.018	0.020	0.005	0.000	0.000	0.000		2.39E-07	4.74E-06	1.39E-09	5.0	0.004
564081.34	4152421.57	0.015	0.017	0.004	0.000	0.000	0.000		2.03E-07	4.02E-06	1.18E-09	4.2	0.003
564101.34	4152421.57	0.013	0.014	0.003	0.000	0.000	0.000		1.73E-07	3.45E-06	1.01E-09	3.6	0.003
564121.34	4152421.57	0.011	0.013	0.003	0.000	0.000	0.000		1.50E-07	2.97E-06	8.72E-10	3.1	0.003
564141.34	4152421.57	0.010	0.011	0.003	0.000	0.000	0.000		1.30E-07	2.59E-06	7.59E-10	2.7	0.002
564161.34	4152421.57	0.008	0.010	0.002	0.000	0.000	0.000		1.14E-07	2.26E-06	6.63E-10	2.4	0.002
564181.34	4152421.57	0.007	0.008	0.002	0.000	0.000	0.000		9.98E-08	1.98E-06	5.81E-10	2.1	0.002
563501.34	4152441.57	0.001	0.001	0.000	0.000	0.000	0.000		7.04E-09	1.38E-07	4.10E-11	0.1	0.000
563521.34	4152441.57	0.001	0.001	0.000	0.000	0.000	0.000		8.04E-09	1.56E-07	4.69E-11	0.2	0.000
563821.34	4152441.57	0.015	0.017	0.004	0.000	0.000	0.000		2.05E-07	4.07E-06	1.20E-09	4.3	0.003
563841.34	4152441.57	0.022	0.024	0.006	0.000	0.000	0.000		2.91E-07	5.77E-06	1.69E-09	6.1	0.005

563861.34	4152441.57	0.030	0.034	0.008	0.000	0.000	0.000	4.09E-07	8.11E-06	2.38E-09	8.5	0.007
563921.34	4152441.57	0.061	0.068	0.016	0.000	0.000	0.000	8.19E-07	1.63E-05	4.77E-09	17.1	0.014
563941.34	4152441.57	0.068	0.077	0.018	0.000	0.000	0.000	9.18E-07	1.82E-05	5.35E-09	19.1	0.015
563961.34	4152441.57	0.065	0.072	0.017	0.000	0.000	0.000	8.65E-07	1.72E-05	5.04E-09	18.1	0.014
563981.34	4152441.57	0.053	0.059	0.014	0.000	0.000	0.000	7.08E-07	1.41E-05	4.12E-09	14.8	0.012
564001.34	4152441.57	0.042	0.047	0.011	0.000	0.000	0.000	5.58E-07	1.11E-05	3.25E-09	11.6	0.009
564021.34	4152441.57	0.033	0.037	0.009	0.000	0.000	0.000	4.43E-07	8.80E-06	2.58E-09	9.2	0.007
564041.34	4152441.57	0.027	0.030	0.007	0.000	0.000	0.000	3.57E-07	7.10E-06	2.08E-09	7.5	0.006
564061.34	4152441.57	0.022	0.024	0.006	0.000	0.000	0.000	2.91E-07	5.77E-06	1.69E-09	6.1	0.005
564081.34	4152441.57	0.018	0.020	0.005	0.000	0.000	0.000	2.40E-07	4.76E-06	1.40E-09	5.0	0.004
564101.34	4152441.57	0.015	0.017	0.004	0.000	0.000	0.000	2.00E-07	3.96E-06	1.16E-09	4.2	0.003
564121.34	4152441.57	0.013	0.014	0.003	0.000	0.000	0.000	1.68E-07	3.34E-06	9.80E-10	3.5	0.003
564141.34	4152441.57	0.011	0.012	0.003	0.000	0.000	0.000	1.43E-07	2.84E-06	8.33E-10	3.0	0.002
564161.34	4152441.57	0.009	0.010	0.002	0.000	0.000	0.000	1.23E-07	2.44E-06	7.17E-10	2.6	0.002
564181.34	4152441.57	0.008	0.009	0.002	0.000	0.000	0.000	1.06E-07	2.11E-06	6.20E-10	2.2	0.002
563501.34	4152461.57	0.000	0.001	0.000	0.000	0.000	0.000	6.52E-09	1.28E-07	3.80E-11	0.1	0.000
563521.34	4152461.57	0.001	0.001	0.000	0.000	0.000	0.000	7.35E-09	1.45E-07	4.28E-11	0.2	0.000
563541.34	4152461.57	0.001	0.001	0.000	0.000	0.000	0.000	8.29E-09	1.63E-07	4.83E-11	0.2	0.000
563561.34	4152461.57	0.001	0.001	0.000	0.000	0.000	0.000	9.42E-09	1.85E-07	5.49E-11	0.2	0.000
563581.34	4152461.57	0.001	0.001	0.000	0.000	0.000	0.000	1.08E-08	2.12E-07	6.31E-11	0.2	0.000
563601.34	4152461.57	0.001	0.001	0.000	0.000	0.000	0.000	1.26E-08	2.45E-07	7.33E-11	0.3	0.000
563621.34	4152461.57	0.001	0.001	0.000	0.000	0.000	0.000	1.51E-08	2.90E-07	8.81E-11	0.3	0.000
563641.34	4152461.57	0.001	0.001	0.000	0.000	0.000	0.000	1.83E-08	3.48E-07	1.07E-10	0.4	0.000
563821.34	4152461.57	0.017	0.019	0.004	0.000	0.000	0.000	2.33E-07	4.61E-06	1.35E-09	4.8	0.004
563841.34	4152461.57	0.026	0.029	0.007	0.000	0.000	0.000	3.49E-07	6.92E-06	2.03E-09	7.3	0.006
563861.34	4152461.57	0.037	0.041	0.010	0.000	0.000	0.000	4.97E-07	9.86E-06	2.89E-09	10.4	0.008
563921.34	4152461.57	0.081	0.091	0.021	0.000	0.000	0.000	1.09E-06	2.16E-05	6.33E-09	22.7	0.018
563941.34	4152461.57	0.103	0.115	0.027	0.000	0.000	0.000	1.38E-06	2.74E-05	8.04E-09	28.8	0.023
563961.34	4152461.57	0.098	0.110	0.026	0.000	0.000	0.000	1.32E-06	2.62E-05	7.68E-09	27.5	0.022
563981.34	4152461.57	0.076	0.085	0.020	0.000	0.000	0.000	1.02E-06	2.02E-05	5.94E-09	21.3	0.017
564001.34	4152461.57	0.056	0.063	0.015	0.000	0.000	0.000	7.58E-07	1.51E-05	4.42E-09	15.8	0.013
564021.34	4152461.57	0.043	0.048	0.011	0.000	0.000	0.000	5.78E-07	1.15E-05	3.37E-09	12.1	0.010
564041.34	4152461.57	0.033	0.037	0.009	0.000	0.000	0.000	4.45E-07	8.84E-06	2.59E-09	9.3	0.007
564061.34	4152461.57	0.026	0.029	0.007	0.000	0.000	0.000	3.48E-07	6.90E-06	2.02E-09	7.3	0.006
564081.34	4152461.57	0.021	0.023	0.005	0.000	0.000	0.000	2.76E-07	5.48E-06	1.61E-09	5.8	0.005
564101.34	4152461.57	0.017	0.019	0.004	0.000	0.000	0.000	2.23E-07	4.44E-06	1.30E-09	4.7	0.004
564121.34	4152461.57	0.014	0.015	0.004	0.000	0.000	0.000	1.84E-07	3.65E-06	1.07E-09	3.8	0.003
564141.34	4152461.57	0.011	0.013	0.003	0.000	0.000	0.000	1.54E-07	3.05E-06	8.96E-10	3.2	0.003
564161.34	4152461.57	0.010	0.011	0.003	0.000	0.000	0.000	1.30E-07	2.59E-06	7.59E-10	2.7	0.002
564181.34	4152461.57	0.008	0.009	0.002	0.000	0.000	0.000	1.11E-07	2.21E-06	6.49E-10	2.3	0.002
563501.34	4152481.57	0.000	0.001	0.000	0.000	0.000	0.000	6.08E-09	1.20E-07	3.54E-11	0.1	0.000
563521.34	4152481.57	0.001	0.001	0.000	0.000	0.000	0.000	6.80E-09	1.34E-07	3.96E-11	0.1	0.000
563541.34	4152481.57	0.001	0.001	0.000	0.000	0.000	0.000	7.67E-09	1.51E-07	4.47E-11	0.2	0.000
563561.34	4152481.57	0.001	0.001	0.000	0.000	0.000	0.000	8.70E-09	1.72E-07	5.07E-11	0.2	0.000
563581.34	4152481.57	0.001	0.001	0.000	0.000	0.000	0.000	9.90E-09	1.95E-07	5.77E-11	0.2	0.000
563601.34	4152481.57	0.001	0.001	0.000	0.000	0.000	0.000	1.14E-08	2.24E-07	6.61E-11	0.2	0.000
563621.34	4152481.57	0.001	0.001	0.000	0.000	0.000	0.000	1.31E-08	2.59E-07	7.64E-11	0.3	0.000
563641.34	4152481.57	0.001	0.001	0.000	0.000	0.000	0.000	1.55E-08	3.06E-07	9.05E-11	0.3	0.000
563661.34	4152481.57	0.001	0.002	0.000	0.000	0.000	0.000	1.90E-08	3.75E-07	1.11E-10	0.4	0.000
563681.34	4152481.57	0.002	0.002	0.000	0.000	0.000	0.000	2.45E-08	4.81E-07	1.43E-10	0.5	0.000
563701.34	4152481.57	0.002	0.003	0.001	0.000	0.000	0.000	3.16E-08	6.22E-07	1.84E-10	0.7	0.001
563801.34	4152481.57	0.012	0.013	0.003	0.000	0.000	0.000	1.58E-07	3.12E-06	9.18E-10	3.3	0.003
563821.34	4152481.57	0.019	0.021	0.005	0.000	0.000	0.000	2.51E-07	4.98E-06	1.46E-09	5.2	0.004
563861.34	4152481.57	0.046	0.052	0.012	0.000	0.000	0.000	6.19E-07	1.23E-05	3.60E-09	12.9	0.010
563881.34	4152481.57	0.062	0.070	0.016	0.000	0.000	0.000	8.35E-07	1.66E-05	4.86E-09	17.4	0.014
563961.34	4152481.57	0.131	0.147	0.034	0.000	0.000	0.000	1.76E-06	3.50E-05	1.03E-08	36.8	0.029
563981.34	4152481.57	0.106	0.118	0.027	0.000	0.000	0.000	1.42E-06	2.82E-05	8.26E-09	29.6	0.024
564001.34	4152481.57	0.076	0.085	0.020	0.000	0.000	0.000	1.02E-06	2.02E-05	5.92E-09	21.2	0.017
564021.34	4152481.57	0.054	0.060	0.014	0.000	0.000	0.000	7.18E-07	1.43E-05	4.18E-09	15.0	0.012

564041.34	4152481.57	0.039	0.044	0.010	0.000	0.000	0.000	5.25E-07	1.04E-05	3.06E-09	10.9	0.009
564061.34	4152481.57	0.029	0.033	0.008	0.000	0.000	0.000	3.96E-07	7.86E-06	2.31E-09	8.3	0.007
564081.34	4152481.57	0.023	0.025	0.006	0.000	0.000	0.000	3.05E-07	6.05E-06	1.78E-09	6.4	0.005
564101.34	4152481.57	0.018	0.020	0.005	0.000	0.000	0.000	2.41E-07	4.78E-06	1.40E-09	5.0	0.004
564121.34	4152481.57	0.015	0.016	0.004	0.000	0.000	0.000	1.95E-07	3.87E-06	1.13E-09	4.1	0.003
564141.34	4152481.57	0.012	0.013	0.003	0.000	0.000	0.000	1.60E-07	3.18E-06	9.34E-10	3.3	0.003
564161.34	4152481.57	0.010	0.011	0.003	0.000	0.000	0.000	1.34E-07	2.66E-06	7.80E-10	2.8	0.002
564181.34	4152481.57	0.008	0.009	0.002	0.000	0.000	0.000	1.14E-07	2.25E-06	6.61E-10	2.4	0.002
563501.34	4152501.57	0.000	0.000	0.000	0.000	0.000	0.000	5.73E-09	1.13E-07	3.34E-11	0.1	0.000
563521.34	4152501.57	0.000	0.001	0.000	0.000	0.000	0.000	6.41E-09	1.27E-07	3.73E-11	0.1	0.000
563541.34	4152501.57	0.001	0.001	0.000	0.000	0.000	0.000	7.19E-09	1.42E-07	4.19E-11	0.1	0.000
563561.34	4152501.57	0.001	0.001	0.000	0.000	0.000	0.000	8.11E-09	1.60E-07	4.72E-11	0.2	0.000
563581.34	4152501.57	0.001	0.001	0.000	0.000	0.000	0.000	9.19E-09	1.82E-07	5.35E-11	0.2	0.000
563601.34	4152501.57	0.001	0.001	0.000	0.000	0.000	0.000	1.04E-08	2.07E-07	6.09E-11	0.2	0.000
563621.34	4152501.57	0.001	0.001	0.000	0.000	0.000	0.000	1.19E-08	2.36E-07	6.95E-11	0.2	0.000
563641.34	4152501.57	0.001	0.001	0.000	0.000	0.000	0.000	1.40E-08	2.76E-07	8.14E-11	0.3	0.000
563661.34	4152501.57	0.001	0.001	0.000	0.000	0.000	0.000	1.72E-08	3.40E-07	1.00E-10	0.4	0.000
563681.34	4152501.57	0.002	0.002	0.000	0.000	0.000	0.000	2.18E-08	4.31E-07	1.27E-10	0.5	0.000
563701.34	4152501.57	0.002	0.002	0.001	0.000	0.000	0.000	2.84E-08	5.61E-07	1.65E-10	0.6	0.000
563721.34	4152501.57	0.003	0.003	0.001	0.000	0.000	0.000	3.66E-08	7.23E-07	2.13E-10	0.8	0.001
563741.34	4152501.57	0.004	0.004	0.001	0.000	0.000	0.000	4.87E-08	9.63E-07	2.84E-10	1.0	0.001
563821.34	4152501.57	0.019	0.022	0.005	0.000	0.000	0.000	2.61E-07	5.17E-06	1.52E-09	5.4	0.004
563861.34	4152501.57	0.058	0.065	0.015	0.000	0.000	0.000	7.80E-07	1.55E-05	4.54E-09	16.3	0.013
563881.34	4152501.57	0.081	0.091	0.021	0.000	0.000	0.000	1.09E-06	2.16E-05	6.32E-09	22.6	0.018
563901.34	4152501.57	0.101	0.113	0.026	0.000	0.000	0.000	1.35E-06	2.69E-05	7.89E-09	28.3	0.023
563981.34	4152501.57	0.112	0.125	0.029	0.000	0.000	0.000	1.50E-06	2.97E-05	8.72E-09	31.2	0.025
564001.34	4152501.57	0.085	0.096	0.022	0.000	0.000	0.000	1.15E-06	2.27E-05	6.67E-09	23.9	0.019
564021.34	4152501.57	0.060	0.068	0.016	0.000	0.000	0.000	8.08E-07	1.61E-05	4.71E-09	16.9	0.014
564041.34	4152501.57	0.042	0.047	0.011	0.000	0.000	0.000	5.66E-07	1.12E-05	3.30E-09	11.8	0.009
564061.34	4152501.57	0.031	0.035	0.008	0.000	0.000	0.000	4.14E-07	8.22E-06	2.41E-09	8.6	0.007
564081.34	4152501.57	0.023	0.026	0.006	0.000	0.000	0.000	3.14E-07	6.23E-06	1.83E-09	6.5	0.005
564101.34	4152501.57	0.018	0.020	0.005	0.000	0.000	0.000	2.45E-07	4.86E-06	1.43E-09	5.1	0.004
564121.34	4152501.57	0.015	0.016	0.004	0.000	0.000	0.000	1.96E-07	3.89E-06	1.14E-09	4.1	0.003
564141.34	4152501.57	0.012	0.013	0.003	0.000	0.000	0.000	1.60E-07	3.18E-06	9.33E-10	3.3	0.003
564161.34	4152501.57	0.010	0.011	0.003	0.000	0.000	0.000	1.33E-07	2.65E-06	7.76E-10	2.8	0.002
564181.34	4152501.57	0.008	0.009	0.002	0.000	0.000	0.000	1.13E-07	2.24E-06	6.56E-10	2.3	0.002
563501.34	4152521.57	0.000	0.000	0.000	0.000	0.000	0.000	5.33E-09	1.06E-07	3.11E-11	0.1	0.000
563521.34	4152521.57	0.000	0.000	0.000	0.000	0.000	0.000	5.96E-09	1.18E-07	3.47E-11	0.1	0.000
563541.34	4152521.57	0.000	0.001	0.000	0.000	0.000	0.000	6.67E-09	1.32E-07	3.89E-11	0.1	0.000
563561.34	4152521.57	0.001	0.001	0.000	0.000	0.000	0.000	7.50E-09	1.48E-07	4.37E-11	0.2	0.000
563581.34	4152521.57	0.001	0.001	0.000	0.000	0.000	0.000	8.45E-09	1.67E-07	4.92E-11	0.2	0.000
563601.34	4152521.57	0.001	0.001	0.000	0.000	0.000	0.000	9.58E-09	1.90E-07	5.58E-11	0.2	0.000
563621.34	4152521.57	0.001	0.001	0.000	0.000	0.000	0.000	1.09E-08	2.16E-07	6.35E-11	0.2	0.000
563641.34	4152521.57	0.001	0.001	0.000	0.000	0.000	0.000	1.28E-08	2.53E-07	7.44E-11	0.3	0.000
563661.34	4152521.57	0.001	0.001	0.000	0.000	0.000	0.000	1.57E-08	3.11E-07	9.15E-11	0.3	0.000
563681.34	4152521.57	0.001	0.002	0.000	0.000	0.000	0.000	2.00E-08	3.96E-07	1.17E-10	0.4	0.000
563701.34	4152521.57	0.002	0.002	0.000	0.000	0.000	0.000	2.59E-08	5.13E-07	1.51E-10	0.5	0.000
563721.34	4152521.57	0.002	0.003	0.001	0.000	0.000	0.000	3.31E-08	6.56E-07	1.93E-10	0.7	0.001
563741.34	4152521.57	0.003	0.004	0.001	0.000	0.000	0.000	4.41E-08	8.73E-07	2.57E-10	0.9	0.001
563761.34	4152521.57	0.005	0.005	0.001	0.000	0.000	0.000	6.27E-08	1.24E-06	3.65E-10	1.3	0.001
563821.34	4152521.57	0.019	0.021	0.005	0.000	0.000	0.000	2.51E-07	4.97E-06	1.46E-09	5.2	0.004
563861.34	4152521.57	0.072	0.081	0.019	0.000	0.000	0.000	9.64E-07	1.91E-05	5.62E-09	20.1	0.016
564001.34	4152521.57	0.075	0.084	0.019	0.000	0.000	0.000	1.00E-06	2.00E-05	5.86E-09	21.0	0.017
564021.34	4152521.57	0.055	0.062	0.014	0.000	0.000	0.000	7.43E-07	1.48E-05	4.33E-09	15.5	0.012
564041.34	4152521.57	0.039	0.044	0.010	0.000	0.000	0.000	5.29E-07	1.05E-05	3.08E-09	11.0	0.009
564061.34	4152521.57	0.029	0.032	0.008	0.000	0.000	0.000	3.89E-07	7.72E-06	2.26E-09	8.1	0.006
564081.34	4152521.57	0.022	0.025	0.006	0.000	0.000	0.000	2.96E-07	5.89E-06	1.73E-09	6.2	0.005
564101.34	4152521.57	0.017	0.019	0.005	0.000	0.000	0.000	2.32E-07	4.62E-06	1.35E-09	4.8	0.004
564121.34	4152521.57	0.014	0.016	0.004	0.000	0.000	0.000	1.87E-07	3.71E-06	1.09E-09	3.9	0.003

564141.34	4152521.57	0.011	0.013	0.003	0.000	0.000	0.000	1.53E-07	3.04E-06	8.92E-10	3.2	0.003
564161.34	4152521.57	0.010	0.011	0.002	0.000	0.000	0.000	1.28E-07	2.54E-06	7.44E-10	2.7	0.002
563501.34	4152541.57	0.000	0.000	0.000	0.000	0.000	0.000	4.94E-09	9.77E-08	2.88E-11	0.1	0.000
563521.34	4152541.57	0.000	0.000	0.000	0.000	0.000	0.000	5.47E-09	1.08E-07	3.19E-11	0.1	0.000
563541.34	4152541.57	0.000	0.001	0.000	0.000	0.000	0.000	6.10E-09	1.21E-07	3.55E-11	0.1	0.000
563561.34	4152541.57	0.001	0.001	0.000	0.000	0.000	0.000	6.82E-09	1.35E-07	3.97E-11	0.1	0.000
563581.34	4152541.57	0.001	0.001	0.000	0.000	0.000	0.000	7.66E-09	1.52E-07	4.46E-11	0.2	0.000
563601.34	4152541.57	0.001	0.001	0.000	0.000	0.000	0.000	8.66E-09	1.72E-07	5.05E-11	0.2	0.000
563621.34	4152541.57	0.001	0.001	0.000	0.000	0.000	0.000	9.91E-09	1.96E-07	5.77E-11	0.2	0.000
563641.34	4152541.57	0.001	0.001	0.000	0.000	0.000	0.000	1.16E-08	2.30E-07	6.77E-11	0.2	0.000
563661.34	4152541.57	0.001	0.001	0.000	0.000	0.000	0.000	1.44E-08	2.84E-07	8.36E-11	0.3	0.000
563681.34	4152541.57	0.001	0.002	0.000	0.000	0.000	0.000	1.83E-08	3.62E-07	1.07E-10	0.4	0.000
563701.34	4152541.57	0.002	0.002	0.000	0.000	0.000	0.000	2.34E-08	4.63E-07	1.36E-10	0.5	0.000
563721.34	4152541.57	0.002	0.002	0.001	0.000	0.000	0.000	2.92E-08	5.78E-07	1.70E-10	0.6	0.000
563741.34	4152541.57	0.003	0.003	0.001	0.000	0.000	0.000	3.74E-08	7.41E-07	2.18E-10	0.8	0.001
563761.34	4152541.57	0.004	0.005	0.001	0.000	0.000	0.000	5.60E-08	1.11E-06	3.26E-10	1.2	0.001
563781.34	4152541.57	0.006	0.007	0.002	0.000	0.000	0.000	8.28E-08	1.64E-06	4.83E-10	1.7	0.001
563981.34	4152541.57	0.069	0.077	0.018	0.000	0.000	0.000	9.20E-07	1.83E-05	5.36E-09	19.2	0.015
564001.34	4152541.57	0.052	0.059	0.014	0.000	0.000	0.000	7.03E-07	1.40E-05	4.09E-09	14.7	0.012
564021.34	4152541.57	0.041	0.046	0.011	0.000	0.000	0.000	5.46E-07	1.08E-05	3.18E-09	11.4	0.009
564041.34	4152541.57	0.031	0.035	0.008	0.000	0.000	0.000	4.21E-07	8.36E-06	2.45E-09	8.8	0.007
564061.34	4152541.57	0.024	0.027	0.006	0.000	0.000	0.000	3.26E-07	6.47E-06	1.90E-09	6.8	0.005
564081.34	4152541.57	0.019	0.021	0.005	0.000	0.000	0.000	2.56E-07	5.08E-06	1.49E-09	5.3	0.004
564101.34	4152541.57	0.015	0.017	0.004	0.000	0.000	0.000	2.05E-07	4.08E-06	1.20E-09	4.3	0.003
564121.34	4152541.57	0.013	0.014	0.003	0.000	0.000	0.000	1.68E-07	3.34E-06	9.79E-10	3.5	0.003
564141.34	4152541.57	0.010	0.012	0.003	0.000	0.000	0.000	1.39E-07	2.77E-06	8.12E-10	2.9	0.002
563501.34	4152561.57	0.000	0.000	0.000	0.000	0.000	0.000	4.59E-09	9.10E-08	2.68E-11	0.1	0.000
563521.34	4152561.57	0.000	0.000	0.000	0.000	0.000	0.000	5.05E-09	1.00E-07	2.94E-11	0.1	0.000
563541.34	4152561.57	0.000	0.000	0.000	0.000	0.000	0.000	5.60E-09	1.11E-07	3.26E-11	0.1	0.000
563561.34	4152561.57	0.000	0.001	0.000	0.000	0.000	0.000	6.23E-09	1.24E-07	3.63E-11	0.1	0.000
563581.34	4152561.57	0.001	0.001	0.000	0.000	0.000	0.000	7.00E-09	1.39E-07	4.08E-11	0.1	0.000
563601.34	4152561.57	0.001	0.001	0.000	0.000	0.000	0.000	7.91E-09	1.57E-07	4.61E-11	0.2	0.000
563621.34	4152561.57	0.001	0.001	0.000	0.000	0.000	0.000	9.08E-09	1.80E-07	5.29E-11	0.2	0.000
563641.34	4152561.57	0.001	0.001	0.000	0.000	0.000	0.000	1.07E-08	2.12E-07	6.25E-11	0.2	0.000
563661.34	4152561.57	0.001	0.001	0.000	0.000	0.000	0.000	1.32E-08	2.61E-07	7.68E-11	0.3	0.000
563681.34	4152561.57	0.001	0.001	0.000	0.000	0.000	0.000	1.67E-08	3.31E-07	9.74E-11	0.3	0.000
563701.34	4152561.57	0.002	0.002	0.000	0.000	0.000	0.000	2.06E-08	4.09E-07	1.20E-10	0.4	0.000
563721.34	4152561.57	0.002	0.002	0.000	0.000	0.000	0.000	2.57E-08	5.09E-07	1.49E-10	0.5	0.000
563741.34	4152561.57	0.002	0.003	0.001	0.000	0.000	0.000	3.30E-08	6.54E-07	1.92E-10	0.7	0.001
563761.34	4152561.57	0.004	0.004	0.001	0.000	0.000	0.000	4.78E-08	9.48E-07	2.79E-10	1.0	0.001
563781.34	4152561.57	0.005	0.006	0.001	0.000	0.000	0.000	7.39E-08	1.46E-06	4.31E-10	1.5	0.001
563981.34	4152561.57	0.046	0.052	0.012	0.000	0.000	0.000	6.22E-07	1.24E-05	3.62E-09	13.0	0.010
564001.34	4152561.57	0.035	0.040	0.009	0.000	0.000	0.000	4.76E-07	9.45E-06	2.77E-09	9.9	0.008
564021.34	4152561.57	0.028	0.031	0.007	0.000	0.000	0.000	3.75E-07	7.44E-06	2.18E-09	7.8	0.006
564041.34	4152561.57	0.023	0.025	0.006	0.000	0.000	0.000	3.04E-07	6.04E-06	1.77E-09	6.4	0.005
564061.34	4152561.57	0.019	0.021	0.005	0.000	0.000	0.000	2.50E-07	4.96E-06	1.45E-09	5.2	0.004
564081.34	4152561.57	0.015	0.017	0.004	0.000	0.000	0.000	2.05E-07	4.08E-06	1.20E-09	4.3	0.003
564101.34	4152561.57	0.013	0.014	0.003	0.000	0.000	0.000	1.71E-07	3.40E-06	9.96E-10	3.6	0.003
564121.34	4152561.57	0.011	0.012	0.003	0.000	0.000	0.000	1.43E-07	2.85E-06	8.36E-10	3.0	0.002
563501.34	4152581.57	0.000	0.000	0.000	0.000	0.000	0.000	4.30E-09	8.53E-08	2.51E-11	0.1	0.000
563521.34	4152581.57	0.000	0.000	0.000	0.000	0.000	0.000	4.70E-09	9.32E-08	2.74E-11	0.1	0.000
563541.34	4152581.57	0.000	0.000	0.000	0.000	0.000	0.000	5.18E-09	1.03E-07	3.02E-11	0.1	0.000
563561.34	4152581.57	0.000	0.000	0.000	0.000	0.000	0.000	5.75E-09	1.14E-07	3.35E-11	0.1	0.000
563581.34	4152581.57	0.000	0.001	0.000	0.000	0.000	0.000	6.46E-09	1.28E-07	3.76E-11	0.1	0.000
563601.34	4152581.57	0.001	0.001	0.000	0.000	0.000	0.000	7.35E-09	1.46E-07	4.28E-11	0.2	0.000
563621.34	4152581.57	0.001	0.001	0.000	0.000	0.000	0.000	8.49E-09	1.68E-07	4.95E-11	0.2	0.000
563641.34	4152581.57	0.001	0.001	0.000	0.000	0.000	0.000	1.00E-08	1.99E-07	5.84E-11	0.2	0.000
563661.34	4152581.57	0.001	0.001	0.000	0.000	0.000	0.000	1.23E-08	2.44E-07	7.18E-11	0.3	0.000
563681.34	4152581.57	0.001	0.001	0.000	0.000	0.000	0.000	1.52E-08	3.02E-07	8.87E-11	0.3	0.000

563701.34	4152581.57	0.001	0.002	0.000	0.000	0.000	0.000	1.85E-08	3.66E-07	1.08E-10	0.4	0.000
563721.34	4152581.57	0.002	0.002	0.000	0.000	0.000	0.000	2.28E-08	4.53E-07	1.33E-10	0.5	0.000
563741.34	4152581.57	0.002	0.002	0.001	0.000	0.000	0.000	2.95E-08	5.85E-07	1.72E-10	0.6	0.000
563761.34	4152581.57	0.003	0.003	0.001	0.000	0.000	0.000	4.11E-08	8.15E-07	2.40E-10	0.9	0.001
563781.34	4152581.57	0.005	0.005	0.001	0.000	0.000	0.000	6.42E-08	1.27E-06	3.74E-10	1.3	0.001
563801.34	4152581.57	0.007	0.008	0.002	0.000	0.000	0.000	9.60E-08	1.90E-06	5.59E-10	2.0	0.002
563981.34	4152581.57	0.029	0.032	0.007	0.000	0.000	0.000	3.86E-07	7.67E-06	2.25E-09	8.1	0.006
564001.34	4152581.57	0.023	0.026	0.006	0.000	0.000	0.000	3.11E-07	6.17E-06	1.81E-09	6.5	0.005
564021.34	4152581.57	0.019	0.021	0.005	0.000	0.000	0.000	2.55E-07	5.06E-06	1.49E-09	5.3	0.004
564041.34	4152581.57	0.016	0.018	0.004	0.000	0.000	0.000	2.14E-07	4.26E-06	1.25E-09	4.5	0.004
564061.34	4152581.57	0.014	0.015	0.004	0.000	0.000	0.000	1.83E-07	3.63E-06	1.07E-09	3.8	0.003
564081.34	4152581.57	0.012	0.013	0.003	0.000	0.000	0.000	1.57E-07	3.12E-06	9.16E-10	3.3	0.003
564101.34	4152581.57	0.010	0.011	0.003	0.000	0.000	0.000	1.36E-07	2.69E-06	7.90E-10	2.8	0.002
563501.34	4152601.57	0.000	0.000	0.000	0.000	0.000	0.000	4.05E-09	8.02E-08	2.36E-11	0.1	0.000
563521.34	4152601.57	0.000	0.000	0.000	0.000	0.000	0.000	4.40E-09	8.71E-08	2.56E-11	0.1	0.000
563541.34	4152601.57	0.000	0.000	0.000	0.000	0.000	0.000	4.79E-09	9.50E-08	2.79E-11	0.1	0.000
563561.34	4152601.57	0.000	0.000	0.000	0.000	0.000	0.000	5.29E-09	1.05E-07	3.08E-11	0.1	0.000
563581.34	4152601.57	0.000	0.000	0.000	0.000	0.000	0.000	5.99E-09	1.19E-07	3.49E-11	0.1	0.000
563601.34	4152601.57	0.001	0.001	0.000	0.000	0.000	0.000	6.85E-09	1.36E-07	3.99E-11	0.1	0.000
563621.34	4152601.57	0.001	0.001	0.000	0.000	0.000	0.000	7.96E-09	1.58E-07	4.64E-11	0.2	0.000
563641.34	4152601.57	0.001	0.001	0.000	0.000	0.000	0.000	9.39E-09	1.86E-07	5.47E-11	0.2	0.000
563661.34	4152601.57	0.001	0.001	0.000	0.000	0.000	0.000	1.15E-08	2.28E-07	6.69E-11	0.2	0.000
563681.34	4152601.57	0.001	0.001	0.000	0.000	0.000	0.000	1.35E-08	2.69E-07	7.89E-11	0.3	0.000
563701.34	4152601.57	0.001	0.001	0.000	0.000	0.000	0.000	1.63E-08	3.24E-07	9.52E-11	0.3	0.000
563721.34	4152601.57	0.002	0.002	0.000	0.000	0.000	0.000	2.04E-08	4.04E-07	1.19E-10	0.4	0.000
563741.34	4152601.57	0.002	0.002	0.001	0.000	0.000	0.000	2.66E-08	5.27E-07	1.55E-10	0.6	0.000
563761.34	4152601.57	0.003	0.003	0.001	0.000	0.000	0.000	3.64E-08	7.22E-07	2.12E-10	0.8	0.001
563781.34	4152601.57	0.004	0.005	0.001	0.000	0.000	0.000	5.75E-08	1.14E-06	3.35E-10	1.2	0.001
563801.34	4152601.57	0.006	0.007	0.002	0.000	0.000	0.000	8.71E-08	1.72E-06	5.07E-10	1.8	0.001
564021.34	4152601.57	0.013	0.014	0.003	0.000	0.000	0.000	1.72E-07	3.41E-06	1.00E-09	3.6	0.003
564041.34	4152601.57	0.011	0.012	0.003	0.000	0.000	0.000	1.49E-07	2.97E-06	8.71E-10	3.1	0.002
564061.34	4152601.57	0.010	0.011	0.003	0.000	0.000	0.000	1.32E-07	2.61E-06	7.67E-10	2.7	0.002
564081.34	4152601.57	0.009	0.010	0.002	0.000	0.000	0.000	1.17E-07	2.32E-06	6.82E-10	2.4	0.002
564101.34	4152601.57	0.008	0.009	0.002	0.000	0.000	0.000	1.04E-07	2.07E-06	6.07E-10	2.2	0.002
563501.34	4152621.57	0.000	0.000	0.000	0.000	0.000	0.000	3.81E-09	7.56E-08	2.22E-11	0.1	0.000
563521.34	4152621.57	0.000	0.000	0.000	0.000	0.000	0.000	4.14E-09	8.21E-08	2.41E-11	0.1	0.000
563541.34	4152621.57	0.000	0.000	0.000	0.000	0.000	0.000	4.52E-09	8.96E-08	2.63E-11	0.1	0.000
563561.34	4152621.57	0.000	0.000	0.000	0.000	0.000	0.000	4.97E-09	9.85E-08	2.90E-11	0.1	0.000
563581.34	4152621.57	0.000	0.000	0.000	0.000	0.000	0.000	5.59E-09	1.11E-07	3.26E-11	0.1	0.000
563601.34	4152621.57	0.000	0.001	0.000	0.000	0.000	0.000	6.42E-09	1.27E-07	3.74E-11	0.1	0.000
563621.34	4152621.57	0.001	0.001	0.000	0.000	0.000	0.000	7.48E-09	1.48E-07	4.36E-11	0.2	0.000
563641.34	4152621.57	0.001	0.001	0.000	0.000	0.000	0.000	8.83E-09	1.75E-07	5.15E-11	0.2	0.000
563661.34	4152621.57	0.001	0.001	0.000	0.000	0.000	0.000	1.05E-08	2.07E-07	6.09E-11	0.2	0.000
563681.34	4152621.57	0.001	0.001	0.000	0.000	0.000	0.000	1.23E-08	2.43E-07	7.14E-11	0.3	0.000
563701.34	4152621.57	0.001	0.001	0.000	0.000	0.000	0.000	1.47E-08	2.91E-07	8.55E-11	0.3	0.000
563721.34	4152621.57	0.001	0.002	0.000	0.000	0.000	0.000	1.87E-08	3.71E-07	1.09E-10	0.4	0.000
563741.34	4152621.57	0.002	0.002	0.000	0.000	0.000	0.000	2.49E-08	4.93E-07	1.45E-10	0.5	0.000
563761.34	4152621.57	0.003	0.003	0.001	0.000	0.000	0.000	3.41E-08	6.77E-07	1.99E-10	0.7	0.001
563781.34	4152621.57	0.004	0.004	0.001	0.000	0.000	0.000	5.38E-08	1.07E-06	3.14E-10	1.1	0.001
564041.34	4152621.57	0.008	0.009	0.002	0.000	0.000	0.000	1.05E-07	2.08E-06	6.10E-10	2.2	0.002
564061.34	4152621.57	0.007	0.008	0.002	0.000	0.000	0.000	9.47E-08	1.88E-06	5.52E-10	2.0	0.002
564081.34	4152621.57	0.006	0.007	0.002	0.000	0.000	0.000	8.63E-08	1.71E-06	5.03E-10	1.8	0.001
563501.34	4152641.57	0.000	0.000	0.000	0.000	0.000	0.000	3.61E-09	7.16E-08	2.10E-11	0.1	0.000
563521.34	4152641.57	0.000	0.000	0.000	0.000	0.000	0.000	3.92E-09	7.77E-08	2.28E-11	0.1	0.000
563541.34	4152641.57	0.000	0.000	0.000	0.000	0.000	0.000	4.29E-09	8.51E-08	2.50E-11	0.1	0.000
563561.34	4152641.57	0.000	0.000	0.000	0.000	0.000	0.000	4.74E-09	9.40E-08	2.76E-11	0.1	0.000
563581.34	4152641.57	0.000	0.000	0.000	0.000	0.000	0.000	5.33E-09	1.06E-07	3.10E-11	0.1	0.000
563601.34	4152641.57	0.000	0.001	0.000	0.000	0.000	0.000	6.13E-09	1.21E-07	3.57E-11	0.1	0.000
563621.34	4152641.57	0.001	0.001	0.000	0.000	0.000	0.000	7.15E-09	1.42E-07	4.17E-11	0.1	0.000

563641.34	4152641.57	0.001	0.001	0.000	0.000	0.000	0.000	8.43E-09	1.67E-07	4.91E-11	0.2	0.000
563661.34	4152641.57	0.001	0.001	0.000	0.000	0.000	0.000	9.88E-09	1.96E-07	5.76E-11	0.2	0.000
563681.34	4152641.57	0.001	0.001	0.000	0.000	0.000	0.000	1.14E-08	2.27E-07	6.67E-11	0.2	0.000
563701.34	4152641.57	0.001	0.001	0.000	0.000	0.000	0.000	1.38E-08	2.73E-07	8.02E-11	0.3	0.000
563721.34	4152641.57	0.001	0.001	0.000	0.000	0.000	0.000	1.77E-08	3.50E-07	1.03E-10	0.4	0.000
563741.34	4152641.57	0.002	0.002	0.000	0.000	0.000	0.000	2.44E-08	4.83E-07	1.42E-10	0.5	0.000
563761.34	4152641.57	0.002	0.003	0.001	0.000	0.000	0.000	3.34E-08	6.63E-07	1.95E-10	0.7	0.001
563781.34	4152641.57	0.004	0.004	0.001	0.000	0.000	0.000	5.09E-08	1.01E-06	2.97E-10	1.1	0.001
563801.34	4152641.57	0.006	0.006	0.001	0.000	0.000	0.000	7.56E-08	1.50E-06	4.40E-10	1.6	0.001
564061.34	4152641.57	0.005	0.006	0.001	0.000	0.000	0.000	6.86E-08	1.36E-06	3.99E-10	1.4	0.001
563501.34	4152661.57	0.000	0.000	0.000	0.000	0.000	0.000	3.46E-09	6.87E-08	2.02E-11	0.1	0.000
563521.34	4152661.57	0.000	0.000	0.000	0.000	0.000	0.000	3.76E-09	7.46E-08	2.19E-11	0.1	0.000
563541.34	4152661.57	0.000	0.000	0.000	0.000	0.000	0.000	4.15E-09	8.23E-08	2.42E-11	0.1	0.000
563561.34	4152661.57	0.000	0.000	0.000	0.000	0.000	0.000	4.61E-09	9.14E-08	2.69E-11	0.1	0.000
563581.34	4152661.57	0.000	0.000	0.000	0.000	0.000	0.000	5.21E-09	1.03E-07	3.04E-11	0.1	0.000
563601.34	4152661.57	0.000	0.001	0.000	0.000	0.000	0.000	6.00E-09	1.19E-07	3.50E-11	0.1	0.000
563621.34	4152661.57	0.001	0.001	0.000	0.000	0.000	0.000	7.03E-09	1.39E-07	4.10E-11	0.1	0.000
563641.34	4152661.57	0.001	0.001	0.000	0.000	0.000	0.000	8.16E-09	1.62E-07	4.76E-11	0.2	0.000
563661.34	4152661.57	0.001	0.001	0.000	0.000	0.000	0.000	9.51E-09	1.89E-07	5.54E-11	0.2	0.000
563681.34	4152661.57	0.001	0.001	0.000	0.000	0.000	0.000	1.11E-08	2.19E-07	6.44E-11	0.2	0.000
563701.34	4152661.57	0.001	0.001	0.000	0.000	0.000	0.000	1.34E-08	2.66E-07	7.82E-11	0.3	0.000
563721.34	4152661.57	0.001	0.001	0.000	0.000	0.000	0.000	1.73E-08	3.43E-07	1.01E-10	0.4	0.000
563741.34	4152661.57	0.002	0.002	0.000	0.000	0.000	0.000	2.40E-08	4.76E-07	1.40E-10	0.5	0.000
563761.34	4152661.57	0.002	0.003	0.001	0.000	0.000	0.000	3.20E-08	6.35E-07	1.87E-10	0.7	0.001
563781.34	4152661.57	0.004	0.004	0.001	0.000	0.000	0.000	4.71E-08	9.34E-07	2.75E-10	1.0	0.001
563801.34	4152661.57	0.005	0.005	0.001	0.000	0.000	0.000	6.59E-08	1.31E-06	3.84E-10	1.4	0.001
563821.34	4152661.57	0.006	0.007	0.002	0.000	0.000	0.000	8.65E-08	1.71E-06	5.04E-10	1.8	0.001
563501.34	4152681.57	0.000	0.000	0.000	0.000	0.000	0.000	3.39E-09	6.73E-08	1.98E-11	0.1	0.000
563521.34	4152681.57	0.000	0.000	0.000	0.000	0.000	0.000	3.71E-09	7.36E-08	2.16E-11	0.1	0.000
563541.34	4152681.57	0.000	0.000	0.000	0.000	0.000	0.000	4.12E-09	8.16E-08	2.40E-11	0.1	0.000
563561.34	4152681.57	0.000	0.000	0.000	0.000	0.000	0.000	4.60E-09	9.12E-08	2.68E-11	0.1	0.000
563581.34	4152681.57	0.000	0.000	0.000	0.000	0.000	0.000	5.21E-09	1.03E-07	3.04E-11	0.1	0.000
563601.34	4152681.57	0.000	0.000	0.000	0.000	0.000	0.000	5.99E-09	1.19E-07	3.49E-11	0.1	0.000
563621.34	4152681.57	0.001	0.001	0.000	0.000	0.000	0.000	7.00E-09	1.39E-07	4.08E-11	0.1	0.000
563641.34	4152681.57	0.001	0.001	0.000	0.000	0.000	0.000	8.09E-09	1.60E-07	4.71E-11	0.2	0.000
563661.34	4152681.57	0.001	0.001	0.000	0.000	0.000	0.000	9.33E-09	1.85E-07	5.44E-11	0.2	0.000
563681.34	4152681.57	0.001	0.001	0.000	0.000	0.000	0.000	1.11E-08	2.19E-07	6.44E-11	0.2	0.000
563701.34	4152681.57	0.001	0.001	0.000	0.000	0.000	0.000	1.35E-08	2.68E-07	7.86E-11	0.3	0.000
563721.34	4152681.57	0.001	0.001	0.000	0.000	0.000	0.000	1.73E-08	3.43E-07	1.01E-10	0.4	0.000
563741.34	4152681.57	0.002	0.002	0.000	0.000	0.000	0.000	2.22E-08	4.41E-07	1.30E-10	0.5	0.000
563761.34	4152681.57	0.002	0.002	0.001	0.000	0.000	0.000	2.91E-08	5.77E-07	1.69E-10	0.6	0.000
563781.34	4152681.57	0.003	0.004	0.001	0.000	0.000	0.000	4.25E-08	8.42E-07	2.47E-10	0.9	0.001
563501.34	4152701.57	0.000	0.000	0.000	0.000	0.000	0.000	3.40E-09	6.74E-08	1.98E-11	0.1	0.000
563521.34	4152701.57	0.000	0.000	0.000	0.000	0.000	0.000	3.74E-09	7.41E-08	2.18E-11	0.1	0.000
563541.34	4152701.57	0.000	0.000	0.000	0.000	0.000	0.000	4.15E-09	8.24E-08	2.42E-11	0.1	0.000
563561.34	4152701.57	0.000	0.000	0.000	0.000	0.000	0.000	4.64E-09	9.19E-08	2.70E-11	0.1	0.000
563581.34	4152701.57	0.000	0.000	0.000	0.000	0.000	0.000	5.28E-09	1.05E-07	3.08E-11	0.1	0.000
563601.34	4152701.57	0.000	0.001	0.000	0.000	0.000	0.000	6.05E-09	1.20E-07	3.52E-11	0.1	0.000
563621.34	4152701.57	0.001	0.001	0.000	0.000	0.000	0.000	6.94E-09	1.38E-07	4.05E-11	0.1	0.000
563641.34	4152701.57	0.001	0.001	0.000	0.000	0.000	0.000	8.00E-09	1.59E-07	4.66E-11	0.2	0.000
563661.34	4152701.57	0.001	0.001	0.000	0.000	0.000	0.000	9.28E-09	1.84E-07	5.40E-11	0.2	0.000
563681.34	4152701.57	0.001	0.001	0.000	0.000	0.000	0.000	1.12E-08	2.22E-07	6.53E-11	0.2	0.000
563701.34	4152701.57	0.001	0.001	0.000	0.000	0.000	0.000	1.38E-08	2.74E-07	8.04E-11	0.3	0.000
563721.34	4152701.57	0.001	0.001	0.000	0.000	0.000	0.000	1.74E-08	3.44E-07	1.01E-10	0.4	0.000
563741.34	4152701.57	0.002	0.002	0.000	0.000	0.000	0.000	2.13E-08	4.22E-07	1.24E-10	0.4	0.000
563761.34	4152701.57	0.002	0.002	0.001	0.000	0.000	0.000	2.77E-08	5.49E-07	1.61E-10	0.6	0.000
563781.34	4152701.57	0.003	0.003	0.001	0.000	0.000	0.000	3.72E-08	7.39E-07	2.17E-10	0.8	0.001
563501.34	4152721.57	0.000	0.000	0.000	0.000	0.000	0.000	3.45E-09	6.83E-08	2.01E-11	0.1	0.000
563521.34	4152721.57	0.000	0.000	0.000	0.000	0.000	0.000	3.80E-09	7.54E-08	2.21E-11	0.1	0.000

563541.34	4152721.57	0.000	0.000	0.000	0.000	0.000	0.000	4.22E-09	8.37E-08	2.46E-11	0.1	0.000
563561.34	4152721.57	0.000	0.000	0.000	0.000	0.000	0.000	4.70E-09	9.32E-08	2.74E-11	0.1	0.000
563581.34	4152721.57	0.000	0.000	0.000	0.000	0.000	0.000	5.32E-09	1.06E-07	3.10E-11	0.1	0.000
563601.34	4152721.57	0.000	0.001	0.000	0.000	0.000	0.000	6.07E-09	1.21E-07	3.54E-11	0.1	0.000
563621.34	4152721.57	0.001	0.001	0.000	0.000	0.000	0.000	6.93E-09	1.37E-07	4.04E-11	0.1	0.000
563641.34	4152721.57	0.001	0.001	0.000	0.000	0.000	0.000	8.03E-09	1.59E-07	4.68E-11	0.2	0.000
563661.34	4152721.57	0.001	0.001	0.000	0.000	0.000	0.000	9.43E-09	1.87E-07	5.49E-11	0.2	0.000
563681.34	4152721.57	0.001	0.001	0.000	0.000	0.000	0.000	1.15E-08	2.29E-07	6.72E-11	0.2	0.000
563701.34	4152721.57	0.001	0.001	0.000	0.000	0.000	0.000	1.42E-08	2.81E-07	8.26E-11	0.3	0.000
563721.34	4152721.57	0.001	0.001	0.000	0.000	0.000	0.000	1.71E-08	3.40E-07	9.98E-11	0.4	0.000
563741.34	4152721.57	0.002	0.002	0.000	0.000	0.000	0.000	2.04E-08	4.06E-07	1.19E-10	0.4	0.000
563761.34	4152721.57	0.002	0.002	0.001	0.000	0.000	0.000	2.67E-08	5.29E-07	1.55E-10	0.6	0.000
563781.34	4152721.57	0.002	0.003	0.001	0.000	0.000	0.000	3.25E-08	6.45E-07	1.90E-10	0.7	0.001
563501.34	4152741.57	0.000	0.000	0.000	0.000	0.000	0.000	3.50E-09	6.94E-08	2.04E-11	0.1	0.000
563521.34	4152741.57	0.000	0.000	0.000	0.000	0.000	0.000	3.85E-09	7.64E-08	2.24E-11	0.1	0.000
563541.34	4152741.57	0.000	0.000	0.000	0.000	0.000	0.000	4.28E-09	8.48E-08	2.49E-11	0.1	0.000
563561.34	4152741.57	0.000	0.000	0.000	0.000	0.000	0.000	4.77E-09	9.46E-08	2.78E-11	0.1	0.000
563581.34	4152741.57	0.000	0.000	0.000	0.000	0.000	0.000	5.35E-09	1.06E-07	3.12E-11	0.1	0.000
563601.34	4152741.57	0.000	0.001	0.000	0.000	0.000	0.000	6.07E-09	1.20E-07	3.54E-11	0.1	0.000
563621.34	4152741.57	0.001	0.001	0.000	0.000	0.000	0.000	6.95E-09	1.38E-07	4.05E-11	0.1	0.000
563641.34	4152741.57	0.001	0.001	0.000	0.000	0.000	0.000	8.16E-09	1.62E-07	4.76E-11	0.2	0.000
563661.34	4152741.57	0.001	0.001	0.000	0.000	0.000	0.000	9.70E-09	1.92E-07	5.65E-11	0.2	0.000
563681.34	4152741.57	0.001	0.001	0.000	0.000	0.000	0.000	1.18E-08	2.35E-07	6.89E-11	0.2	0.000
563701.34	4152741.57	0.001	0.001	0.000	0.000	0.000	0.000	1.42E-08	2.82E-07	8.27E-11	0.3	0.000
563721.34	4152741.57	0.001	0.001	0.000	0.000	0.000	0.000	1.66E-08	3.29E-07	9.65E-11	0.3	0.000
563741.34	4152741.57	0.001	0.002	0.000	0.000	0.000	0.000	1.97E-08	3.90E-07	1.15E-10	0.4	0.000
563761.34	4152741.57	0.002	0.002	0.000	0.000	0.000	0.000	2.47E-08	4.90E-07	1.44E-10	0.5	0.000
563781.34	4152741.57	0.002	0.002	0.001	0.000	0.000	0.000	2.84E-08	5.64E-07	1.66E-10	0.6	0.000
563801.34	4152741.57	0.002	0.003	0.001	0.000	0.000	0.000	3.21E-08	6.36E-07	1.87E-10	0.7	0.001
563501.34	4152761.57	0.000	0.000	0.000	0.000	0.000	0.000	3.56E-09	7.06E-08	2.07E-11	0.1	0.000
563521.34	4152761.57	0.000	0.000	0.000	0.000	0.000	0.000	3.90E-09	7.75E-08	2.27E-11	0.1	0.000
563541.34	4152761.57	0.000	0.000	0.000	0.000	0.000	0.000	4.32E-09	8.57E-08	2.52E-11	0.1	0.000
563561.34	4152761.57	0.000	0.000	0.000	0.000	0.000	0.000	4.80E-09	9.53E-08	2.80E-11	0.1	0.000
563581.34	4152761.57	0.000	0.000	0.000	0.000	0.000	0.000	5.38E-09	1.07E-07	3.13E-11	0.1	0.000
563601.34	4152761.57	0.000	0.001	0.000	0.000	0.000	0.000	6.11E-09	1.21E-07	3.56E-11	0.1	0.000
563621.34	4152761.57	0.001	0.001	0.000	0.000	0.000	0.000	7.07E-09	1.40E-07	4.12E-11	0.1	0.000
563641.34	4152761.57	0.001	0.001	0.000	0.000	0.000	0.000	8.33E-09	1.65E-07	4.86E-11	0.2	0.000
563661.34	4152761.57	0.001	0.001	0.000	0.000	0.000	0.000	9.88E-09	1.96E-07	5.76E-11	0.2	0.000
563681.34	4152761.57	0.001	0.001	0.000	0.000	0.000	0.000	1.17E-08	2.33E-07	6.85E-11	0.2	0.000
563701.34	4152761.57	0.001	0.001	0.000	0.000	0.000	0.000	1.36E-08	2.71E-07	7.95E-11	0.3	0.000
563721.34	4152761.57	0.001	0.001	0.000	0.000	0.000	0.000	1.57E-08	3.11E-07	9.14E-11	0.3	0.000
563741.34	4152761.57	0.001	0.002	0.000	0.000	0.000	0.000	1.90E-08	3.76E-07	1.10E-10	0.4	0.000
563761.34	4152761.57	0.002	0.002	0.000	0.000	0.000	0.000	2.23E-08	4.42E-07	1.30E-10	0.5	0.000
563781.34	4152761.57	0.002	0.002	0.000	0.000	0.000	0.000	2.51E-08	4.99E-07	1.46E-10	0.5	0.000
563801.34	4152761.57	0.002	0.002	0.001	0.000	0.000	0.000	2.78E-08	5.51E-07	1.62E-10	0.6	0.000
563501.34	4152781.57	0.000	0.000	0.000	0.000	0.000	0.000	3.62E-09	7.19E-08	2.11E-11	0.1	0.000
563521.34	4152781.57	0.000	0.000	0.000	0.000	0.000	0.000	3.96E-09	7.86E-08	2.31E-11	0.1	0.000
563541.34	4152781.57	0.000	0.000	0.000	0.000	0.000	0.000	4.36E-09	8.66E-08	2.54E-11	0.1	0.000
563561.34	4152781.57	0.000	0.000	0.000	0.000	0.000	0.000	4.86E-09	9.64E-08	2.83E-11	0.1	0.000
563581.34	4152781.57	0.000	0.000	0.000	0.000	0.000	0.000	5.44E-09	1.08E-07	3.17E-11	0.1	0.000
563601.34	4152781.57	0.000	0.001	0.000	0.000	0.000	0.000	6.21E-09	1.23E-07	3.62E-11	0.1	0.000
563621.34	4152781.57	0.001	0.001	0.000	0.000	0.000	0.000	7.23E-09	1.43E-07	4.21E-11	0.2	0.000
563641.34	4152781.57	0.001	0.001	0.000	0.000	0.000	0.000	8.50E-09	1.69E-07	4.95E-11	0.2	0.000
563661.34	4152781.57	0.001	0.001	0.000	0.000	0.000	0.000	9.88E-09	1.96E-07	5.76E-11	0.2	0.000
563681.34	4152781.57	0.001	0.001	0.000	0.000	0.000	0.000	1.12E-08	2.23E-07	6.54E-11	0.2	0.000
563701.34	4152781.57	0.001	0.001	0.000	0.000	0.000	0.000	1.26E-08	2.50E-07	7.33E-11	0.3	0.000
563721.34	4152781.57	0.001	0.001	0.000	0.000	0.000	0.000	1.48E-08	2.93E-07	8.62E-11	0.3	0.000
563741.34	4152781.57	0.001	0.001	0.000	0.000	0.000	0.000	1.76E-08	3.50E-07	1.03E-10	0.4	0.000
563761.34	4152781.57	0.001	0.002	0.000	0.000	0.000	0.000	2.01E-08	3.99E-07	1.17E-10	0.4	0.000

563781.34	4152781.57	0.002	0.002	0.000	0.000	0.000	0.000	2.25E-08	4.47E-07	1.31E-10	0.5	0.000
563801.34	4152781.57	0.002	0.002	0.000	0.000	0.000	0.000	2.46E-08	4.88E-07	1.43E-10	0.5	0.000
563501.34	4152801.57	0.000	0.000	0.000	0.000	0.000	0.000	3.71E-09	7.35E-08	2.16E-11	0.1	0.000
563521.34	4152801.57	0.000	0.000	0.000	0.000	0.000	0.000	4.06E-09	8.05E-08	2.36E-11	0.1	0.000
563541.34	4152801.57	0.000	0.000	0.000	0.000	0.000	0.000	4.46E-09	8.84E-08	2.60E-11	0.1	0.000
563561.34	4152801.57	0.000	0.000	0.000	0.000	0.000	0.000	4.96E-09	9.83E-08	2.89E-11	0.1	0.000
563581.34	4152801.57	0.000	0.000	0.000	0.000	0.000	0.000	5.56E-09	1.10E-07	3.24E-11	0.1	0.000
563601.34	4152801.57	0.000	0.001	0.000	0.000	0.000	0.000	6.36E-09	1.26E-07	3.71E-11	0.1	0.000
563621.34	4152801.57	0.001	0.001	0.000	0.000	0.000	0.000	7.39E-09	1.47E-07	4.31E-11	0.2	0.000
563641.34	4152801.57	0.001	0.001	0.000	0.000	0.000	0.000	8.64E-09	1.71E-07	5.03E-11	0.2	0.000
563661.34	4152801.57	0.001	0.001	0.000	0.000	0.000	0.000	9.69E-09	1.92E-07	5.65E-11	0.2	0.000
563681.34	4152801.57	0.001	0.001	0.000	0.000	0.000	0.000	1.07E-08	2.13E-07	6.25E-11	0.2	0.000
563701.34	4152801.57	0.001	0.001	0.000	0.000	0.000	0.000	1.21E-08	2.39E-07	7.02E-11	0.3	0.000
563721.34	4152801.57	0.001	0.001	0.000	0.000	0.000	0.000	1.40E-08	2.79E-07	8.18E-11	0.3	0.000
563741.34	4152801.57	0.001	0.001	0.000	0.000	0.000	0.000	1.61E-08	3.20E-07	9.40E-11	0.3	0.000
563761.34	4152801.57	0.001	0.001	0.000	0.000	0.000	0.000	1.80E-08	3.57E-07	1.05E-10	0.4	0.000
563781.34	4152801.57	0.001	0.002	0.000	0.000	0.000	0.000	2.00E-08	3.97E-07	1.17E-10	0.4	0.000
563801.34	4152801.57	0.002	0.002	0.000	0.000	0.000	0.000	2.15E-08	4.25E-07	1.25E-10	0.4	0.000
563501.34	4152821.57	0.000	0.000	0.000	0.000	0.000	0.000	3.80E-09	7.54E-08	2.22E-11	0.1	0.000
563521.34	4152821.57	0.000	0.000	0.000	0.000	0.000	0.000	4.16E-09	8.26E-08	2.43E-11	0.1	0.000
563541.34	4152821.57	0.000	0.000	0.000	0.000	0.000	0.000	4.56E-09	9.04E-08	2.66E-11	0.1	0.000
563561.34	4152821.57	0.000	0.000	0.000	0.000	0.000	0.000	5.05E-09	1.00E-07	2.94E-11	0.1	0.000
563581.34	4152821.57	0.000	0.000	0.000	0.000	0.000	0.000	5.70E-09	1.13E-07	3.32E-11	0.1	0.000
563601.34	4152821.57	0.000	0.001	0.000	0.000	0.000	0.000	6.54E-09	1.30E-07	3.81E-11	0.1	0.000
563621.34	4152821.57	0.001	0.001	0.000	0.000	0.000	0.000	7.46E-09	1.48E-07	4.35E-11	0.2	0.000
563641.34	4152821.57	0.001	0.001	0.000	0.000	0.000	0.000	8.45E-09	1.68E-07	4.93E-11	0.2	0.000
563661.34	4152821.57	0.001	0.001	0.000	0.000	0.000	0.000	9.36E-09	1.86E-07	5.45E-11	0.2	0.000
563681.34	4152821.57	0.001	0.001	0.000	0.000	0.000	0.000	1.04E-08	2.06E-07	6.06E-11	0.2	0.000
563701.34	4152821.57	0.001	0.001	0.000	0.000	0.000	0.000	1.17E-08	2.31E-07	6.79E-11	0.2	0.000
563721.34	4152821.57	0.001	0.001	0.000	0.000	0.000	0.000	1.32E-08	2.62E-07	7.68E-11	0.3	0.000
563741.34	4152821.57	0.001	0.001	0.000	0.000	0.000	0.000	1.46E-08	2.89E-07	8.50E-11	0.3	0.000
563761.34	4152821.57	0.001	0.001	0.000	0.000	0.000	0.000	1.60E-08	3.17E-07	9.30E-11	0.3	0.000
563781.34	4152821.57	0.001	0.001	0.000	0.000	0.000	0.000	1.73E-08	3.43E-07	1.01E-10	0.4	0.000

Twin Pines Project
Construction Health Risk Calculations - Mitigated

Cancer Risk, Hazard Index and $PM_{2.5}$ Concentration Calculations - Offsite Residential

					Exposure Duration (Days)							
				Start Date	5/1/2024	7/31/2024	8/1/2026		DPM		$PM_{2.5}$	
				Stop Date	7/30/2024	7/31/2026			Emisions (tons)	Emission Rate (g/s)	Emisions (tons)	Emission Rate (g/s)
AERMOD Source	Year	Start Date	End Date	Calendar Days	3rd Trimester	0<2	2<9	Exposure Duration	Uncontrolled	Uncontrolled	Uncontrolled	Uncontrolled
PAREA1	2024	5/1/2024	12/31/2024	244	90	153	1	244	0.00	0.000	0.00	0.000
PAREA1	2025	1/1/2025	12/31/2025	364	0	364	0	364	0.00	0.000	0.00	0.000
PAREA1	2026	1/1/2026	4/30/2026	119	0	119	0	119	0.00	0.000	0.00	0.000
ARLN1	2024	5/1/2024	12/31/2024	244	90	153	1	244	0.00	0.000	0.00	0.000
ARLN1	2025	1/1/2025	12/31/2025	364	0	364	0	364	0.00	0.000	0.00	0.000
ARLN1	2026	1/1/2026	4/30/2026	119	0	119	0	119	0.00	0.000	0.00	0.000
									0.01		0.01	

Cancer Risk Factors

	Abbreviation	UOM	3rd Trimester	0<2	2<9
Daily Breathing Rate	DBR	L/kg-day	361	1090	631
Fraction Of Time At Home	FAH	unitless	1	1	1
Exposure Frequency	EF	days/year	0.96	0.96	0.96
Age Sensitivity Factor	ASF	unitless	10	10	3
Inhalation Absorption Factor	A	unitless	1	1	1
Conversion Factor	CF_1	m^3/L	0.001	0.001	0.001
Conversion Factor	CF_2	$\mu g/m^3$	0.001	0.001	0.001
Cancer Potency Factor (diesel exhaust)	CPF	$mg/kg\text{-}day^{-1}$	1.1	1.1	1.1
Averaging Time (for residential exposure)	AT	years	70.00	70.00	70.00

Risk at nearby schools assumed to be >1

SOURCE: Office of Environmental Health Hazard Assessment, 2015. *Air Toxics Hot Spots Program Guidance Manual for the Preparation of Health Risk Assessments* . February 2015

Daily breathing rate for residential receptor is based on the OEHHA 95th percentile moderate intensity breathing rates (OEHHA Table 5.7).

Fraction of time at home is set to values per OEHHA Table 8.4 for residential since the nearest school has an unmitigated cancer risk of <1 per million.

Inhalation cancer potency factor from OEHHA Table 7.1

Hazard Index

Chronic Inhalation	REL	$\mu g/m^3$	5

Intake Factor for Inhalation, IF (m^3/kg-day) = DBR*FAH*EF*ED*ASF*A*CF/AT

AERMOD Source	3rd Trimester	0<2	2<9
PAREA1	0.012	0.063	0.000
PAREA1	0.000	0.149	0.000
PAREA1	0.000	0.049	0.000
ARLN1	0.012	0.063	0.000
ARLN1	0.000	0.149	0.000
ARLN1	0.000	0.049	0.000

Risk Calculation Part 1, R1 = IF*CPF*CF

3rd Trimester	0<2	2<9
1.34E-05	6.88E-05	7.81E-08
0.00E+00	1.64E-04	0.00E+00
0.00E+00	5.35E-05	0.00E+00
1.34E-05	6.88E-05	7.81E-08
0.00E+00	1.64E-04	0.00E+00
0.00E+00	5.35E-05	0.00E+00

	Cancer Risk	UTM X	UTM Y
MAX MITIGATED	4.61	563961.3	4152481.57

HI	UTM X	UTM Y
0.004	563961.3	4152481.57

$PM_{2.5}$ Conc.	UTM X	UTM Y
0.022	563961.34	4152481.57

$PM_{2.5}$ concentration, $C_{PM2.5}$ ($\mu g/m^3$) - at max. HI receptor

X (UTM)	Y (UTM)	Project Construction					
		PAREA1	PAREA1	PAREA1	ARLN1	ARLN1	ARLN1
		2024	2025	2026	2024	2025	2026
563961.34	4152481.570	0.021	0.019	0.007	0.000	0.000	0.000

$PM_{2.5}$ Conc.
$\mu g/m^3$
Max. Annual
0.022

Diesel Particulate Matter concentration, C_{DPM} ($\mu g/m^3$)

X (UTM)	Y (UTM)	Project Construction					
		PAREA1	PAREA1	PAREA1	ARLN1	ARLN1	ARLN1

Risk Calculation Part 2

Cancer Risk = ∑R1*C_{DPM}				HI
3rd Trimester	0<2	2<9	Total	C_{DPM}/REL

		2024	2025	2026	2024	2025	2026					unitless
563701.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	1.73E-09	3.59E-08	1.01E-11	0.038	0.000
563721.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	1.94E-09	4.03E-08	1.13E-11	0.042	0.000
563741.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	2.16E-09	4.49E-08	1.26E-11	0.047	0.000
563761.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	2.37E-09	4.93E-08	1.38E-11	0.052	0.000
563781.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	2.58E-09	5.37E-08	1.50E-11	0.056	0.000
563801.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	2.78E-09	5.78E-08	1.62E-11	0.061	0.000
563821.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	2.97E-09	6.19E-08	1.73E-11	0.065	0.000
563841.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	3.13E-09	6.53E-08	1.82E-11	0.068	0.000
563861.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	3.26E-09	6.79E-08	1.90E-11	0.071	0.000
563881.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	3.37E-09	7.02E-08	1.96E-11	0.074	0.000
563901.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	3.46E-09	7.21E-08	2.02E-11	0.076	0.000
563921.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	3.53E-09	7.36E-08	2.05E-11	0.077	0.000
563941.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	3.55E-09	7.41E-08	2.07E-11	0.078	0.000
563961.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	3.57E-09	7.45E-08	2.08E-11	0.078	0.000
563981.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	3.62E-09	7.56E-08	2.11E-11	0.079	0.000
564001.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	3.69E-09	7.70E-08	2.15E-11	0.081	0.000
564021.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	3.75E-09	7.83E-08	2.18E-11	0.082	0.000
564041.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	3.83E-09	8.00E-08	2.23E-11	0.084	0.000
564061.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	3.85E-09	8.04E-08	2.24E-11	0.084	0.000
564081.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	3.63E-09	7.57E-08	2.11E-11	0.079	0.000
564101.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	3.45E-09	7.21E-08	2.01E-11	0.076	0.000
564121.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	3.39E-09	7.07E-08	1.97E-11	0.074	0.000
564141.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	3.22E-09	6.72E-08	1.88E-11	0.070	0.000
564161.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	2.94E-09	6.12E-08	1.71E-11	0.064	0.000
564181.34	4152141.57	0.000	0.000	0.000	0.000	0.000	0.000	2.70E-09	5.64E-08	1.57E-11	0.059	0.000
563741.34	4152161.57	0.000	0.000	0.000	0.000	0.000	0.000	2.31E-09	4.80E-08	1.35E-11	0.050	0.000
563761.34	4152161.57	0.000	0.000	0.000	0.000	0.000	0.000	2.55E-09	5.30E-08	1.49E-11	0.056	0.000
563781.34	4152161.57	0.000	0.000	0.000	0.000	0.000	0.000	2.77E-09	5.77E-08	1.62E-11	0.060	0.000
563801.34	4152161.57	0.000	0.000	0.000	0.000	0.000	0.000	3.00E-09	6.24E-08	1.75E-11	0.065	0.000
563821.34	4152161.57	0.000	0.000	0.000	0.000	0.000	0.000	3.21E-09	6.70E-08	1.87E-11	0.070	0.000
563841.34	4152161.57	0.000	0.000	0.000	0.000	0.000	0.000	3.43E-09	7.15E-08	2.00E-11	0.075	0.000
563861.34	4152161.57	0.000	0.000	0.000	0.000	0.000	0.000	3.59E-09	7.48E-08	2.09E-11	0.078	0.000
563881.34	4152161.57	0.000	0.000	0.000	0.000	0.000	0.000	3.73E-09	7.77E-08	2.17E-11	0.081	0.000
563901.34	4152161.57	0.000	0.000	0.000	0.000	0.000	0.000	3.84E-09	8.00E-08	2.23E-11	0.084	0.000
563921.34	4152161.57	0.000	0.000	0.000	0.000	0.000	0.000	3.90E-09	8.13E-08	2.27E-11	0.085	0.000
563941.34	4152161.57	0.000	0.000	0.000	0.000	0.000	0.000	3.93E-09	8.21E-08	2.29E-11	0.086	0.000
563961.34	4152161.57	0.000	0.000	0.000	0.000	0.000	0.000	3.95E-09	8.25E-08	2.30E-11	0.086	0.000
563981.34	4152161.57	0.000	0.000	0.000	0.000	0.000	0.000	3.99E-09	8.32E-08	2.32E-11	0.087	0.000
564001.34	4152161.57	0.000	0.000	0.000	0.000	0.000	0.000	4.07E-09	8.50E-08	2.37E-11	0.089	0.000
564021.34	4152161.57	0.000	0.000	0.000	0.000	0.000	0.000	4.11E-09	8.57E-08	2.39E-11	0.090	0.000
564041.34	4152161.57	0.000	0.000	0.000	0.000	0.000	0.000	4.17E-09	8.69E-08	2.43E-11	0.091	0.000
564061.34	4152161.57	0.000	0.000	0.000	0.000	0.000	0.000	4.22E-09	8.81E-08	2.46E-11	0.092	0.000
564081.34	4152161.57	0.000	0.000	0.000	0.000	0.000	0.000	4.06E-09	8.46E-08	2.36E-11	0.089	0.000
564101.34	4152161.57	0.000	0.000	0.000	0.000	0.000	0.000	3.85E-09	8.04E-08	2.25E-11	0.084	0.000
564121.34	4152161.57	0.000	0.000	0.000	0.000	0.000	0.000	3.71E-09	7.74E-08	2.16E-11	0.081	0.000
564141.34	4152161.57	0.000	0.000	0.000	0.000	0.000	0.000	3.49E-09	7.29E-08	2.03E-11	0.076	0.000
564161.34	4152161.57	0.000	0.000	0.000	0.000	0.000	0.000	3.17E-09	6.61E-08	1.85E-11	0.069	0.000
564181.34	4152161.57	0.000	0.000	0.000	0.000	0.000	0.000	2.92E-09	6.10E-08	1.70E-11	0.064	0.000
563741.34	4152181.57	0.000	0.000	0.000	0.000	0.000	0.000	2.48E-09	5.14E-08	1.44E-11	0.054	0.000
563761.34	4152181.57	0.000	0.000	0.000	0.000	0.000	0.000	2.75E-09	5.71E-08	1.60E-11	0.060	0.000
563781.34	4152181.57	0.000	0.000	0.000	0.000	0.000	0.000	3.00E-09	6.24E-08	1.75E-11	0.065	0.000
563801.34	4152181.57	0.000	0.000	0.000	0.000	0.000	0.000	3.25E-09	6.76E-08	1.89E-11	0.071	0.000
563821.34	4152181.57	0.000	0.000	0.000	0.000	0.000	0.000	3.52E-09	7.34E-08	2.05E-11	0.077	0.000
563841.34	4152181.57	0.000	0.000	0.000	0.000	0.000	0.000	3.80E-09	7.91E-08	2.21E-11	0.083	0.000
563861.34	4152181.57	0.000	0.000	0.000	0.000	0.000	0.000	3.98E-09	8.31E-08	2.32E-11	0.087	0.000
563881.34	4152181.57	0.000	0.000	0.000	0.000	0.000	0.000	4.16E-09	8.67E-08	2.42E-11	0.091	0.000
563901.34	4152181.57	0.000	0.000	0.000	0.000	0.000	0.000	4.29E-09	8.94E-08	2.50E-11	0.094	0.000
563921.34	4152181.57	0.000	0.000	0.000	0.000	0.000	0.000	4.36E-09	9.09E-08	2.54E-11	0.095	0.000

563941.34	4152181.57	0.000	0.000	0.000	0.000	0.000	0.000	4.39E-09	9.15E-08	2.56E-11	0.096	0.000
563961.34	4152181.57	0.000	0.000	0.000	0.000	0.000	0.000	4.40E-09	9.19E-08	2.57E-11	0.096	0.000
563981.34	4152181.57	0.000	0.000	0.000	0.000	0.000	0.000	4.49E-09	9.36E-08	2.61E-11	0.098	0.000
564001.34	4152181.57	0.000	0.000	0.000	0.000	0.000	0.000	4.57E-09	9.54E-08	2.66E-11	0.100	0.000
564021.34	4152181.57	0.000	0.000	0.000	0.000	0.000	0.000	4.56E-09	9.51E-08	2.65E-11	0.100	0.000
564041.34	4152181.57	0.000	0.000	0.000	0.000	0.000	0.000	4.60E-09	9.61E-08	2.68E-11	0.101	0.000
564061.34	4152181.57	0.000	0.000	0.000	0.000	0.000	0.000	4.62E-09	9.65E-08	2.69E-11	0.101	0.000
564081.34	4152181.57	0.000	0.000	0.000	0.000	0.000	0.000	4.54E-09	9.48E-08	2.65E-11	0.099	0.000
564101.34	4152181.57	0.000	0.000	0.000	0.000	0.000	0.000	4.28E-09	8.93E-08	2.49E-11	0.094	0.000
564121.34	4152181.57	0.000	0.000	0.000	0.000	0.000	0.000	4.03E-09	8.41E-08	2.35E-11	0.088	0.000
564141.34	4152181.57	0.000	0.000	0.000	0.000	0.000	0.000	3.72E-09	7.77E-08	2.17E-11	0.081	0.000
564161.34	4152181.57	0.000	0.000	0.000	0.000	0.000	0.000	3.42E-09	7.15E-08	2.00E-11	0.075	0.000
564181.34	4152181.57	0.000	0.000	0.000	0.000	0.000	0.000	3.17E-09	6.61E-08	1.84E-11	0.069	0.000
563841.34	4152201.57	0.000	0.000	0.000	0.000	0.000	0.000	4.18E-09	8.72E-08	2.44E-11	0.091	0.000
563861.34	4152201.57	0.000	0.000	0.000	0.000	0.000	0.000	4.42E-09	9.23E-08	2.58E-11	0.097	0.000
563881.34	4152201.57	0.000	0.000	0.000	0.000	0.000	0.000	4.67E-09	9.75E-08	2.72E-11	0.102	0.000
563901.34	4152201.57	0.000	0.000	0.000	0.000	0.000	0.000	4.85E-09	1.01E-07	2.83E-11	0.106	0.000
563921.34	4152201.57	0.000	0.000	0.000	0.000	0.000	0.000	4.96E-09	1.03E-07	2.89E-11	0.108	0.000
563941.34	4152201.57	0.000	0.000	0.000	0.000	0.000	0.000	4.96E-09	1.04E-07	2.89E-11	0.109	0.000
563961.34	4152201.57	0.000	0.000	0.000	0.000	0.000	0.000	5.04E-09	1.05E-07	2.93E-11	0.110	0.000
563981.34	4152201.57	0.000	0.000	0.000	0.000	0.000	0.000	5.16E-09	1.08E-07	3.00E-11	0.113	0.000
564001.34	4152201.57	0.000	0.000	0.000	0.000	0.000	0.000	5.18E-09	1.08E-07	3.02E-11	0.113	0.000
564021.34	4152201.57	0.000	0.000	0.000	0.000	0.000	0.000	5.20E-09	1.09E-07	3.03E-11	0.114	0.000
564041.34	4152201.57	0.000	0.000	0.000	0.000	0.000	0.000	5.19E-09	1.08E-07	3.02E-11	0.113	0.000
564061.34	4152201.57	0.000	0.000	0.000	0.000	0.000	0.000	5.10E-09	1.06E-07	2.97E-11	0.112	0.000
564081.34	4152201.57	0.000	0.000	0.000	0.000	0.000	0.000	4.96E-09	1.03E-07	2.89E-11	0.108	0.000
564101.34	4152201.57	0.000	0.000	0.000	0.000	0.000	0.000	4.71E-09	9.84E-08	2.75E-11	0.103	0.000
564121.34	4152201.57	0.000	0.000	0.000	0.000	0.000	0.000	4.38E-09	9.14E-08	2.55E-11	0.096	0.000
564141.34	4152201.57	0.000	0.000	0.000	0.000	0.000	0.000	4.03E-09	8.42E-08	2.35E-11	0.088	0.000
564161.34	4152201.57	0.000	0.000	0.000	0.000	0.000	0.000	3.77E-09	7.86E-08	2.19E-11	0.082	0.000
564181.34	4152201.57	0.000	0.000	0.000	0.000	0.000	0.000	3.45E-09	7.20E-08	2.01E-11	0.076	0.000
563841.34	4152221.57	0.000	0.000	0.000	0.000	0.000	0.000	4.64E-09	9.67E-08	2.70E-11	0.101	0.000
563861.34	4152221.57	0.000	0.000	0.000	0.000	0.000	0.000	4.98E-09	1.04E-07	2.90E-11	0.109	0.000
563881.34	4152221.57	0.000	0.000	0.000	0.000	0.000	0.000	5.31E-09	1.11E-07	3.09E-11	0.116	0.000
563901.34	4152221.57	0.000	0.000	0.000	0.000	0.000	0.000	5.57E-09	1.16E-07	3.24E-11	0.122	0.000
563921.34	4152221.57	0.000	0.000	0.000	0.000	0.000	0.000	5.75E-09	1.20E-07	3.35E-11	0.126	0.000
563941.34	4152221.57	0.000	0.000	0.000	0.000	0.000	0.000	5.82E-09	1.21E-07	3.39E-11	0.127	0.000
563961.34	4152221.57	0.000	0.001	0.000	0.000	0.000	0.000	5.90E-09	1.23E-07	3.44E-11	0.129	0.000
563981.34	4152221.57	0.000	0.001	0.000	0.000	0.000	0.000	5.96E-09	1.24E-07	3.47E-11	0.130	0.000
564001.34	4152221.57	0.000	0.001	0.000	0.000	0.000	0.000	6.04E-09	1.26E-07	3.52E-11	0.132	0.000
564021.34	4152221.57	0.000	0.001	0.000	0.000	0.000	0.000	6.04E-09	1.26E-07	3.52E-11	0.132	0.000
564041.34	4152221.57	0.000	0.001	0.000	0.000	0.000	0.000	5.90E-09	1.23E-07	3.44E-11	0.129	0.000
564081.34	4152221.57	0.000	0.000	0.000	0.000	0.000	0.000	5.46E-09	1.14E-07	3.18E-11	0.119	0.000
564101.34	4152221.57	0.000	0.000	0.000	0.000	0.000	0.000	5.16E-09	1.08E-07	3.00E-11	0.113	0.000
564121.34	4152221.57	0.000	0.000	0.000	0.000	0.000	0.000	4.81E-09	1.01E-07	2.81E-11	0.105	0.000
564141.34	4152221.57	0.000	0.000	0.000	0.000	0.000	0.000	4.48E-09	9.34E-08	2.61E-11	0.098	0.000
564161.34	4152221.57	0.000	0.000	0.000	0.000	0.000	0.000	4.14E-09	8.64E-08	2.41E-11	0.091	0.000
564181.34	4152221.57	0.000	0.000	0.000	0.000	0.000	0.000	3.79E-09	7.90E-08	2.21E-11	0.083	0.000
563821.34	4152241.57	0.000	0.000	0.000	0.000	0.000	0.000	4.82E-09	1.00E-07	2.81E-11	0.105	0.000
563841.34	4152241.57	0.000	0.000	0.000	0.000	0.000	0.000	5.20E-09	1.08E-07	3.03E-11	0.114	0.000
563861.34	4152241.57	0.000	0.000	0.000	0.000	0.000	0.000	5.58E-09	1.16E-07	3.25E-11	0.122	0.000
563881.34	4152241.57	0.000	0.001	0.000	0.000	0.000	0.000	5.95E-09	1.24E-07	3.46E-11	0.130	0.000
563901.34	4152241.57	0.000	0.001	0.000	0.000	0.000	0.000	6.25E-09	1.30E-07	3.64E-11	0.137	0.000
563921.34	4152241.57	0.000	0.001	0.000	0.000	0.000	0.000	6.65E-09	1.39E-07	3.87E-11	0.145	0.000
563941.34	4152241.57	0.001	0.001	0.000	0.000	0.000	0.000	6.83E-09	1.43E-07	3.98E-11	0.149	0.000
563961.34	4152241.57	0.001	0.001	0.000	0.000	0.000	0.000	6.92E-09	1.45E-07	4.03E-11	0.151	0.000
563981.34	4152241.57	0.001	0.001	0.000	0.000	0.000	0.000	7.12E-09	1.49E-07	4.15E-11	0.156	0.000
564001.34	4152241.57	0.001	0.001	0.000	0.000	0.000	0.000	7.18E-09	1.50E-07	4.18E-11	0.157	0.000
564021.34	4152241.57	0.001	0.001	0.000	0.000	0.000	0.000	7.04E-09	1.47E-07	4.10E-11	0.154	0.000

564061.34	4152241.57	0.000	0.001	0.000	0.000	0.000	0.000	6.46E-09	1.35E-07	3.77E-11	0.141	0.000
564081.34	4152241.57	0.000	0.001	0.000	0.000	0.000	0.000	6.19E-09	1.29E-07	3.60E-11	0.135	0.000
564101.34	4152241.57	0.000	0.001	0.000	0.000	0.000	0.000	5.86E-09	1.22E-07	3.42E-11	0.128	0.000
564121.34	4152241.57	0.000	0.000	0.000	0.000	0.000	0.000	5.42E-09	1.13E-07	3.16E-11	0.119	0.000
564141.34	4152241.57	0.000	0.000	0.000	0.000	0.000	0.000	4.96E-09	1.04E-07	2.89E-11	0.109	0.000
564161.34	4152241.57	0.000	0.000	0.000	0.000	0.000	0.000	4.53E-09	9.47E-08	2.64E-11	0.099	0.000
564181.34	4152241.57	0.000	0.000	0.000	0.000	0.000	0.000	4.16E-09	8.69E-08	2.43E-11	0.091	0.000
563821.34	4152261.57	0.000	0.000	0.000	0.000	0.000	0.000	5.37E-09	1.12E-07	3.13E-11	0.117	0.000
563841.34	4152261.57	0.000	0.000	0.000	0.000	0.000	0.000	5.80E-09	1.21E-07	3.38E-11	0.127	0.000
563861.34	4152261.57	0.000	0.001	0.000	0.000	0.000	0.000	6.21E-09	1.30E-07	3.62E-11	0.136	0.000
563881.34	4152261.57	0.000	0.001	0.000	0.000	0.000	0.000	6.61E-09	1.38E-07	3.85E-11	0.145	0.000
563901.34	4152261.57	0.001	0.001	0.000	0.000	0.000	0.000	6.99E-09	1.46E-07	4.07E-11	0.153	0.000
563921.34	4152261.57	0.001	0.001	0.000	0.000	0.000	0.000	7.51E-09	1.57E-07	4.37E-11	0.164	0.000
563941.34	4152261.57	0.001	0.001	0.000	0.000	0.000	0.000	7.91E-09	1.65E-07	4.61E-11	0.173	0.000
563961.34	4152261.57	0.001	0.001	0.000	0.000	0.000	0.000	8.38E-09	1.75E-07	4.88E-11	0.183	0.000
563981.34	4152261.57	0.001	0.001	0.000	0.000	0.000	0.000	8.52E-09	1.78E-07	4.96E-11	0.187	0.000
564041.34	4152261.57	0.001	0.001	0.000	0.000	0.000	0.000	7.81E-09	1.63E-07	4.55E-11	0.171	0.000
564061.34	4152261.57	0.001	0.001	0.000	0.000	0.000	0.000	7.45E-09	1.56E-07	4.34E-11	0.163	0.000
564081.34	4152261.57	0.001	0.001	0.000	0.000	0.000	0.000	7.10E-09	1.48E-07	4.14E-11	0.155	0.000
564101.34	4152261.57	0.000	0.001	0.000	0.000	0.000	0.000	6.69E-09	1.40E-07	3.90E-11	0.147	0.000
564121.34	4152261.57	0.000	0.001	0.000	0.000	0.000	0.000	6.07E-09	1.27E-07	3.53E-11	0.133	0.000
564141.34	4152261.57	0.000	0.000	0.000	0.000	0.000	0.000	5.53E-09	1.16E-07	3.22E-11	0.121	0.000
564161.34	4152261.57	0.000	0.000	0.000	0.000	0.000	0.000	5.07E-09	1.06E-07	2.96E-11	0.111	0.000
564181.34	4152261.57	0.000	0.000	0.000	0.000	0.000	0.000	4.67E-09	9.74E-08	2.72E-11	0.102	0.000
563821.34	4152281.57	0.000	0.001	0.000	0.000	0.000	0.000	6.06E-09	1.26E-07	3.53E-11	0.132	0.000
563841.34	4152281.57	0.000	0.001	0.000	0.000	0.000	0.000	6.44E-09	1.34E-07	3.75E-11	0.141	0.000
563861.34	4152281.57	0.001	0.001	0.000	0.000	0.000	0.000	7.00E-09	1.46E-07	4.08E-11	0.153	0.000
563881.34	4152281.57	0.001	0.001	0.000	0.000	0.000	0.000	7.42E-09	1.55E-07	4.33E-11	0.162	0.000
563901.34	4152281.57	0.001	0.001	0.000	0.000	0.000	0.000	7.85E-09	1.64E-07	4.57E-11	0.172	0.000
563921.34	4152281.57	0.001	0.001	0.000	0.000	0.000	0.000	8.55E-09	1.78E-07	4.98E-11	0.187	0.000
563941.34	4152281.57	0.001	0.001	0.000	0.000	0.000	0.000	9.22E-09	1.93E-07	5.37E-11	0.202	0.000
564001.34	4152281.57	0.001	0.001	0.000	0.000	0.000	0.000	9.93E-09	2.07E-07	5.78E-11	0.217	0.000
564021.34	4152281.57	0.001	0.001	0.000	0.000	0.000	0.000	9.59E-09	2.00E-07	5.59E-11	0.210	0.000
564041.34	4152281.57	0.001	0.001	0.000	0.000	0.000	0.000	9.11E-09	1.90E-07	5.31E-11	0.200	0.000
564061.34	4152281.57	0.001	0.001	0.000	0.000	0.000	0.000	8.58E-09	1.79E-07	5.00E-11	0.188	0.000
564081.34	4152281.57	0.001	0.001	0.000	0.000	0.000	0.000	8.05E-09	1.68E-07	4.69E-11	0.176	0.000
564101.34	4152281.57	0.001	0.001	0.000	0.000	0.000	0.000	7.48E-09	1.56E-07	4.36E-11	0.164	0.000
564121.34	4152281.57	0.001	0.001	0.000	0.000	0.000	0.000	6.80E-09	1.42E-07	3.96E-11	0.149	0.000
564141.34	4152281.57	0.000	0.001	0.000	0.000	0.000	0.000	6.24E-09	1.30E-07	3.64E-11	0.137	0.000
564161.34	4152281.57	0.000	0.000	0.000	0.000	0.000	0.000	5.72E-09	1.19E-07	3.33E-11	0.125	0.000
564181.34	4152281.57	0.000	0.000	0.000	0.000	0.000	0.000	5.27E-09	1.10E-07	3.07E-11	0.115	0.000
563501.34	4152301.57	0.000	0.000	0.000	0.000	0.000	0.000	9.81E-10	1.91E-08	5.72E-12	0.020	0.000
563521.34	4152301.57	0.000	0.000	0.000	0.000	0.000	0.000	1.08E-09	2.09E-08	6.28E-12	0.022	0.000
563541.34	4152301.57	0.000	0.000	0.000	0.000	0.000	0.000	1.19E-09	2.31E-08	6.93E-12	0.024	0.000
563861.34	4152301.57	0.001	0.001	0.000	0.000	0.000	0.000	7.95E-09	1.66E-07	4.63E-11	0.174	0.000
563881.34	4152301.57	0.001	0.001	0.000	0.000	0.000	0.000	8.46E-09	1.76E-07	4.93E-11	0.185	0.000
563901.34	4152301.57	0.001	0.001	0.000	0.000	0.000	0.000	9.16E-09	1.91E-07	5.33E-11	0.200	0.000
563921.34	4152301.57	0.001	0.001	0.000	0.000	0.000	0.000	9.95E-09	2.08E-07	5.80E-11	0.218	0.000
563941.34	4152301.57	0.001	0.001	0.000	0.000	0.000	0.000	1.05E-08	2.20E-07	6.14E-11	0.231	0.000
563981.34	4152301.57	0.001	0.001	0.000	0.000	0.000	0.000	1.18E-08	2.47E-07	6.89E-11	0.259	0.000
564001.34	4152301.57	0.001	0.001	0.000	0.000	0.000	0.000	1.17E-08	2.44E-07	6.81E-11	0.256	0.000
564021.34	4152301.57	0.001	0.001	0.000	0.000	0.000	0.000	1.12E-08	2.34E-07	6.53E-11	0.245	0.000
564041.34	4152301.57	0.001	0.001	0.000	0.000	0.000	0.000	1.06E-08	2.21E-07	6.16E-11	0.232	0.000
564061.34	4152301.57	0.001	0.001	0.000	0.000	0.000	0.000	9.85E-09	2.06E-07	5.74E-11	0.216	0.000
564081.34	4152301.57	0.001	0.001	0.000	0.000	0.000	0.000	9.14E-09	1.91E-07	5.32E-11	0.200	0.000
564101.34	4152301.57	0.001	0.001	0.000	0.000	0.000	0.000	8.42E-09	1.76E-07	4.91E-11	0.184	0.000
564121.34	4152301.57	0.001	0.001	0.000	0.000	0.000	0.000	7.69E-09	1.61E-07	4.48E-11	0.168	0.000
564141.34	4152301.57	0.001	0.001	0.000	0.000	0.000	0.000	7.05E-09	1.47E-07	4.11E-11	0.154	0.000
564161.34	4152301.57	0.000	0.001	0.000	0.000	0.000	0.000	6.40E-09	1.34E-07	3.73E-11	0.140	0.000

564181.34	4152301.57	0.000	0.001	0.000	0.000	0.000	0.000	5.87E-09	1.23E-07	3.42E-11	0.128	0.000
563501.34	4152321.57	0.000	0.000	0.000	0.000	0.000	0.000	1.04E-09	1.99E-08	6.07E-12	0.021	0.000
563521.34	4152321.57	0.000	0.000	0.000	0.000	0.000	0.000	1.16E-09	2.21E-08	6.75E-12	0.023	0.000
563541.34	4152321.57	0.000	0.000	0.000	0.000	0.000	0.000	1.28E-09	2.45E-08	7.46E-12	0.026	0.000
563561.34	4152321.57	0.000	0.000	0.000	0.000	0.000	0.000	1.42E-09	2.72E-08	8.27E-12	0.029	0.000
563581.34	4152321.57	0.000	0.000	0.000	0.000	0.000	0.000	1.58E-09	3.06E-08	9.23E-12	0.032	0.000
563601.34	4152321.57	0.000	0.000	0.000	0.000	0.000	0.000	1.78E-09	3.47E-08	1.04E-11	0.036	0.000
563881.34	4152321.57	0.001	0.001	0.000	0.000	0.000	0.000	9.85E-09	2.06E-07	5.74E-11	0.216	0.000
563961.34	4152321.57	0.001	0.001	0.000	0.000	0.000	0.000	1.42E-08	2.96E-07	8.25E-11	0.310	0.000
563981.34	4152321.57	0.001	0.001	0.000	0.000	0.000	0.000	1.44E-08	3.01E-07	8.38E-11	0.315	0.000
564001.34	4152321.57	0.001	0.001	0.000	0.000	0.000	0.000	1.41E-08	2.95E-07	8.22E-11	0.309	0.000
564021.34	4152321.57	0.001	0.001	0.000	0.000	0.000	0.000	1.34E-08	2.79E-07	7.78E-11	0.293	0.000
564041.34	4152321.57	0.001	0.001	0.000	0.000	0.000	0.000	1.24E-08	2.58E-07	7.20E-11	0.271	0.000
564061.34	4152321.57	0.001	0.001	0.000	0.000	0.000	0.000	1.13E-08	2.37E-07	6.60E-11	0.248	0.000
564081.34	4152321.57	0.001	0.001	0.000	0.000	0.000	0.000	1.04E-08	2.17E-07	6.06E-11	0.228	0.000
564101.34	4152321.57	0.001	0.001	0.000	0.000	0.000	0.000	9.57E-09	2.00E-07	5.57E-11	0.209	0.000
564121.34	4152321.57	0.001	0.001	0.000	0.000	0.000	0.000	8.76E-09	1.83E-07	5.10E-11	0.192	0.000
564141.34	4152321.57	0.001	0.001	0.000	0.000	0.000	0.000	8.00E-09	1.67E-07	4.66E-11	0.175	0.000
564161.34	4152321.57	0.001	0.001	0.000	0.000	0.000	0.000	7.32E-09	1.53E-07	4.26E-11	0.160	0.000
564181.34	4152321.57	0.001	0.001	0.000	0.000	0.000	0.000	6.84E-09	1.43E-07	3.98E-11	0.150	0.000
563501.34	4152341.57	0.000	0.000	0.000	0.000	0.000	0.000	1.12E-09	2.08E-08	6.53E-12	0.022	0.000
563521.34	4152341.57	0.000	0.000	0.000	0.000	0.000	0.000	1.26E-09	2.33E-08	7.33E-12	0.025	0.000
563541.34	4152341.57	0.000	0.000	0.000	0.000	0.000	0.000	1.39E-09	2.59E-08	8.10E-12	0.027	0.000
563561.34	4152341.57	0.000	0.000	0.000	0.000	0.000	0.000	1.54E-09	2.89E-08	8.95E-12	0.030	0.000
563581.34	4152341.57	0.000	0.000	0.000	0.000	0.000	0.000	1.71E-09	3.25E-08	9.96E-12	0.034	0.000
563601.34	4152341.57	0.000	0.000	0.000	0.000	0.000	0.000	1.92E-09	3.69E-08	1.12E-11	0.039	0.000
563881.34	4152341.57	0.001	0.001	0.000	0.000	0.000	0.000	1.18E-08	2.46E-07	6.88E-11	0.258	0.000
563901.34	4152341.57	0.001	0.001	0.000	0.000	0.000	0.000	1.30E-08	2.71E-07	7.56E-11	0.284	0.000
563941.34	4152341.57	0.001	0.001	0.001	0.000	0.000	0.000	1.71E-08	3.56E-07	9.94E-11	0.373	0.000
563961.34	4152341.57	0.001	0.002	0.001	0.000	0.000	0.000	1.80E-08	3.76E-07	1.05E-10	0.394	0.000
563981.34	4152341.57	0.001	0.002	0.001	0.000	0.000	0.000	1.78E-08	3.72E-07	1.04E-10	0.390	0.000
564001.34	4152341.57	0.001	0.001	0.001	0.000	0.000	0.000	1.74E-08	3.63E-07	1.01E-10	0.380	0.000
564021.34	4152341.57	0.001	0.001	0.001	0.000	0.000	0.000	1.62E-08	3.39E-07	9.45E-11	0.355	0.000
564041.34	4152341.57	0.001	0.001	0.000	0.000	0.000	0.000	1.48E-08	3.09E-07	8.61E-11	0.324	0.000
564061.34	4152341.57	0.001	0.001	0.000	0.000	0.000	0.000	1.33E-08	2.78E-07	7.76E-11	0.292	0.000
564081.34	4152341.57	0.001	0.001	0.000	0.000	0.000	0.000	1.21E-08	2.52E-07	7.04E-11	0.265	0.000
564101.34	4152341.57	0.001	0.001	0.000	0.000	0.000	0.000	1.10E-08	2.30E-07	6.40E-11	0.241	0.000
564121.34	4152341.57	0.001	0.001	0.000	0.000	0.000	0.000	1.01E-08	2.11E-07	5.87E-11	0.221	0.000
564141.34	4152341.57	0.001	0.001	0.000	0.000	0.000	0.000	9.28E-09	1.94E-07	5.41E-11	0.203	0.000
564161.34	4152341.57	0.001	0.001	0.000	0.000	0.000	0.000	8.58E-09	1.79E-07	5.00E-11	0.188	0.000
564181.34	4152341.57	0.001	0.001	0.000	0.000	0.000	0.000	8.01E-09	1.67E-07	4.67E-11	0.175	0.000
563501.34	4152361.57	0.000	0.000	0.000	0.000	0.000	0.000	1.24E-09	2.22E-08	7.23E-12	0.023	0.000
563521.34	4152361.57	0.000	0.000	0.000	0.000	0.000	0.000	1.39E-09	2.49E-08	8.12E-12	0.026	0.000
563541.34	4152361.57	0.000	0.000	0.000	0.000	0.000	0.000	1.53E-09	2.76E-08	8.91E-12	0.029	0.000
563561.34	4152361.57	0.000	0.000	0.000	0.000	0.000	0.000	1.68E-09	3.07E-08	9.76E-12	0.032	0.000
563581.34	4152361.57	0.000	0.000	0.000	0.000	0.000	0.000	1.85E-09	3.43E-08	1.08E-11	0.036	0.000
563901.34	4152361.57	0.001	0.001	0.001	0.000	0.000	0.000	1.72E-08	3.59E-07	1.00E-10	0.376	0.000
563921.34	4152361.57	0.002	0.002	0.001	0.000	0.000	0.000	2.06E-08	4.30E-07	1.20E-10	0.451	0.000
563941.34	4152361.57	0.002	0.002	0.001	0.000	0.000	0.000	2.25E-08	4.70E-07	1.31E-10	0.492	0.000
563961.34	4152361.57	0.002	0.002	0.001	0.000	0.000	0.000	2.29E-08	4.78E-07	1.33E-10	0.501	0.000
563981.34	4152361.57	0.002	0.002	0.001	0.000	0.000	0.000	2.29E-08	4.78E-07	1.33E-10	0.501	0.000
564001.34	4152361.57	0.002	0.002	0.001	0.000	0.000	0.000	2.26E-08	4.73E-07	1.32E-10	0.496	0.000
564021.34	4152361.57	0.002	0.002	0.001	0.000	0.000	0.000	2.06E-08	4.31E-07	1.20E-10	0.452	0.000
564041.34	4152361.57	0.001	0.002	0.001	0.000	0.000	0.000	1.81E-08	3.78E-07	1.05E-10	0.396	0.000
564061.34	4152361.57	0.001	0.001	0.001	0.000	0.000	0.000	1.60E-08	3.34E-07	9.30E-11	0.350	0.000
564081.34	4152361.57	0.001	0.001	0.000	0.000	0.000	0.000	1.41E-08	2.95E-07	8.22E-11	0.309	0.000
564101.34	4152361.57	0.001	0.001	0.000	0.000	0.000	0.000	1.27E-08	2.66E-07	7.40E-11	0.278	0.000
564121.34	4152361.57	0.001	0.001	0.000	0.000	0.000	0.000	1.16E-08	2.42E-07	6.76E-11	0.254	0.000
564141.34	4152361.57	0.001	0.001	0.000	0.000	0.000	0.000	1.07E-08	2.23E-07	6.22E-11	0.234	0.000

564161.34	4152361.57	0.001	0.001	0.000	0.000	0.000	0.000	9.77E-09	2.04E-07	5.69E-11	0.214	0.000
564181.34	4152361.57	0.001	0.001	0.000	0.000	0.000	0.000	8.96E-09	1.87E-07	5.22E-11	0.196	0.000
563501.34	4152381.57	0.000	0.000	0.000	0.000	0.000	0.000	1.46E-09	2.45E-08	8.48E-12	0.026	0.000
563521.34	4152381.57	0.000	0.000	0.000	0.000	0.000	0.000	1.61E-09	2.73E-08	9.41E-12	0.029	0.000
563541.34	4152381.57	0.000	0.000	0.000	0.000	0.000	0.000	1.74E-09	3.00E-08	1.01E-11	0.032	0.000
563561.34	4152381.57	0.000	0.000	0.000	0.000	0.000	0.000	1.87E-09	3.29E-08	1.09E-11	0.035	0.000
563581.34	4152381.57	0.000	0.000	0.000	0.000	0.000	0.000	2.02E-09	3.63E-08	1.17E-11	0.038	0.000
563921.34	4152381.57	0.002	0.002	0.001	0.000	0.000	0.000	2.79E-08	5.83E-07	1.62E-10	0.611	0.000
563941.34	4152381.57	0.002	0.003	0.001	0.000	0.000	0.000	3.03E-08	6.33E-07	1.76E-10	0.663	0.001
563961.34	4152381.57	0.002	0.003	0.001	0.000	0.000	0.000	3.21E-08	6.72E-07	1.87E-10	0.704	0.001
563981.34	4152381.57	0.002	0.003	0.001	0.000	0.000	0.000	3.22E-08	6.74E-07	1.88E-10	0.706	0.001
564001.34	4152381.57	0.002	0.003	0.001	0.000	0.000	0.000	2.96E-08	6.19E-07	1.72E-10	0.649	0.001
564021.34	4152381.57	0.002	0.002	0.001	0.000	0.000	0.000	2.56E-08	5.35E-07	1.49E-10	0.561	0.000
564041.34	4152381.57	0.002	0.002	0.001	0.000	0.000	0.000	2.20E-08	4.61E-07	1.28E-10	0.483	0.000
564061.34	4152381.57	0.001	0.002	0.001	0.000	0.000	0.000	1.91E-08	4.00E-07	1.11E-10	0.419	0.000
564081.34	4152381.57	0.001	0.001	0.001	0.000	0.000	0.000	1.66E-08	3.47E-07	9.66E-11	0.363	0.000
564101.34	4152381.57	0.001	0.001	0.000	0.000	0.000	0.000	1.48E-08	3.09E-07	8.62E-11	0.324	0.000
564121.34	4152381.57	0.001	0.001	0.000	0.000	0.000	0.000	1.34E-08	2.81E-07	7.82E-11	0.294	0.000
564141.34	4152381.57	0.001	0.001	0.000	0.000	0.000	0.000	1.22E-08	2.55E-07	7.10E-11	0.267	0.000
564161.34	4152381.57	0.001	0.001	0.000	0.000	0.000	0.000	1.10E-08	2.30E-07	6.42E-11	0.241	0.000
564181.34	4152381.57	0.001	0.001	0.000	0.000	0.000	0.000	9.95E-09	2.08E-07	5.80E-11	0.218	0.000
563501.34	4152401.57	0.000	0.000	0.000	0.000	0.000	0.000	2.00E-09	3.03E-08	1.17E-11	0.032	0.000
563521.34	4152401.57	0.000	0.000	0.000	0.000	0.000	0.000	2.10E-09	3.24E-08	1.22E-11	0.035	0.000
563561.34	4152401.57	0.000	0.000	0.000	0.000	0.000	0.000	2.19E-09	3.62E-08	1.27E-11	0.038	0.000
563581.34	4152401.57	0.000	0.000	0.000	0.000	0.000	0.000	2.29E-09	3.92E-08	1.33E-11	0.042	0.000
563921.34	4152401.57	0.003	0.004	0.001	0.000	0.000	0.000	4.26E-08	8.91E-07	2.48E-10	0.934	0.001
563941.34	4152401.57	0.004	0.004	0.002	0.000	0.000	0.000	4.80E-08	1.00E-06	2.80E-10	1.053	0.001
563961.34	4152401.57	0.004	0.004	0.002	0.000	0.000	0.000	4.77E-08	9.97E-07	2.78E-10	1.045	0.001
563981.34	4152401.57	0.003	0.004	0.001	0.000	0.000	0.000	4.30E-08	9.01E-07	2.51E-10	0.944	0.001
564001.34	4152401.57	0.003	0.003	0.001	0.000	0.000	0.000	3.75E-08	7.84E-07	2.18E-10	0.822	0.001
564021.34	4152401.57	0.002	0.003	0.001	0.000	0.000	0.000	3.19E-08	6.68E-07	1.86E-10	0.700	0.001
564041.34	4152401.57	0.002	0.002	0.001	0.000	0.000	0.000	2.69E-08	5.63E-07	1.57E-10	0.590	0.000
564061.34	4152401.57	0.002	0.002	0.001	0.000	0.000	0.000	2.31E-08	4.82E-07	1.34E-10	0.505	0.000
564081.34	4152401.57	0.001	0.002	0.001	0.000	0.000	0.000	1.98E-08	4.14E-07	1.15E-10	0.434	0.000
564101.34	4152401.57	0.001	0.001	0.001	0.000	0.000	0.000	1.74E-08	3.65E-07	1.02E-10	0.382	0.000
564121.34	4152401.57	0.001	0.001	0.000	0.000	0.000	0.000	1.55E-08	3.24E-07	9.02E-11	0.339	0.000
564141.34	4152401.57	0.001	0.001	0.000	0.000	0.000	0.000	1.39E-08	2.91E-07	8.11E-11	0.305	0.000
564161.34	4152401.57	0.001	0.001	0.000	0.000	0.000	0.000	1.24E-08	2.59E-07	7.21E-11	0.271	0.000
564181.34	4152401.57	0.001	0.001	0.000	0.000	0.000	0.000	1.10E-08	2.30E-07	6.41E-11	0.241	0.000
563501.34	4152421.57	0.000	0.000	0.000	0.000	0.000	0.000	3.05E-09	4.12E-08	1.78E-11	0.044	0.000
563521.34	4152421.57	0.000	0.000	0.000	0.000	0.000	0.000	3.48E-09	4.69E-08	2.03E-11	0.050	0.000
563921.34	4152421.57	0.005	0.006	0.002	0.000	0.000	0.000	6.62E-08	1.38E-06	3.86E-10	1.451	0.001
563941.34	4152421.57	0.005	0.006	0.002	0.000	0.000	0.000	7.03E-08	1.47E-06	4.10E-10	1.542	0.001
563961.34	4152421.57	0.005	0.006	0.002	0.000	0.000	0.000	6.80E-08	1.42E-06	3.96E-10	1.491	0.001
563981.34	4152421.57	0.004	0.005	0.002	0.000	0.000	0.000	5.95E-08	1.25E-06	3.47E-10	1.305	0.001
564001.34	4152421.57	0.004	0.004	0.002	0.000	0.000	0.000	4.97E-08	1.04E-06	2.89E-10	1.089	0.001
564021.34	4152421.57	0.003	0.003	0.001	0.000	0.000	0.000	4.07E-08	8.52E-07	2.37E-10	0.893	0.001
564041.34	4152421.57	0.003	0.003	0.001	0.000	0.000	0.000	3.39E-08	7.09E-07	1.97E-10	0.743	0.001
564061.34	4152421.57	0.002	0.002	0.001	0.000	0.000	0.000	2.85E-08	5.96E-07	1.66E-10	0.624	0.000
564081.34	4152421.57	0.002	0.002	0.001	0.000	0.000	0.000	2.42E-08	5.05E-07	1.41E-10	0.530	0.000
564101.34	4152421.57	0.002	0.002	0.001	0.000	0.000	0.000	2.07E-08	4.33E-07	1.21E-10	0.454	0.000
564121.34	4152421.57	0.001	0.002	0.001	0.000	0.000	0.000	1.79E-08	3.74E-07	1.04E-10	0.392	0.000
564141.34	4152421.57	0.001	0.001	0.000	0.000	0.000	0.000	1.55E-08	3.25E-07	9.05E-11	0.341	0.000
564161.34	4152421.57	0.001	0.001	0.000	0.000	0.000	0.000	1.36E-08	2.84E-07	7.91E-11	0.298	0.000
564181.34	4152421.57	0.001	0.001	0.000	0.000	0.000	0.000	1.19E-08	2.49E-07	6.94E-11	0.261	0.000
563501.34	4152441.57	0.000	0.000	0.000	0.000	0.000	0.000	1.07E-09	1.97E-08	6.22E-12	0.021	0.000
563521.34	4152441.57	0.000	0.000	0.000	0.000	0.000	0.000	1.36E-09	2.38E-08	7.90E-12	0.025	0.000
563821.34	4152441.57	0.002	0.002	0.001	0.000	0.000	0.000	2.49E-08	5.17E-07	1.45E-10	0.542	0.000
563841.34	4152441.57	0.003	0.003	0.001	0.000	0.000	0.000	3.50E-08	7.28E-07	2.04E-10	0.763	0.001

563861.34	4152441.57	0.004	0.004	0.002	0.000	0.000	0.000	4.89E-08	1.02E-06	2.85E-10	1.070	0.001
563921.34	4152441.57	0.007	0.008	0.003	0.000	0.000	0.000	9.76E-08	2.04E-06	5.69E-10	2.141	0.002
563941.34	4152441.57	0.008	0.009	0.003	0.000	0.000	0.000	1.09E-07	2.29E-06	6.37E-10	2.398	0.002
563961.34	4152441.57	0.008	0.009	0.003	0.000	0.000	0.000	1.03E-07	2.16E-06	6.00E-10	2.261	0.002
563981.34	4152441.57	0.006	0.007	0.003	0.000	0.000	0.000	8.43E-08	1.76E-06	4.91E-10	1.849	0.001
564001.34	4152441.57	0.005	0.006	0.002	0.000	0.000	0.000	6.65E-08	1.39E-06	3.87E-10	1.459	0.001
564021.34	4152441.57	0.004	0.005	0.002	0.000	0.000	0.000	5.28E-08	1.10E-06	3.07E-10	1.157	0.001
564041.34	4152441.57	0.003	0.004	0.001	0.000	0.000	0.000	4.26E-08	8.91E-07	2.48E-10	0.934	0.001
564061.34	4152441.57	0.003	0.003	0.001	0.000	0.000	0.000	3.46E-08	7.25E-07	2.02E-10	0.760	0.001
564081.34	4152441.57	0.002	0.002	0.001	0.000	0.000	0.000	2.86E-08	5.98E-07	1.66E-10	0.626	0.000
564101.34	4152441.57	0.002	0.002	0.001	0.000	0.000	0.000	2.38E-08	4.98E-07	1.39E-10	0.522	0.000
564121.34	4152441.57	0.001	0.002	0.001	0.000	0.000	0.000	2.01E-08	4.20E-07	1.17E-10	0.440	0.000
564141.34	4152441.57	0.001	0.001	0.001	0.000	0.000	0.000	1.71E-08	3.57E-07	9.95E-11	0.374	0.000
564161.34	4152441.57	0.001	0.001	0.000	0.000	0.000	0.000	1.47E-08	3.07E-07	8.55E-11	0.322	0.000
564181.34	4152441.57	0.001	0.001	0.000	0.000	0.000	0.000	1.27E-08	2.66E-07	7.41E-11	0.279	0.000
563501.34	4152461.57	0.000	0.000	0.000	0.000	0.000	0.000	8.74E-10	1.72E-08	5.09E-12	0.018	0.000
563521.34	4152461.57	0.000	0.000	0.000	0.000	0.000	0.000	1.01E-09	1.96E-08	5.86E-12	0.021	0.000
563541.34	4152461.57	0.000	0.000	0.000	0.000	0.000	0.000	1.16E-09	2.23E-08	6.76E-12	0.023	0.000
563561.34	4152461.57	0.000	0.000	0.000	0.000	0.000	0.000	1.35E-09	2.56E-08	7.89E-12	0.027	0.000
563581.34	4152461.57	0.000	0.000	0.000	0.000	0.000	0.000	1.62E-09	3.01E-08	9.44E-12	0.032	0.000
563601.34	4152461.57	0.000	0.000	0.000	0.000	0.000	0.000	1.99E-09	3.59E-08	1.16E-11	0.038	0.000
563621.34	4152461.57	0.000	0.000	0.000	0.000	0.000	0.000	2.78E-09	4.69E-08	1.62E-11	0.050	0.000
563641.34	4152461.57	0.000	0.000	0.000	0.000	0.000	0.000	3.71E-09	5.99E-08	2.16E-11	0.064	0.000
563821.34	4152461.57	0.002	0.002	0.001	0.000	0.000	0.000	2.83E-08	5.86E-07	1.65E-10	0.614	0.000
563841.34	4152461.57	0.003	0.004	0.001	0.000	0.000	0.000	4.20E-08	8.73E-07	2.44E-10	0.915	0.001
563861.34	4152461.57	0.004	0.005	0.002	0.000	0.000	0.000	5.95E-08	1.24E-06	3.46E-10	1.301	0.001
563921.34	4152461.57	0.010	0.011	0.004	0.000	0.000	0.000	1.29E-07	2.71E-06	7.54E-10	2.839	0.002
563941.34	4152461.57	0.012	0.014	0.005	0.000	0.000	0.000	1.64E-07	3.44E-06	9.57E-10	3.603	0.003
563961.34	4152461.57	0.012	0.013	0.005	0.000	0.000	0.000	1.57E-07	3.28E-06	9.14E-10	3.441	0.003
563981.34	4152461.57	0.009	0.010	0.004	0.000	0.000	0.000	1.21E-07	2.54E-06	7.07E-10	2.662	0.002
564001.34	4152461.57	0.007	0.008	0.003	0.000	0.000	0.000	9.03E-08	1.89E-06	5.26E-10	1.980	0.002
564021.34	4152461.57	0.005	0.006	0.002	0.000	0.000	0.000	6.89E-08	1.44E-06	4.01E-10	1.511	0.001
564041.34	4152461.57	0.004	0.005	0.002	0.000	0.000	0.000	5.30E-08	1.11E-06	3.09E-10	1.164	0.001
564061.34	4152461.57	0.003	0.004	0.001	0.000	0.000	0.000	4.14E-08	8.67E-07	2.41E-10	0.908	0.001
564081.34	4152461.57	0.002	0.003	0.001	0.000	0.000	0.000	3.29E-08	6.88E-07	1.92E-10	0.721	0.001
564101.34	4152461.57	0.002	0.002	0.001	0.000	0.000	0.000	2.66E-08	5.57E-07	1.55E-10	0.584	0.000
564121.34	4152461.57	0.002	0.002	0.001	0.000	0.000	0.000	2.19E-08	4.59E-07	1.28E-10	0.481	0.000
564141.34	4152461.57	0.001	0.002	0.001	0.000	0.000	0.000	1.84E-08	3.84E-07	1.07E-10	0.402	0.000
564161.34	4152461.57	0.001	0.001	0.000	0.000	0.000	0.000	1.55E-08	3.25E-07	9.06E-11	0.341	0.000
564181.34	4152461.57	0.001	0.001	0.000	0.000	0.000	0.000	1.33E-08	2.78E-07	7.74E-11	0.291	0.000
563501.34	4152481.57	0.000	0.000	0.000	0.000	0.000	0.000	7.84E-10	1.57E-08	4.57E-12	0.017	0.000
563521.34	4152481.57	0.000	0.000	0.000	0.000	0.000	0.000	8.84E-10	1.76E-08	5.15E-12	0.019	0.000
563541.34	4152481.57	0.000	0.000	0.000	0.000	0.000	0.000	1.00E-09	1.99E-08	5.84E-12	0.021	0.000
563561.34	4152481.57	0.000	0.000	0.000	0.000	0.000	0.000	1.14E-09	2.27E-08	6.66E-12	0.024	0.000
563581.34	4152481.57	0.000	0.000	0.000	0.000	0.000	0.000	1.31E-09	2.59E-08	7.62E-12	0.027	0.000
563601.34	4152481.57	0.000	0.000	0.000	0.000	0.000	0.000	1.51E-09	2.98E-08	8.79E-12	0.031	0.000
563621.34	4152481.57	0.000	0.000	0.000	0.000	0.000	0.000	1.75E-09	3.44E-08	1.02E-11	0.036	0.000
563641.34	4152481.57	0.000	0.000	0.000	0.000	0.000	0.000	2.08E-09	4.09E-08	1.21E-11	0.043	0.000
563661.34	4152481.57	0.000	0.000	0.000	0.000	0.000	0.000	2.59E-09	5.04E-08	1.51E-11	0.053	0.000
563681.34	4152481.57	0.000	0.000	0.000	0.000	0.000	0.000	3.38E-09	6.53E-08	1.97E-11	0.069	0.000
563701.34	4152481.57	0.000	0.000	0.000	0.000	0.000	0.000	4.36E-09	8.44E-08	2.54E-11	0.089	0.000
563801.34	4152481.57	0.001	0.002	0.001	0.000	0.000	0.000	2.00E-08	4.05E-07	1.17E-10	0.425	0.000
563821.34	4152481.57	0.002	0.003	0.001	0.000	0.000	0.000	3.07E-08	6.34E-07	1.79E-10	0.665	0.001
563861.34	4152481.57	0.005	0.006	0.002	0.000	0.000	0.000	7.40E-08	1.55E-06	4.31E-10	1.620	0.001
563881.34	4152481.57	0.007	0.009	0.003	0.000	0.000	0.000	9.96E-08	2.08E-06	5.80E-10	2.183	0.002
563961.34	4152481.57	0.016	0.018	0.007	0.000	0.000	0.000	2.10E-07	4.40E-06	1.22E-09	4.606	0.004
563981.34	4152481.57	0.013	0.015	0.005	0.000	0.000	0.000	1.69E-07	3.53E-06	9.83E-10	3.702	0.003
564001.34	4152481.57	0.009	0.010	0.004	0.000	0.000	0.000	1.21E-07	2.53E-06	7.05E-10	2.656	0.002
564021.34	4152481.57	0.006	0.007	0.003	0.000	0.000	0.000	8.55E-08	1.79E-06	4.98E-10	1.876	0.001

564041.34	4152481.57	0.005	0.005	0.002	0.000	0.000	0.000	6.25E-08	1.31E-06	3.64E-10	1.371	0.001
564061.34	4152481.57	0.004	0.004	0.001	0.000	0.000	0.000	4.71E-08	9.87E-07	2.75E-10	1.034	0.001
564081.34	4152481.57	0.003	0.003	0.001	0.000	0.000	0.000	3.63E-08	7.60E-07	2.12E-10	0.797	0.001
564101.34	4152481.57	0.002	0.002	0.001	0.000	0.000	0.000	2.87E-08	6.01E-07	1.67E-10	0.630	0.000
564121.34	4152481.57	0.002	0.002	0.001	0.000	0.000	0.000	2.32E-08	4.86E-07	1.35E-10	0.509	0.000
564141.34	4152481.57	0.001	0.002	0.001	0.000	0.000	0.000	1.91E-08	4.00E-07	1.11E-10	0.419	0.000
564161.34	4152481.57	0.001	0.001	0.001	0.000	0.000	0.000	1.60E-08	3.34E-07	9.31E-11	0.350	0.000
564181.34	4152481.57	0.001	0.001	0.000	0.000	0.000	0.000	1.36E-08	2.83E-07	7.89E-11	0.297	0.000
563501.34	4152501.57	0.000	0.000	0.000	0.000	0.000	0.000	7.27E-10	1.47E-08	4.23E-12	0.015	0.000
563521.34	4152501.57	0.000	0.000	0.000	0.000	0.000	0.000	8.14E-10	1.65E-08	4.75E-12	0.017	0.000
563541.34	4152501.57	0.000	0.000	0.000	0.000	0.000	0.000	9.16E-10	1.85E-08	5.34E-12	0.019	0.000
563561.34	4152501.57	0.000	0.000	0.000	0.000	0.000	0.000	1.03E-09	2.08E-08	6.02E-12	0.022	0.000
563581.34	4152501.57	0.000	0.000	0.000	0.000	0.000	0.000	1.17E-09	2.36E-08	6.82E-12	0.025	0.000
563601.34	4152501.57	0.000	0.000	0.000	0.000	0.000	0.000	1.33E-09	2.69E-08	7.75E-12	0.028	0.000
563621.34	4152501.57	0.000	0.000	0.000	0.000	0.000	0.000	1.52E-09	3.06E-08	8.83E-12	0.032	0.000
563641.34	4152501.57	0.000	0.000	0.000	0.000	0.000	0.000	1.77E-09	3.59E-08	1.03E-11	0.038	0.000
563661.34	4152501.57	0.000	0.000	0.000	0.000	0.000	0.000	2.18E-09	4.41E-08	1.27E-11	0.046	0.000
563681.34	4152501.57	0.000	0.000	0.000	0.000	0.000	0.000	2.79E-09	5.62E-08	1.62E-11	0.059	0.000
563701.34	4152501.57	0.000	0.000	0.000	0.000	0.000	0.000	3.64E-09	7.32E-08	2.12E-11	0.077	0.000
563721.34	4152501.57	0.000	0.000	0.000	0.000	0.000	0.000	4.68E-09	9.42E-08	2.72E-11	0.099	0.000
563741.34	4152501.57	0.000	0.000	0.000	0.000	0.000	0.000	6.26E-09	1.26E-07	3.65E-11	0.132	0.000
563821.34	4152501.57	0.002	0.003	0.001	0.000	0.000	0.000	3.21E-08	6.60E-07	1.87E-10	0.692	0.001
563861.34	4152501.57	0.007	0.008	0.003	0.000	0.000	0.000	9.32E-08	1.95E-06	5.43E-10	2.041	0.002
563881.34	4152501.57	0.010	0.011	0.004	0.000	0.000	0.000	1.29E-07	2.71E-06	7.54E-10	2.837	0.002
563901.34	4152501.57	0.012	0.014	0.005	0.000	0.000	0.000	1.61E-07	3.38E-06	9.40E-10	3.539	0.003
563981.34	4152501.57	0.013	0.015	0.006	0.000	0.000	0.000	1.78E-07	3.73E-06	1.04E-09	3.909	0.003
564001.34	4152501.57	0.010	0.012	0.004	0.000	0.000	0.000	1.36E-07	2.85E-06	7.94E-10	2.991	0.002
564021.34	4152501.57	0.007	0.008	0.003	0.000	0.000	0.000	9.62E-08	2.01E-06	5.61E-10	2.112	0.002
564041.34	4152501.57	0.005	0.006	0.002	0.000	0.000	0.000	6.74E-08	1.41E-06	3.93E-10	1.478	0.001
564061.34	4152501.57	0.004	0.004	0.002	0.000	0.000	0.000	4.93E-08	1.03E-06	2.87E-10	1.082	0.001
564081.34	4152501.57	0.003	0.003	0.001	0.000	0.000	0.000	3.74E-08	7.82E-07	2.18E-10	0.820	0.001
564101.34	4152501.57	0.002	0.003	0.001	0.000	0.000	0.000	2.92E-08	6.10E-07	1.70E-10	0.640	0.001
564121.34	4152501.57	0.002	0.002	0.001	0.000	0.000	0.000	2.34E-08	4.89E-07	1.36E-10	0.512	0.000
564141.34	4152501.57	0.001	0.002	0.001	0.000	0.000	0.000	1.91E-08	4.00E-07	1.11E-10	0.419	0.000
564161.34	4152501.57	0.001	0.001	0.001	0.000	0.000	0.000	1.59E-08	3.33E-07	9.27E-11	0.349	0.000
564181.34	4152501.57	0.001	0.001	0.000	0.000	0.000	0.000	1.34E-08	2.81E-07	7.83E-11	0.294	0.000
563501.34	4152521.57	0.000	0.000	0.000	0.000	0.000	0.000	6.69E-10	1.36E-08	3.90E-12	0.014	0.000
563521.34	4152521.57	0.000	0.000	0.000	0.000	0.000	0.000	7.49E-10	1.52E-08	4.36E-12	0.016	0.000
563541.34	4152521.57	0.000	0.000	0.000	0.000	0.000	0.000	8.38E-10	1.70E-08	4.88E-12	0.018	0.000
563561.34	4152521.57	0.000	0.000	0.000	0.000	0.000	0.000	9.41E-10	1.91E-08	5.48E-12	0.020	0.000
563581.34	4152521.57	0.000	0.000	0.000	0.000	0.000	0.000	1.06E-09	2.16E-08	6.17E-12	0.023	0.000
563601.34	4152521.57	0.000	0.000	0.000	0.000	0.000	0.000	1.20E-09	2.44E-08	6.99E-12	0.026	0.000
563621.34	4152521.57	0.000	0.000	0.000	0.000	0.000	0.000	1.36E-09	2.78E-08	7.93E-12	0.029	0.000
563641.34	4152521.57	0.000	0.000	0.000	0.000	0.000	0.000	1.59E-09	3.25E-08	9.27E-12	0.034	0.000
563661.34	4152521.57	0.000	0.000	0.000	0.000	0.000	0.000	1.96E-09	4.00E-08	1.14E-11	0.042	0.000
563681.34	4152521.57	0.000	0.000	0.000	0.000	0.000	0.000	2.50E-09	5.09E-08	1.45E-11	0.053	0.000
563701.34	4152521.57	0.000	0.000	0.000	0.000	0.000	0.000	3.24E-09	6.61E-08	1.89E-11	0.069	0.000
563721.34	4152521.57	0.000	0.000	0.000	0.000	0.000	0.000	4.14E-09	8.44E-08	2.41E-11	0.089	0.000
563741.34	4152521.57	0.000	0.000	0.000	0.000	0.000	0.000	5.52E-09	1.12E-07	3.21E-11	0.118	0.000
563761.34	4152521.57	0.001	0.001	0.000	0.000	0.000	0.000	7.92E-09	1.61E-07	4.61E-11	0.169	0.000
563821.34	4152521.57	0.002	0.003	0.001	0.000	0.000	0.000	3.12E-08	6.38E-07	1.82E-10	0.669	0.001
563861.34	4152521.57	0.009	0.010	0.004	0.000	0.000	0.000	1.15E-07	2.41E-06	6.71E-10	2.524	0.002
564001.34	4152521.57	0.009	0.010	0.004	0.000	0.000	0.000	1.20E-07	2.51E-06	6.97E-10	2.625	0.002
564021.34	4152521.57	0.007	0.008	0.003	0.000	0.000	0.000	8.85E-08	1.85E-06	5.16E-10	1.942	0.002
564041.34	4152521.57	0.005	0.005	0.002	0.000	0.000	0.000	6.30E-08	1.32E-06	3.67E-10	1.382	0.001
564061.34	4152521.57	0.003	0.004	0.001	0.000	0.000	0.000	4.63E-08	9.69E-07	2.70E-10	1.016	0.001
564081.34	4152521.57	0.003	0.003	0.001	0.000	0.000	0.000	3.53E-08	7.39E-07	2.06E-10	0.775	0.001
564101.34	4152521.57	0.002	0.002	0.001	0.000	0.000	0.000	2.77E-08	5.80E-07	1.61E-10	0.608	0.000
564121.34	4152521.57	0.002	0.002	0.001	0.000	0.000	0.000	2.23E-08	4.66E-07	1.30E-10	0.488	0.000

564141.34	4152521.57	0.001	0.002	0.001	0.000	0.000	0.000	1.83E-08	3.82E-07	1.06E-10	0.401	0.000
564161.34	4152521.57	0.001	0.001	0.000	0.000	0.000	0.000	1.52E-08	3.19E-07	8.88E-11	0.334	0.000
563501.34	4152541.57	0.000	0.000	0.000	0.000	0.000	0.000	6.15E-10	1.26E-08	3.58E-12	0.013	0.000
563521.34	4152541.57	0.000	0.000	0.000	0.000	0.000	0.000	6.82E-10	1.39E-08	3.97E-12	0.015	0.000
563541.34	4152541.57	0.000	0.000	0.000	0.000	0.000	0.000	7.60E-10	1.55E-08	4.43E-12	0.016	0.000
563561.34	4152541.57	0.000	0.000	0.000	0.000	0.000	0.000	8.49E-10	1.73E-08	4.95E-12	0.018	0.000
563581.34	4152541.57	0.000	0.000	0.000	0.000	0.000	0.000	9.52E-10	1.95E-08	5.55E-12	0.020	0.000
563601.34	4152541.57	0.000	0.000	0.000	0.000	0.000	0.000	1.07E-09	2.20E-08	6.26E-12	0.023	0.000
563621.34	4152541.57	0.000	0.000	0.000	0.000	0.000	0.000	1.23E-09	2.51E-08	7.15E-12	0.026	0.000
563641.34	4152541.57	0.000	0.000	0.000	0.000	0.000	0.000	1.44E-09	2.95E-08	8.37E-12	0.031	0.000
563661.34	4152541.57	0.000	0.000	0.000	0.000	0.000	0.000	1.77E-09	3.64E-08	1.03E-11	0.038	0.000
563681.34	4152541.57	0.000	0.000	0.000	0.000	0.000	0.000	2.26E-09	4.64E-08	1.32E-11	0.049	0.000
563701.34	4152541.57	0.000	0.000	0.000	0.000	0.000	0.000	2.89E-09	5.93E-08	1.68E-11	0.062	0.000
563721.34	4152541.57	0.000	0.000	0.000	0.000	0.000	0.000	3.60E-09	7.39E-08	2.10E-11	0.078	0.000
563741.34	4152541.57	0.000	0.000	0.000	0.000	0.000	0.000	4.62E-09	9.48E-08	2.69E-11	0.099	0.000
563761.34	4152541.57	0.000	0.001	0.000	0.000	0.000	0.000	6.96E-09	1.42E-07	4.06E-11	0.149	0.000
563781.34	4152541.57	0.001	0.001	0.000	0.000	0.000	0.000	1.05E-08	2.12E-07	6.11E-11	0.223	0.000
563981.34	4152541.57	0.008	0.009	0.003	0.000	0.000	0.000	1.10E-07	2.29E-06	6.38E-10	2.403	0.002
564001.34	4152541.57	0.006	0.007	0.003	0.000	0.000	0.000	8.37E-08	1.75E-06	4.88E-10	1.836	0.001
564021.34	4152541.57	0.005	0.006	0.002	0.000	0.000	0.000	6.50E-08	1.36E-06	3.79E-10	1.427	0.001
564041.34	4152541.57	0.004	0.004	0.002	0.000	0.000	0.000	5.02E-08	1.05E-06	2.92E-10	1.100	0.001
564061.34	4152541.57	0.003	0.003	0.001	0.000	0.000	0.000	3.88E-08	8.12E-07	2.26E-10	0.851	0.001
564081.34	4152541.57	0.002	0.003	0.001	0.000	0.000	0.000	3.05E-08	6.38E-07	1.78E-10	0.669	0.001
564101.34	4152541.57	0.002	0.002	0.001	0.000	0.000	0.000	2.45E-08	5.13E-07	1.43E-10	0.537	0.000
564121.34	4152541.57	0.001	0.002	0.001	0.000	0.000	0.000	2.01E-08	4.19E-07	1.17E-10	0.440	0.000
564141.34	4152541.57	0.001	0.001	0.001	0.000	0.000	0.000	1.66E-08	3.48E-07	9.70E-11	0.365	0.000
563501.34	4152561.57	0.000	0.000	0.000	0.000	0.000	0.000	5.69E-10	1.17E-08	3.32E-12	0.012	0.000
563521.34	4152561.57	0.000	0.000	0.000	0.000	0.000	0.000	6.26E-10	1.28E-08	3.65E-12	0.013	0.000
563541.34	4152561.57	0.000	0.000	0.000	0.000	0.000	0.000	6.94E-10	1.42E-08	4.04E-12	0.015	0.000
563561.34	4152561.57	0.000	0.000	0.000	0.000	0.000	0.000	7.72E-10	1.58E-08	4.50E-12	0.017	0.000
563581.34	4152561.57	0.000	0.000	0.000	0.000	0.000	0.000	8.66E-10	1.77E-08	5.04E-12	0.019	0.000
563601.34	4152561.57	0.000	0.000	0.000	0.000	0.000	0.000	9.76E-10	2.00E-08	5.69E-12	0.021	0.000
563621.34	4152561.57	0.000	0.000	0.000	0.000	0.000	0.000	1.12E-09	2.30E-08	6.52E-12	0.024	0.000
563641.34	4152561.57	0.000	0.000	0.000	0.000	0.000	0.000	1.32E-09	2.71E-08	7.68E-12	0.028	0.000
563661.34	4152561.57	0.000	0.000	0.000	0.000	0.000	0.000	1.62E-09	3.34E-08	9.45E-12	0.035	0.000
563681.34	4152561.57	0.000	0.000	0.000	0.000	0.000	0.000	2.06E-09	4.23E-08	1.20E-11	0.044	0.000
563701.34	4152561.57	0.000	0.000	0.000	0.000	0.000	0.000	2.54E-09	5.22E-08	1.48E-11	0.055	0.000
563721.34	4152561.57	0.000	0.000	0.000	0.000	0.000	0.000	3.15E-09	6.49E-08	1.84E-11	0.068	0.000
563741.34	4152561.57	0.000	0.000	0.000	0.000	0.000	0.000	4.06E-09	8.35E-08	2.37E-11	0.088	0.000
563761.34	4152561.57	0.000	0.000	0.000	0.000	0.000	0.000	5.91E-09	1.21E-07	3.44E-11	0.127	0.000
563781.34	4152561.57	0.001	0.001	0.000	0.000	0.000	0.000	9.27E-09	1.89E-07	5.40E-11	0.198	0.000
563981.34	4152561.57	0.006	0.006	0.002	0.000	0.000	0.000	7.41E-08	1.55E-06	4.32E-10	1.626	0.001
564001.34	4152561.57	0.004	0.005	0.002	0.000	0.000	0.000	5.67E-08	1.19E-06	3.31E-10	1.244	0.001
564021.34	4152561.57	0.003	0.004	0.001	0.000	0.000	0.000	4.47E-08	9.35E-07	2.60E-10	0.980	0.001
564041.34	4152561.57	0.003	0.003	0.001	0.000	0.000	0.000	3.63E-08	7.59E-07	2.12E-10	0.796	0.001
564061.34	4152561.57	0.002	0.003	0.001	0.000	0.000	0.000	2.98E-08	6.23E-07	1.74E-10	0.653	0.001
564081.34	4152561.57	0.002	0.002	0.001	0.000	0.000	0.000	2.45E-08	5.13E-07	1.43E-10	0.537	0.000
564101.34	4152561.57	0.002	0.002	0.001	0.000	0.000	0.000	2.04E-08	4.27E-07	1.19E-10	0.447	0.000
564121.34	4152561.57	0.001	0.001	0.001	0.000	0.000	0.000	1.71E-08	3.58E-07	9.98E-11	0.375	0.000
563501.34	4152581.57	0.000	0.000	0.000	0.000	0.000	0.000	5.31E-10	1.09E-08	3.10E-12	0.011	0.000
563521.34	4152581.57	0.000	0.000	0.000	0.000	0.000	0.000	5.80E-10	1.19E-08	3.38E-12	0.012	0.000
563541.34	4152581.57	0.000	0.000	0.000	0.000	0.000	0.000	6.39E-10	1.31E-08	3.72E-12	0.014	0.000
563561.34	4152581.57	0.000	0.000	0.000	0.000	0.000	0.000	7.09E-10	1.46E-08	4.13E-12	0.015	0.000
563581.34	4152581.57	0.000	0.000	0.000	0.000	0.000	0.000	7.96E-10	1.64E-08	4.64E-12	0.017	0.000
563601.34	4152581.57	0.000	0.000	0.000	0.000	0.000	0.000	9.04E-10	1.86E-08	5.27E-12	0.019	0.000
563621.34	4152581.57	0.000	0.000	0.000	0.000	0.000	0.000	1.04E-09	2.15E-08	6.07E-12	0.023	0.000
563641.34	4152581.57	0.000	0.000	0.000	0.000	0.000	0.000	1.23E-09	2.53E-08	7.16E-12	0.027	0.000
563661.34	4152581.57	0.000	0.000	0.000	0.000	0.000	0.000	1.51E-09	3.11E-08	8.80E-12	0.033	0.000
563681.34	4152581.57	0.000	0.000	0.000	0.000	0.000	0.000	1.87E-09	3.84E-08	1.09E-11	0.040	0.000

563701.34	4152581.57	0.000	0.000	0.000	0.000	0.000	0.000	2.26E-09	4.66E-08	1.32E-11	0.049	0.000
563721.34	4152581.57	0.000	0.000	0.000	0.000	0.000	0.000	2.80E-09	5.77E-08	1.63E-11	0.060	0.000
563741.34	4152581.57	0.000	0.000	0.000	0.000	0.000	0.000	3.62E-09	7.46E-08	2.11E-11	0.078	0.000
563761.34	4152581.57	0.000	0.000	0.000	0.000	0.000	0.000	5.07E-09	1.04E-07	2.95E-11	0.109	0.000
563781.34	4152581.57	0.001	0.001	0.000	0.000	0.000	0.000	8.01E-09	1.63E-07	4.67E-11	0.171	0.000
563801.34	4152581.57	0.001	0.001	0.000	0.000	0.000	0.000	1.23E-08	2.48E-07	7.18E-11	0.260	0.000
563981.34	4152581.57	0.003	0.004	0.001	0.000	0.000	0.000	4.61E-08	9.63E-07	2.68E-10	1.010	0.001
564001.34	4152581.57	0.003	0.003	0.001	0.000	0.000	0.000	3.71E-08	7.75E-07	2.16E-10	0.813	0.001
564021.34	4152581.57	0.002	0.003	0.001	0.000	0.000	0.000	3.05E-08	6.36E-07	1.77E-10	0.667	0.001
564041.34	4152581.57	0.002	0.002	0.001	0.000	0.000	0.000	2.56E-08	5.35E-07	1.49E-10	0.561	0.000
564061.34	4152581.57	0.002	0.002	0.001	0.000	0.000	0.000	2.19E-08	4.57E-07	1.27E-10	0.479	0.000
564081.34	4152581.57	0.001	0.002	0.001	0.000	0.000	0.000	1.88E-08	3.92E-07	1.09E-10	0.411	0.000
564101.34	4152581.57	0.001	0.001	0.001	0.000	0.000	0.000	1.62E-08	3.38E-07	9.44E-11	0.355	0.000
563501.34	4152601.57	0.000	0.000	0.000	0.000	0.000	0.000	4.98E-10	1.02E-08	2.90E-12	0.011	0.000
563521.34	4152601.57	0.000	0.000	0.000	0.000	0.000	0.000	5.41E-10	1.11E-08	3.15E-12	0.012	0.000
563541.34	4152601.57	0.000	0.000	0.000	0.000	0.000	0.000	5.90E-10	1.21E-08	3.44E-12	0.013	0.000
563561.34	4152601.57	0.000	0.000	0.000	0.000	0.000	0.000	6.50E-10	1.34E-08	3.79E-12	0.014	0.000
563581.34	4152601.57	0.000	0.000	0.000	0.000	0.000	0.000	7.35E-10	1.51E-08	4.29E-12	0.016	0.000
563601.34	4152601.57	0.000	0.000	0.000	0.000	0.000	0.000	8.41E-10	1.73E-08	4.90E-12	0.018	0.000
563621.34	4152601.57	0.000	0.000	0.000	0.000	0.000	0.000	9.76E-10	2.01E-08	5.68E-12	0.021	0.000
563641.34	4152601.57	0.000	0.000	0.000	0.000	0.000	0.000	1.15E-09	2.37E-08	6.70E-12	0.025	0.000
563661.34	4152601.57	0.000	0.000	0.000	0.000	0.000	0.000	1.41E-09	2.90E-08	8.19E-12	0.030	0.000
563681.34	4152601.57	0.000	0.000	0.000	0.000	0.000	0.000	1.66E-09	3.42E-08	9.65E-12	0.036	0.000
563701.34	4152601.57	0.000	0.000	0.000	0.000	0.000	0.000	2.00E-09	4.12E-08	1.16E-11	0.043	0.000
563721.34	4152601.57	0.000	0.000	0.000	0.000	0.000	0.000	2.49E-09	5.14E-08	1.45E-11	0.054	0.000
563741.34	4152601.57	0.000	0.000	0.000	0.000	0.000	0.000	3.25E-09	6.71E-08	1.89E-11	0.070	0.000
563761.34	4152601.57	0.000	0.000	0.000	0.000	0.000	0.000	4.47E-09	9.20E-08	2.60E-11	0.097	0.000
563781.34	4152601.57	0.001	0.001	0.000	0.000	0.000	0.000	7.12E-09	1.46E-07	4.15E-11	0.153	0.000
563801.34	4152601.57	0.001	0.001	0.000	0.000	0.000	0.000	1.10E-08	2.23E-07	6.43E-11	0.235	0.000
564021.34	4152601.57	0.002	0.002	0.001	0.000	0.000	0.000	2.06E-08	4.30E-07	1.20E-10	0.450	0.000
564041.34	4152601.57	0.001	0.002	0.001	0.000	0.000	0.000	1.79E-08	3.74E-07	1.04E-10	0.392	0.000
564061.34	4152601.57	0.001	0.001	0.000	0.000	0.000	0.000	1.58E-08	3.29E-07	9.19E-11	0.345	0.000
564081.34	4152601.57	0.001	0.001	0.000	0.000	0.000	0.000	1.40E-08	2.93E-07	8.17E-11	0.307	0.000
564101.34	4152601.57	0.001	0.001	0.000	0.000	0.000	0.000	1.25E-08	2.60E-07	7.27E-11	0.273	0.000
563501.34	4152621.57	0.000	0.000	0.000	0.000	0.000	0.000	4.68E-10	9.64E-09	2.73E-12	0.010	0.000
563521.34	4152621.57	0.000	0.000	0.000	0.000	0.000	0.000	5.08E-10	1.05E-08	2.96E-12	0.011	0.000
563541.34	4152621.57	0.000	0.000	0.000	0.000	0.000	0.000	5.55E-10	1.14E-08	3.23E-12	0.012	0.000
563561.34	4152621.57	0.000	0.000	0.000	0.000	0.000	0.000	6.10E-10	1.26E-08	3.55E-12	0.013	0.000
563581.34	4152621.57	0.000	0.000	0.000	0.000	0.000	0.000	6.85E-10	1.41E-08	3.99E-12	0.015	0.000
563601.34	4152621.57	0.000	0.000	0.000	0.000	0.000	0.000	7.86E-10	1.62E-08	4.58E-12	0.017	0.000
563621.34	4152621.57	0.000	0.000	0.000	0.000	0.000	0.000	9.15E-10	1.89E-08	5.33E-12	0.020	0.000
563641.34	4152621.57	0.000	0.000	0.000	0.000	0.000	0.000	1.08E-09	2.23E-08	6.29E-12	0.023	0.000
563661.34	4152621.57	0.000	0.000	0.000	0.000	0.000	0.000	1.28E-09	2.64E-08	7.44E-12	0.028	0.000
563681.34	4152621.57	0.000	0.000	0.000	0.000	0.000	0.000	1.50E-09	3.09E-08	8.72E-12	0.032	0.000
563701.34	4152621.57	0.000	0.000	0.000	0.000	0.000	0.000	1.79E-09	3.70E-08	1.04E-11	0.039	0.000
563721.34	4152621.57	0.000	0.000	0.000	0.000	0.000	0.000	2.28E-09	4.71E-08	1.33E-11	0.049	0.000
563741.34	4152621.57	0.000	0.000	0.000	0.000	0.000	0.000	3.04E-09	6.27E-08	1.77E-11	0.066	0.000
563761.34	4152621.57	0.000	0.000	0.000	0.000	0.000	0.000	4.18E-09	8.62E-08	2.43E-11	0.090	0.000
563781.34	4152621.57	0.000	0.001	0.000	0.000	0.000	0.000	6.62E-09	1.36E-07	3.86E-11	0.143	0.000
564041.34	4152621.57	0.001	0.001	0.000	0.000	0.000	0.000	1.26E-08	2.62E-07	7.33E-11	0.275	0.000
564061.34	4152621.57	0.001	0.001	0.000	0.000	0.000	0.000	1.14E-08	2.37E-07	6.63E-11	0.248	0.000
564081.34	4152621.57	0.001	0.001	0.000	0.000	0.000	0.000	1.04E-08	2.16E-07	6.04E-11	0.226	0.000
563501.34	4152641.57	0.000	0.000	0.000	0.000	0.000	0.000	4.43E-10	9.13E-09	2.58E-12	0.010	0.000
563521.34	4152641.57	0.000	0.000	0.000	0.000	0.000	0.000	4.81E-10	9.91E-09	2.80E-12	0.010	0.000
563541.34	4152641.57	0.000	0.000	0.000	0.000	0.000	0.000	5.26E-10	1.08E-08	3.07E-12	0.011	0.000
563561.34	4152641.57	0.000	0.000	0.000	0.000	0.000	0.000	5.80E-10	1.20E-08	3.38E-12	0.013	0.000
563581.34	4152641.57	0.000	0.000	0.000	0.000	0.000	0.000	6.52E-10	1.34E-08	3.80E-12	0.014	0.000
563601.34	4152641.57	0.000	0.000	0.000	0.000	0.000	0.000	7.49E-10	1.55E-08	4.36E-12	0.016	0.000
563621.34	4152641.57	0.000	0.000	0.000	0.000	0.000	0.000	8.74E-10	1.80E-08	5.09E-12	0.019	0.000

563641.34	4152641.57	0.000	0.000	0.000	0.000	0.000	0.000	1.03E-09	2.13E-08	6.00E-12	0.022	0.000
563661.34	4152641.57	0.000	0.000	0.000	0.000	0.000	0.000	1.21E-09	2.49E-08	7.02E-12	0.026	0.000
563681.34	4152641.57	0.000	0.000	0.000	0.000	0.000	0.000	1.39E-09	2.88E-08	8.12E-12	0.030	0.000
563701.34	4152641.57	0.000	0.000	0.000	0.000	0.000	0.000	1.68E-09	3.47E-08	9.77E-12	0.036	0.000
563721.34	4152641.57	0.000	0.000	0.000	0.000	0.000	0.000	2.15E-09	4.45E-08	1.25E-11	0.047	0.000
563741.34	4152641.57	0.000	0.000	0.000	0.000	0.000	0.000	2.97E-09	6.14E-08	1.73E-11	0.064	0.000
563761.34	4152641.57	0.000	0.000	0.000	0.000	0.000	0.000	4.07E-09	8.42E-08	2.37E-11	0.088	0.000
563781.34	4152641.57	0.000	0.001	0.000	0.000	0.000	0.000	6.23E-09	1.28E-07	3.63E-11	0.135	0.000
563801.34	4152641.57	0.001	0.001	0.000	0.000	0.000	0.000	9.38E-09	1.92E-07	5.46E-11	0.201	0.000
564061.34	4152641.57	0.001	0.001	0.000	0.000	0.000	0.000	8.27E-09	1.72E-07	4.82E-11	0.180	0.000
563501.34	4152661.57	0.000	0.000	0.000	0.000	0.000	0.000	4.24E-10	8.74E-09	2.47E-12	0.009	0.000
563521.34	4152661.57	0.000	0.000	0.000	0.000	0.000	0.000	4.61E-10	9.50E-09	2.69E-12	0.010	0.000
563541.34	4152661.57	0.000	0.000	0.000	0.000	0.000	0.000	5.08E-10	1.05E-08	2.96E-12	0.011	0.000
563561.34	4152661.57	0.000	0.000	0.000	0.000	0.000	0.000	5.63E-10	1.16E-08	3.28E-12	0.012	0.000
563581.34	4152661.57	0.000	0.000	0.000	0.000	0.000	0.000	6.37E-10	1.31E-08	3.71E-12	0.014	0.000
563601.34	4152661.57	0.000	0.000	0.000	0.000	0.000	0.000	7.33E-10	1.51E-08	4.27E-12	0.016	0.000
563621.34	4152661.57	0.000	0.000	0.000	0.000	0.000	0.000	8.58E-10	1.77E-08	5.00E-12	0.019	0.000
563641.34	4152661.57	0.000	0.000	0.000	0.000	0.000	0.000	9.94E-10	2.06E-08	5.79E-12	0.022	0.000
563661.34	4152661.57	0.000	0.000	0.000	0.000	0.000	0.000	1.16E-09	2.39E-08	6.74E-12	0.025	0.000
563681.34	4152661.57	0.000	0.000	0.000	0.000	0.000	0.000	1.34E-09	2.78E-08	7.84E-12	0.029	0.000
563701.34	4152661.57	0.000	0.000	0.000	0.000	0.000	0.000	1.63E-09	3.38E-08	9.50E-12	0.035	0.000
563721.34	4152661.57	0.000	0.000	0.000	0.000	0.000	0.000	2.10E-09	4.34E-08	1.22E-11	0.046	0.000
563741.34	4152661.57	0.000	0.000	0.000	0.000	0.000	0.000	2.92E-09	6.04E-08	1.70E-11	0.063	0.000
563761.34	4152661.57	0.000	0.000	0.000	0.000	0.000	0.000	3.89E-09	8.06E-08	2.27E-11	0.084	0.000
563781.34	4152661.57	0.000	0.000	0.000	0.000	0.000	0.000	5.74E-09	1.19E-07	3.35E-11	0.124	0.000
563801.34	4152661.57	0.001	0.001	0.000	0.000	0.000	0.000	8.13E-09	1.67E-07	4.74E-11	0.175	0.000
563821.34	4152661.57	0.001	0.001	0.000	0.000	0.000	0.000	1.11E-08	2.23E-07	6.49E-11	0.235	0.000
563501.34	4152681.57	0.000	0.000	0.000	0.000	0.000	0.000	4.15E-10	8.56E-09	2.42E-12	0.009	0.000
563521.34	4152681.57	0.000	0.000	0.000	0.000	0.000	0.000	4.54E-10	9.36E-09	2.64E-12	0.010	0.000
563541.34	4152681.57	0.000	0.000	0.000	0.000	0.000	0.000	5.03E-10	1.04E-08	2.93E-12	0.011	0.000
563561.34	4152681.57	0.000	0.000	0.000	0.000	0.000	0.000	5.61E-10	1.16E-08	3.27E-12	0.012	0.000
563581.34	4152681.57	0.000	0.000	0.000	0.000	0.000	0.000	6.36E-10	1.31E-08	3.70E-12	0.014	0.000
563601.34	4152681.57	0.000	0.000	0.000	0.000	0.000	0.000	7.30E-10	1.51E-08	4.25E-12	0.016	0.000
563621.34	4152681.57	0.000	0.000	0.000	0.000	0.000	0.000	8.52E-10	1.76E-08	4.97E-12	0.018	0.000
563641.34	4152681.57	0.000	0.000	0.000	0.000	0.000	0.000	9.83E-10	2.04E-08	5.73E-12	0.021	0.000
563661.34	4152681.57	0.000	0.000	0.000	0.000	0.000	0.000	1.13E-09	2.35E-08	6.60E-12	0.025	0.000
563681.34	4152681.57	0.000	0.000	0.000	0.000	0.000	0.000	1.34E-09	2.78E-08	7.82E-12	0.029	0.000
563701.34	4152681.57	0.000	0.000	0.000	0.000	0.000	0.000	1.64E-09	3.39E-08	9.53E-12	0.036	0.000
563721.34	4152681.57	0.000	0.000	0.000	0.000	0.000	0.000	2.10E-09	4.35E-08	1.22E-11	0.046	0.000
563741.34	4152681.57	0.000	0.000	0.000	0.000	0.000	0.000	2.70E-09	5.59E-08	1.57E-11	0.059	0.000
563761.34	4152681.57	0.000	0.000	0.000	0.000	0.000	0.000	3.52E-09	7.30E-08	2.05E-11	0.077	0.000
563781.34	4152681.57	0.000	0.000	0.000	0.000	0.000	0.000	5.17E-09	1.07E-07	3.01E-11	0.112	0.000
563501.34	4152701.57	0.000	0.000	0.000	0.000	0.000	0.000	4.15E-10	8.57E-09	2.42E-12	0.009	0.000
563521.34	4152701.57	0.000	0.000	0.000	0.000	0.000	0.000	4.56E-10	9.42E-09	2.66E-12	0.010	0.000
563541.34	4152701.57	0.000	0.000	0.000	0.000	0.000	0.000	5.06E-10	1.05E-08	2.95E-12	0.011	0.000
563561.34	4152701.57	0.000	0.000	0.000	0.000	0.000	0.000	5.65E-10	1.17E-08	3.29E-12	0.012	0.000
563581.34	4152701.57	0.000	0.000	0.000	0.000	0.000	0.000	6.42E-10	1.33E-08	3.74E-12	0.014	0.000
563601.34	4152701.57	0.000	0.000	0.000	0.000	0.000	0.000	7.35E-10	1.52E-08	4.28E-12	0.016	0.000
563621.34	4152701.57	0.000	0.000	0.000	0.000	0.000	0.000	8.43E-10	1.75E-08	4.91E-12	0.018	0.000
563641.34	4152701.57	0.000	0.000	0.000	0.000	0.000	0.000	9.71E-10	2.01E-08	5.66E-12	0.021	0.000
563661.34	4152701.57	0.000	0.000	0.000	0.000	0.000	0.000	1.12E-09	2.33E-08	6.55E-12	0.024	0.000
563681.34	4152701.57	0.000	0.000	0.000	0.000	0.000	0.000	1.36E-09	2.82E-08	7.91E-12	0.030	0.000
563701.34	4152701.57	0.000	0.000	0.000	0.000	0.000	0.000	1.67E-09	3.47E-08	9.73E-12	0.036	0.000
563721.34	4152701.57	0.000	0.000	0.000	0.000	0.000	0.000	2.10E-09	4.36E-08	1.22E-11	0.046	0.000
563741.34	4152701.57	0.000	0.000	0.000	0.000	0.000	0.000	2.57E-09	5.34E-08	1.50E-11	0.056	0.000
563761.34	4152701.57	0.000	0.000	0.000	0.000	0.000	0.000	3.36E-09	6.96E-08	1.96E-11	0.073	0.000
563781.34	4152701.57	0.000	0.000	0.000	0.000	0.000	0.000	4.53E-09	9.37E-08	2.64E-11	0.098	0.000
563501.34	4152721.57	0.000	0.000	0.000	0.000	0.000	0.000	4.20E-10	8.68E-09	2.45E-12	0.009	0.000
563521.34	4152721.57	0.000	0.000	0.000	0.000	0.000	0.000	4.63E-10	9.57E-09	2.70E-12	0.010	0.000

563541.34	4152721.57	0.000	0.000	0.000	0.000	0.000	0.000	5.13E-10	1.06E-08	2.99E-12	0.011	0.000
563561.34	4152721.57	0.000	0.000	0.000	0.000	0.000	0.000	5.71E-10	1.18E-08	3.33E-12	0.012	0.000
563581.34	4152721.57	0.000	0.000	0.000	0.000	0.000	0.000	6.46E-10	1.34E-08	3.76E-12	0.014	0.000
563601.34	4152721.57	0.000	0.000	0.000	0.000	0.000	0.000	7.37E-10	1.53E-08	4.30E-12	0.016	0.000
563621.34	4152721.57	0.000	0.000	0.000	0.000	0.000	0.000	8.40E-10	1.74E-08	4.90E-12	0.018	0.000
563641.34	4152721.57	0.000	0.000	0.000	0.000	0.000	0.000	9.72E-10	2.02E-08	5.67E-12	0.021	0.000
563661.34	4152721.57	0.000	0.000	0.000	0.000	0.000	0.000	1.14E-09	2.37E-08	6.65E-12	0.025	0.000
563681.34	4152721.57	0.000	0.000	0.000	0.000	0.000	0.000	1.39E-09	2.90E-08	8.13E-12	0.030	0.000
563701.34	4152721.57	0.000	0.000	0.000	0.000	0.000	0.000	1.71E-09	3.56E-08	9.98E-12	0.037	0.000
563721.34	4152721.57	0.000	0.000	0.000	0.000	0.000	0.000	2.07E-09	4.30E-08	1.21E-11	0.045	0.000
563741.34	4152721.57	0.000	0.000	0.000	0.000	0.000	0.000	2.47E-09	5.13E-08	1.44E-11	0.054	0.000
563761.34	4152721.57	0.000	0.000	0.000	0.000	0.000	0.000	3.23E-09	6.70E-08	1.88E-11	0.070	0.000
563781.34	4152721.57	0.000	0.000	0.000	0.000	0.000	0.000	3.96E-09	8.19E-08	2.30E-11	0.086	0.000
563501.34	4152741.57	0.000	0.000	0.000	0.000	0.000	0.000	4.26E-10	8.81E-09	2.48E-12	0.009	0.000
563521.34	4152741.57	0.000	0.000	0.000	0.000	0.000	0.000	4.68E-10	9.69E-09	2.73E-12	0.010	0.000
563541.34	4152741.57	0.000	0.000	0.000	0.000	0.000	0.000	5.19E-10	1.08E-08	3.03E-12	0.011	0.000
563561.34	4152741.57	0.000	0.000	0.000	0.000	0.000	0.000	5.79E-10	1.20E-08	3.37E-12	0.013	0.000
563581.34	4152741.57	0.000	0.000	0.000	0.000	0.000	0.000	6.48E-10	1.34E-08	3.78E-12	0.014	0.000
563601.34	4152741.57	0.000	0.000	0.000	0.000	0.000	0.000	7.35E-10	1.52E-08	4.28E-12	0.016	0.000
563621.34	4152741.57	0.000	0.000	0.000	0.000	0.000	0.000	8.42E-10	1.75E-08	4.91E-12	0.018	0.000
563641.34	4152741.57	0.000	0.000	0.000	0.000	0.000	0.000	9.87E-10	2.05E-08	5.75E-12	0.021	0.000
563661.34	4152741.57	0.000	0.000	0.000	0.000	0.000	0.000	1.17E-09	2.43E-08	6.83E-12	0.026	0.000
563681.34	4152741.57	0.000	0.000	0.000	0.000	0.000	0.000	1.43E-09	2.97E-08	8.33E-12	0.031	0.000
563701.34	4152741.57	0.000	0.000	0.000	0.000	0.000	0.000	1.72E-09	3.56E-08	1.00E-11	0.037	0.000
563721.34	4152741.57	0.000	0.000	0.000	0.000	0.000	0.000	2.00E-09	4.16E-08	1.17E-11	0.044	0.000
563741.34	4152741.57	0.000	0.000	0.000	0.000	0.000	0.000	2.38E-09	4.94E-08	1.39E-11	0.052	0.000
563761.34	4152741.57	0.000	0.000	0.000	0.000	0.000	0.000	2.99E-09	6.20E-08	1.74E-11	0.065	0.000
563781.34	4152741.57	0.000	0.000	0.000	0.000	0.000	0.000	3.46E-09	7.16E-08	2.01E-11	0.075	0.000
563801.34	4152741.57	0.000	0.000	0.000	0.000	0.000	0.000	3.92E-09	8.09E-08	2.28E-11	0.085	0.000
563501.34	4152761.57	0.000	0.000	0.000	0.000	0.000	0.000	4.33E-10	8.96E-09	2.52E-12	0.009	0.000
563521.34	4152761.57	0.000	0.000	0.000	0.000	0.000	0.000	4.74E-10	9.82E-09	2.76E-12	0.010	0.000
563541.34	4152761.57	0.000	0.000	0.000	0.000	0.000	0.000	5.24E-10	1.09E-08	3.05E-12	0.011	0.000
563561.34	4152761.57	0.000	0.000	0.000	0.000	0.000	0.000	5.82E-10	1.21E-08	3.39E-12	0.013	0.000
563581.34	4152761.57	0.000	0.000	0.000	0.000	0.000	0.000	6.51E-10	1.35E-08	3.80E-12	0.014	0.000
563601.34	4152761.57	0.000	0.000	0.000	0.000	0.000	0.000	7.39E-10	1.53E-08	4.30E-12	0.016	0.000
563621.34	4152761.57	0.000	0.000	0.000	0.000	0.000	0.000	8.55E-10	1.78E-08	4.98E-12	0.019	0.000
563641.34	4152761.57	0.000	0.000	0.000	0.000	0.000	0.000	1.01E-09	2.09E-08	5.87E-12	0.022	0.000
563661.34	4152761.57	0.000	0.000	0.000	0.000	0.000	0.000	1.19E-09	2.48E-08	6.95E-12	0.026	0.000
563681.34	4152761.57	0.000	0.000	0.000	0.000	0.000	0.000	1.42E-09	2.95E-08	8.27E-12	0.031	0.000
563701.34	4152761.57	0.000	0.000	0.000	0.000	0.000	0.000	1.65E-09	3.42E-08	9.60E-12	0.036	0.000
563721.34	4152761.57	0.000	0.000	0.000	0.000	0.000	0.000	1.90E-09	3.94E-08	1.11E-11	0.041	0.000
563741.34	4152761.57	0.000	0.000	0.000	0.000	0.000	0.000	2.29E-09	4.76E-08	1.34E-11	0.050	0.000
563761.34	4152761.57	0.000	0.000	0.000	0.000	0.000	0.000	2.70E-09	5.60E-08	1.58E-11	0.059	0.000
563781.34	4152761.57	0.000	0.000	0.000	0.000	0.000	0.000	3.05E-09	6.32E-08	1.78E-11	0.066	0.000
563801.34	4152761.57	0.000	0.000	0.000	0.000	0.000	0.000	3.39E-09	7.01E-08	1.98E-11	0.073	0.000
563501.34	4152781.57	0.000	0.000	0.000	0.000	0.000	0.000	4.40E-10	9.11E-09	2.56E-12	0.010	0.000
563521.34	4152781.57	0.000	0.000	0.000	0.000	0.000	0.000	4.80E-10	9.95E-09	2.80E-12	0.010	0.000
563541.34	4152781.57	0.000	0.000	0.000	0.000	0.000	0.000	5.28E-10	1.10E-08	3.08E-12	0.011	0.000
563561.34	4152781.57	0.000	0.000	0.000	0.000	0.000	0.000	5.88E-10	1.22E-08	3.42E-12	0.013	0.000
563581.34	4152781.57	0.000	0.000	0.000	0.000	0.000	0.000	6.57E-10	1.36E-08	3.83E-12	0.014	0.000
563601.34	4152781.57	0.000	0.000	0.000	0.000	0.000	0.000	7.50E-10	1.56E-08	4.37E-12	0.016	0.000
563621.34	4152781.57	0.000	0.000	0.000	0.000	0.000	0.000	8.73E-10	1.81E-08	5.09E-12	0.019	0.000
563641.34	4152781.57	0.000	0.000	0.000	0.000	0.000	0.000	1.03E-09	2.13E-08	5.98E-12	0.022	0.000
563661.34	4152781.57	0.000	0.000	0.000	0.000	0.000	0.000	1.19E-09	2.48E-08	6.95E-12	0.026	0.000
563681.34	4152781.57	0.000	0.000	0.000	0.000	0.000	0.000	1.35E-09	2.81E-08	7.89E-12	0.029	0.000
563701.34	4152781.57	0.000	0.000	0.000	0.000	0.000	0.000	1.52E-09	3.16E-08	8.85E-12	0.033	0.000
563721.34	4152781.57	0.000	0.000	0.000	0.000	0.000	0.000	1.79E-09	3.71E-08	1.04E-11	0.039	0.000
563741.34	4152781.57	0.000	0.000	0.000	0.000	0.000	0.000	2.14E-09	4.43E-08	1.24E-11	0.046	0.000
563761.34	4152781.57	0.000	0.000	0.000	0.000	0.000	0.000	2.44E-09	5.05E-08	1.42E-11	0.053	0.000

563781.34	4152781.57	0.000	0.000	0.000	0.000	0.000	0.000	2.74E-09	5.67E-08	1.60E-11	0.059	0.000
563801.34	4152781.57	0.000	0.000	0.000	0.000	0.000	0.000	3.00E-09	6.20E-08	1.75E-11	0.065	0.000
563501.34	4152801.57	0.000	0.000	0.000	0.000	0.000	0.000	4.49E-10	9.31E-09	2.62E-12	0.010	0.000
563521.34	4152801.57	0.000	0.000	0.000	0.000	0.000	0.000	4.91E-10	1.02E-08	2.86E-12	0.011	0.000
563541.34	4152801.57	0.000	0.000	0.000	0.000	0.000	0.000	5.39E-10	1.12E-08	3.14E-12	0.012	0.000
563561.34	4152801.57	0.000	0.000	0.000	0.000	0.000	0.000	5.99E-10	1.24E-08	3.49E-12	0.013	0.000
563581.34	4152801.57	0.000	0.000	0.000	0.000	0.000	0.000	6.72E-10	1.40E-08	3.91E-12	0.015	0.000
563601.34	4152801.57	0.000	0.000	0.000	0.000	0.000	0.000	7.68E-10	1.60E-08	4.48E-12	0.017	0.000
563621.34	4152801.57	0.000	0.000	0.000	0.000	0.000	0.000	8.92E-10	1.85E-08	5.20E-12	0.019	0.000
563641.34	4152801.57	0.000	0.000	0.000	0.000	0.000	0.000	1.04E-09	2.17E-08	6.08E-12	0.023	0.000
563661.34	4152801.57	0.000	0.000	0.000	0.000	0.000	0.000	1.17E-09	2.43E-08	6.82E-12	0.025	0.000
563681.34	4152801.57	0.000	0.000	0.000	0.000	0.000	0.000	1.30E-09	2.69E-08	7.55E-12	0.028	0.000
563701.34	4152801.57	0.000	0.000	0.000	0.000	0.000	0.000	1.46E-09	3.02E-08	8.48E-12	0.032	0.000
563721.34	4152801.57	0.000	0.000	0.000	0.000	0.000	0.000	1.70E-09	3.52E-08	9.89E-12	0.037	0.000
563741.34	4152801.57	0.000	0.000	0.000	0.000	0.000	0.000	1.95E-09	4.05E-08	1.14E-11	0.042	0.000
563761.34	4152801.57	0.000	0.000	0.000	0.000	0.000	0.000	2.18E-09	4.52E-08	1.27E-11	0.047	0.000
563781.34	4152801.57	0.000	0.000	0.000	0.000	0.000	0.000	2.43E-09	5.03E-08	1.42E-11	0.053	0.000
563801.34	4152801.57	0.000	0.000	0.000	0.000	0.000	0.000	2.62E-09	5.40E-08	1.52E-11	0.057	0.000
563501.34	4152821.57	0.000	0.000	0.000	0.000	0.000	0.000	4.60E-10	9.55E-09	2.68E-12	0.010	0.000
563521.34	4152821.57	0.000	0.000	0.000	0.000	0.000	0.000	5.03E-10	1.05E-08	2.93E-12	0.011	0.000
563541.34	4152821.57	0.000	0.000	0.000	0.000	0.000	0.000	5.51E-10	1.14E-08	3.21E-12	0.012	0.000
563561.34	4152821.57	0.000	0.000	0.000	0.000	0.000	0.000	6.10E-10	1.27E-08	3.55E-12	0.013	0.000
563581.34	4152821.57	0.000	0.000	0.000	0.000	0.000	0.000	6.88E-10	1.43E-08	4.01E-12	0.015	0.000
563601.34	4152821.57	0.000	0.000	0.000	0.000	0.000	0.000	7.89E-10	1.64E-08	4.59E-12	0.017	0.000
563621.34	4152821.57	0.000	0.000	0.000	0.000	0.000	0.000	9.00E-10	1.87E-08	5.25E-12	0.020	0.000
563641.34	4152821.57	0.000	0.000	0.000	0.000	0.000	0.000	1.02E-09	2.12E-08	5.94E-12	0.022	0.000
563661.34	4152821.57	0.000	0.000	0.000	0.000	0.000	0.000	1.13E-09	2.35E-08	6.58E-12	0.025	0.000
563681.34	4152821.57	0.000	0.000	0.000	0.000	0.000	0.000	1.25E-09	2.61E-08	7.31E-12	0.027	0.000
563701.34	4152821.57	0.000	0.000	0.000	0.000	0.000	0.000	1.41E-09	2.92E-08	8.20E-12	0.031	0.000
563721.34	4152821.57	0.000	0.000	0.000	0.000	0.000	0.000	1.59E-09	3.31E-08	9.29E-12	0.035	0.000
563741.34	4152821.57	0.000	0.000	0.000	0.000	0.000	0.000	1.77E-09	3.66E-08	1.03E-11	0.038	0.000
563761.34	4152821.57	0.000	0.000	0.000	0.000	0.000	0.000	1.93E-09	4.01E-08	1.13E-11	0.042	0.000
563781.34	4152821.57	0.000	0.000	0.000	0.000	0.000	0.000	2.10E-09	4.35E-08	1.22E-11	0.046	0.000

Twin Pines Project - Cumulative Health Risk at Project MEIR

Existing of-site receptor

MEIR

	Twin Pines Construction	
	UTM X	UTM Y
Existing Resident	563961.3	4152481.6

Background Risk from Highways, Rail and Major Streets

	Risk at MEIR			
Source	Cancer Risk[1]	Unit	$PM_{2.5}$	Unit
Highways	9.6	per million	0.209	$\mu g/m^3$
Rail	5.8	per million	0.011	$\mu g/m^3$
Major Streets	5.7	per million	0.144	$\mu g/m^3$

Risk from Permitted Stationary Sources

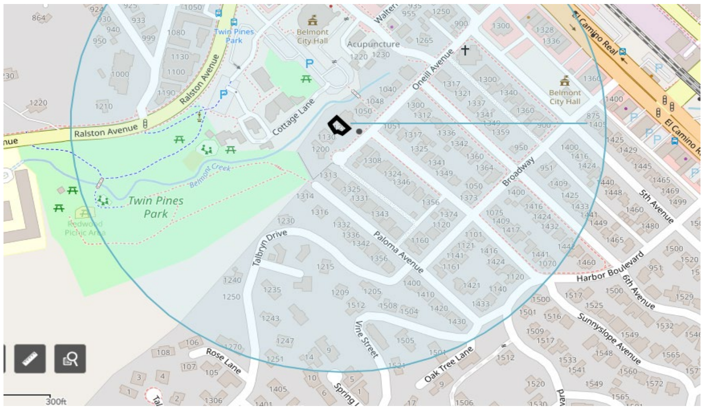
Source: https://baaqmd.maps.arcgis.com/apps/webappviewer/index.html?id=2387ae674013413f987b1071715daa65

Sources within 1000 feet from MEIR

FID	FACID	Name	Address	Cancer	HI	PM_25	Type
465	16185	City of Belmont	One Twin Pines Lane	14.77	0.0228468	0.01883	Generator
5272	23307	Safeway Inc, #1138	1100 El Camino Real	0.01	0.000056	0.000272	Generator
6987	108127_1	Belmont 76 Service	995 Ralston Ave	5.42	0.0259357	0	Gas Dispensing Facility

Stationary Source Risk

			Risk at MEIR					
FACID	Name	Distance to MEIR (ft)	Cancer Risk[1]	Unit	Hazard	unitless	$PM_{2.5}$	Unit
16185	City of Belmont	320	2.89	per million	0.00	unitless	0.00	$\mu g/m^3$
23307	Safeway Inc, #1138	495	0.00	per million	0.000	unitless	0.00	$\mu g/m^3$
108127_1	Belmont 76 Service	750	0.14	per million	0.001	unitless	0.00	$\mu g/m^3$



Cumulative Risks at the Project MEIR - Unmitigated

	Cumulative HRA Results		
	Cancer Risk per million	HI unitless	$PM_{2.5}$ $\mu g/m^3$
City of Belmont	2.9	0.00	0.00
Safeway Inc, #1138	0.0	0.000	0.00
Belmont 76 Service	0.1	0.0007	0.00
Highways	9.6	0.000	0.21
Rail	5.8	0.000	0.01
Major Streets	5.7	0.000	0.14
Project Construction	36.8	0.029	0.14
Total	**60.8**	**0.03**	**0.51**
BAAQMD Threshold	**100**	**10**	**0.8**
Significant?	**No**	**No**	**No**

Cumulative Risks at the Project MEIR - Mitigated

	Cumulative HRA Results		
	Cancer Risk per million	HI unitless	$PM_{2.5}$ $\mu g/m^3$
City of Belmont	2.9	0.00	0.00
Safeway Inc, #1138	0.0	0.000	0.00
Belmont 76 Service	0.1	0.0007	0.00
Highways	9.6	0.000	0.21
Rail	5.8	0.000	0.01
Major Streets	5.7	0.000	0.14
Project Construction	4.6	0.004	0.02
Total	**28.6**	**0.01**	**0.39**
BAAQMD Threshold	**100**	**10**	**0.8**
Significant?	**No**	**No**	**No**

Twin Pines Initial Study

San Mateo County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Industrial	1.00	User Defined Unit	1.95	85,056.00	0
Parking Lot	1.20	Acre	1.20	52,272.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	70
Climate Zone	5			**Operational Year**	2026
Utility Company	Pacific Gas and Electric Company				
CO2 Intensity (lb/MWhr)	203.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Project Specific Information: Stormwater Storage Facility, Parking Lot

Construction Phase - Project Specific Timeline

Off-road Equipment - Project Specific Information: Hours

Off-road Equipment - Project Specific Information: Hours and Horsepower

Off-road Equipment - Project Specific Information: Hours and Horsepower

Off-road Equipment - Project Specific Information: Hours and Horsepower

Off-road Equipment - Project Specific Information: Hours and Horsepower

Off-road Equipment - Project Specific Information: Hours and Horsepower

Off-road Equipment - Project Specific Information: Hours and Horsepower

Off-road Equipment - Project Specific Information: Hours and Horsepower

Off-road Equipment - Project Specific Information: Hours and Horsepower

Off-road Equipment - Project Specific Information: Hours and Horsepower

Trips and VMT - Project Specific Information

Demolition - Project Specific Information

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Grading - Project Specific Information

Construction Off-road Equipment Mitigation - Tier 4 Final Equipment for > 50 hp

Table Name	Column Name	Default Value	New Value
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	3.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	4.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	9.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	1.00
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tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
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tblConstEquipMitigation	Tier	No Change	Tier 4 Final
tblConstEquipMitigation	Tier	No Change	Tier 4 Final
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tblConstEquipMitigation	Tier	No Change	Tier 4 Final
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tblConstructionPhase	NumDays	230.00	129.00
tblConstructionPhase	NumDays	230.00	21.00
tblConstructionPhase	NumDays	230.00	22.00
tblConstructionPhase	NumDays	230.00	22.00
tblConstructionPhase	NumDays	230.00	42.00
tblConstructionPhase	NumDays	20.00	43.00
tblConstructionPhase	NumDays	8.00	89.00
tblConstructionPhase	NumDays	18.00	44.00
tblConstructionPhase	NumDays	5.00	66.00
tblGrading	AcresOfGrading	19.80	1.20
tblGrading	MaterialExported	0.00	24,070.00
tblLandUse	LandUseSquareFeet	0.00	85,056.00
tblLandUse	LotAcreage	0.00	1.95
tblOffRoadEquipment	HorsePower	231.00	226.00
tblOffRoadEquipment	HorsePower	231.00	226.00
tblOffRoadEquipment	HorsePower	231.00	226.00
tblOffRoadEquipment	HorsePower	231.00	226.00
tblOffRoadEquipment	HorsePower	158.00	163.00
tblOffRoadEquipment	HorsePower	130.00	126.00
tblOffRoadEquipment	HorsePower	132.00	131.00
tblOffRoadEquipment	HorsePower	80.00	81.00
tblOffRoadEquipment	HorsePower	97.00	98.00
tblOffRoadEquipment	HorsePower	97.00	98.00
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tblOffRoadEquipment	HorsePower	16.00	400.00
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tblOffRoadEquipment	HorsePower	158.00	163.00
tblOffRoadEquipment	HorsePower	187.00	175.00
tblOffRoadEquipment	HorsePower	187.00	175.00
tblOffRoadEquipment	HorsePower	80.00	81.00

tblOffRoadEquipment	HorsePower	78.00	81.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
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tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	UsageHours	8.00	0.70
tblOffRoadEquipment	UsageHours	7.00	5.60
tblOffRoadEquipment	UsageHours	7.00	1.90
tblOffRoadEquipment	UsageHours	7.00	3.30
tblOffRoadEquipment	UsageHours	7.00	1.40
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tblOffRoadEquipment	UsageHours	8.00	5.60
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tblOffRoadEquipment	UsageHours	6.00	7.30
tblOffRoadEquipment	UsageHours	6.00	7.30
tblOffRoadEquipment	UsageHours	7.00	7.40
tblOffRoadEquipment	UsageHours	8.00	7.60
tblTripsAndVMT	HaulingTripNumber	3,009.00	0.00
tblTripsAndVMT	HaulingTripNumber	69.00	86.00
tblTripsAndVMT	HaulingTripNumber	0.00	3,009.00
tblTripsAndVMT	HaulingTripNumber	0.00	42.00
tblTripsAndVMT	VendorTripNumber	23.00	0.00
tblTripsAndVMT	VendorTripNumber	23.00	22.00
tblTripsAndVMT	VendorTripNumber	23.00	4.00
tblTripsAndVMT	VendorTripNumber	23.00	2.00
tblTripsAndVMT	VendorTripNumber	23.00	0.00
tblTripsAndVMT	VendorTripNumber	0.00	2.00

tblTripsAndVMT	VendorTripNumber	23.00	2.00
tblTripsAndVMT	WorkerTripNumber	8.00	20.00
tblTripsAndVMT	WorkerTripNumber	58.00	12.00
tblTripsAndVMT	WorkerTripNumber	8.00	12.00
tblTripsAndVMT	WorkerTripNumber	18.00	28.00
tblTripsAndVMT	WorkerTripNumber	58.00	28.00
tblTripsAndVMT	WorkerTripNumber	58.00	16.00
tblTripsAndVMT	WorkerTripNumber	58.00	24.00
tblTripsAndVMT	WorkerTripNumber	58.00	12.00
tblTripsAndVMT	WorkerTripNumber	10.00	36.00
tblTripsAndVMT	WorkerTripNumber	58.00	20.00

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					
2024	0.0423	0.5061	0.6394	1.68E-03	0.044	0.0162	0.0603	0.0107	0.0151	0.0258	0	160.9369	160.9369	0.0308	0.0128	165.5108
2025	0.0702	0.6937	0.8243	2.02E-03	0.0463	0.026	0.0723	0.0124	0.0241	0.0364	0	185.5307	185.5307	0.0387	9.41E-03	189.3007
2026	6.01E-03	0.0508	0.0733	1.50E-04	5.66E-03	1.93E-03	7.59E-03	1.51E-03	1.79E-03	3.31E-03	0	13.4567	13.4567	2.89E-03	2.10E-04	13.591
Maximum	**0.0702**	**0.6937**	**0.8243**	**2.02E-03**	**0.0463**	**0.026**	**0.0723**	**0.0124**	**0.0241**	**0.0364**	**0**	**185.5307**	**185.5307**	**0.0387**	**0.0128**	**189.3007**

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					
2024	0.0203	0.3221	0.6774	1.68E-03	0.0385	3.04E-03	0.0415	9.87E-03	2.99E-03	0.0129	0	160.9368	160.9368	0.0308	0.0128	165.5107

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

2025	0.0312	0.2765	0.9189	2.02E-03	0.0452	3.99E-03	0.0492	0.0122	3.94E-03	0.0161	0	185.5306	185.5306	0.0387	9.41E-03	189.3006
2026	4.03E-03	0.0404	0.0817	1.50E-04	5.66E-03	4.00E-04	6.06E-03	1.51E-03	4.00E-04	1.91E-03	0	13.4567	13.4567	2.89E-03	2.10E-04	13.591
Maximum	**0.0312**	**0.3221**	**0.9189**	**2.02E-03**	**0.0452**	**3.99E-03**	**0.0492**	**0.0122**	**3.94E-03**	**0.0161**	**0**	**185.5306**	**185.5306**	**0.0387**	**0.0128**	**189.3006**

	ROG	**NOx**	**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	**53.15**	**48.92**	**-9.18**	**0.00**	**6.91**	**83.18**	**30.96**	**3.91**	**82.10**	**52.82**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	**Start Date**	**End Date**	**Maximum Unmitigated ROG + NOX (tons/quarter)**	**Maximum Mitigated ROG + NOX (tons/quarter)**
1	**5-1-2024**	**7-31-2024**	0.1338	0.0499
2	**8-1-2024**	**10-31-2024**	0.1603	0.1208
3	**11-1-2024**	**1-31-2025**	0.3778	0.2607
4	**2-1-2025**	**4-30-2025**	0.1924	0.0660
5	**5-1-2025**	**7-31-2025**	0.1975	0.0668
6	**8-1-2025**	**10-31-2025**	0.1358	0.0462
7	**11-1-2025**	**1-31-2026**	0.1280	0.0511
8	**2-1-2026**	**4-30-2026**	0.0414	0.0325
		Highest	0.3778	0.2607

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	0.3810	0.0000	2.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	4.0000e-005	4.0000e-005	0.0000	0.0000	4.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.6927	1.6927	2.7000e-004	3.0000e-005	1.7095
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.3810**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**1.6928**	**1.6928**	**2.7000e-004**	**3.0000e-005**	**1.7095**

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	0.3810	0.0000	2.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	4.0000e-005	4.0000e-005	0.0000	0.0000	4.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	1.6927	1.6927	2.7000e-004	3.0000e-005	1.7095
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.3810**	**0.0000**	**2.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**1.6928**	**1.6928**	**2.7000e-004**	**3.0000e-005**	**1.7095**

	ROG	**NOx**	**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	Site Mobilization, Clearing, Grubbing, and Vegetation Removal	Site Preparation	5/1/2024	7/31/2024	5	66	
2	Demolition of Existing Parking Lot	Demolition	8/1/2024	9/30/2024	5	43	
3	Underground Storage Excavation	Grading	10/1/2024	1/31/2025	5	89	
4	Underground Storage Construction and Backfill	Building Construction	2/1/2025	7/31/2025	5	129	
5	Weirs, Sedimentation Basin, and Check Structure Construction	Building Construction	8/1/2025	8/31/2025	5	21	
6	Pipeline Installation	Building Construction	9/1/2025	9/30/2025	5	22	

7	Field Surface Replacement	Building Construction	10/1/2025	10/30/2025	5	22	
8	Parking Reconstruction	Paving	10/31/2025	12/31/2025	5	44	
9	Landscape and Stream Restoration	Building Construction	1/1/2026	2/28/2026	5	42	
10	Ancillary Park Improvements	Building Construction	3/1/2026	4/30/2026	5	44	

Acres of Grading (Site Preparation Phase): 1.2

Acres of Grading (Grading Phase): 1.2

Acres of Paving: 1.2

Residential Indoor: 0; Residential Outdoor: 0; 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 of Existing Parking Lot	Concrete/Industrial Saws	1	0.70	81	0.73
Demolition of Existing Parking Lot	Dumpers/Tenders	1	4.70	400	0.38
Demolition of Existing Parking Lot	Skid Steer Loaders	1	7.40	65	0.37
Site Mobilization, Clearing, Grubbing, and Vegetation Removal	Excavators	1	2.40	163	0.38
Site Mobilization, Clearing, Grubbing, and Vegetation Removal	Graders	1	4.80	175	0.41
Site Mobilization, Clearing, Grubbing, and Vegetation Removal	Skid Steer Loaders	1	7.30	65	0.37
Underground Storage Excavation	Dumpers/Tenders	1	7.60	400	0.38
Underground Storage Excavation	Excavators	2	7.60	163	0.38
Underground Storage Excavation	Pumps	1	0.90	84	0.74
Underground Storage Excavation	Signal Boards	1	8.00	6	0.82
Underground Storage Excavation	Skid Steer Loaders	1	7.60	65	0.37
Underground Storage Excavation	Tractors/Loaders/Backhoes	1	7.60	98	0.37
Underground Storage Construction and Backfill	Cranes	1	5.60	226	0.29
Underground Storage Construction and Backfill	Dumpers/Tenders	1	7.40	400	0.38
Underground Storage Construction and Backfill	Forklifts	1	5.60	89	0.20
Underground Storage Construction and Backfill	Rollers	1	0.60	81	0.38
Underground Storage Construction and Backfill	Signal Boards	1	8.00	6	0.82

Underground Storage Construction and Backfill	Tractors/Loaders/Backhoes		1	7.40	98	0.37
Weirs, Sedimentation Basin, and Check Structure Construction	Cement and Mortar Mixers		1	3.80	9	0.56
Weirs, Sedimentation Basin, and Check Structure Construction	Cranes		1	1.90	226	0.29
Weirs, Sedimentation Basin, and Check Structure Construction	Excavators		1	4.30	163	0.38
Weirs, Sedimentation Basin, and Check Structure Construction	Pumps		1	3.80	84	0.74
Weirs, Sedimentation Basin, and Check Structure Construction	Skid Steer Loaders		1	3.80	65	0.37
Pipeline Installation	Cranes		1	3.30	226	0.29
Pipeline Installation	Skid Steer Loaders		1	4.90	65	0.37
Pipeline Installation	Trenchers		1	4.90	81	0.50
Field Surface Replacement	Graders		1	7.30	175	0.41
Field Surface Replacement	Skid Steer Loaders		1	5.50	65	0.37
Parking Reconstruction	Pavers		1	7.30	126	0.42
Parking Reconstruction	Paving Equipment		1	7.30	131	0.36
Parking Reconstruction	Rollers		1	7.30	81	0.38
Parking Reconstruction	Skid Steer Loaders		1	5.50	65	0.37
Landscape and Stream Restoration	Cement and Mortar Mixers		1	2.40	9	0.56
Landscape and Stream Restoration	Cranes		1	1.40	226	0.29
Landscape and Stream Restoration	Skid Steer Loaders		1	4.80	65	0.37
Ancillary Park Improvements	Cement and Mortar Mixers		1	3.20	9	0.56
Ancillary Park Improvements	Forklifts		1	4.80	89	0.20
Ancillary Park Improvements	Skid Steer Loaders		1	4.80	65	0.37

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 of Existing Parking Lot	3	12.00	0.00	86.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Mobilization, Clearing, Grubbing, and Vegetation Removal	3	20.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

Underground Storage Excavation	7	28.00	0.00	3,009.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Underground Storage Construction and Backfill	6	28.00	22.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Weirs, Sedimentation Basin, and Check Structure Construction	5	16.00	4.00	42.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Pipeline Installation	3	24.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Field Surface Replacement	2	12.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Parking Reconstruction	4	36.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Landscape and Stream Restoration	3	20.00	2.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Ancillary Park Improvements	3	12.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Cleaner Engines for Construction Equipment

Water Exposed Area

3.2 Site Mobilization, Clearing, Grubbing, and Vegetation Removal - 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					
Fugitive Dust					6.40E-04	0	6.40E-04	7.00E-05	0	7.00E-05	0	0	0	0	0	0
Off-Road	0.0128	0.1195	0.161	2.40E-04		5.93E-03	5.93E-03		5.46E-03	5.46E-03	0	20.9906	20.9906	6.79E-03	0	21.1603
Total	**0.0128**	**0.1195**	**0.161**	**2.40E-04**	**6.40E-04**	**5.93E-03**	**6.57E-03**	**7.00E-05**	**5.46E-03**	**5.53E-03**	**0**	**20.9906**	**20.9906**	**6.79E-03**	**0**	**21.1603**

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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vendor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Worker	1.35E-03	8.30E-04	0.012	4.00E-05	5.20E-03	2.00E-05	5.22E-03	1.38E-03	2.00E-05	1.40E-03	0	3.7361	3.7361	9.00E-05	9.00E-05	3.7654
Total	**1.35E-03**	**8.30E-04**	**0.012**	**4.00E-05**	**5.20E-03**	**2.00E-05**	**5.22E-03**	**1.38E-03**	**2.00E-05**	**1.40E-03**	**0**	**3.7361**	**3.7361**	**9.00E-05**	**9.00E-05**	**3.7654**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					2.90E-04	0	2.90E-04	3.00E-05	0	3.00E-05	0	0	0	0	0	0
Off-Road	3.68E-03	0.0443	0.1424	2.40E-04		3.90E-04	3.90E-04		3.90E-04	3.90E-04	0	20.9905	20.9905	6.79E-03	0	21.1603
Total	**3.68E-03**	**0.0443**	**0.1424**	**2.40E-04**	**2.90E-04**	**3.90E-04**	**6.80E-04**	**3.00E-05**	**3.90E-04**	**4.20E-04**	**0**	**20.9905**	**20.9905**	**6.79E-03**	**0**	**21.1603**

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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vendor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Worker	1.35E-03	8.30E-04	0.012	4.00E-05	5.20E-03	2.00E-05	5.22E-03	1.38E-03	2.00E-05	1.40E-03	0	3.7361	3.7361	9.00E-05	9.00E-05	3.7654
Total	**1.35E-03**	**8.30E-04**	**0.012**	**4.00E-05**	**5.20E-03**	**2.00E-05**	**5.22E-03**	**1.38E-03**	**2.00E-05**	**1.40E-03**	**0**	**3.7361**	**3.7361**	**9.00E-05**	**9.00E-05**	**3.7654**

3.3 Demolition of Existing Parking Lot - 2024

Unmitigated Construction On-Site

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not 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	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					7.45E-03	0	7.45E-03	1.13E-03	0	1.13E-03	0	0	0	0	0	0
Off-Road	1.83E-03	0.021	0.0344	5.00E-05		7.40E-04	7.40E-04		6.90E-04	6.90E-04	0	4.63	4.63	1.22E-03	0	4.6605
Total	**1.83E-03**	**0.021**	**0.0344**	**5.00E-05**	**7.45E-03**	**7.40E-04**	**8.19E-03**	**1.13E-03**	**6.90E-04**	**1.82E-03**	**0**	**4.63**	**4.63**	**1.22E-03**	**0**	**4.6605**

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	1.00E-04	6.66E-03	2.27E-03	3.00E-05	7.20E-04	4.00E-05	7.70E-04	2.00E-04	4.00E-05	2.40E-04	0	2.8792	2.8792	3.00E-04	4.60E-04	3.0251
Vendor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Worker	5.30E-04	3.30E-04	4.70E-03	2.00E-05	2.03E-03	1.00E-05	2.04E-03	5.40E-04	1.00E-05	5.50E-04	0	1.4605	1.4605	3.00E-05	4.00E-05	1.4719
Total	**6.30E-04**	**6.99E-03**	**6.97E-03**	**5.00E-05**	**2.75E-03**	**5.00E-05**	**2.81E-03**	**7.40E-04**	**5.00E-05**	**7.90E-04**	**0**	**4.3397**	**4.3397**	**3.30E-04**	**5.00E-04**	**4.497**

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					3.35E-03	0	3.35E-03	5.10E-04	0	5.10E-04	0	0	0	0	0	0
Off-Road	1.13E-03	0.0236	0.0385	5.00E-05		8.00E-05	8.00E-05		8.00E-05	8.00E-05	0	4.63	4.63	1.22E-03	0	4.6605
Total	**1.13E-03**	**0.0236**	**0.0385**	**5.00E-05**	**3.35E-03**	**8.00E-05**	**3.43E-03**	**5.10E-04**	**8.00E-05**	**5.90E-04**	**0**	**4.63**	**4.63**	**1.22E-03**	**0**	**4.6605**

Mitigated Construction Off-Site

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not 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	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.00E-04	6.66E-03	2.27E-03	3.00E-05	7.20E-04	4.00E-05	7.70E-04	2.00E-04	4.00E-05	2.40E-04	0	2.8792	2.8792	3.00E-04	4.60E-04	3.0251
Vendor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Worker	5.30E-04	3.30E-04	4.70E-03	2.00E-05	2.03E-03	1.00E-05	2.04E-03	5.40E-04	1.00E-05	5.50E-04	0	1.4605	1.4605	3.00E-05	4.00E-05	1.4719
Total	**6.30E-04**	**6.99E-03**	**6.97E-03**	**5.00E-05**	**2.75E-03**	**5.00E-05**	**2.81E-03**	**7.40E-04**	**5.00E-05**	**7.90E-04**	**0**	**4.3397**	**4.3397**	**3.30E-04**	**5.00E-04**	**4.497**

3.4 Underground Storage Excavation - 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					
Fugitive Dust					2.00E-03	0	2.00E-03	2.70E-04	0	2.70E-04	0	0	0	0	0	0
Off-Road	0.0212	0.184	0.3492	5.50E-04		8.30E-03	8.30E-03		7.71E-03	7.71E-03	0	47.3054	47.3054	0.0144	0	47.6652
Total	**0.0212**	**0.184**	**0.3492**	**5.50E-04**	**2.00E-03**	**8.30E-03**	**0.0103**	**2.70E-04**	**7.71E-03**	**7.98E-03**	**0**	**47.3054**	**47.3054**	**0.0144**	**0**	**47.6652**

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	2.57E-03	0.1727	0.0589	7.00E-04	0.0187	1.15E-03	0.0199	5.15E-03	1.10E-03	6.25E-03	0	74.7045	74.7045	7.83E-03	0.0121	78.491
Vendor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Worker	1.89E-03	1.17E-03	0.0168	6.00E-05	7.27E-03	3.00E-05	7.31E-03	1.94E-03	3.00E-05	1.97E-03	0	5.2306	5.2306	1.30E-04	1.30E-04	5.2715
Total	**4.46E-03**	**0.1739**	**0.0758**	**7.60E-04**	**0.026**	**1.18E-03**	**0.0272**	**7.09E-03**	**1.13E-03**	**8.22E-03**	**0**	**79.9351**	**79.9351**	**7.96E-03**	**0.0122**	**83.7625**

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					9.00E-04	0	9.00E-04	1.20E-04	0	1.20E-04	0	0	0	0	0	0
Off-Road	9.05E-03	0.0724	0.4018	5.50E-04		1.31E-03	1.31E-03		1.31E-03	1.31E-03	0	47.3054	47.3054	0.0144	0	47.6651
Total	**9.05E-03**	**0.0724**	**0.4018**	**5.50E-04**	**9.00E-04**	**1.31E-03**	**2.21E-03**	**1.20E-04**	**1.31E-03**	**1.43E-03**	**0**	**47.3054**	**47.3054**	**0.0144**	**0**	**47.6651**

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	2.57E-03	0.1727	0.0589	7.00E-04	0.0187	1.15E-03	0.0199	5.15E-03	1.10E-03	6.25E-03	0	74.7045	74.7045	7.83E-03	0.0121	78.491
Vendor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Worker	1.89E-03	1.17E-03	0.0168	6.00E-05	7.27E-03	3.00E-05	7.31E-03	1.94E-03	3.00E-05	1.97E-03	0	5.2306	5.2306	1.30E-04	1.30E-04	5.2715
Total	**4.46E-03**	**0.1739**	**0.0758**	**7.60E-04**	**0.026**	**1.18E-03**	**0.0272**	**7.09E-03**	**1.13E-03**	**8.22E-03**	**0**	**79.9351**	**79.9351**	**7.96E-03**	**0.0122**	**83.7625**

3.4 Underground Storage Excavation - 2025

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					2.00E-03	0	2.00E-03	2.70E-04	0	2.70E-04	0	0	0	0	0	0
Off-Road	6.90E-03	0.0582	0.1214	1.90E-04		2.50E-03	2.50E-03		2.32E-03	2.32E-03	0	16.4887	16.4887	5.01E-03	0	16.614
Total	**6.90E-03**	**0.0582**	**0.1214**	**1.90E-04**	**2.00E-03**	**2.50E-03**	**4.50E-03**	**2.70E-04**	**2.32E-03**	**2.59E-03**	**0**	**16.4887**	**16.4887**	**5.01E-03**	**0**	**16.614**

Twin Pines Initial Study - San Mateo County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

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	8.90E-04	0.0591	0.021	2.40E-04	6.53E-03	4.00E-04	6.93E-03	1.79E-03	3.80E-04	2.18E-03	0	25.502	25.502	2.79E-03	4.12E-03	26.7987
Vendor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Worker	6.30E-04	3.70E-04	5.53E-03	2.00E-05	2.53E-03	1.00E-05	2.55E-03	6.70E-04	1.00E-05	6.80E-04	0	1.7619	1.7619	4.00E-05	4.00E-05	1.7752
Total	**1.52E-03**	**0.0595**	**0.0266**	**2.60E-04**	**9.06E-03**	**4.10E-04**	**9.48E-03**	**2.46E-03**	**3.90E-04**	**2.86E-03**	**0**	**27.2638**	**27.2638**	**2.83E-03**	**4.16E-03**	**28.574**

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					9.00E-04	0	9.00E-04	1.20E-04	0	1.20E-04	0	0	0	0	0	0
Off-Road	3.15E-03	0.0252	0.14	1.90E-04		4.60E-04	4.60E-04		4.60E-04	4.60E-04	0	16.4887	16.4887	5.01E-03	0	16.614
Total	**3.15E-03**	**0.0252**	**0.14**	**1.90E-04**	**9.00E-04**	**4.60E-04**	**1.36E-03**	**1.20E-04**	**4.60E-04**	**5.80E-04**	**0**	**16.4887**	**16.4887**	**5.01E-03**	**0**	**16.614**

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	8.90E-04	0.0591	0.021	2.40E-04	6.53E-03	4.00E-04	6.93E-03	1.79E-03	3.80E-04	2.18E-03	0	25.502	25.502	2.79E-03	4.12E-03	26.7987
Vendor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Worker	6.30E-04	3.70E-04	5.53E-03	2.00E-05	2.53E-03	1.00E-05	2.55E-03	6.70E-04	1.00E-05	6.80E-04	0	1.7619	1.7619	4.00E-05	4.00E-05	1.7752

Total	**1.52E-03**	**0.0595**	**0.0266**	**2.60E-04**	**9.06E-03**	**4.10E-04**	**9.48E-03**	**2.46E-03**	**3.90E-04**	**2.86E-03**	**0**	**27.2638**	**27.2638**	**2.83E-03**	**4.16E-03**	**28.574**

3.5 Underground Storage Construction and Backfill - 2025

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	0.0301	0.2876	0.2908	5.70E-04		0.0124	0.0124		0.0115	0.0115	0	48.9887	48.9887	0.0152	0	49.3689
Total	**0.0301**	**0.2876**	**0.2908**	**5.70E-04**		**0.0124**	**0.0124**		**0.0115**	**0.0115**	**0**	**48.9887**	**48.9887**	**0.0152**	**0**	**49.3689**

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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vendor	1.42E-03	0.0654	0.0239	2.80E-04	9.26E-03	3.50E-04	9.61E-03	2.68E-03	3.30E-04	3.01E-03	0	29.0307	29.0307	1.94E-03	4.29E-03	30.3572
Worker	3.52E-03	2.06E-03	0.031	1.10E-04	0.0142	6.00E-05	0.0143	3.78E-03	6.00E-05	3.84E-03	0	9.8818	9.8818	2.20E-04	2.30E-04	9.9568
Total	**4.94E-03**	**0.0675**	**0.0549**	**3.90E-04**	**0.0235**	**4.10E-04**	**0.0239**	**6.46E-03**	**3.90E-04**	**6.85E-03**	**0**	**38.9124**	**38.9124**	**2.16E-03**	**4.52E-03**	**40.314**

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	0.0101	0.051	0.3376	5.70E-04		1.76E-03	1.76E-03		1.76E-03	1.76E-03	0	48.9886	48.9886	0.0152	0	49.3689
Total	**0.0101**	**0.051**	**0.3376**	**5.70E-04**		**1.76E-03**	**1.76E-03**		**1.76E-03**	**1.76E-03**	**0**	**48.9886**	**48.9886**	**0.0152**	**0**	**49.3689**

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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vendor	1.42E-03	0.0654	0.0239	2.80E-04	9.26E-03	3.50E-04	9.61E-03	2.68E-03	3.30E-04	3.01E-03	0	29.0307	29.0307	1.94E-03	4.29E-03	30.3572
Worker	3.52E-03	2.06E-03	0.031	1.10E-04	0.0142	6.00E-05	0.0143	3.78E-03	6.00E-05	3.84E-03	0	9.8818	9.8818	2.20E-04	2.30E-04	9.9568
Total	**4.94E-03**	**0.0675**	**0.0549**	**3.90E-04**	**0.0235**	**4.10E-04**	**0.0239**	**6.46E-03**	**3.90E-04**	**6.85E-03**	**0**	**38.9124**	**38.9124**	**2.16E-03**	**4.52E-03**	**40.314**

3.6 Weirs, Sedimentation Basin, and Check Structure Construction - 2025

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	3.75E-03	0.0327	0.0502	9.00E-05		1.37E-03	1.37E-03		1.31E-03	1.31E-03	0	7.8342	7.8342	1.69E-03	0	7.8764
Total	**3.75E-03**	**0.0327**	**0.0502**	**9.00E-05**		**1.37E-03**	**1.37E-03**		**1.31E-03**	**1.31E-03**	**0**	**7.8342**	**7.8342**	**1.69E-03**	**0**	**7.8764**

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	5.00E-05	3.19E-03	1.14E-03	1.00E-05	3.50E-04	2.00E-05	3.70E-04	1.00E-04	2.00E-05	1.20E-04	0	1.3774	1.3774	1.50E-04	2.20E-04	1.4475
Vendor	4.00E-05	1.94E-03	7.10E-04	1.00E-05	2.70E-04	1.00E-05	2.80E-04	8.00E-05	1.00E-05	9.00E-05	0	0.8593	0.8593	6.00E-05	1.30E-04	0.8985
Worker	3.30E-04	1.90E-04	2.89E-03	1.00E-05	1.32E-03	1.00E-05	1.33E-03	3.50E-04	1.00E-05	3.60E-04	0	0.9192	0.9192	2.00E-05	2.00E-05	0.9262

Total	**4.20E-04**	**5.32E-03**	**4.74E-03**	**3.00E-05**	**1.94E-03**	**4.00E-05**	**1.98E-03**	**5.30E-04**	**4.00E-05**	**5.70E-04**	**0**	**3.1559**	**3.1559**	**2.30E-04**	**3.70E-04**	**3.2722**

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	1.42E-03	0.0114	0.0588	9.00E-05		2.00E-04	2.00E-04		2.00E-04	2.00E-04	0	7.8342	7.8342	1.69E-03	0	7.8764
Total	**1.42E-03**	**0.0114**	**0.0588**	**9.00E-05**		**2.00E-04**	**2.00E-04**		**2.00E-04**	**2.00E-04**	**0**	**7.8342**	**7.8342**	**1.69E-03**	**0**	**7.8764**

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	5.00E-05	3.19E-03	1.14E-03	1.00E-05	3.50E-04	2.00E-05	3.70E-04	1.00E-04	2.00E-05	1.20E-04	0	1.3774	1.3774	1.50E-04	2.20E-04	1.4475
Vendor	4.00E-05	1.94E-03	7.10E-04	1.00E-05	2.70E-04	1.00E-05	2.80E-04	8.00E-05	1.00E-05	9.00E-05	0	0.8593	0.8593	6.00E-05	1.30E-04	0.8985
Worker	3.30E-04	1.90E-04	2.89E-03	1.00E-05	1.32E-03	1.00E-05	1.33E-03	3.50E-04	1.00E-05	3.60E-04	0	0.9192	0.9192	2.00E-05	2.00E-05	0.9262
Total	**4.20E-04**	**5.32E-03**	**4.74E-03**	**3.00E-05**	**1.94E-03**	**4.00E-05**	**1.98E-03**	**5.30E-04**	**4.00E-05**	**5.70E-04**	**0**	**3.1559**	**3.1559**	**2.30E-04**	**3.70E-04**	**3.2722**

3.7 Pipeline Installation - 2025

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	3.99E-03	0.04	0.035	6.00E-05		2.13E-03	2.13E-03		1.96E-03	1.96E-03	0	5.5536	5.5536	1.80E-03	0	5.5985
Total	**3.99E-03**	**0.04**	**0.035**	**6.00E-05**		**2.13E-03**	**2.13E-03**		**1.96E-03**	**1.96E-03**	**0**	**5.5536**	**5.5536**	**1.80E-03**	**0**	**5.5985**

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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vendor	2.00E-05	1.01E-03	3.70E-04	0	1.40E-04	1.00E-05	1.50E-04	4.00E-05	1.00E-05	5.00E-05	0	0.4501	0.4501	3.00E-05	7.00E-05	0.4707
Worker	5.10E-04	3.00E-04	4.53E-03	2.00E-05	2.08E-03	1.00E-05	2.09E-03	5.50E-04	1.00E-05	5.60E-04	0	1.4445	1.4445	3.00E-05	3.00E-05	1.4555
Total	**5.30E-04**	**1.31E-03**	**4.90E-03**	**2.00E-05**	**2.22E-03**	**2.00E-05**	**2.24E-03**	**5.90E-04**	**2.00E-05**	**6.10E-04**	**0**	**1.8946**	**1.8946**	**6.00E-05**	**1.00E-04**	**1.9261**

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	9.50E-04	0.0105	0.0399	6.00E-05		1.00E-04	1.00E-04		1.00E-04	1.00E-04	0	5.5536	5.5536	1.80E-03	0	5.5985
Total	**9.50E-04**	**0.0105**	**0.0399**	**6.00E-05**		**1.00E-04**	**1.00E-04**		**1.00E-04**	**1.00E-04**	**0**	**5.5536**	**5.5536**	**1.80E-03**	**0**	**5.5985**

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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vendor	2.00E-05	1.01E-03	3.70E-04	0	1.40E-04	1.00E-05	1.50E-04	4.00E-05	1.00E-05	5.00E-05	0	0.4501	0.4501	3.00E-05	7.00E-05	0.4707
Worker	5.10E-04	3.00E-04	4.53E-03	2.00E-05	2.08E-03	1.00E-05	2.09E-03	5.50E-04	1.00E-05	5.60E-04	0	1.4445	1.4445	3.00E-05	3.00E-05	1.4555
Total	**5.30E-04**	**1.31E-03**	**4.90E-03**	**2.00E-05**	**2.22E-03**	**2.00E-05**	**2.24E-03**	**5.90E-04**	**2.00E-05**	**6.10E-04**	**0**	**1.8946**	**1.8946**	**6.00E-05**	**1.00E-04**	**1.9261**

3.8 Field Surface Replacement - 2025

Twin Pines Initial Study - San Mateo County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

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	4.62E-03	0.0412	0.0538	8.00E-05		2.11E-03	2.11E-03		1.94E-03	1.94E-03	0	6.8893	6.8893	2.23E-03	0	6.945
Total	**4.62E-03**	**0.0412**	**0.0538**	**8.00E-05**		**2.11E-03**	**2.11E-03**		**1.94E-03**	**1.94E-03**	**0**	**6.8893**	**6.8893**	**2.23E-03**	**0**	**6.945**

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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vendor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Worker	2.60E-04	1.50E-04	2.27E-03	1.00E-05	1.04E-03	0	1.04E-03	2.80E-04	0	2.80E-04	0	0.7223	0.7223	2.00E-05	2.00E-05	0.7277
Total	**2.60E-04**	**1.50E-04**	**2.27E-03**	**1.00E-05**	**1.04E-03**	**0**	**1.04E-03**	**2.80E-04**	**0**	**2.80E-04**	**0**	**0.7223**	**0.7223**	**2.00E-05**	**2.00E-05**	**0.7277**

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	1.15E-03	0.0121	0.0398	8.00E-05		1.30E-04	1.30E-04		1.30E-04	1.30E-04	0	6.8892	6.8892	2.23E-03	0	6.945
Total	**1.15E-03**	**0.0121**	**0.0398**	**8.00E-05**		**1.30E-04**	**1.30E-04**		**1.30E-04**	**1.30E-04**	**0**	**6.8892**	**6.8892**	**2.23E-03**	**0**	**6.945**

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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vendor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Worker	2.60E-04	1.50E-04	2.27E-03	1.00E-05	1.04E-03	0	1.04E-03	2.80E-04	0	2.80E-04	0	0.7223	0.7223	2.00E-05	2.00E-05	0.7277
Total	**2.60E-04**	**1.50E-04**	**2.27E-03**	**1.00E-05**	**1.04E-03**	**0**	**1.04E-03**	**2.80E-04**	**0**	**2.80E-04**	**0**	**0.7223**	**0.7223**	**2.00E-05**	**2.00E-05**	**0.7277**

3.9 Parking Reconstruction - 2025

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	9.99E-03	0.0973	0.1655	2.60E-04		4.53E-03	4.53E-03		4.17E-03	4.17E-03	0	22.5936	22.5936	7.31E-03	0	22.7762
Paving	1.57E-03					0	0		0	0	0	0	0	0	0	0
Total	**0.0116**	**0.0973**	**0.1655**	**2.60E-04**		**4.53E-03**	**4.53E-03**		**4.17E-03**	**4.17E-03**	**0**	**22.5936**	**22.5936**	**7.31E-03**	**0**	**22.7762**

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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vendor	4.00E-05	2.03E-03	7.40E-04	1.00E-05	2.90E-04	1.00E-05	3.00E-04	8.00E-05	1.00E-05	9.00E-05	0	0.9002	0.9002	6.00E-05	1.30E-04	0.9413
Worker	1.54E-03	9.10E-04	0.0136	5.00E-05	6.23E-03	3.00E-05	6.26E-03	1.66E-03	3.00E-05	1.68E-03	0	4.3335	4.3335	1.00E-04	1.00E-04	4.3664
Total	**1.58E-03**	**2.94E-03**	**0.0143**	**6.00E-05**	**6.52E-03**	**4.00E-05**	**6.56E-03**	**1.74E-03**	**4.00E-05**	**1.77E-03**	**0**	**5.2337**	**5.2337**	**1.60E-04**	**2.30E-04**	**5.3077**

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	3.55E-03	0.0296	0.1952	2.60E-04		4.20E-04	4.20E-04		4.20E-04	4.20E-04	0	22.5935	22.5935	7.31E-03	0	22.7762
Paving	1.57E-03					0	0		0	0	0	0	0	0	0	0
Total	**5.12E-03**	**0.0296**	**0.1952**	**2.60E-04**		**4.20E-04**	**4.20E-04**		**4.20E-04**	**4.20E-04**	**0**	**22.5935**	**22.5935**	**7.31E-03**	**0**	**22.7762**

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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vendor	4.00E-05	2.03E-03	7.40E-04	1.00E-05	2.90E-04	1.00E-05	3.00E-04	8.00E-05	1.00E-05	9.00E-05	0	0.9002	0.9002	6.00E-05	1.30E-04	0.9413
Worker	1.54E-03	9.10E-04	0.0136	5.00E-05	6.23E-03	3.00E-05	6.26E-03	1.66E-03	3.00E-05	1.68E-03	0	4.3335	4.3335	1.00E-04	1.00E-04	4.3664
Total	**1.58E-03**	**2.94E-03**	**0.0143**	**6.00E-05**	**6.52E-03**	**4.00E-05**	**6.56E-03**	**1.74E-03**	**4.00E-05**	**1.77E-03**	**0**	**5.2337**	**5.2337**	**1.60E-04**	**2.30E-04**	**5.3077**

3.10 Landscape and Stream Restoration - 2026

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	2.24E-03	0.0237	0.0256	5.00E-05		8.80E-04	8.80E-04		8.10E-04	8.10E-04	0	4.403	4.403	1.36E-03	0	4.437
Total	**2.24E-03**	**0.0237**	**0.0256**	**5.00E-05**		**8.80E-04**	**8.80E-04**		**8.10E-04**	**8.10E-04**	**0**	**4.403**	**4.403**	**1.36E-03**	**0**	**4.437**

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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vendor	4.00E-05	1.91E-03	7.10E-04	1.00E-05	2.70E-04	1.00E-05	2.80E-04	8.00E-05	1.00E-05	9.00E-05	0	0.8426	0.8426	6.00E-05	1.20E-04	0.8811
Worker	7.90E-04	4.40E-04	6.86E-03	2.00E-05	3.31E-03	1.00E-05	3.32E-03	8.80E-04	1.00E-05	8.90E-04	0	2.2318	2.2318	5.00E-05	5.00E-05	2.2483
Total	**8.30E-04**	**2.35E-03**	**7.57E-03**	**3.00E-05**	**3.58E-03**	**2.00E-05**	**3.60E-03**	**9.60E-04**	**2.00E-05**	**9.80E-04**	**0**	**3.0743**	**3.0743**	**1.10E-04**	**1.70E-04**	**3.1294**

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	1.27E-03	0.0181	0.0311	5.00E-05		1.70E-04	1.70E-04		1.70E-04	1.70E-04	0	4.403	4.403	1.36E-03	0	4.437
Total	**1.27E-03**	**0.0181**	**0.0311**	**5.00E-05**		**1.70E-04**	**1.70E-04**		**1.70E-04**	**1.70E-04**	**0**	**4.403**	**4.403**	**1.36E-03**	**0**	**4.437**

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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vendor	4.00E-05	1.91E-03	7.10E-04	1.00E-05	2.70E-04	1.00E-05	2.80E-04	8.00E-05	1.00E-05	9.00E-05	0	0.8426	0.8426	6.00E-05	1.20E-04	0.8811
Worker	7.90E-04	4.40E-04	6.86E-03	2.00E-05	3.31E-03	1.00E-05	3.32E-03	8.80E-04	1.00E-05	8.90E-04	0	2.2318	2.2318	5.00E-05	5.00E-05	2.2483
Total	**8.30E-04**	**2.35E-03**	**7.57E-03**	**3.00E-05**	**3.58E-03**	**2.00E-05**	**3.60E-03**	**9.60E-04**	**2.00E-05**	**9.80E-04**	**0**	**3.0743**	**3.0743**	**1.10E-04**	**1.70E-04**	**3.1294**

3.11 Ancillary Park Improvements - 2026

Unmitigated Construction On-Site

Date: 2/21/2023 10:14 AM

Twin Pines Initial Study - San Mateo County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not 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	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	2.45E-03	0.0245	0.0359	5.00E-05		1.02E-03	1.02E-03		9.50E-04	9.50E-04	0	4.5766	4.5766	1.39E-03	0	4.6114
Total	**2.45E-03**	**0.0245**	**0.0359**	**5.00E-05**		**1.02E-03**	**1.02E-03**		**9.50E-04**	**9.50E-04**	**0**	**4.5766**	**4.5766**	**1.39E-03**	**0**	**4.6114**

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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vendor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Worker	4.90E-04	2.80E-04	4.31E-03	2.00E-05	2.08E-03	1.00E-05	2.09E-03	5.50E-04	1.00E-05	5.60E-04	0	1.4028	1.4028	3.00E-05	3.00E-05	1.4132
Total	**4.90E-04**	**2.80E-04**	**4.31E-03**	**2.00E-05**	**2.08E-03**	**1.00E-05**	**2.09E-03**	**5.50E-04**	**1.00E-05**	**5.60E-04**	**0**	**1.4028**	**1.4028**	**3.00E-05**	**3.00E-05**	**1.4132**

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	1.44E-03	0.0197	0.0388	5.00E-05		2.00E-04	2.00E-04		2.00E-04	2.00E-04	0	4.5766	4.5766	1.39E-03	0	4.6114
Total	**1.44E-03**	**0.0197**	**0.0388**	**5.00E-05**		**2.00E-04**	**2.00E-04**		**2.00E-04**	**2.00E-04**	**0**	**4.5766**	**4.5766**	**1.39E-03**	**0**	**4.6114**

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					

Twin Pines Initial Study - San Mateo County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Hauling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Vendor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Worker	4.90E-04	2.80E-04	4.31E-03	2.00E-05	2.08E-03	1.00E-05	2.09E-03	5.50E-04	1.00E-05	5.60E-04	0	1.4028	1.4028	3.00E-05	3.00E-05	1.4132
Total	**4.90E-04**	**2.80E-04**	**4.31E-03**	**2.00E-05**	**2.08E-03**	**1.00E-05**	**2.09E-03**	**5.50E-04**	**1.00E-05**	**5.60E-04**	**0**	**1.4028**	**1.4028**	**3.00E-05**	**3.00E-05**	**1.4132**

AERMOD (	2): C:\Lakes\	ERMOD Vi	in Pines Co	structio	n HRA\T	win Pines	Construc	2/21/2023
AERMET (	34):							9:47:07
MODELING	IONS USED: F	gDFAULT (	ELEV FLGP	OL URBA	N			
PLOT	FILE OF ANNU	VALUES AV	GED ACRO	5 YEARS	FOR SO	URCE GRO	: PAREA1	
FOR	A TOTAL OF	2 RECEPTORS.						
FORM	AT: (3(1X,F13.	),3(1X,F8.2	2X,A6,2X,A	2X,I8.8,	2X,A8)			
X	Y	AVERAGE (	ZELEV	ZHILL	ZFLAG	AVE	GRP	NUM YRS
563701.3	4152141.57	0.51003	109.85	172.72	1.8	ANNUAL	PAREA1	5
563721.3	4152141.57	0.57331	109.69	172.72	1.8	ANNUAL	PAREA1	5
563741.3	4152141.57	0.63914	109.3	172.72	1.8	ANNUAL	PAREA1	5
563761.3	4152141.57	0.70326	109.37	172.72	1.8	ANNUAL	PAREA1	5
563781.3	4152141.57	0.76638	109.05	172.72	1.8	ANNUAL	PAREA1	5
563801.3	4152141.57	0.82585	108.26	172.72	1.8	ANNUAL	PAREA1	5
563821.3	4152141.57	0.88466	105.15	172.72	1.8	ANNUAL	PAREA1	5
563841.3	4152141.57	0.93329	101.62	172.72	1.8	ANNUAL	PAREA1	5
563861.3	4152141.57	0.9707	97.89	172.72	1.8	ANNUAL	PAREA1	5
563881.3	4152141.57	1.00436	92.98	172.72	1.8	ANNUAL	PAREA1	5
563901.3	4152141.57	1.03224	87.93	172.72	1.8	ANNUAL	PAREA1	5
563921.3	4152141.57	1.05266	83.36	172.72	1.8	ANNUAL	PAREA1	5
563941.3	4152141.57	1.06077	79.99	172.72	1.8	ANNUAL	PAREA1	5
563961.3	4152141.57	1.06671	76.43	172.72	1.8	ANNUAL	PAREA1	5
563981.3	4152141.57	1.08163	71.4	172.72	1.8	ANNUAL	PAREA1	5
564001.3	4152141.57	1.1023	65.42	172.72	1.8	ANNUAL	PAREA1	5
564021.3	4152141.57	1.12038	59.29	172.72	1.8	ANNUAL	PAREA1	5
564041.3	4152141.57	1.1456	51.75	172.72	1.8	ANNUAL	PAREA1	5
564061.3	4152141.57	1.15146	45.71	172.72	1.8	ANNUAL	PAREA1	5
564081.3	4152141.57	1.08384	46.87	172.72	1.8	ANNUAL	PAREA1	5
564101.3	4152141.57	1.03191	45.75	172.72	1.8	ANNUAL	PAREA1	5
564121.3	4152141.57	1.01209	41.14	172.72	1.8	ANNUAL	PAREA1	5
564141.3	4152141.57	0.96218	40.08	172.72	1.8	ANNUAL	PAREA1	5
564161.3	4152141.57	0.87675	43.57	172.72	1.8	ANNUAL	PAREA1	5
564181.3	4152141.57	0.80722	46.85	172.72	1.8	ANNUAL	PAREA1	5
563741.3	4152161.57	0.68328	101.68	172.72	1.8	ANNUAL	PAREA1	5
563761.3	4152161.57	0.75534	102.43	172.72	1.8	ANNUAL	PAREA1	5
563781.3	4152161.57	0.82341	103.61	172.72	1.8	ANNUAL	PAREA1	5
563801.3	4152161.57	0.89074	103.71	172.72	1.8	ANNUAL	PAREA1	5
563821.3	4152161.57	0.95719	101.88	172.72	1.8	ANNUAL	PAREA1	5
563841.3	4152161.57	1.02283	97.6	172.72	1.8	ANNUAL	PAREA1	5
563861.3	4152161.57	1.07039	94.09	172.72	1.8	ANNUAL	PAREA1	5
563881.3	4152161.57	1.11239	89.38	172.72	1.8	ANNUAL	PAREA1	5
563901.3	4152161.57	1.14489	84.72	172.72	1.8	ANNUAL	PAREA1	5
563921.3	4152161.57	1.16398	80.93	172.72	1.8	ANNUAL	PAREA1	5
563941.3	4152161.57	1.17443	77.51	172.72	1.8	ANNUAL	PAREA1	5
563961.3	4152161.57	1.18042	74.11	172.72	1.8	ANNUAL	PAREA1	5
563981.3	4152161.57	1.19171	69.76	172.72	1.8	ANNUAL	PAREA1	5
564001.3	4152161.57	1.21667	63.63	172.72	1.8	ANNUAL	PAREA1	5
564021.3	4152161.57	1.22748	58.36	172.72	1.8	ANNUAL	PAREA1	5
564041.3	4152161.57	1.24509	51.79	172.72	1.8	ANNUAL	PAREA1	5
564061.3	4152161.57	1.26127	44.64	172.72	1.8	ANNUAL	PAREA1	5
564081.3	4152161.57	1.2121	42.84	172.72	1.8	ANNUAL	PAREA1	5
564101.3	4152161.57	1.15188	41.65	172.72	1.8	ANNUAL	PAREA1	5
564121.3	4152161.57	1.10892	39.12	172.72	1.8	ANNUAL	PAREA1	5
564141.3	4152161.57	1.04325	38.9	172.72	1.8	ANNUAL	PAREA1	5
564161.3	4152161.57	0.94681	42.47	172.72	1.8	ANNUAL	PAREA1	5
564181.3	4152161.57	0.87266	45.49	172.72	1.8	ANNUAL	PAREA1	5
563741.3	4152181.57	0.73133	94.28	172.72	1.8	ANNUAL	PAREA1	5
563761.3	4152181.57	0.81399	95.38	172.72	1.8	ANNUAL	PAREA1	5
563781.3	4152181.57	0.88994	97.45	172.72	1.8	ANNUAL	PAREA1	5
563801.3	4152181.57	0.9649	98.66	172.72	1.8	ANNUAL	PAREA1	5
563821.3	4152181.57	1.0492	96.41	172.72	1.8	ANNUAL	PAREA1	5
563841.3	4152181.57	1.13101	92.5	172.72	1.8	ANNUAL	PAREA1	5
563861.3	4152181.57	1.18832	89.82	172.72	1.8	ANNUAL	PAREA1	5
563881.3	4152181.57	1.24007	85.54	172.72	1.8	ANNUAL	PAREA1	5
563901.3	4152181.57	1.27952	81.19	172.72	1.8	ANNUAL	PAREA1	5
563921.3	4152181.57	1.30148	77.69	172.72	1.8	ANNUAL	PAREA1	5
563941.3	4152181.57	1.31046	74.72	172.72	1.8	ANNUAL	PAREA1	5
563961.3	4152181.57	1.31558	71.55	172.72	1.8	ANNUAL	PAREA1	5
563981.3	4152181.57	1.34031	66.19	172.72	1.8	ANNUAL	PAREA1	5
564001.3	4152181.57	1.36542	60.39	172.72	1.8	ANNUAL	PAREA1	5
564021.3	4152181.57	1.36177	56.35	172.72	1.8	ANNUAL	PAREA1	5
564041.3	4152181.57	1.37638	50.12	172.72	1.8	ANNUAL	PAREA1	5
564061.3	4152181.57	1.38163	43.86	172.72	1.8	ANNUAL	PAREA1	5
564081.3	4152181.57	1.35768	39.54	172.72	1.8	ANNUAL	PAREA1	5
564101.3	4152181.57	1.27911	38.89	172.72	1.8	ANNUAL	PAREA1	5
564121.3	4152181.57	1.20367	38.3	172.72	1.8	ANNUAL	PAREA1	5
564141.3	4152181.57	1.11272	39.48	172.72	1.8	ANNUAL	PAREA1	5
564161.3	4152181.57	1.02311	41.74	172.72	1.8	ANNUAL	PAREA1	5
564181.3	4152181.57	0.94604	44.36	172.72	1.8	ANNUAL	PAREA1	5
563841.3	4152201.57	1.2468	88.51	172.72	1.8	ANNUAL	PAREA1	5
563861.3	4152201.57	1.31975	86.18	172.72	1.8	ANNUAL	PAREA1	5
563881.3	4152201.57	1.39519	81.17	172.72	1.8	ANNUAL	PAREA1	5
563901.3	4152201.57	1.44885	76.75	172.72	1.8	ANNUAL	PAREA1	5
563921.3	4152201.57	1.48008	73.16	172.72	1.8	ANNUAL	PAREA1	5
563941.3	4152201.57	1.48306	70.98	172.72	1.8	ANNUAL	PAREA1	5
563961.3	4152201.57	1.50495	66.7	172.72	1.8	ANNUAL	PAREA1	5
563981.3	4152201.57	1.54159	60.97	172.72	1.8	ANNUAL	PAREA1	5
564001.3	4152201.57	1.54765	56.78	172.72	1.8	ANNUAL	PAREA1	5

AERMOD (	2): C:\Lake	ERMOD Vi	in Pines Co	structio	n HRA\T	win Pines	Construc	2/21/2023
AERMET (	34):							9:47:07
MODELING	IONS USED	gDFAULT (	ELEV FLGP	OL URBA	N			
PLOT	FILE OF AN	VALUES AV	GED ACRO	5 YEARS	FOR SO	URCE GRO	: ARLN1	
FOR	A TOTAL O	2 RECEPTORS.						
FORM	AT: (3(1X,F	),3(1X,F8.2	2X,A6,2X,A	2X,I8.8,	2X,A8)			
X	Y	AVERAGE (	ZELEV	ZHILL	ZFLAG	AVE	GRP	NUM YRS
563701.3	4152142	1.50454	109.85	172.72	1.8	ANNUAL	ARLN1	5
563721.3	4152142	1.48622	109.69	172.72	1.8	ANNUAL	ARLN1	5
563741.3	4152142	1.45457	109.3	172.72	1.8	ANNUAL	ARLN1	5
563761.3	4152142	1.40498	109.37	172.72	1.8	ANNUAL	ARLN1	5
563781.3	4152142	1.35264	109.05	172.72	1.8	ANNUAL	ARLN1	5
563801.3	4152142	1.31438	108.26	172.72	1.8	ANNUAL	ARLN1	5
563821.3	4152142	1.29145	105.15	172.72	1.8	ANNUAL	ARLN1	5
563841.3	4152142	1.27017	101.62	172.72	1.8	ANNUAL	ARLN1	5
563861.3	4152142	1.24924	97.89	172.72	1.8	ANNUAL	ARLN1	5
563881.3	4152142	1.23657	92.98	172.72	1.8	ANNUAL	ARLN1	5
563901.3	4152142	1.22897	87.93	172.72	1.8	ANNUAL	ARLN1	5
563921.3	4152142	1.21995	83.36	172.72	1.8	ANNUAL	ARLN1	5
563941.3	4152142	1.2016	79.99	172.72	1.8	ANNUAL	ARLN1	5
563961.3	4152142	1.18318	76.43	172.72	1.8	ANNUAL	ARLN1	5
563981.3	4152142	1.17249	71.4	172.72	1.8	ANNUAL	ARLN1	5
564001.3	4152142	1.16586	65.42	172.72	1.8	ANNUAL	ARLN1	5
564021.3	4152142	1.15769	59.29	172.72	1.8	ANNUAL	ARLN1	5
564041.3	4152142	1.15965	51.75	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152142	1.16017	45.71	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152142	1.09816	46.87	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152142	1.0604	45.75	172.72	1.8	ANNUAL	ARLN1	5
564121.3	4152142	1.06186	41.14	172.72	1.8	ANNUAL	ARLN1	5
564141.3	4152142	1.02822	40.08	172.72	1.8	ANNUAL	ARLN1	5
564161.3	4152142	0.94821	43.57	172.72	1.8	ANNUAL	ARLN1	5
564181.3	4152142	0.88134	46.85	172.72	1.8	ANNUAL	ARLN1	5
563741.3	4152162	1.63056	101.68	172.72	1.8	ANNUAL	ARLN1	5
563761.3	4152162	1.56699	102.43	172.72	1.8	ANNUAL	ARLN1	5
563781.3	4152162	1.49455	103.61	172.72	1.8	ANNUAL	ARLN1	5
563801.3	4152162	1.44457	103.71	172.72	1.8	ANNUAL	ARLN1	5
563821.3	4152162	1.41073	101.88	172.72	1.8	ANNUAL	ARLN1	5
563841.3	4152162	1.39117	97.6	172.72	1.8	ANNUAL	ARLN1	5
563861.3	4152162	1.36484	94.09	172.72	1.8	ANNUAL	ARLN1	5
563881.3	4152162	1.34965	89.38	172.72	1.8	ANNUAL	ARLN1	5
563901.3	4152162	1.33834	84.72	172.72	1.8	ANNUAL	ARLN1	5
563921.3	4152162	1.3209	80.93	172.72	1.8	ANNUAL	ARLN1	5
563941.3	4152162	1.29992	77.51	172.72	1.8	ANNUAL	ARLN1	5
563961.3	4152162	1.27624	74.11	172.72	1.8	ANNUAL	ARLN1	5
563981.3	4152162	1.25758	69.76	172.72	1.8	ANNUAL	ARLN1	5
564001.3	4152162	1.25118	63.63	172.72	1.8	ANNUAL	ARLN1	5
564021.3	4152162	1.23505	58.36	172.72	1.8	ANNUAL	ARLN1	5
564041.3	4152162	1.22905	51.79	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152162	1.23989	44.64	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152162	1.20374	42.84	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152162	1.16329	41.65	172.72	1.8	ANNUAL	ARLN1	5
564121.3	4152162	1.14269	39.12	172.72	1.8	ANNUAL	ARLN1	5
564141.3	4152162	1.09386	38.9	172.72	1.8	ANNUAL	ARLN1	5
564161.3	4152162	1.00432	42.47	172.72	1.8	ANNUAL	ARLN1	5
564181.3	4152162	0.93212	45.49	172.72	1.8	ANNUAL	ARLN1	5
563741.3	4152182	1.83803	94.28	172.72	1.8	ANNUAL	ARLN1	5
563761.3	4152182	1.76179	95.38	172.72	1.8	ANNUAL	ARLN1	5
563781.3	4152182	1.67055	97.45	172.72	1.8	ANNUAL	ARLN1	5
563801.3	4152182	1.60261	98.66	172.72	1.8	ANNUAL	ARLN1	5
563821.3	4152182	1.56528	96.41	172.72	1.8	ANNUAL	ARLN1	5
563841.3	4152182	1.53934	92.5	172.72	1.8	ANNUAL	ARLN1	5
563861.3	4152182	1.50262	89.82	172.72	1.8	ANNUAL	ARLN1	5
563881.3	4152182	1.4824	85.54	172.72	1.8	ANNUAL	ARLN1	5
563901.3	4152182	1.46541	81.19	172.72	1.8	ANNUAL	ARLN1	5
563921.3	4152182	1.44098	77.69	172.72	1.8	ANNUAL	ARLN1	5
563941.3	4152182	1.41125	74.72	172.72	1.8	ANNUAL	ARLN1	5
563961.3	4152182	1.38068	71.55	172.72	1.8	ANNUAL	ARLN1	5
563981.3	4152182	1.36886	66.19	172.72	1.8	ANNUAL	ARLN1	5
564001.3	4152182	1.35823	60.39	172.72	1.8	ANNUAL	ARLN1	5
564021.3	4152182	1.32852	56.35	172.72	1.8	ANNUAL	ARLN1	5
564041.3	4152182	1.31986	50.12	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152182	1.32327	43.86	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152182	1.31889	39.54	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152182	1.26534	38.89	172.72	1.8	ANNUAL	ARLN1	5
564121.3	4152182	1.21354	38.3	172.72	1.8	ANNUAL	ARLN1	5
564141.3	4152182	1.14013	39.48	172.72	1.8	ANNUAL	ARLN1	5
564161.3	4152182	1.05972	41.74	172.72	1.8	ANNUAL	ARLN1	5
564181.3	4152182	0.98411	44.36	172.72	1.8	ANNUAL	ARLN1	5
563841.3	4152202	1.7028	88.51	172.72	1.8	ANNUAL	ARLN1	5
563861.3	4152202	1.65633	86.18	172.72	1.8	ANNUAL	ARLN1	5
563881.3	4152202	1.6401	81.17	172.72	1.8	ANNUAL	ARLN1	5
563901.3	4152202	1.61935	76.75	172.72	1.8	ANNUAL	ARLN1	5
563921.3	4152202	1.59136	73.16	172.72	1.8	ANNUAL	ARLN1	5
563941.3	4152202	1.54665	70.98	172.72	1.8	ANNUAL	ARLN1	5
563961.3	4152202	1.5235	66.7	172.72	1.8	ANNUAL	ARLN1	5
563981.3	4152202	1.51381	60.97	172.72	1.8	ANNUAL	ARLN1	5
564001.3	4152202	1.4832	56.78	172.72	1.8	ANNUAL	ARLN1	5

564021.3	4152201.57	1.55447	51.86	172.72	1.8	ANNUAL	PAREA1	5	564021.3	4152202	1.45885	51.86	172.72	1.8	ANNUAL	ARLN1	5
564041.3	4152201.57	1.55061	46.88	172.72	1.8	ANNUAL	PAREA1	5	564041.3	4152202	1.43906	46.88	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152201.57	1.52498	42.6	172.72	1.8	ANNUAL	PAREA1	5	564061.3	4152202	1.4206	42.6	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152201.57	1.48171	39.06	172.72	1.8	ANNUAL	PAREA1	5	564081.3	4152202	1.40203	39.06	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152201.57	1.40957	37.3	172.72	1.8	ANNUAL	PAREA1	5	564101.3	4152202	1.35998	37.3	172.72	1.8	ANNUAL	ARLN1	5
564121.3	4152201.57	1.30934	37.58	172.72	1.8	ANNUAL	PAREA1	5	564121.3	4152202	1.2875	37.58	172.72	1.8	ANNUAL	ARLN1	5
564141.3	4152201.57	1.20549	38.97	172.72	1.8	ANNUAL	PAREA1	5	564141.3	4152202	1.20353	38.97	172.72	1.8	ANNUAL	ARLN1	5
564161.3	4152201.57	1.12526	39.79	172.72	1.8	ANNUAL	PAREA1	5	564161.3	4152202	1.13303	39.79	172.72	1.8	ANNUAL	ARLN1	5
564181.3	4152201.57	1.03143	43	172.72	1.8	ANNUAL	PAREA1	5	564181.3	4152202	1.04193	43	172.72	1.8	ANNUAL	ARLN1	5
563841.3	4152221.57	1.38238	84.11	172.72	1.8	ANNUAL	PAREA1	5	563841.3	4152222	1.89854	84.11	172.72	1.8	ANNUAL	ARLN1	5
563861.3	4152221.57	1.48514	81.23	172.72	1.8	ANNUAL	PAREA1	5	563861.3	4152222	1.8487	81.23	172.72	1.8	ANNUAL	ARLN1	5
563881.3	4152221.57	1.58547	76.35	172.72	1.8	ANNUAL	PAREA1	5	563881.3	4152222	1.82732	76.35	172.72	1.8	ANNUAL	ARLN1	5
563901.3	4152221.57	1.66226	71.7	172.72	1.8	ANNUAL	PAREA1	5	563901.3	4152222	1.80661	71.7	172.72	1.8	ANNUAL	ARLN1	5
563921.3	4152221.57	1.71673	67.43	172.72	1.8	ANNUAL	PAREA1	5	563921.3	4152222	1.78488	67.43	172.72	1.8	ANNUAL	ARLN1	5
563941.3	4152221.57	1.73871	64.36	172.72	1.8	ANNUAL	PAREA1	5	563941.3	4152222	1.74371	64.36	172.72	1.8	ANNUAL	ARLN1	5
563961.3	4152221.57	1.76363	60.45	172.72	1.8	ANNUAL	PAREA1	5	563961.3	4152222	1.70997	60.45	172.72	1.8	ANNUAL	ARLN1	5
563981.3	4152221.57	1.78133	56.35	172.72	1.8	ANNUAL	PAREA1	5	563981.3	4152222	1.67542	56.35	172.72	1.8	ANNUAL	ARLN1	5
564001.3	4152221.57	1.80594	51.16	172.72	1.8	ANNUAL	PAREA1	5	564001.3	4152222	1.65226	51.16	172.72	1.8	ANNUAL	ARLN1	5
564021.3	4152221.57	1.80672	46.49	172.72	1.8	ANNUAL	PAREA1	5	564021.3	4152222	1.62379	46.49	172.72	1.8	ANNUAL	ARLN1	5
564041.3	4152221.57	1.76589	43.34	172.72	1.8	ANNUAL	PAREA1	5	564041.3	4152222	1.58068	43.34	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152221.57	1.63182	38.06	172.72	1.8	ANNUAL	PAREA1	5	564081.3	4152222	1.5002	38.06	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152221.57	1.54184	36.63	172.72	1.8	ANNUAL	PAREA1	5	564101.3	4152222	1.44615	36.63	172.72	1.8	ANNUAL	ARLN1	5
564121.3	4152221.57	1.43953	36.36	172.72	1.8	ANNUAL	PAREA1	5	564121.3	4152222	1.37505	36.36	172.72	1.8	ANNUAL	ARLN1	5
564141.3	4152221.57	1.33802	36.88	172.72	1.8	ANNUAL	PAREA1	5	564141.3	4152222	1.29504	36.88	172.72	1.8	ANNUAL	ARLN1	5
564161.3	4152221.57	1.23784	38.3	172.72	1.8	ANNUAL	PAREA1	5	564161.3	4152222	1.20703	38.3	172.72	1.8	ANNUAL	ARLN1	5
564181.3	4152221.57	1.13174	41.2	172.72	1.8	ANNUAL	PAREA1	5	564181.3	4152222	1.10942	41.2	172.72	1.8	ANNUAL	ARLN1	5
563821.3	4152241.57	1.4345	77.83	172.72	1.8	ANNUAL	PAREA1	5	563821.3	4152242	2.26434	77.83	172.72	1.8	ANNUAL	ARLN1	5
563841.3	4152241.57	1.55039	78.65	172.72	1.8	ANNUAL	PAREA1	5	563841.3	4152242	2.14283	78.65	172.72	1.8	ANNUAL	ARLN1	5
563861.3	4152241.57	1.66422	77.58	172.72	1.8	ANNUAL	PAREA1	5	563861.3	4152242	2.05253	77.58	172.72	1.8	ANNUAL	ARLN1	5
563881.3	4152241.57	1.77524	74.23	172.72	1.8	ANNUAL	PAREA1	5	563881.3	4152242	2.00162	74.23	172.72	1.8	ANNUAL	ARLN1	5
563901.3	4152241.57	1.86789	70.01	172.72	1.8	ANNUAL	PAREA1	5	563901.3	4152242	1.97048	70.01	172.72	1.8	ANNUAL	ARLN1	5
563921.3	4152241.57	1.98613	63.22	172.72	1.8	ANNUAL	PAREA1	5	563921.3	4152242	1.99064	63.22	172.72	1.8	ANNUAL	ARLN1	5
563941.3	4152241.57	2.04184	59.01	172.72	1.8	ANNUAL	PAREA1	5	563941.3	4152242	1.96028	59.01	172.72	1.8	ANNUAL	ARLN1	5
563961.3	4152241.57	2.07007	55.4	172.72	1.8	ANNUAL	PAREA1	5	563961.3	4152242	1.91316	55.4	172.72	1.8	ANNUAL	ARLN1	5
563981.3	4152241.57	2.12946	49.74	172.72	1.8	ANNUAL	PAREA1	5	563981.3	4152242	1.89654	49.74	172.72	1.8	ANNUAL	ARLN1	5
564001.3	4152241.57	2.14777	45.02	172.72	1.8	ANNUAL	PAREA1	5	564001.3	4152242	1.86449	45.02	172.72	1.8	ANNUAL	ARLN1	5
564021.3	4152241.57	2.10596	42.06	172.72	1.8	ANNUAL	PAREA1	5	564021.3	4152242	1.80795	42.06	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152241.57	1.93333	37.81	172.72	1.8	ANNUAL	PAREA1	5	564061.3	4152242	1.68624	37.81	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152241.57	1.85057	35.26	172.72	1.8	ANNUAL	PAREA1	5	564081.3	4152242	1.64381	35.26	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152241.57	1.75361	33.62	172.72	1.8	ANNUAL	PAREA1	5	564101.3	4152242	1.58583	33.62	172.72	1.8	ANNUAL	ARLN1	5
564121.3	4152241.57	1.62056	33.96	172.72	1.8	ANNUAL	PAREA1	5	564121.3	4152242	1.49193	33.96	172.72	1.8	ANNUAL	ARLN1	5
564141.3	4152241.57	1.4831	35.41	172.72	1.8	ANNUAL	PAREA1	5	564141.3	4152242	1.38486	35.41	172.72	1.8	ANNUAL	ARLN1	5
564161.3	4152241.57	1.35571	37.41	172.72	1.8	ANNUAL	PAREA1	5	564161.3	4152242	1.2784	37.41	172.72	1.8	ANNUAL	ARLN1	5
564181.3	4152241.57	1.24444	39.31	172.72	1.8	ANNUAL	PAREA1	5	564181.3	4152242	1.18447	39.31	172.72	1.8	ANNUAL	ARLN1	5
563821.3	4152261.57	1.59786	72.64	172.72	1.8	ANNUAL	PAREA1	5	563821.3	4152262	2.58348	72.64	172.72	1.8	ANNUAL	ARLN1	5
563841.3	4152261.57	1.72738	74.73	172.72	1.8	ANNUAL	PAREA1	5	563841.3	4152262	2.40543	74.73	172.72	1.8	ANNUAL	ARLN1	5
563861.3	4152261.57	1.85387	75.21	172.72	1.8	ANNUAL	PAREA1	5	563861.3	4152262	2.26753	75.21	172.72	1.8	ANNUAL	ARLN1	5
563881.3	4152261.57	1.97494	73.43	172.72	1.8	ANNUAL	PAREA1	5	563881.3	4152262	2.17721	73.43	172.72	1.8	ANNUAL	ARLN1	5
563901.3	4152261.57	2.08899	69.49	172.72	1.8	ANNUAL	PAREA1	5	563901.3	4152262	2.13386	69.49	172.72	1.8	ANNUAL	ARLN1	5
563921.3	4152261.57	2.24413	62.22	172.72	1.8	ANNUAL	PAREA1	5	563921.3	4152262	2.16404	62.22	172.72	1.8	ANNUAL	ARLN1	5
563941.3	4152261.57	2.3645	56.11	172.72	1.8	ANNUAL	PAREA1	5	563941.3	4152262	2.16705	56.11	172.72	1.8	ANNUAL	ARLN1	5
563961.3	4152261.57	2.50759	48.94	172.72	1.8	ANNUAL	PAREA1	5	563961.3	4152262	2.1834	48.94	172.72	1.8	ANNUAL	ARLN1	5
563981.3	4152261.57	2.5501	44.42	172.72	1.8	ANNUAL	PAREA1	5	563981.3	4152262	2.14183	44.42	172.72	1.8	ANNUAL	ARLN1	5
564041.3	4152261.57	2.33886	36.86	172.72	1.8	ANNUAL	PAREA1	5	564041.3	4152262	1.92635	36.86	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152261.57	2.23089	34.58	172.72	1.8	ANNUAL	PAREA1	5	564061.3	4152262	1.86568	34.58	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152261.57	2.12469	32.38	172.72	1.8	ANNUAL	PAREA1	5	564081.3	4152262	1.80735	32.38	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152261.57	2.00309	31.05	172.72	1.8	ANNUAL	PAREA1	5	564101.3	4152262	1.73087	31.05	172.72	1.8	ANNUAL	ARLN1	5
564121.3	4152261.57	1.81445	32.45	172.72	1.8	ANNUAL	PAREA1	5	564121.3	4152262	1.60188	32.45	172.72	1.8	ANNUAL	ARLN1	5
564141.3	4152261.57	1.65555	33.82	172.72	1.8	ANNUAL	PAREA1	5	564141.3	4152262	1.48419	33.82	172.72	1.8	ANNUAL	ARLN1	5
564161.3	4152261.57	1.5171	35.11	172.72	1.8	ANNUAL	PAREA1	5	564161.3	4152262	1.37777	35.11	172.72	1.8	ANNUAL	ARLN1	5
564181.3	4152261.57	1.39522	36.18	172.72	1.8	ANNUAL	PAREA1	5	564181.3	4152262	1.28464	36.18	172.72	1.8	ANNUAL	ARLN1	5
563821.3	4152281.57	1.8011	66.76	172.72	1.8	ANNUAL	PAREA1	5	563821.3	4152282	2.99861	66.76	172.72	1.8	ANNUAL	ARLN1	5
563841.3	4152281.57	1.91774	71.69	172.72	1.8	ANNUAL	PAREA1	5	563841.3	4152282	2.70009	71.69	172.72	1.8	ANNUAL	ARLN1	5
563861.3	4152281.57	2.08811	71.92	172.72	1.8	ANNUAL	PAREA1	5	563861.3	4152282	2.53968	71.92	172.72	1.8	ANNUAL	ARLN1	5
563881.3	4152281.57	2.21734	72.04	172.72	1.8	ANNUAL	PAREA1	5	563881.3	4152282	2.38863	72.04	172.72	1.8	ANNUAL	ARLN1	5
563901.3	4152281.57	2.34589	69.16	172.72	1.8	ANNUAL	PAREA1	5	563901.3	4152282	2.31134	69.16	172.72	1.8	ANNUAL	ARLN1	5
563921.3	4152281.57	2.55557	61.15	172.72	1.8	ANNUAL	PAREA1	5	563921.3	4152282	2.35822	61.15	172.72	1.8	ANNUAL	ARLN1	5
563941.3	4152281.57	2.75995	53.44	172.72	1.8	ANNUAL	PAREA1	5	563941.3	4152282	2.39995	53.44	172.72	1.8	ANNUAL	ARLN1	5
564001.3	4152281.57	2.97264	38.16	172.72	1.8	ANNUAL	PAREA1	5	564001.3	4152282	2.30895	38.16	172.72	1.8	ANNUAL	ARLN1	5
564021.3	4152281.57	2.87229	35.78	172.72	1.8	ANNUAL	PAREA1	5	564021.3	4152282	2.22452	35.78	172.72	1.8	ANNUAL	ARLN1	5
564041.3	4152281.57	2.72871	33.91	172.72	1.8	ANNUAL	PAREA1	5	564041.3	4152282	2.1346	33.91	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152281.57	2.56919	32.23	172.72	1.8	ANNUAL	PAREA1	5	564061.3	4152282	2.04601	32.23	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152281.57	2.41007	30.79	172.72	1.8	ANNUAL	PAREA1	5	564081.3	4152282	1.95535	30.79	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152281.57	2.23781	30.23	172.72	1.8	ANNUAL	PAREA1	5	564101.3	4152282	1.84792	30.23	172.72	1.8	ANNUAL	ARLN1	5
564121.3	4152281.57	2.03561	31.17	172.72	1.8	ANNUAL	PAREA1	5	564121.3	4152282	1.71554	31.17	172.72	1.8	ANNUAL	ARLN1	5
564141.3	4152281.57	1.86795	31.85	172.72	1.8	ANNUAL	PAREA1	5	564141.3	4152282	1.59872	31.85	172.72	1.8	ANNUAL	ARLN1	5
564161.3	4152281.57	1.70989	32.73	172.72	1.8	ANNUAL	PAREA1	5	564161.3	4152282	1.48748	32.73	172.72	1.8	ANNUAL	ARLN1	5
564181.3	4152281.57	1.57642	33.3	172.72	1.8	ANNUAL	PAREA1	5	564181.3	4152282	1.39178	33.3	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152301.57	0.25132	28.22	172.72	1.8	ANNUAL	PAREA1	5	563501.3	4152302	5.51175	28.22	172.72	1.8	ANNUAL	ARLN1	5
563521.3	4152301.57	0.27548	28.87	172.72	1.8	ANNUAL	PAREA1	5	563521.3	4152302	6.1246	28.87	172.72	1.8	ANNUAL	ARLN1	5
563541.3	4152301.57	0.30504	29.06	172.72	1.8	ANNUAL	PAREA1	5	563541.3	4152302	6.60718	29.06	172.72	1.8	ANNUAL	ARLN1	5
563861.3	4152301.57	2.37132	68.23	172.72	1.8	ANNUAL	PAREA1	5	563861.3	4152302	2.87333	68.23	172.72	1.8	ANNUAL	ARLN1	5
563881.3	4152301.57	2.52677	69.5	172.72	1.8	ANNUAL	PAREA1	5	563881.3	4152302	2.65901	69.5	172.72	1.8	ANNUAL	ARLN1	5
563901.3	4152301.57	2.7376	65.55	172.72	1.8	ANNUAL	PAREA1	5	563901.3	4152302	2.59241	65.55	172.72	1.8	ANNUAL	ARLN1	5
563921.3	4152301.57	2.97818	58.81	172.72	1.8	ANNUAL	PAREA1	5	563921.3	4152302	2.61065	58.81	172.72	1.8	ANNUAL	ARLN1	5
563941.3	4152301.57	3.15205	53.22	172.72	1.8	ANNUAL	PAREA1	5	563941.3	4152302	2.59736	53.22	172.72	1.8	ANNUAL	ARLN1	5
563981.3	4152301.57	3.5435	39.39	172.72	1.8	ANNUAL	PAREA1	5	563981.3	4152302	2.62708	39.39	172.72	1.8	ANNUAL	ARLN1	5
564001.3	4152301.57	3.49969	36	172.72	1.8	ANNUAL	PAREA1	5	564001.3	4152302	2.55031	36	172.72	1.8	ANNUAL	ARLN1	5

564021.3	4152301.57	3.35688	33.78	172.72	1.8	ANNUAL	PAREA1	5	564021.3	4152302	2.44686	33.78	172.72	1.8	ANNUAL	ARLN1	5
564041.3	4152301.57	3.1689	31.92	172.72	1.8	ANNUAL	PAREA1	5	564041.3	4152302	2.34065	31.92	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152301.57	2.95048	30.57	172.72	1.8	ANNUAL	PAREA1	5	564061.3	4152302	2.22483	30.57	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152301.57	2.73535	29.6	172.72	1.8	ANNUAL	PAREA1	5	564081.3	4152302	2.1047	29.6	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152301.57	2.52198	29.26	172.72	1.8	ANNUAL	PAREA1	5	564101.3	4152302	1.9768	29.26	172.72	1.8	ANNUAL	ARLN1	5
564121.3	4152301.57	2.30218	29.71	172.72	1.8	ANNUAL	PAREA1	5	564121.3	4152302	1.84092	29.71	172.72	1.8	ANNUAL	ARLN1	5
564141.3	4152301.57	2.11061	30.07	172.72	1.8	ANNUAL	PAREA1	5	564141.3	4152302	1.71721	30.07	172.72	1.8	ANNUAL	ARLN1	5
564161.3	4152301.57	1.91685	31.08	172.72	1.8	ANNUAL	PAREA1	5	564161.3	4152302	1.59151	31.08	172.72	1.8	ANNUAL	ARLN1	5
564181.3	4152301.57	1.75569	31.93	172.72	1.8	ANNUAL	PAREA1	5	564181.3	4152302	1.48099	31.93	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152321.57	0.25672	26.3	172.72	1.8	ANNUAL	PAREA1	5	563501.3	4152322	7.14915	26.3	172.72	1.8	ANNUAL	ARLN1	5
563521.3	4152321.57	0.28409	26.38	172.72	1.8	ANNUAL	PAREA1	5	563521.3	4152322	8.07049	26.38	172.72	1.8	ANNUAL	ARLN1	5
563541.3	4152321.57	0.31603	26.38	172.72	1.8	ANNUAL	PAREA1	5	563541.3	4152322	8.68342	26.38	172.72	1.8	ANNUAL	ARLN1	5
563561.3	4152321.57	0.35444	26.19	172.72	1.8	ANNUAL	PAREA1	5	563561.3	4152322	9.09186	26.19	172.72	1.8	ANNUAL	ARLN1	5
563581.3	4152321.57	0.40175	25.79	172.72	1.8	ANNUAL	PAREA1	5	563581.3	4152322	9.39864	25.79	172.72	1.8	ANNUAL	ARLN1	5
563601.3	4152321.57	0.459	25.59	172.72	1.8	ANNUAL	PAREA1	5	563601.3	4152322	9.60284	25.59	172.72	1.8	ANNUAL	ARLN1	5
563881.3	4152321.57	2.94395	65.27	172.72	1.8	ANNUAL	PAREA1	5	563881.3	4152322	3.0268	65.27	172.72	1.8	ANNUAL	ARLN1	5
563961.3	4152321.57	4.2418	40.64	172.72	1.8	ANNUAL	PAREA1	5	563961.3	4152322	3.01898	40.64	172.72	1.8	ANNUAL	ARLN1	5
563981.3	4152321.57	4.31181	36.26	172.72	1.8	ANNUAL	PAREA1	5	563981.3	4152322	2.95352	36.26	172.72	1.8	ANNUAL	ARLN1	5
564001.3	4152321.57	4.22995	33.21	172.72	1.8	ANNUAL	PAREA1	5	564001.3	4152322	2.85149	33.21	172.72	1.8	ANNUAL	ARLN1	5
564021.3	4152321.57	4.00206	31.37	172.72	1.8	ANNUAL	PAREA1	5	564021.3	4152322	2.71254	31.37	172.72	1.8	ANNUAL	ARLN1	5
564041.3	4152321.57	3.70488	30.12	172.72	1.8	ANNUAL	PAREA1	5	564041.3	4152322	2.56138	30.12	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152321.57	3.3953	29.27	172.72	1.8	ANNUAL	PAREA1	5	564061.3	4152322	2.40742	29.27	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152321.57	3.11523	28.62	172.72	1.8	ANNUAL	PAREA1	5	564081.3	4152322	2.25919	28.62	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152321.57	2.86495	28.17	172.72	1.8	ANNUAL	PAREA1	5	564101.3	4152322	2.117	28.17	172.72	1.8	ANNUAL	ARLN1	5
564121.3	4152321.57	2.62304	28.14	172.72	1.8	ANNUAL	PAREA1	5	564121.3	4152322	1.97574	28.14	172.72	1.8	ANNUAL	ARLN1	5
564141.3	4152321.57	2.39467	28.43	172.72	1.8	ANNUAL	PAREA1	5	564141.3	4152322	1.83869	28.43	172.72	1.8	ANNUAL	ARLN1	5
564161.3	4152321.57	2.19115	28.87	172.72	1.8	ANNUAL	PAREA1	5	564161.3	4152322	1.71075	28.87	172.72	1.8	ANNUAL	ARLN1	5
564181.3	4152321.57	2.04678	28.51	172.72	1.8	ANNUAL	PAREA1	5	564181.3	4152322	1.60917	28.51	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152341.57	0.25986	24.84	172.72	1.8	ANNUAL	PAREA1	5	563501.3	4152342	9.686	24.84	172.72	1.8	ANNUAL	ARLN1	5
563521.3	4152341.57	0.29044	24.36	172.72	1.8	ANNUAL	PAREA1	5	563521.3	4152342	11.04212	24.36	172.72	1.8	ANNUAL	ARLN1	5
563541.3	4152341.57	0.32483	24.18	172.72	1.8	ANNUAL	PAREA1	5	563541.3	4152342	11.72207	24.18	172.72	1.8	ANNUAL	ARLN1	5
563561.3	4152341.57	0.36576	23.86	172.72	1.8	ANNUAL	PAREA1	5	563561.3	4152342	12.05708	23.86	172.72	1.8	ANNUAL	ARLN1	5
563581.3	4152341.57	0.41712	23.07	172.72	1.8	ANNUAL	PAREA1	5	563581.3	4152342	12.21667	23.07	172.72	1.8	ANNUAL	ARLN1	5
563601.3	4152341.57	0.47955	22.42	172.72	1.8	ANNUAL	PAREA1	5	563601.3	4152342	12.2677	22.42	172.72	1.8	ANNUAL	ARLN1	5
563881.3	4152341.57	3.52882	59.3	172.72	1.8	ANNUAL	PAREA1	5	563881.3	4152342	3.5435	59.3	172.72	1.8	ANNUAL	ARLN1	5
563901.3	4152341.57	3.88036	57.59	172.72	1.8	ANNUAL	PAREA1	5	563901.3	4152342	3.34675	57.59	172.72	1.8	ANNUAL	ARLN1	5
563941.3	4152341.57	5.10894	41.28	172.72	1.8	ANNUAL	PAREA1	5	563941.3	4152342	3.53072	41.28	172.72	1.8	ANNUAL	ARLN1	5
563961.3	4152341.57	5.38559	36.29	172.72	1.8	ANNUAL	PAREA1	5	563961.3	4152342	3.47187	36.29	172.72	1.8	ANNUAL	ARLN1	5
563981.3	4152341.57	5.33984	33.37	172.72	1.8	ANNUAL	PAREA1	5	563981.3	4152342	3.32697	33.37	172.72	1.8	ANNUAL	ARLN1	5
564001.3	4152341.57	5.20487	30.47	172.72	1.8	ANNUAL	PAREA1	5	564001.3	4152342	3.19471	30.47	172.72	1.8	ANNUAL	ARLN1	5
564021.3	4152341.57	4.86367	28.81	172.72	1.8	ANNUAL	PAREA1	5	564021.3	4152342	3.01299	28.81	172.72	1.8	ANNUAL	ARLN1	5
564041.3	4152341.57	4.42882	27.88	172.72	1.8	ANNUAL	PAREA1	5	564041.3	4152342	2.81572	27.88	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152341.57	3.99242	27.44	172.72	1.8	ANNUAL	PAREA1	5	564061.3	4152342	2.61945	27.44	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152341.57	3.61923	27.06	172.72	1.8	ANNUAL	PAREA1	5	564081.3	4152342	2.4393	27.06	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152341.57	3.29128	26.82	172.72	1.8	ANNUAL	PAREA1	5	564101.3	4152342	2.2711	26.82	172.72	1.8	ANNUAL	ARLN1	5
564121.3	4152341.57	3.02062	26.37	172.72	1.8	ANNUAL	PAREA1	5	564121.3	4152342	2.12081	26.37	172.72	1.8	ANNUAL	ARLN1	5
564141.3	4152341.57	2.77955	26.02	172.72	1.8	ANNUAL	PAREA1	5	564141.3	4152342	1.97966	26.02	172.72	1.8	ANNUAL	ARLN1	5
564161.3	4152341.57	2.57032	25.62	172.72	1.8	ANNUAL	PAREA1	5	564161.3	4152342	1.85163	25.62	172.72	1.8	ANNUAL	ARLN1	5
564181.3	4152341.57	2.3992	24.73	172.72	1.8	ANNUAL	PAREA1	5	564181.3	4152342	1.74291	24.73	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152361.57	0.26206	23.47	172.72	1.8	ANNUAL	PAREA1	5	563501.3	4152362	13.89848	23.47	172.72	1.8	ANNUAL	ARLN1	5
563521.3	4152361.57	0.29398	22.97	172.72	1.8	ANNUAL	PAREA1	5	563521.3	4152362	15.68605	22.97	172.72	1.8	ANNUAL	ARLN1	5
563541.3	4152361.57	0.32994	22.8	172.72	1.8	ANNUAL	PAREA1	5	563541.3	4152362	16.30408	22.8	172.72	1.8	ANNUAL	ARLN1	5
563561.3	4152361.57	0.37387	22.21	172.72	1.8	ANNUAL	PAREA1	5	563561.3	4152362	16.3069	22.21	172.72	1.8	ANNUAL	ARLN1	5
563581.3	4152361.57	0.428	21.3	172.72	1.8	ANNUAL	PAREA1	5	563581.3	4152362	15.9471	21.3	172.72	1.8	ANNUAL	ARLN1	5
563901.3	4152361.57	5.1406	47.77	172.72	1.8	ANNUAL	PAREA1	5	563901.3	4152362	4.18232	47.77	172.72	1.8	ANNUAL	ARLN1	5
563921.3	4152361.57	6.16886	40.42	172.72	1.8	ANNUAL	PAREA1	5	563921.3	4152362	4.26618	40.42	172.72	1.8	ANNUAL	ARLN1	5
563941.3	4152361.57	6.73924	36.1	172.72	1.8	ANNUAL	PAREA1	5	563941.3	4152362	4.14864	36.1	172.72	1.8	ANNUAL	ARLN1	5
563961.3	4152361.57	6.85437	33.34	172.72	1.8	ANNUAL	PAREA1	5	563961.3	4152362	3.94303	33.34	172.72	1.8	ANNUAL	ARLN1	5
563981.3	4152361.57	6.86078	30.02	172.72	1.8	ANNUAL	PAREA1	5	563981.3	4152362	3.78635	30.02	172.72	1.8	ANNUAL	ARLN1	5
564001.3	4152361.57	6.78548	26.39	172.72	1.8	ANNUAL	PAREA1	5	564001.3	4152362	3.63706	26.39	172.72	1.8	ANNUAL	ARLN1	5
564021.3	4152361.57	6.18524	25.13	172.72	1.8	ANNUAL	PAREA1	5	564021.3	4152362	3.37941	25.13	172.72	1.8	ANNUAL	ARLN1	5
564041.3	4152361.57	5.42016	25.23	172.72	1.8	ANNUAL	PAREA1	5	564041.3	4152362	3.09995	25.23	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152361.57	4.78409	25.26	172.72	1.8	ANNUAL	PAREA1	5	564061.3	4152362	2.85371	25.26	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152361.57	4.22726	25.63	172.72	1.8	ANNUAL	PAREA1	5	564081.3	4152362	2.62448	25.63	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152361.57	3.80752	25.49	172.72	1.8	ANNUAL	PAREA1	5	564101.3	4152362	2.43054	25.49	172.72	1.8	ANNUAL	ARLN1	5
564121.3	4152361.57	3.47723	24.97	172.72	1.8	ANNUAL	PAREA1	5	564121.3	4152362	2.26114	24.97	172.72	1.8	ANNUAL	ARLN1	5
564141.3	4152361.57	3.20161	24.19	172.72	1.8	ANNUAL	PAREA1	5	564141.3	4152362	2.10953	24.19	172.72	1.8	ANNUAL	ARLN1	5
564161.3	4152361.57	2.92684	23.84	172.72	1.8	ANNUAL	PAREA1	5	564161.3	4152362	1.9647	23.84	172.72	1.8	ANNUAL	ARLN1	5
564181.3	4152361.57	2.68574	23.17	172.72	1.8	ANNUAL	PAREA1	5	564181.3	4152362	1.83862	23.17	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152381.57	0.26264	22.69	172.72	1.8	ANNUAL	PAREA1	5	563501.3	4152382	21.93416	22.69	172.72	1.8	ANNUAL	ARLN1	5
563521.3	4152381.57	0.29585	21.98	172.72	1.8	ANNUAL	PAREA1	5	563521.3	4152382	23.74755	21.98	172.72	1.8	ANNUAL	ARLN1	5
563541.3	4152381.57	0.33402	21.52	172.72	1.8	ANNUAL	PAREA1	5	563541.3	4152382	23.6128	21.52	172.72	1.8	ANNUAL	ARLN1	5
563561.3	4152381.57	0.37992	21.25	172.72	1.8	ANNUAL	PAREA1	5	563561.3	4152382	22.84703	21.25	172.72	1.8	ANNUAL	ARLN1	5
563581.3	4152381.57	0.43379	20.68	172.72	1.8	ANNUAL	PAREA1	5	563581.3	4152382	21.62471	20.68	172.72	1.8	ANNUAL	ARLN1	5
563921.3	4152381.57	8.35549	34.75	172.72	1.8	ANNUAL	PAREA1	5	563921.3	4152382	5.13395	34.75	172.72	1.8	ANNUAL	ARLN1	5
563941.3	4152381.57	9.08056	31.93	172.72	1.8	ANNUAL	PAREA1	5	563941.3	4152382	4.85361	31.93	172.72	1.8	ANNUAL	ARLN1	5
563961.3	4152381.57	9.63688	28.09	172.72	1.8	ANNUAL	PAREA1	5	563961.3	4152382	4.65872	28.09	172.72	1.8	ANNUAL	ARLN1	5
563981.3	4152381.57	9.66944	24.69	172.72	1.8	ANNUAL	PAREA1	5	563981.3	4152382	4.40628	24.69	172.72	1.8	ANNUAL	ARLN1	5
564001.3	4152381.57	8.88566	23.08	172.72	1.8	ANNUAL	PAREA1	5	564001.3	4152382	4.05588	23.08	172.72	1.8	ANNUAL	ARLN1	5
564021.3	4152381.57	7.68336	23.09	172.72	1.8	ANNUAL	PAREA1	5	564021.3	4152382	3.69078	23.09	172.72	1.8	ANNUAL	ARLN1	5
564041.3	4152381.57	6.61409	23.26	172.72	1.8	ANNUAL	PAREA1	5	564041.3	4152382	3.36636	23.26	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152381.57	5.73348	23.54	172.72	1.8	ANNUAL	PAREA1	5	564061.3	4152382	3.07803	23.54	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152381.57	4.97398	24.28	172.72	1.8	ANNUAL	PAREA1	5	564081.3	4152382	2.81158	24.28	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152381.57	4.43445	24.21	172.72	1.8	ANNUAL	PAREA1	5	564101.3	4152382	2.5902	24.21	172.72	1.8	ANNUAL	ARLN1	5
564121.3	4152381.57	4.0243	23.49	172.72	1.8	ANNUAL	PAREA1	5	564121.3	4152382	2.40081	23.49	172.72	1.8	ANNUAL	ARLN1	5
564141.3	4152381.57	3.65217	22.75	172.72	1.8	ANNUAL	PAREA1	5	564141.3	4152382	2.22928	22.75	172.72	1.8	ANNUAL	ARLN1	5
564161.3	4152381.57	3.30365	22.09	172.72	1.8	ANNUAL	PAREA1	5	564161.3	4152382	2.07443	22.09	172.72	1.8	ANNUAL	ARLN1	5
564181.3	4152381.57	2.98156	21.48	172.72	1.8	ANNUAL	PAREA1	5	564181.3	4152382	1.93448	21.48	172.72	1.8	ANNUAL	ARLN1	5

563501.3	4152401.57	0.25871	23.6	172.72	1.8	ANNUAL	PAREA1	5	563501.3	4152402	42.98376	23.6	172.72	1.8	ANNUAL	ARLN1	5
563521.3	4152401.57	0.29261	22.49	172.72	1.8	ANNUAL	PAREA1	5	563521.3	4152402	42.4059	22.49	172.72	1.8	ANNUAL	ARLN1	5
563561.3	4152401.57	0.37601	21.56	172.72	1.8	ANNUAL	PAREA1	5	563561.3	4152402	35.19536	21.56	172.72	1.8	ANNUAL	ARLN1	5
563581.3	4152401.57	0.4319	21.26	172.72	1.8	ANNUAL	PAREA1	5	563581.3	4152402	32.14605	21.26	172.72	1.8	ANNUAL	ARLN1	5
563921.3	4152401.57	12.79035	27	172.72	1.8	ANNUAL	PAREA1	5	563921.3	4152402	6.49256	27	172.72	1.8	ANNUAL	ARLN1	5
563941.3	4152401.57	14.4165	24.35	172.72	1.8	ANNUAL	PAREA1	5	563941.3	4152402	5.98746	24.35	172.72	1.8	ANNUAL	ARLN1	5
563961.3	4152401.57	14.31737	22.96	172.72	1.8	ANNUAL	PAREA1	5	563961.3	4152402	5.41127	22.96	172.72	1.8	ANNUAL	ARLN1	5
563981.3	4152401.57	12.92879	22.52	172.72	1.8	ANNUAL	PAREA1	5	563981.3	4152402	4.86741	22.52	172.72	1.8	ANNUAL	ARLN1	5
564001.3	4152401.57	11.25339	21.92	172.72	1.8	ANNUAL	PAREA1	5	564001.3	4152402	4.40464	21.92	172.72	1.8	ANNUAL	ARLN1	5
564021.3	4152401.57	9.58978	21.53	172.72	1.8	ANNUAL	PAREA1	5	564021.3	4152402	3.99641	21.53	172.72	1.8	ANNUAL	ARLN1	5
564041.3	4152401.57	8.08241	21.81	172.72	1.8	ANNUAL	PAREA1	5	564041.3	4152402	3.62321	21.81	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152401.57	6.91988	22.02	172.72	1.8	ANNUAL	PAREA1	5	564061.3	4152402	3.29879	22.02	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152401.57	5.94594	22.62	172.72	1.8	ANNUAL	PAREA1	5	564081.3	4152402	3.00334	22.62	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152401.57	5.23393	22.45	172.72	1.8	ANNUAL	PAREA1	5	564101.3	4152402	2.75544	22.45	172.72	1.8	ANNUAL	ARLN1	5
564121.3	4152401.57	4.64305	21.98	172.72	1.8	ANNUAL	PAREA1	5	564121.3	4152402	2.53816	21.98	172.72	1.8	ANNUAL	ARLN1	5
564141.3	4152401.57	4.17571	21.17	172.72	1.8	ANNUAL	PAREA1	5	564141.3	4152402	2.34971	21.17	172.72	1.8	ANNUAL	ARLN1	5
564161.3	4152401.57	3.70874	20.46	172.72	1.8	ANNUAL	PAREA1	5	564161.3	4152402	2.18013	20.46	172.72	1.8	ANNUAL	ARLN1	5
564181.3	4152401.57	3.3004	19.69	172.72	1.8	ANNUAL	PAREA1	5	564181.3	4152402	2.02648	19.69	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152421.57	0.2514	26.05	172.72	1.8	ANNUAL	PAREA1	5	563501.3	4152422	83.2014	26.05	172.72	1.8	ANNUAL	ARLN1	5
563521.3	4152421.57	0.28327	24.93	172.72	1.8	ANNUAL	PAREA1	5	563521.3	4152422	95.32157	24.93	172.72	1.8	ANNUAL	ARLN1	5
563921.3	4152421.57	19.874	21.12	172.72	1.8	ANNUAL	PAREA1	5	563921.3	4152422	7.73882	21.12	172.72	1.8	ANNUAL	ARLN1	5
563941.3	4152421.57	21.12516	21.31	172.72	1.8	ANNUAL	PAREA1	5	563941.3	4152422	6.76368	21.31	172.72	1.8	ANNUAL	ARLN1	5
563961.3	4152421.57	20.43187	21.16	172.72	1.8	ANNUAL	PAREA1	5	563961.3	4152422	5.9759	21.16	172.72	1.8	ANNUAL	ARLN1	5
563981.3	4152421.57	17.88366	20.79	172.72	1.8	ANNUAL	PAREA1	5	563981.3	4152422	5.32569	20.79	172.72	1.8	ANNUAL	ARLN1	5
564001.3	4152421.57	14.92367	20.38	172.72	1.8	ANNUAL	PAREA1	5	564001.3	4152422	4.77628	20.38	172.72	1.8	ANNUAL	ARLN1	5
564021.3	4152421.57	12.22796	20.37	172.72	1.8	ANNUAL	PAREA1	5	564021.3	4152422	4.29475	20.37	172.72	1.8	ANNUAL	ARLN1	5
564041.3	4152421.57	10.17967	20.21	172.72	1.8	ANNUAL	PAREA1	5	564041.3	4152422	3.88399	20.21	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152421.57	8.55062	20.34	172.72	1.8	ANNUAL	PAREA1	5	564061.3	4152422	3.52022	20.34	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152421.57	7.25237	20.53	172.72	1.8	ANNUAL	PAREA1	5	564081.3	4152422	3.19949	20.53	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152421.57	6.21194	20.51	172.72	1.8	ANNUAL	PAREA1	5	564101.3	4152422	2.91941	20.51	172.72	1.8	ANNUAL	ARLN1	5
564121.3	4152421.57	5.3617	20.24	172.72	1.8	ANNUAL	PAREA1	5	564121.3	4152422	2.67517	20.24	172.72	1.8	ANNUAL	ARLN1	5
564141.3	4152421.57	4.6618	19.65	172.72	1.8	ANNUAL	PAREA1	5	564141.3	4152422	2.46242	19.65	172.72	1.8	ANNUAL	ARLN1	5
564161.3	4152421.57	4.07331	18.93	172.72	1.8	ANNUAL	PAREA1	5	564161.3	4152422	2.27383	18.93	172.72	1.8	ANNUAL	ARLN1	5
564181.3	4152421.57	3.57207	18.29	172.72	1.8	ANNUAL	PAREA1	5	564181.3	4152422	2.10458	18.29	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152441.57	0.243	29.29	172.72	1.8	ANNUAL	PAREA1	5	563501.3	4152442	9.79051	29.29	172.72	1.8	ANNUAL	ARLN1	5
563521.3	4152441.57	0.27194	28.38	172.72	1.8	ANNUAL	PAREA1	5	563521.3	4152442	17.01804	28.38	172.72	1.8	ANNUAL	ARLN1	5
563821.3	4152441.57	7.33713	20.77	172.72	1.8	ANNUAL	PAREA1	5	563821.3	4152442	21.93482	20.77	172.72	1.8	ANNUAL	ARLN1	5
563841.3	4152441.57	10.39075	19.65	172.72	1.8	ANNUAL	PAREA1	5	563841.3	4152442	17.68656	19.65	172.72	1.8	ANNUAL	ARLN1	5
563861.3	4152441.57	14.62534	16.44	172.72	1.8	ANNUAL	PAREA1	5	563861.3	4152442	14.2718	16.44	172.72	1.8	ANNUAL	ARLN1	5
563921.3	4152441.57	29.33178	17.12	172.72	1.8	ANNUAL	PAREA1	5	563921.3	4152442	8.64617	17.12	172.72	1.8	ANNUAL	ARLN1	5
563941.3	4152441.57	32.86237	18.14	172.72	1.8	ANNUAL	PAREA1	5	563941.3	4152442	7.4941	18.14	172.72	1.8	ANNUAL	ARLN1	5
563961.3	4152441.57	30.99464	18.65	172.72	1.8	ANNUAL	PAREA1	5	563961.3	4152442	6.54713	18.65	172.72	1.8	ANNUAL	ARLN1	5
563981.3	4152441.57	25.34253	18.98	172.72	1.8	ANNUAL	PAREA1	5	563981.3	4152442	5.76801	18.98	172.72	1.8	ANNUAL	ARLN1	5
564001.3	4152441.57	19.98907	18.81	172.72	1.8	ANNUAL	PAREA1	5	564001.3	4152442	5.12574	18.81	172.72	1.8	ANNUAL	ARLN1	5
564021.3	4152441.57	15.85951	18.58	172.72	1.8	ANNUAL	PAREA1	5	564021.3	4152442	4.585	18.58	172.72	1.8	ANNUAL	ARLN1	5
564041.3	4152441.57	12.79348	18.42	172.72	1.8	ANNUAL	PAREA1	5	564041.3	4152442	4.12301	18.42	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152441.57	10.40897	18.65	172.72	1.8	ANNUAL	PAREA1	5	564061.3	4152442	3.72	18.65	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152441.57	8.57782	18.81	172.72	1.8	ANNUAL	PAREA1	5	564081.3	4152442	3.36842	18.81	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152441.57	7.14468	18.86	172.72	1.8	ANNUAL	PAREA1	5	564101.3	4152442	3.06054	18.86	172.72	1.8	ANNUAL	ARLN1	5
564121.3	4152441.57	6.02335	18.6	172.72	1.8	ANNUAL	PAREA1	5	564121.3	4152442	2.79349	18.6	172.72	1.8	ANNUAL	ARLN1	5
564141.3	4152441.57	5.12197	18.3	172.72	1.8	ANNUAL	PAREA1	5	564141.3	4152442	2.5598	18.3	172.72	1.8	ANNUAL	ARLN1	5
564161.3	4152441.57	4.4034	17.67	172.72	1.8	ANNUAL	PAREA1	5	564161.3	4152442	2.35573	17.67	172.72	1.8	ANNUAL	ARLN1	5
564181.3	4152441.57	3.81277	17.11	172.72	1.8	ANNUAL	PAREA1	5	564181.3	4152442	2.1737	17.11	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152461.57	0.22937	34.61	172.72	1.8	ANNUAL	PAREA1	5	563501.3	4152462	4.22778	34.61	172.72	1.8	ANNUAL	ARLN1	5
563521.3	4152461.57	0.25801	32.9	172.72	1.8	ANNUAL	PAREA1	5	563521.3	4152462	5.63738	32.9	172.72	1.8	ANNUAL	ARLN1	5
563541.3	4152461.57	0.28997	31.98	172.72	1.8	ANNUAL	PAREA1	5	563541.3	4152462	7.40137	31.98	172.72	1.8	ANNUAL	ARLN1	5
563561.3	4152461.57	0.3279	31.21	172.72	1.8	ANNUAL	PAREA1	5	563561.3	4152462	9.96207	31.21	172.72	1.8	ANNUAL	ARLN1	5
563581.3	4152461.57	0.37453	30.34	172.72	1.8	ANNUAL	PAREA1	5	563581.3	4152462	14.14334	30.34	172.72	1.8	ANNUAL	ARLN1	5
563601.3	4152461.57	0.43047	29.79	172.72	1.8	ANNUAL	PAREA1	5	563601.3	4152462	21.03387	29.79	172.72	1.8	ANNUAL	ARLN1	5
563621.3	4152461.57	0.50182	29.04	172.72	1.8	ANNUAL	PAREA1	5	563621.3	4152462	41.96584	29.04	172.72	1.8	ANNUAL	ARLN1	5
563641.3	4152461.57	0.59378	28.15	172.72	1.8	ANNUAL	PAREA1	5	563641.3	4152462	65.11899	28.15	172.72	1.8	ANNUAL	ARLN1	5
563821.3	4152461.57	8.30361	19.73	172.72	1.8	ANNUAL	PAREA1	5	563821.3	4152462	28.108	19.73	172.72	1.8	ANNUAL	ARLN1	5
563841.3	4152461.57	12.46724	18.75	172.72	1.8	ANNUAL	PAREA1	5	563841.3	4152462	21.39265	18.75	172.72	1.8	ANNUAL	ARLN1	5
563861.3	4152461.57	17.77691	17.32	172.72	1.8	ANNUAL	PAREA1	5	563861.3	4152462	16.73578	17.32	172.72	1.8	ANNUAL	ARLN1	5
563921.3	4152461.57	38.90707	15.89	172.72	1.8	ANNUAL	PAREA1	5	563921.3	4152462	9.42855	15.89	172.72	1.8	ANNUAL	ARLN1	5
563941.3	4152461.57	49.39383	16.44	172.72	1.8	ANNUAL	PAREA1	5	563941.3	4152462	8.10401	16.44	172.72	1.8	ANNUAL	ARLN1	5
563961.3	4152461.57	47.1827	17.28	172.72	1.8	ANNUAL	PAREA1	5	563961.3	4152462	7.03955	17.28	172.72	1.8	ANNUAL	ARLN1	5
563981.3	4152461.57	36.50064	17.63	172.72	1.8	ANNUAL	PAREA1	5	563981.3	4152462	6.16401	17.63	172.72	1.8	ANNUAL	ARLN1	5
564001.3	4152461.57	27.14726	17.61	172.72	1.8	ANNUAL	PAREA1	5	564001.3	4152462	5.44259	17.61	172.72	1.8	ANNUAL	ARLN1	5
564021.3	4152461.57	20.71555	17.08	172.72	1.8	ANNUAL	PAREA1	5	564021.3	4152462	4.84235	17.08	172.72	1.8	ANNUAL	ARLN1	5
564041.3	4152461.57	15.94658	17.01	172.72	1.8	ANNUAL	PAREA1	5	564041.3	4152462	4.33291	17.01	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152461.57	12.44505	17.25	172.72	1.8	ANNUAL	PAREA1	5	564061.3	4152462	3.89442	17.25	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152461.57	9.87467	17.61	172.72	1.8	ANNUAL	PAREA1	5	564081.3	4152462	3.51252	17.61	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152461.57	8.00079	17.61	172.72	1.8	ANNUAL	PAREA1	5	564101.3	4152462	3.18142	17.61	172.72	1.8	ANNUAL	ARLN1	5
564121.3	4152461.57	6.58145	17.61	172.72	1.8	ANNUAL	PAREA1	5	564121.3	4152462	2.89324	17.61	172.72	1.8	ANNUAL	ARLN1	5
564141.3	4152461.57	5.50765	17.2	172.72	1.8	ANNUAL	PAREA1	5	564141.3	4152462	2.64441	17.2	172.72	1.8	ANNUAL	ARLN1	5
564161.3	4152461.57	4.6652	16.74	172.72	1.8	ANNUAL	PAREA1	5	564161.3	4152462	2.42599	16.74	172.72	1.8	ANNUAL	ARLN1	5
564181.3	4152461.57	3.98532	16.25	172.72	1.8	ANNUAL	PAREA1	5	564181.3	4152462	2.23318	16.25	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152481.57	0.21528	40.43	172.72	1.8	ANNUAL	PAREA1	5	563501.3	4152482	2.61862	40.43	172.72	1.8	ANNUAL	ARLN1	5
563521.3	4152481.57	0.24066	39.02	172.72	1.8	ANNUAL	PAREA1	5	563521.3	4152482	3.1903	39.02	172.72	1.8	ANNUAL	ARLN1	5
563541.3	4152481.57	0.27108	37.5	172.72	1.8	ANNUAL	PAREA1	5	563541.3	4152482	3.83275	37.5	172.72	1.8	ANNUAL	ARLN1	5
563561.3	4152481.57	0.30737	36.09	172.72	1.8	ANNUAL	PAREA1	5	563561.3	4152482	4.6224	36.09	172.72	1.8	ANNUAL	ARLN1	5
563581.3	4152481.57	0.34922	35.32	172.72	1.8	ANNUAL	PAREA1	5	563581.3	4152482	5.55299	35.32	172.72	1.8	ANNUAL	ARLN1	5
563601.3	4152481.57	0.40021	34.57	172.72	1.8	ANNUAL	PAREA1	5	563601.3	4152482	6.75978	34.57	172.72	1.8	ANNUAL	ARLN1	5
563621.3	4152481.57	0.46224	34.02	172.72	1.8	ANNUAL	PAREA1	5	563621.3	4152482	8.06296	34.02	172.72	1.8	ANNUAL	ARLN1	5
563641.3	4152481.57	0.54693	32.56	172.72	1.8	ANNUAL	PAREA1	5	563641.3	4152482	9.94595	32.56	172.72	1.8	ANNUAL	ARLN1	5
563661.3	4152481.57	0.66882	30	172.72	1.8	ANNUAL	PAREA1	5	563661.3	4152482	13.71094	30	172.72	1.8	ANNUAL	ARLN1	5
563681.3	4152481.57	0.85713	26.09	172.72	1.8	ANNUAL	PAREA1	5	563681.3	4152482	19.9636	26.09	172.72	1.8	ANNUAL	ARLN1	5

563701.3	4152481.57	1.10927	23.03	172.72	1.8	ANNUAL	PAREA1	5	563701.3	4152482	25.47431	23.03	172.72	1.8	ANNUAL	ARLN1	5
563801.3	4152481.57	5.5936	20.06	172.72	1.8	ANNUAL	PAREA1	5	563801.3	4152482	54.31533	20.06	172.72	1.8	ANNUAL	ARLN1	5
563821.3	4152481.57	8.96445	19.84	172.72	1.8	ANNUAL	PAREA1	5	563821.3	4152482	35.87996	19.84	172.72	1.8	ANNUAL	ARLN1	5
563861.3	4152481.57	22.13992	17.85	172.72	1.8	ANNUAL	PAREA1	5	563861.3	4152482	19.3339	17.85	172.72	1.8	ANNUAL	ARLN1	5
563881.3	4152481.57	29.88181	17.17	172.72	1.8	ANNUAL	PAREA1	5	563881.3	4152482	15.19364	17.17	172.72	1.8	ANNUAL	ARLN1	5
563961.3	4152481.57	63.16747	16.16	172.72	1.8	ANNUAL	PAREA1	5	563961.3	4152482	7.4875	16.16	172.72	1.8	ANNUAL	ARLN1	5
563981.3	4152481.57	50.76929	16.4	172.72	1.8	ANNUAL	PAREA1	5	563981.3	4152482	6.52177	16.4	172.72	1.8	ANNUAL	ARLN1	5
564001.3	4152481.57	36.41822	16.55	172.72	1.8	ANNUAL	PAREA1	5	564001.3	4152482	5.73064	16.55	172.72	1.8	ANNUAL	ARLN1	5
564021.3	4152481.57	25.71097	15.99	172.72	1.8	ANNUAL	PAREA1	5	564021.3	4152482	5.07317	15.99	172.72	1.8	ANNUAL	ARLN1	5
564041.3	4152481.57	18.78677	15.94	172.72	1.8	ANNUAL	PAREA1	5	564041.3	4152482	4.52133	15.94	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152481.57	14.16988	16.26	172.72	1.8	ANNUAL	PAREA1	5	564061.3	4152482	4.04945	16.26	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152481.57	10.91422	16.52	172.72	1.8	ANNUAL	PAREA1	5	564081.3	4152482	3.64117	16.52	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152481.57	8.62414	16.69	172.72	1.8	ANNUAL	PAREA1	5	564101.3	4152482	3.2873	16.69	172.72	1.8	ANNUAL	ARLN1	5
564121.3	4152481.57	6.96899	16.58	172.72	1.8	ANNUAL	PAREA1	5	564121.3	4152482	2.98247	16.58	172.72	1.8	ANNUAL	ARLN1	5
564141.3	4152481.57	5.73808	16.25	172.72	1.8	ANNUAL	PAREA1	5	564141.3	4152482	2.71877	16.25	172.72	1.8	ANNUAL	ARLN1	5
564161.3	4152481.57	4.79525	15.92	172.72	1.8	ANNUAL	PAREA1	5	564161.3	4152482	2.48802	15.92	172.72	1.8	ANNUAL	ARLN1	5
564181.3	4152481.57	4.06397	15.64	172.72	1.8	ANNUAL	PAREA1	5	564181.3	4152482	2.28505	15.64	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152501.57	0.20361	44.4	172.72	1.8	ANNUAL	PAREA1	5	563501.3	4152502	1.91342	44.4	172.72	1.8	ANNUAL	ARLN1	5
563521.3	4152501.57	0.22732	43.1	172.72	1.8	ANNUAL	PAREA1	5	563521.3	4152502	2.24875	43.1	172.72	1.8	ANNUAL	ARLN1	5
563541.3	4152501.57	0.25515	41.9	172.72	1.8	ANNUAL	PAREA1	5	563541.3	4152502	2.58977	41.9	172.72	1.8	ANNUAL	ARLN1	5
563561.3	4152501.57	0.28764	40.97	172.72	1.8	ANNUAL	PAREA1	5	563561.3	4152502	2.94973	40.97	172.72	1.8	ANNUAL	ARLN1	5
563581.3	4152501.57	0.32585	40.28	172.72	1.8	ANNUAL	PAREA1	5	563581.3	4152502	3.34523	40.28	172.72	1.8	ANNUAL	ARLN1	5
563601.3	4152501.57	0.37074	39.92	172.72	1.8	ANNUAL	PAREA1	5	563601.3	4152502	3.76396	39.92	172.72	1.8	ANNUAL	ARLN1	5
563621.3	4152501.57	0.42338	39.97	172.72	1.8	ANNUAL	PAREA1	5	563621.3	4152502	4.16604	39.97	172.72	1.8	ANNUAL	ARLN1	5
563641.3	4152501.57	0.49617	38.51	172.72	1.8	ANNUAL	PAREA1	5	563641.3	4152502	4.75806	38.51	172.72	1.8	ANNUAL	ARLN1	5
563661.3	4152501.57	0.6092	34.63	172.72	1.8	ANNUAL	PAREA1	5	563661.3	4152502	6.03881	34.63	172.72	1.8	ANNUAL	ARLN1	5
563681.3	4152501.57	0.77354	30.45	172.72	1.8	ANNUAL	PAREA1	5	563681.3	4152502	8.29712	30.45	172.72	1.8	ANNUAL	ARLN1	5
563701.3	4152501.57	1.00665	26.82	172.72	1.8	ANNUAL	PAREA1	5	563701.3	4152502	11.22537	26.82	172.72	1.8	ANNUAL	ARLN1	5
563721.3	4152501.57	1.29712	25.24	172.72	1.8	ANNUAL	PAREA1	5	563721.3	4152502	13.94022	25.24	172.72	1.8	ANNUAL	ARLN1	5
563741.3	4152501.57	1.72737	23.59	172.72	1.8	ANNUAL	PAREA1	5	563741.3	4152502	19.67984	23.59	172.72	1.8	ANNUAL	ARLN1	5
563821.3	4152501.57	9.30607	19.91	172.72	1.8	ANNUAL	PAREA1	5	563821.3	4152502	45.03474	19.91	172.72	1.8	ANNUAL	ARLN1	5
563861.3	4152501.57	27.90696	18.44	172.72	1.8	ANNUAL	PAREA1	5	563861.3	4152502	21.93726	18.44	172.72	1.8	ANNUAL	ARLN1	5
563881.3	4152501.57	38.85413	17.79	172.72	1.8	ANNUAL	PAREA1	5	563881.3	4152502	16.83596	17.79	172.72	1.8	ANNUAL	ARLN1	5
563901.3	4152501.57	48.50001	17.17	172.72	1.8	ANNUAL	PAREA1	5	563901.3	4152502	13.43321	17.17	172.72	1.8	ANNUAL	ARLN1	5
563981.3	4152501.57	53.6043	15.76	172.72	1.8	ANNUAL	PAREA1	5	563981.3	4152502	6.85439	15.76	172.72	1.8	ANNUAL	ARLN1	5
564001.3	4152501.57	41.01376	15.89	172.72	1.8	ANNUAL	PAREA1	5	564001.3	4152502	5.9988	15.89	172.72	1.8	ANNUAL	ARLN1	5
564021.3	4152501.57	28.9474	15.77	172.72	1.8	ANNUAL	PAREA1	5	564021.3	4152502	5.29002	15.77	172.72	1.8	ANNUAL	ARLN1	5
564041.3	4152501.57	20.26087	15.58	172.72	1.8	ANNUAL	PAREA1	5	564041.3	4152502	4.69651	15.58	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152501.57	14.82597	15.76	172.72	1.8	ANNUAL	PAREA1	5	564061.3	4152502	4.19285	15.76	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152501.57	11.23015	15.94	172.72	1.8	ANNUAL	PAREA1	5	564081.3	4152502	3.75885	15.94	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152501.57	8.75999	15.93	172.72	1.8	ANNUAL	PAREA1	5	564101.3	4152502	3.38518	15.93	172.72	1.8	ANNUAL	ARLN1	5
564121.3	4152501.57	7.01708	15.94	172.72	1.8	ANNUAL	PAREA1	5	564121.3	4152502	3.06355	15.94	172.72	1.8	ANNUAL	ARLN1	5
564141.3	4152501.57	5.73455	15.67	172.72	1.8	ANNUAL	PAREA1	5	564141.3	4152502	2.7859	15.67	172.72	1.8	ANNUAL	ARLN1	5
564161.3	4152501.57	4.77158	15.39	172.72	1.8	ANNUAL	PAREA1	5	564161.3	4152502	2.5441	15.39	172.72	1.8	ANNUAL	ARLN1	5
564181.3	4152501.57	4.03022	15.1	172.72	1.8	ANNUAL	PAREA1	5	564181.3	4152502	2.3329	15.1	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152521.57	0.18954	49.83	172.72	1.8	ANNUAL	PAREA1	5	563501.3	4152522	1.47897	49.83	172.72	1.8	ANNUAL	ARLN1	5
563521.3	4152521.57	0.21193	47.93	172.72	1.8	ANNUAL	PAREA1	5	563521.3	4152522	1.70436	47.93	172.72	1.8	ANNUAL	ARLN1	5
563541.3	4152521.57	0.23715	46.87	172.72	1.8	ANNUAL	PAREA1	5	563541.3	4152522	1.92296	46.87	172.72	1.8	ANNUAL	ARLN1	5
563561.3	4152521.57	0.26647	46.1	172.72	1.8	ANNUAL	PAREA1	5	563561.3	4152522	2.13593	46.1	172.72	1.8	ANNUAL	ARLN1	5
563581.3	4152521.57	0.30044	45.71	172.72	1.8	ANNUAL	PAREA1	5	563581.3	4152522	2.34382	45.71	172.72	1.8	ANNUAL	ARLN1	5
563601.3	4152521.57	0.3407	45.41	172.72	1.8	ANNUAL	PAREA1	5	563601.3	4152522	2.55293	45.41	172.72	1.8	ANNUAL	ARLN1	5
563621.3	4152521.57	0.38793	45.42	172.72	1.8	ANNUAL	PAREA1	5	563621.3	4152522	2.77047	45.42	172.72	1.8	ANNUAL	ARLN1	5
563641.3	4152521.57	0.45437	43.53	172.72	1.8	ANNUAL	PAREA1	5	563641.3	4152522	3.11232	43.53	172.72	1.8	ANNUAL	ARLN1	5
563661.3	4152521.57	0.55904	38.71	172.72	1.8	ANNUAL	PAREA1	5	563661.3	4152522	3.81044	38.71	172.72	1.8	ANNUAL	ARLN1	5
563681.3	4152521.57	0.71149	33.54	172.72	1.8	ANNUAL	PAREA1	5	563681.3	4152522	5.07761	33.54	172.72	1.8	ANNUAL	ARLN1	5
563701.3	4152521.57	0.92199	29.54	172.72	1.8	ANNUAL	PAREA1	5	563701.3	4152522	6.80786	29.54	172.72	1.8	ANNUAL	ARLN1	5
563721.3	4152521.57	1.1785	27.98	172.72	1.8	ANNUAL	PAREA1	5	563721.3	4152522	8.49356	27.98	172.72	1.8	ANNUAL	ARLN1	5
563741.3	4152521.57	1.56887	26.08	172.72	1.8	ANNUAL	PAREA1	5	563741.3	4152522	11.54233	26.08	172.72	1.8	ANNUAL	ARLN1	5
563761.3	4152521.57	2.22739	23.36	172.72	1.8	ANNUAL	PAREA1	5	563761.3	4152522	19.7327	23.36	172.72	1.8	ANNUAL	ARLN1	5
563821.3	4152521.57	8.94201	20.32	172.72	1.8	ANNUAL	PAREA1	5	563821.3	4152522	55.57973	20.32	172.72	1.8	ANNUAL	ARLN1	5
563861.3	4152521.57	34.5216	18.75	172.72	1.8	ANNUAL	PAREA1	5	563861.3	4152522	24.41587	18.75	172.72	1.8	ANNUAL	ARLN1	5
564001.3	4152521.57	35.99288	15.54	172.72	1.8	ANNUAL	PAREA1	5	564001.3	4152522	6.24233	15.54	172.72	1.8	ANNUAL	ARLN1	5
564021.3	4152521.57	26.62719	15.49	172.72	1.8	ANNUAL	PAREA1	5	564021.3	4152522	5.48843	15.49	172.72	1.8	ANNUAL	ARLN1	5
564041.3	4152521.57	18.93634	15.34	172.72	1.8	ANNUAL	PAREA1	5	564041.3	4152522	4.85874	15.34	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152521.57	13.91532	15.32	172.72	1.8	ANNUAL	PAREA1	5	564061.3	4152522	4.32472	15.32	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152521.57	10.61604	15.5	172.72	1.8	ANNUAL	PAREA1	5	564081.3	4152522	3.86651	15.5	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152521.57	8.32101	15.49	172.72	1.8	ANNUAL	PAREA1	5	564101.3	4152522	3.4743	15.49	172.72	1.8	ANNUAL	ARLN1	5
564121.3	4152521.57	6.68246	15.35	172.72	1.8	ANNUAL	PAREA1	5	564121.3	4152522	3.13848	15.35	172.72	1.8	ANNUAL	ARLN1	5
564141.3	4152521.57	5.48377	15.29	172.72	1.8	ANNUAL	PAREA1	5	564141.3	4152522	2.84825	15.29	172.72	1.8	ANNUAL	ARLN1	5
564161.3	4152521.57	4.57209	14.99	172.72	1.8	ANNUAL	PAREA1	5	564161.3	4152522	2.59714	14.99	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152541.57	0.17566	56.55	172.72	1.8	ANNUAL	PAREA1	5	563501.3	4152542	1.1889	56.55	172.72	1.8	ANNUAL	ARLN1	5
563521.3	4152541.57	0.19479	55.21	172.72	1.8	ANNUAL	PAREA1	5	563521.3	4152542	1.33421	55.21	172.72	1.8	ANNUAL	ARLN1	5
563541.3	4152541.57	0.21707	53.99	172.72	1.8	ANNUAL	PAREA1	5	563541.3	4152542	1.4897	53.99	172.72	1.8	ANNUAL	ARLN1	5
563561.3	4152541.57	0.24263	53.19	172.72	1.8	ANNUAL	PAREA1	5	563561.3	4152542	1.62975	53.19	172.72	1.8	ANNUAL	ARLN1	5
563581.3	4152541.57	0.2727	52.46	172.72	1.8	ANNUAL	PAREA1	5	563581.3	4152542	1.76788	52.46	172.72	1.8	ANNUAL	ARLN1	5
563601.3	4152541.57	0.30849	51.74	172.72	1.8	ANNUAL	PAREA1	5	563601.3	4152542	1.90998	51.74	172.72	1.8	ANNUAL	ARLN1	5
563621.3	4152541.57	0.35304	50.57	172.72	1.8	ANNUAL	PAREA1	5	563621.3	4152542	2.07467	50.57	172.72	1.8	ANNUAL	ARLN1	5
563641.3	4152541.57	0.41415	47.89	172.72	1.8	ANNUAL	PAREA1	5	563641.3	4152542	2.31664	47.89	172.72	1.8	ANNUAL	ARLN1	5
563661.3	4152541.57	0.5114	42.16	172.72	1.8	ANNUAL	PAREA1	5	563661.3	4152542	2.7989	42.16	172.72	1.8	ANNUAL	ARLN1	5
563681.3	4152541.57	0.65166	36.14	172.72	1.8	ANNUAL	PAREA1	5	563681.3	4152542	3.66183	36.14	172.72	1.8	ANNUAL	ARLN1	5
563701.3	4152541.57	0.83327	32.34	172.72	1.8	ANNUAL	PAREA1	5	563701.3	4152542	4.72265	32.34	172.72	1.8	ANNUAL	ARLN1	5
563721.3	4152541.57	1.03881	31.43	172.72	1.8	ANNUAL	PAREA1	5	563721.3	4152542	5.74447	31.43	172.72	1.8	ANNUAL	ARLN1	5
563741.3	4152541.57	1.33263	30.38	172.72	1.8	ANNUAL	PAREA1	5	563741.3	4152542	7.44433	30.38	172.72	1.8	ANNUAL	ARLN1	5
563761.3	4152541.57	1.99206	25.25	172.72	1.8	ANNUAL	PAREA1	5	563761.3	4152542	13.20083	25.25	172.72	1.8	ANNUAL	ARLN1	5
563781.3	4152541.57	2.94104	22.94	172.72	1.8	ANNUAL	PAREA1	5	563781.3	4152542	27.06529	22.94	172.72	1.8	ANNUAL	ARLN1	5
563981.3	4152541.57	32.93343	16.11	172.72	1.8	ANNUAL	PAREA1	5	563981.3	4152542	7.43104	16.11	172.72	1.8	ANNUAL	ARLN1	5
564001.3	4152541.57	25.1595	15.64	172.72	1.8	ANNUAL	PAREA1	5	564001.3	4152542	6.45458	15.64	172.72	1.8	ANNUAL	ARLN1	5
564021.3	4152541.57	19.5511	15.23	172.72	1.8	ANNUAL	PAREA1	5	564021.3	4152542	5.65815	15.23	172.72	1.8	ANNUAL	ARLN1	5

564041.3	4152541.57	15.07453	15.17	172.72	1.8	ANNUAL	PAREA1	5	564041.3	4152542	4.99649	15.17	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152541.57	11.66294	15.15	172.72	1.8	ANNUAL	PAREA1	5	564061.3	4152542	4.4356	15.15	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152541.57	9.15993	15	172.72	1.8	ANNUAL	PAREA1	5	564081.3	4152542	3.9575	15	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152541.57	7.3567	15.01	172.72	1.8	ANNUAL	PAREA1	5	564101.3	4152542	3.55013	15.01	172.72	1.8	ANNUAL	ARLN1	5
564121.3	4152541.57	6.01653	15.01	172.72	1.8	ANNUAL	PAREA1	5	564121.3	4152542	3.20172	15.01	172.72	1.8	ANNUAL	ARLN1	5
564141.3	4152541.57	4.9918	14.75	172.72	1.8	ANNUAL	PAREA1	5	564141.3	4152542	2.90251	14.75	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152561.57	0.16363	64.3	172.72	1.8	ANNUAL	PAREA1	5	563501.3	4152562	0.98272	64.3	172.72	1.8	ANNUAL	ARLN1	5
563521.3	4152561.57	0.17986	63.35	172.72	1.8	ANNUAL	PAREA1	5	563521.3	4152562	1.08574	63.35	172.72	1.8	ANNUAL	ARLN1	5
563541.3	4152561.57	0.19946	61.78	172.72	1.8	ANNUAL	PAREA1	5	563541.3	4152562	1.20303	61.78	172.72	1.8	ANNUAL	ARLN1	5
563561.3	4152561.57	0.2221	60.42	172.72	1.8	ANNUAL	PAREA1	5	563561.3	4152562	1.31112	60.42	172.72	1.8	ANNUAL	ARLN1	5
563581.3	4152561.57	0.24939	58.77	172.72	1.8	ANNUAL	PAREA1	5	563581.3	4152562	1.41914	58.77	172.72	1.8	ANNUAL	ARLN1	5
563601.3	4152561.57	0.28177	57.23	172.72	1.8	ANNUAL	PAREA1	5	563601.3	4152562	1.53271	57.23	172.72	1.8	ANNUAL	ARLN1	5
563621.3	4152561.57	0.32353	54.83	172.72	1.8	ANNUAL	PAREA1	5	563621.3	4152562	1.67181	54.83	172.72	1.8	ANNUAL	ARLN1	5
563641.3	4152561.57	0.38219	50.7	172.72	1.8	ANNUAL	PAREA1	5	563641.3	4152562	1.87872	50.7	172.72	1.8	ANNUAL	ARLN1	5
563661.3	4152561.57	0.47034	44.51	172.72	1.8	ANNUAL	PAREA1	5	563661.3	4152562	2.25349	44.51	172.72	1.8	ANNUAL	ARLN1	5
563681.3	4152561.57	0.59589	38.22	172.72	1.8	ANNUAL	PAREA1	5	563681.3	4152562	2.89373	38.22	172.72	1.8	ANNUAL	ARLN1	5
563701.3	4152561.57	0.73627	35.68	172.72	1.8	ANNUAL	PAREA1	5	563701.3	4152562	3.52261	35.68	172.72	1.8	ANNUAL	ARLN1	5
563721.3	4152561.57	0.91481	34.23	172.72	1.8	ANNUAL	PAREA1	5	563721.3	4152562	4.33288	34.23	172.72	1.8	ANNUAL	ARLN1	5
563741.3	4152561.57	1.17672	32.37	172.72	1.8	ANNUAL	PAREA1	5	563741.3	4152562	5.75312	32.37	172.72	1.8	ANNUAL	ARLN1	5
563761.3	4152561.57	1.70474	27.66	172.72	1.8	ANNUAL	PAREA1	5	563761.3	4152562	9.5152	27.66	172.72	1.8	ANNUAL	ARLN1	5
563781.3	4152561.57	2.62838	23.4	172.72	1.8	ANNUAL	PAREA1	5	563781.3	4152562	20.31748	23.4	172.72	1.8	ANNUAL	ARLN1	5
563981.3	4152561.57	22.26907	16.12	172.72	1.8	ANNUAL	PAREA1	5	563981.3	4152562	7.68215	16.12	172.72	1.8	ANNUAL	ARLN1	5
564001.3	4152561.57	17.03987	15.74	172.72	1.8	ANNUAL	PAREA1	5	564001.3	4152562	6.6498	15.74	172.72	1.8	ANNUAL	ARLN1	5
564021.3	4152561.57	13.42073	15.23	172.72	1.8	ANNUAL	PAREA1	5	564021.3	4152562	5.80997	15.23	172.72	1.8	ANNUAL	ARLN1	5
564041.3	4152561.57	10.89683	14.94	172.72	1.8	ANNUAL	PAREA1	5	564041.3	4152562	5.1134	14.94	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152561.57	8.93757	14.85	172.72	1.8	ANNUAL	PAREA1	5	564061.3	4152562	4.52526	14.85	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152561.57	7.35617	14.68	172.72	1.8	ANNUAL	PAREA1	5	564081.3	4152562	4.02798	14.68	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152561.57	6.12089	14.71	172.72	1.8	ANNUAL	PAREA1	5	564101.3	4152562	3.60673	14.71	172.72	1.8	ANNUAL	ARLN1	5
564121.3	4152561.57	5.13399	14.59	172.72	1.8	ANNUAL	PAREA1	5	564121.3	4152562	3.24844	14.59	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152581.57	0.15337	72.19	172.72	1.8	ANNUAL	PAREA1	5	563501.3	4152582	0.83115	72.19	172.72	1.8	ANNUAL	ARLN1	5
563521.3	4152581.57	0.16758	71.2	172.72	1.8	ANNUAL	PAREA1	5	563521.3	4152582	0.90915	71.2	172.72	1.8	ANNUAL	ARLN1	5
563541.3	4152581.57	0.18445	69.72	172.72	1.8	ANNUAL	PAREA1	5	563541.3	4152582	0.99748	69.72	172.72	1.8	ANNUAL	ARLN1	5
563561.3	4152581.57	0.2049	67.63	172.72	1.8	ANNUAL	PAREA1	5	563561.3	4152582	1.08908	67.63	172.72	1.8	ANNUAL	ARLN1	5
563581.3	4152581.57	0.23025	64.83	172.72	1.8	ANNUAL	PAREA1	5	563581.3	4152582	1.18178	64.83	172.72	1.8	ANNUAL	ARLN1	5
563601.3	4152581.57	0.26197	61.45	172.72	1.8	ANNUAL	PAREA1	5	563601.3	4152582	1.28763	61.45	172.72	1.8	ANNUAL	ARLN1	5
563621.3	4152581.57	0.30271	57.42	172.72	1.8	ANNUAL	PAREA1	5	563621.3	4152582	1.41912	57.42	172.72	1.8	ANNUAL	ARLN1	5
563641.3	4152581.57	0.35759	52.5	172.72	1.8	ANNUAL	PAREA1	5	563641.3	4152582	1.60431	52.5	172.72	1.8	ANNUAL	ARLN1	5
563661.3	4152581.57	0.43952	45.66	172.72	1.8	ANNUAL	PAREA1	5	563661.3	4152582	1.93401	45.66	172.72	1.8	ANNUAL	ARLN1	5
563681.3	4152581.57	0.54303	40.55	172.72	1.8	ANNUAL	PAREA1	5	563681.3	4152582	2.37773	40.55	172.72	1.8	ANNUAL	ARLN1	5
563701.3	4152581.57	0.65885	38.32	172.72	1.8	ANNUAL	PAREA1	5	563701.3	4152582	2.8393	38.32	172.72	1.8	ANNUAL	ARLN1	5
563721.3	4152581.57	0.81459	36.25	172.72	1.8	ANNUAL	PAREA1	5	563721.3	4152582	3.51328	36.25	172.72	1.8	ANNUAL	ARLN1	5
563741.3	4152581.57	1.05271	33.41	172.72	1.8	ANNUAL	PAREA1	5	563741.3	4152582	4.73905	33.41	172.72	1.8	ANNUAL	ARLN1	5
563761.3	4152581.57	1.46638	29.36	172.72	1.8	ANNUAL	PAREA1	5	563761.3	4152582	7.43009	29.36	172.72	1.8	ANNUAL	ARLN1	5
563781.3	4152581.57	2.28465	24.11	172.72	1.8	ANNUAL	PAREA1	5	563781.3	4152582	15.92455	24.11	172.72	1.8	ANNUAL	ARLN1	5
563801.3	4152581.57	3.40157	22.44	172.72	1.8	ANNUAL	PAREA1	5	563801.3	4152582	38.72352	22.44	172.72	1.8	ANNUAL	ARLN1	5
563981.3	4152581.57	13.81894	15.95	172.72	1.8	ANNUAL	PAREA1	5	563981.3	4152582	7.95662	15.95	172.72	1.8	ANNUAL	ARLN1	5
564001.3	4152581.57	11.11979	15.54	172.72	1.8	ANNUAL	PAREA1	5	564001.3	4152582	6.85994	15.54	172.72	1.8	ANNUAL	ARLN1	5
564021.3	4152581.57	9.12721	15.17	172.72	1.8	ANNUAL	PAREA1	5	564021.3	4152582	5.96914	15.17	172.72	1.8	ANNUAL	ARLN1	5
564041.3	4152581.57	7.67109	14.83	172.72	1.8	ANNUAL	PAREA1	5	564041.3	4152582	5.23109	14.83	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152581.57	6.54931	14.58	172.72	1.8	ANNUAL	PAREA1	5	564061.3	4152582	4.61103	14.58	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152581.57	5.62575	14.39	172.72	1.8	ANNUAL	PAREA1	5	564081.3	4152582	4.09095	14.39	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152581.57	4.8513	14.29	172.72	1.8	ANNUAL	PAREA1	5	564101.3	4152582	3.65358	14.29	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152601.57	0.14434	78.94	156.32	1.8	ANNUAL	PAREA1	5	563501.3	4152602	0.7202	78.94	156.32	1.8	ANNUAL	ARLN1	5
563521.3	4152601.57	0.15674	78.06	156.32	1.8	ANNUAL	PAREA1	5	563521.3	4152602	0.7781	78.06	156.32	1.8	ANNUAL	ARLN1	5
563541.3	4152601.57	0.17094	77.08	156.32	1.8	ANNUAL	PAREA1	5	563541.3	4152602	0.8439	77.08	156.32	1.8	ANNUAL	ARLN1	5
563561.3	4152601.57	0.18853	75.04	171.64	1.8	ANNUAL	PAREA1	5	563561.3	4152602	0.9213	75.04	171.64	1.8	ANNUAL	ARLN1	5
563581.3	4152601.57	0.21347	70.06	172.72	1.8	ANNUAL	PAREA1	5	563581.3	4152602	1.00954	70.06	172.72	1.8	ANNUAL	ARLN1	5
563601.3	4152601.57	0.24437	64.93	172.72	1.8	ANNUAL	PAREA1	5	563601.3	4152602	1.10955	64.93	172.72	1.8	ANNUAL	ARLN1	5
563621.3	4152601.57	0.28397	59.43	172.72	1.8	ANNUAL	PAREA1	5	563621.3	4152602	1.23734	59.43	172.72	1.8	ANNUAL	ARLN1	5
563641.3	4152601.57	0.33503	53.93	172.72	1.8	ANNUAL	PAREA1	5	563641.3	4152602	1.4102	53.93	172.72	1.8	ANNUAL	ARLN1	5
563661.3	4152601.57	0.40965	46.91	172.72	1.8	ANNUAL	PAREA1	5	563661.3	4152602	1.69988	46.91	172.72	1.8	ANNUAL	ARLN1	5
563681.3	4152601.57	0.48348	44.62	172.72	1.8	ANNUAL	PAREA1	5	563681.3	4152602	1.95026	44.62	172.72	1.8	ANNUAL	ARLN1	5
563701.3	4152601.57	0.58307	41.97	172.72	1.8	ANNUAL	PAREA1	5	563701.3	4152602	2.31638	41.97	172.72	1.8	ANNUAL	ARLN1	5
563721.3	4152601.57	0.72738	38.57	172.72	1.8	ANNUAL	PAREA1	5	563721.3	4152602	2.91364	38.57	172.72	1.8	ANNUAL	ARLN1	5
563741.3	4152601.57	0.94792	34.66	172.72	1.8	ANNUAL	PAREA1	5	563741.3	4152602	3.95632	34.66	172.72	1.8	ANNUAL	ARLN1	5
563761.3	4152601.57	1.29864	30.72	172.72	1.8	ANNUAL	PAREA1	5	563761.3	4152602	5.9901	30.72	172.72	1.8	ANNUAL	ARLN1	5
563781.3	4152601.57	2.04717	24.8	172.72	1.8	ANNUAL	PAREA1	5	563781.3	4152602	12.22763	24.8	172.72	1.8	ANNUAL	ARLN1	5
563801.3	4152601.57	3.09225	22.55	172.72	1.8	ANNUAL	PAREA1	5	563801.3	4152602	29.26241	22.55	172.72	1.8	ANNUAL	ARLN1	5
564021.3	4152601.57	6.15323	14.91	172.72	1.8	ANNUAL	PAREA1	5	564021.3	4152602	6.15135	14.91	172.72	1.8	ANNUAL	ARLN1	5
564041.3	4152601.57	5.34856	14.58	172.72	1.8	ANNUAL	PAREA1	5	564041.3	4152602	5.36503	14.58	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152601.57	4.713	14.28	172.72	1.8	ANNUAL	PAREA1	5	564061.3	4152602	4.70798	14.28	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152601.57	4.1906	14.13	172.72	1.8	ANNUAL	PAREA1	5	564081.3	4152602	4.15989	14.13	172.72	1.8	ANNUAL	ARLN1	5
564101.3	4152601.57	3.73014	13.91	172.72	1.8	ANNUAL	PAREA1	5	564101.3	4152602	3.70229	13.91	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152621.57	0.13599	83.74	87.4	1.8	ANNUAL	PAREA1	5	563501.3	4152622	0.63894	83.74	87.4	1.8	ANNUAL	ARLN1	5
563521.3	4152621.57	0.14768	82.07	155.64	1.8	ANNUAL	PAREA1	5	563521.3	4152622	0.68599	82.07	155.64	1.8	ANNUAL	ARLN1	5
563541.3	4152621.57	0.16124	80.21	156.21	1.8	ANNUAL	PAREA1	5	563541.3	4152622	0.73928	80.21	156.21	1.8	ANNUAL	ARLN1	5
563561.3	4152621.57	0.1773	77.99	156.32	1.8	ANNUAL	PAREA1	5	563561.3	4152622	0.80374	77.99	156.32	1.8	ANNUAL	ARLN1	5
563581.3	4152621.57	0.19944	73.28	172.08	1.8	ANNUAL	PAREA1	5	563581.3	4152622	0.88148	73.28	172.08	1.8	ANNUAL	ARLN1	5
563601.3	4152621.57	0.2289	67.16	172.72	1.8	ANNUAL	PAREA1	5	563601.3	4152622	0.97639	67.16	172.72	1.8	ANNUAL	ARLN1	5
563621.3	4152621.57	0.26682	60.84	172.72	1.8	ANNUAL	PAREA1	5	563621.3	4152622	1.09875	60.84	172.72	1.8	ANNUAL	ARLN1	5
563641.3	4152621.57	0.31517	54.91	172.72	1.8	ANNUAL	PAREA1	5	563641.3	4152622	1.26176	54.91	172.72	1.8	ANNUAL	ARLN1	5
563661.3	4152621.57	0.37323	50.48	172.72	1.8	ANNUAL	PAREA1	5	563661.3	4152622	1.45992	50.48	172.72	1.8	ANNUAL	ARLN1	5
563681.3	4152621.57	0.43731	48.4	172.72	1.8	ANNUAL	PAREA1	5	563681.3	4152622	1.66178	48.4	172.72	1.8	ANNUAL	ARLN1	5
563701.3	4152621.57	0.52386	45.9	172.72	1.8	ANNUAL	PAREA1	5	563701.3	4152622	1.94393	45.9	172.72	1.8	ANNUAL	ARLN1	5
563721.3	4152621.57	0.66693	40.92	172.72	1.8	ANNUAL	PAREA1	5	563721.3	4152622	2.47242	40.92	172.72	1.8	ANNUAL	ARLN1	5
563741.3	4152621.57	0.88729	35.75	172.72	1.8	ANNUAL	PAREA1	5	563741.3	4152622	3.38528	35.75	172.72	1.8	ANNUAL	ARLN1	5
563761.3	4152621.57	1.21849	31.72	172.72	1.8	ANNUAL	PAREA1	5	563761.3	4152622	4.95939	31.72	172.72	1.8	ANNUAL	ARLN1	5
563781.3	4152621.57	1.919	25.74	172.72	1.8	ANNUAL	PAREA1	5	563781.3	4152622	9.57998	25.74	172.72	1.8	ANNUAL	ARLN1	5

564041.3	4152621.57	3.74413	14.42	172.72	1.8	ANNUAL	PAREA1	5	564041.3	4152622	5.5161	14.42	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152621.57	3.38773	14.12	172.72	1.8	ANNUAL	PAREA1	5	564061.3	4152622	4.81658	14.12	172.72	1.8	ANNUAL	ARLN1	5
564081.3	4152621.57	3.08738	13.83	172.72	1.8	ANNUAL	PAREA1	5	564081.3	4152622	4.2381	13.83	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152641.57	0.12886	85.77	85.77	1.8	ANNUAL	PAREA1	5	563501.3	4152642	0.57921	85.77	85.77	1.8	ANNUAL	ARLN1	5
563521.3	4152641.57	0.13988	83.86	85.42	1.8	ANNUAL	PAREA1	5	563521.3	4152642	0.61923	83.86	85.42	1.8	ANNUAL	ARLN1	5
563541.3	4152641.57	0.15315	81.33	155.01	1.8	ANNUAL	PAREA1	5	563541.3	4152642	0.66504	81.33	155.01	1.8	ANNUAL	ARLN1	5
563561.3	4152641.57	0.16906	78.48	156.21	1.8	ANNUAL	PAREA1	5	563561.3	4152642	0.72051	78.48	156.21	1.8	ANNUAL	ARLN1	5
563581.3	4152641.57	0.19009	73.95	156.32	1.8	ANNUAL	PAREA1	5	563581.3	4152642	0.78956	73.95	156.32	1.8	ANNUAL	ARLN1	5
563601.3	4152641.57	0.21865	67.73	172.72	1.8	ANNUAL	PAREA1	5	563601.3	4152642	0.8765	67.73	172.72	1.8	ANNUAL	ARLN1	5
563621.3	4152641.57	0.25536	61.46	172.72	1.8	ANNUAL	PAREA1	5	563621.3	4152642	0.99066	61.46	172.72	1.8	ANNUAL	ARLN1	5
563641.3	4152641.57	0.301	56.04	172.72	1.8	ANNUAL	PAREA1	5	563641.3	4152642	1.13593	56.04	172.72	1.8	ANNUAL	ARLN1	5
563661.3	4152641.57	0.35269	52.9	172.72	1.8	ANNUAL	PAREA1	5	563661.3	4152642	1.29044	52.9	172.72	1.8	ANNUAL	ARLN1	5
563681.3	4152641.57	0.40846	52.14	172.72	1.8	ANNUAL	PAREA1	5	563681.3	4152642	1.43974	52.14	172.72	1.8	ANNUAL	ARLN1	5
563701.3	4152641.57	0.49168	49.41	172.72	1.8	ANNUAL	PAREA1	5	563701.3	4152642	1.68224	49.41	172.72	1.8	ANNUAL	ARLN1	5
563721.3	4152641.57	0.63065	43.8	172.72	1.8	ANNUAL	PAREA1	5	563721.3	4152642	2.12229	43.8	172.72	1.8	ANNUAL	ARLN1	5
563741.3	4152641.57	0.87028	36.39	172.72	1.8	ANNUAL	PAREA1	5	563741.3	4152642	2.97756	36.39	172.72	1.8	ANNUAL	ARLN1	5
563761.3	4152641.57	1.19315	32.3	172.72	1.8	ANNUAL	PAREA1	5	563761.3	4152642	4.23271	32.3	172.72	1.8	ANNUAL	ARLN1	5
563781.3	4152641.57	1.81597	26.69	172.72	1.8	ANNUAL	PAREA1	5	563781.3	4152642	7.50181	26.69	172.72	1.8	ANNUAL	ARLN1	5
563801.3	4152641.57	2.69146	22.89	172.72	1.8	ANNUAL	PAREA1	5	563801.3	4152642	16.59413	22.89	172.72	1.8	ANNUAL	ARLN1	5
564061.3	4152641.57	2.45112	13.92	172.72	1.8	ANNUAL	PAREA1	5	564061.3	4152642	4.93819	13.92	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152661.57	0.12355	85.97	85.97	1.8	ANNUAL	PAREA1	5	563501.3	4152662	0.5335	85.97	85.97	1.8	ANNUAL	ARLN1	5
563521.3	4152661.57	0.1343	84.28	85.13	1.8	ANNUAL	PAREA1	5	563521.3	4152662	0.56817	84.28	85.13	1.8	ANNUAL	ARLN1	5
563541.3	4152661.57	0.14812	81.1	87.13	1.8	ANNUAL	PAREA1	5	563541.3	4152662	0.60997	81.1	87.13	1.8	ANNUAL	ARLN1	5
563561.3	4152661.57	0.16446	78.05	156.21	1.8	ANNUAL	PAREA1	5	563561.3	4152662	0.65932	78.05	156.21	1.8	ANNUAL	ARLN1	5
563581.3	4152661.57	0.18596	73.48	156.32	1.8	ANNUAL	PAREA1	5	563581.3	4152662	0.72344	73.48	156.32	1.8	ANNUAL	ARLN1	5
563601.3	4152661.57	0.21428	67.78	172.72	1.8	ANNUAL	PAREA1	5	563601.3	4152662	0.80232	67.78	172.72	1.8	ANNUAL	ARLN1	5
563621.3	4152661.57	0.25109	61.74	172.72	1.8	ANNUAL	PAREA1	5	563621.3	4152662	0.90509	61.74	172.72	1.8	ANNUAL	ARLN1	5
563641.3	4152661.57	0.29149	58.47	172.72	1.8	ANNUAL	PAREA1	5	563641.3	4152662	1.01187	58.47	172.72	1.8	ANNUAL	ARLN1	5
563661.3	4152661.57	0.33965	56.2	172.72	1.8	ANNUAL	PAREA1	5	563661.3	4152662	1.1352	56.2	172.72	1.8	ANNUAL	ARLN1	5
563681.3	4152661.57	0.395	55.46	172.72	1.8	ANNUAL	PAREA1	5	563681.3	4152662	1.26761	55.46	172.72	1.8	ANNUAL	ARLN1	5
563701.3	4152661.57	0.47948	52.16	172.72	1.8	ANNUAL	PAREA1	5	563701.3	4152662	1.48506	52.16	172.72	1.8	ANNUAL	ARLN1	5
563721.3	4152661.57	0.61697	45.98	172.72	1.8	ANNUAL	PAREA1	5	563721.3	4152662	1.86695	45.98	172.72	1.8	ANNUAL	ARLN1	5
563741.3	4152661.57	0.85764	37.32	172.72	1.8	ANNUAL	PAREA1	5	563741.3	4152662	2.62416	37.32	172.72	1.8	ANNUAL	ARLN1	5
563761.3	4152661.57	1.14375	33.45	172.72	1.8	ANNUAL	PAREA1	5	563761.3	4152662	3.58939	33.45	172.72	1.8	ANNUAL	ARLN1	5
563781.3	4152661.57	1.68194	27.31	172.72	1.8	ANNUAL	PAREA1	5	563781.3	4152662	6.06016	27.31	172.72	1.8	ANNUAL	ARLN1	5
563801.3	4152661.57	2.35034	23.03	172.72	1.8	ANNUAL	PAREA1	5	563801.3	4152662	12.28898	23.03	172.72	1.8	ANNUAL	ARLN1	5
563821.3	4152661.57	3.06553	19.72	172.72	1.8	ANNUAL	PAREA1	5	563821.3	4152662	36.09222	19.72	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152681.57	0.12108	85.09	85.09	1.8	ANNUAL	PAREA1	5	563501.3	4152682	0.49672	85.09	85.09	1.8	ANNUAL	ARLN1	5
563521.3	4152681.57	0.13243	83.34	85.75	1.8	ANNUAL	PAREA1	5	563521.3	4152682	0.52817	83.34	85.75	1.8	ANNUAL	ARLN1	5
563541.3	4152681.57	0.14687	80.25	87.13	1.8	ANNUAL	PAREA1	5	563541.3	4152682	0.5661	80.25	87.13	1.8	ANNUAL	ARLN1	5
563561.3	4152681.57	0.16419	77.03	155.64	1.8	ANNUAL	PAREA1	5	563561.3	4152682	0.61156	77.03	155.64	1.8	ANNUAL	ARLN1	5
563581.3	4152681.57	0.1861	72.92	156.32	1.8	ANNUAL	PAREA1	5	563581.3	4152682	0.67011	72.92	156.32	1.8	ANNUAL	ARLN1	5
563601.3	4152681.57	0.21404	68.08	172.08	1.8	ANNUAL	PAREA1	5	563601.3	4152682	0.74222	68.08	172.08	1.8	ANNUAL	ARLN1	5
563621.3	4152681.57	0.25006	62.76	172.72	1.8	ANNUAL	PAREA1	5	563621.3	4152682	0.83217	62.76	172.72	1.8	ANNUAL	ARLN1	5
563641.3	4152681.57	0.28892	60.32	172.72	1.8	ANNUAL	PAREA1	5	563641.3	4152682	0.91815	60.32	172.72	1.8	ANNUAL	ARLN1	5
563661.3	4152681.57	0.33329	59.37	172.72	1.8	ANNUAL	PAREA1	5	563661.3	4152682	1.00931	59.37	172.72	1.8	ANNUAL	ARLN1	5
563681.3	4152681.57	0.39491	56.92	172.72	1.8	ANNUAL	PAREA1	5	563681.3	4152682	1.14613	56.92	172.72	1.8	ANNUAL	ARLN1	5
563701.3	4152681.57	0.48214	53.04	172.72	1.8	ANNUAL	PAREA1	5	563701.3	4152682	1.34947	53.04	172.72	1.8	ANNUAL	ARLN1	5
563721.3	4152681.57	0.61781	46.53	172.72	1.8	ANNUAL	PAREA1	5	563721.3	4152682	1.6913	46.53	172.72	1.8	ANNUAL	ARLN1	5
563741.3	4152681.57	0.79479	41.28	172.72	1.8	ANNUAL	PAREA1	5	563741.3	4152682	2.17034	41.28	172.72	1.8	ANNUAL	ARLN1	5
563761.3	4152681.57	1.03817	35.93	172.72	1.8	ANNUAL	PAREA1	5	563761.3	4152682	2.9644	35.93	172.72	1.8	ANNUAL	ARLN1	5
563781.3	4152681.57	1.51593	27.54	172.72	1.8	ANNUAL	PAREA1	5	563781.3	4152682	5.08326	27.54	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152701.57	0.12127	84.06	84.06	1.8	ANNUAL	PAREA1	5	563501.3	4152702	0.46533	84.06	84.06	1.8	ANNUAL	ARLN1	5
563521.3	4152701.57	0.13343	82.12	85.69	1.8	ANNUAL	PAREA1	5	563521.3	4152702	0.49479	82.12	85.69	1.8	ANNUAL	ARLN1	5
563541.3	4152701.57	0.14828	79.37	87.18	1.8	ANNUAL	PAREA1	5	563541.3	4152702	0.52908	79.37	87.18	1.8	ANNUAL	ARLN1	5
563561.3	4152701.57	0.16551	76.91	87.73	1.8	ANNUAL	PAREA1	5	563561.3	4152702	0.56845	76.91	87.73	1.8	ANNUAL	ARLN1	5
563581.3	4152701.57	0.18851	72.34	156.27	1.8	ANNUAL	PAREA1	5	563581.3	4152702	0.62481	72.34	156.27	1.8	ANNUAL	ARLN1	5
563601.3	4152701.57	0.216	68.27	156.32	1.8	ANNUAL	PAREA1	5	563601.3	4152702	0.69051	68.27	156.32	1.8	ANNUAL	ARLN1	5
563621.3	4152701.57	0.24803	65.33	172.72	1.8	ANNUAL	PAREA1	5	563621.3	4152702	0.75843	65.33	172.72	1.8	ANNUAL	ARLN1	5
563641.3	4152701.57	0.28582	63.32	172.72	1.8	ANNUAL	PAREA1	5	563641.3	4152702	0.83109	63.32	172.72	1.8	ANNUAL	ARLN1	5
563661.3	4152701.57	0.3314	61.94	172.72	1.8	ANNUAL	PAREA1	5	563661.3	4152702	0.91431	61.94	172.72	1.8	ANNUAL	ARLN1	5
563681.3	4152701.57	0.40066	57.11	172.72	1.8	ANNUAL	PAREA1	5	563681.3	4152702	1.05722	57.11	172.72	1.8	ANNUAL	ARLN1	5
563701.3	4152701.57	0.49314	51.85	172.72	1.8	ANNUAL	PAREA1	5	563701.3	4152702	1.25766	51.85	172.72	1.8	ANNUAL	ARLN1	5
563721.3	4152701.57	0.6202	45.68	172.72	1.8	ANNUAL	PAREA1	5	563721.3	4152702	1.56302	45.68	172.72	1.8	ANNUAL	ARLN1	5
563741.3	4152701.57	0.76021	41.9	172.72	1.8	ANNUAL	PAREA1	5	563741.3	4152702	1.93778	41.9	172.72	1.8	ANNUAL	ARLN1	5
563761.3	4152701.57	0.98906	34.63	172.72	1.8	ANNUAL	PAREA1	5	563761.3	4152702	2.72598	34.63	172.72	1.8	ANNUAL	ARLN1	5
563781.3	4152701.57	1.32982	27.7	172.72	1.8	ANNUAL	PAREA1	5	563781.3	4152702	4.30156	27.7	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152721.57	0.123	83.11	83.11	1.8	ANNUAL	PAREA1	5	563501.3	4152722	0.43761	83.11	83.11	1.8	ANNUAL	ARLN1	5
563521.3	4152721.57	0.13569	80.95	85.16	1.8	ANNUAL	PAREA1	5	563521.3	4152722	0.46581	80.95	85.16	1.8	ANNUAL	ARLN1	5
563541.3	4152721.57	0.15064	78.55	86.93	1.8	ANNUAL	PAREA1	5	563541.3	4152722	0.49702	78.55	86.93	1.8	ANNUAL	ARLN1	5
563561.3	4152721.57	0.16783	76.52	87.18	1.8	ANNUAL	PAREA1	5	563561.3	4152722	0.53223	76.52	87.18	1.8	ANNUAL	ARLN1	5
563581.3	4152721.57	0.19	73.01	155.68	1.8	ANNUAL	PAREA1	5	563581.3	4152722	0.58048	73.01	155.68	1.8	ANNUAL	ARLN1	5
563601.3	4152721.57	0.217	69.55	156.32	1.8	ANNUAL	PAREA1	5	563601.3	4152722	0.63853	69.55	156.32	1.8	ANNUAL	ARLN1	5
563621.3	4152721.57	0.24756	67.69	156.32	1.8	ANNUAL	PAREA1	5	563621.3	4152722	0.69537	67.69	156.32	1.8	ANNUAL	ARLN1	5
563641.3	4152721.57	0.28682	65.09	172.72	1.8	ANNUAL	PAREA1	5	563641.3	4152722	0.76496	65.09	172.72	1.8	ANNUAL	ARLN1	5
563661.3	4152721.57	0.33697	61.94	172.72	1.8	ANNUAL	PAREA1	5	563661.3	4152722	0.85383	61.94	172.72	1.8	ANNUAL	ARLN1	5
563681.3	4152721.57	0.41219	55.08	172.72	1.8	ANNUAL	PAREA1	5	563681.3	4152722	1.00656	55.08	172.72	1.8	ANNUAL	ARLN1	5
563701.3	4152721.57	0.50648	48.78	172.72	1.8	ANNUAL	PAREA1	5	563701.3	4152722	1.21046	48.78	172.72	1.8	ANNUAL	ARLN1	5
563721.3	4152721.57	0.61212	44.26	172.72	1.8	ANNUAL	PAREA1	5	563721.3	4152722	1.45876	44.26	172.72	1.8	ANNUAL	ARLN1	5
563741.3	4152721.57	0.73063	40.28	172.72	1.8	ANNUAL	PAREA1	5	563741.3	4152722	1.79854	40.28	172.72	1.8	ANNUAL	ARLN1	5
563761.3	4152721.57	0.95314	31.7	172.72	1.8	ANNUAL	PAREA1	5	563761.3	4152722	2.61845	31.7	172.72	1.8	ANNUAL	ARLN1	5
563781.3	4152721.57	1.16201	27.43	172.72	1.8	ANNUAL	PAREA1	5	563781.3	4152722	3.69404	27.43	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152741.57	0.12501	82.25	82.25	1.8	ANNUAL	PAREA1	5	563501.3	4152742	0.41247	82.25	82.25	1.8	ANNUAL	ARLN1	5
563521.3	4152741.57	0.13756	80.53	82.31	1.8	ANNUAL	PAREA1	5	563521.3	4152742	0.43809	80.53	82.31	1.8	ANNUAL	ARLN1	5
563541.3	4152741.57	0.15274	78.12	85.16	1.8	ANNUAL	PAREA1	5	563541.3	4152742	0.46758	78.12	85.16	1.8	ANNUAL	ARLN1	5
563561.3	4152741.57	0.17029	76.16	86.08	1.8	ANNUAL	PAREA1	5	563561.3	4152742	0.50033	76.16	86.08	1.8	ANNUAL	ARLN1	5
563581.3	4152741.57	0.19105	74.42	86.45	1.8	ANNUAL	PAREA1	5	563581.3	4152742	0.53846	74.42	86.45	1.8	ANNUAL	ARLN1	5
563601.3	4152741.57	0.21683	72.17	155.64	1.8	ANNUAL	PAREA1	5	563601.3	4152742	0.58594	72.17	155.64	1.8	ANNUAL	ARLN1	5

563621.3	4152741.57	0.24848	69.76	156.21	1.8	ANNUAL	PAREA1	5
563641.3	4152741.57	0.29174	64.99	170.46	1.8	ANNUAL	PAREA1	5
563661.3	4152741.57	0.34663	59.58	172.72	1.8	ANNUAL	PAREA1	5
563681.3	4152741.57	0.42266	51.8	172.72	1.8	ANNUAL	PAREA1	5
563701.3	4152741.57	0.50763	46.01	172.72	1.8	ANNUAL	PAREA1	5
563721.3	4152741.57	0.59204	42.49	172.72	1.8	ANNUAL	PAREA1	5
563741.3	4152741.57	0.70286	37.21	172.72	1.8	ANNUAL	PAREA1	5
563761.3	4152741.57	0.88164	29.94	172.72	1.8	ANNUAL	PAREA1	5
563781.3	4152741.57	1.01567	26.92	172.72	1.8	ANNUAL	PAREA1	5
563801.3	4152741.57	1.14536	24.26	172.72	1.8	ANNUAL	PAREA1	5
563501.3	4152761.57	0.1272	80.87	80.87	1.8	ANNUAL	PAREA1	5
563521.3	4152761.57	0.13946	80.01	80.01	1.8	ANNUAL	PAREA1	5
563541.3	4152761.57	0.15427	78.6	78.6	1.8	ANNUAL	PAREA1	5
563561.3	4152761.57	0.17157	77.47	77.47	1.8	ANNUAL	PAREA1	5
563581.3	4152761.57	0.19224	76.31	77.08	1.8	ANNUAL	PAREA1	5
563601.3	4152761.57	0.21821	74.12	79.1	1.8	ANNUAL	PAREA1	5
563621.3	4152761.57	0.25277	69.61	155.68	1.8	ANNUAL	PAREA1	5
563641.3	4152761.57	0.29786	63.31	156.32	1.8	ANNUAL	PAREA1	5
563661.3	4152761.57	0.35328	56.63	172.72	1.8	ANNUAL	PAREA1	5
563681.3	4152761.57	0.42	49.81	172.72	1.8	ANNUAL	PAREA1	5
563701.3	4152761.57	0.48746	45.19	172.72	1.8	ANNUAL	PAREA1	5
563721.3	4152761.57	0.56102	40.78	172.72	1.8	ANNUAL	PAREA1	5
563741.3	4152761.57	0.67749	33.54	172.72	1.8	ANNUAL	PAREA1	5
563761.3	4152761.57	0.79678	28.81	172.72	1.8	ANNUAL	PAREA1	5
563781.3	4152761.57	0.89755	25.94	172.72	1.8	ANNUAL	PAREA1	5
563801.3	4152761.57	0.99215	23.49	172.72	1.8	ANNUAL	PAREA1	5
563501.3	4152781.57	0.12947	79.51	79.51	1.8	ANNUAL	PAREA1	5
563521.3	4152781.57	0.14147	79.78	79.78	1.8	ANNUAL	PAREA1	5
563541.3	4152781.57	0.15589	79.59	79.59	1.8	ANNUAL	PAREA1	5
563561.3	4152781.57	0.17355	78.65	78.65	1.8	ANNUAL	PAREA1	5
563581.3	4152781.57	0.19433	77.68	77.68	1.8	ANNUAL	PAREA1	5
563601.3	4152781.57	0.2218	74.03	79.62	1.8	ANNUAL	PAREA1	5
563621.3	4152781.57	0.25848	67.41	155.68	1.8	ANNUAL	PAREA1	5
563641.3	4152781.57	0.30396	59.87	172.08	1.8	ANNUAL	PAREA1	5
563661.3	4152781.57	0.35315	53.95	172.72	1.8	ANNUAL	PAREA1	5
563681.3	4152781.57	0.40104	50.03	172.72	1.8	ANNUAL	PAREA1	5
563701.3	4152781.57	0.44988	46.38	172.72	1.8	ANNUAL	PAREA1	5
563721.3	4152781.57	0.52858	38.53	172.72	1.8	ANNUAL	PAREA1	5
563741.3	4152781.57	0.63052	31.5	172.72	1.8	ANNUAL	PAREA1	5
563761.3	4152781.57	0.71823	27.66	172.72	1.8	ANNUAL	PAREA1	5
563781.3	4152781.57	0.80477	24.35	172.72	1.8	ANNUAL	PAREA1	5
563801.3	4152781.57	0.87791	21.9	172.72	1.8	ANNUAL	PAREA1	5
563501.3	4152801.57	0.13239	77.82	77.82	1.8	ANNUAL	PAREA1	5
563521.3	4152801.57	0.14493	78.28	79.88	1.8	ANNUAL	PAREA1	5
563541.3	4152801.57	0.15927	78.97	78.97	1.8	ANNUAL	PAREA1	5
563561.3	4152801.57	0.17711	78.21	78.21	1.8	ANNUAL	PAREA1	5
563581.3	4152801.57	0.1988	76.23	78.51	1.8	ANNUAL	PAREA1	5
563601.3	4152801.57	0.22754	70.93	80.08	1.8	ANNUAL	PAREA1	5
563621.3	4152801.57	0.26425	63.35	156.21	1.8	ANNUAL	PAREA1	5
563641.3	4152801.57	0.30893	54.91	172.72	1.8	ANNUAL	PAREA1	5
563661.3	4152801.57	0.34657	51.38	172.72	1.8	ANNUAL	PAREA1	5
563681.3	4152801.57	0.38373	48.22	172.72	1.8	ANNUAL	PAREA1	5
563701.3	4152801.57	0.43091	42.92	172.72	1.8	ANNUAL	PAREA1	5
563721.3	4152801.57	0.50172	35.44	172.72	1.8	ANNUAL	PAREA1	5
563741.3	4152801.57	0.5764	30.23	172.72	1.8	ANNUAL	PAREA1	5
563761.3	4152801.57	0.64265	26.94	172.72	1.8	ANNUAL	PAREA1	5
563781.3	4152801.57	0.71443	23.49	172.72	1.8	ANNUAL	PAREA1	5
563801.3	4152801.57	0.76582	21.53	172.72	1.8	ANNUAL	PAREA1	5
563501.3	4152821.57	0.13588	75.91	79.88	1.8	ANNUAL	PAREA1	5
563521.3	4152821.57	0.1488	76.55	78.28	1.8	ANNUAL	PAREA1	5
563541.3	4152821.57	0.16292	77.85	77.85	1.8	ANNUAL	PAREA1	5
563561.3	4152821.57	0.18063	77.01	77.81	1.8	ANNUAL	PAREA1	5
563581.3	4152821.57	0.20377	72.89	79.9	1.8	ANNUAL	PAREA1	5
563601.3	4152821.57	0.23372	65.71	87.86	1.8	ANNUAL	PAREA1	5
563621.3	4152821.57	0.26686	59.04	156.32	1.8	ANNUAL	PAREA1	5
563641.3	4152821.57	0.30226	52.93	172.72	1.8	ANNUAL	PAREA1	5
563661.3	4152821.57	0.33456	48.94	172.72	1.8	ANNUAL	PAREA1	5
563681.3	4152821.57	0.37155	43.95	172.72	1.8	ANNUAL	PAREA1	5
563701.3	4152821.57	0.41658	38.33	172.72	1.8	ANNUAL	PAREA1	5
563721.3	4152821.57	0.47133	33.02	172.72	1.8	ANNUAL	PAREA1	5
563741.3	4152821.57	0.52133	29.57	172.72	1.8	ANNUAL	PAREA1	5
563761.3	4152821.57	0.57012	26.92	172.72	1.8	ANNUAL	PAREA1	5
563781.3	4152821.57	0.61781	24.58	172.72	1.8	ANNUAL	PAREA1	5

CONCUNIT /m^3
DEPUNIT g ^2
PUNIT g/m

563621.3	4152742	0.6412	69.76	156.21	1.8	ANNUAL	ARLN1	5
563641.3	4152742	0.71814	64.99	170.46	1.8	ANNUAL	ARLN1	5
563661.3	4152742	0.81839	59.58	172.72	1.8	ANNUAL	ARLN1	5
563681.3	4152742	0.97649	51.8	172.72	1.8	ANNUAL	ARLN1	5
563701.3	4152742	1.1661	46.01	172.72	1.8	ANNUAL	ARLN1	5
563721.3	4152742	1.37645	42.49	172.72	1.8	ANNUAL	ARLN1	5
563741.3	4152742	1.73075	37.21	172.72	1.8	ANNUAL	ARLN1	5
563761.3	4152742	2.42383	29.94	172.72	1.8	ANNUAL	ARLN1	5
563781.3	4152742	3.19745	26.92	172.72	1.8	ANNUAL	ARLN1	5
563801.3	4152742	4.39058	24.26	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152762	0.39028	80.87	80.87	1.8	ANNUAL	ARLN1	5
563521.3	4152762	0.4126	80.01	80.01	1.8	ANNUAL	ARLN1	5
563541.3	4152762	0.43782	78.6	78.6	1.8	ANNUAL	ARLN1	5
563561.3	4152762	0.46571	77.47	77.47	1.8	ANNUAL	ARLN1	5
563581.3	4152762	0.49854	76.31	77.08	1.8	ANNUAL	ARLN1	5
563601.3	4152762	0.54133	74.12	79.1	1.8	ANNUAL	ARLN1	5
563621.3	4152762	0.60209	69.61	155.68	1.8	ANNUAL	ARLN1	5
563641.3	4152762	0.68414	63.31	156.32	1.8	ANNUAL	ARLN1	5
563661.3	4152762	0.79014	56.63	172.72	1.8	ANNUAL	ARLN1	5
563681.3	4152762	0.93184	49.81	172.72	1.8	ANNUAL	ARLN1	5
563701.3	4152762	1.08966	45.19	172.72	1.8	ANNUAL	ARLN1	5
563721.3	4152762	1.29846	40.78	172.72	1.8	ANNUAL	ARLN1	5
563741.3	4152762	1.69803	33.54	172.72	1.8	ANNUAL	ARLN1	5
563761.3	4152762	2.20432	28.81	172.72	1.8	ANNUAL	ARLN1	5
563781.3	4152762	2.82652	25.94	172.72	1.8	ANNUAL	ARLN1	5
563801.3	4152762	3.72314	23.49	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152782	0.37135	79.51	79.51	1.8	ANNUAL	ARLN1	5
563521.3	4152782	0.38931	79.78	79.78	1.8	ANNUAL	ARLN1	5
563541.3	4152782	0.40928	79.59	79.59	1.8	ANNUAL	ARLN1	5
563561.3	4152782	0.43388	78.65	78.65	1.8	ANNUAL	ARLN1	5
563581.3	4152782	0.46282	77.68	77.68	1.8	ANNUAL	ARLN1	5
563601.3	4152782	0.50672	74.03	79.62	1.8	ANNUAL	ARLN1	5
563621.3	4152782	0.57323	67.41	155.68	1.8	ANNUAL	ARLN1	5
563641.3	4152782	0.66119	59.87	172.08	1.8	ANNUAL	ARLN1	5
563661.3	4152782	0.75888	53.95	172.72	1.8	ANNUAL	ARLN1	5
563681.3	4152782	0.86116	50.03	172.72	1.8	ANNUAL	ARLN1	5
563701.3	4152782	0.98565	46.38	172.72	1.8	ANNUAL	ARLN1	5
563721.3	4152782	1.2353	38.53	172.72	1.8	ANNUAL	ARLN1	5
563741.3	4152782	1.6006	31.5	172.72	1.8	ANNUAL	ARLN1	5
563761.3	4152782	2.00284	27.66	172.72	1.8	ANNUAL	ARLN1	5
563781.3	4152782	2.55067	24.35	172.72	1.8	ANNUAL	ARLN1	5
563801.3	4152782	3.26686	21.9	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152802	0.35676	77.82	77.82	1.8	ANNUAL	ARLN1	5
563521.3	4152802	0.37314	78.28	79.88	1.8	ANNUAL	ARLN1	5
563541.3	4152802	0.38942	78.97	78.97	1.8	ANNUAL	ARLN1	5
563561.3	4152802	0.41143	78.21	78.21	1.8	ANNUAL	ARLN1	5
563581.3	4152802	0.44083	76.23	78.51	1.8	ANNUAL	ARLN1	5
563601.3	4152802	0.48781	70.93	80.08	1.8	ANNUAL	ARLN1	5
563621.3	4152802	0.55678	63.35	156.21	1.8	ANNUAL	ARLN1	5
563641.3	4152802	0.65025	54.91	172.72	1.8	ANNUAL	ARLN1	5
563661.3	4152802	0.7269	51.38	172.72	1.8	ANNUAL	ARLN1	5
563681.3	4152802	0.81489	48.22	172.72	1.8	ANNUAL	ARLN1	5
563701.3	4152802	0.95305	42.92	172.72	1.8	ANNUAL	ARLN1	5
563721.3	4152802	1.18999	35.44	172.72	1.8	ANNUAL	ARLN1	5
563741.3	4152802	1.4738	30.23	172.72	1.8	ANNUAL	ARLN1	5
563761.3	4152802	1.79309	26.94	172.72	1.8	ANNUAL	ARLN1	5
563781.3	4152802	2.24512	23.49	172.72	1.8	ANNUAL	ARLN1	5
563801.3	4152802	2.76037	21.53	172.72	1.8	ANNUAL	ARLN1	5
563501.3	4152822	0.34489	75.91	79.88	1.8	ANNUAL	ARLN1	5
563521.3	4152822	0.35992	76.55	78.28	1.8	ANNUAL	ARLN1	5
563541.3	4152822	0.37356	77.85	77.85	1.8	ANNUAL	ARLN1	5
563561.3	4152822	0.39436	77.01	77.81	1.8	ANNUAL	ARLN1	5
563581.3	4152822	0.42865	72.89	79.9	1.8	ANNUAL	ARLN1	5
563601.3	4152822	0.48199	65.71	87.86	1.8	ANNUAL	ARLN1	5
563621.3	4152822	0.54619	59.04	156.32	1.8	ANNUAL	ARLN1	5
563641.3	4152822	0.62232	52.93	172.72	1.8	ANNUAL	ARLN1	5
563661.3	4152822	0.69841	48.94	172.72	1.8	ANNUAL	ARLN1	5
563681.3	4152822	0.80094	43.95	172.72	1.8	ANNUAL	ARLN1	5
563701.3	4152822	0.94399	38.33	172.72	1.8	ANNUAL	ARLN1	5
563721.3	4152822	1.13325	33.02	172.72	1.8	ANNUAL	ARLN1	5
563741.3	4152822	1.33847	29.57	172.72	1.8	ANNUAL	ARLN1	5
563761.3	4152822	1.57882	26.92	172.72	1.8	ANNUAL	ARLN1	5
563781.3	4152822	1.87869	24.58	172.72	1.8	ANNUAL	ARLN1	5

CONCUNIT /m^3
DEPUNIT g ^2

Appendix D

Biological Resources

CALIFORNIA DEPARTMENT OF
FISH and WILDLIFE RareFind

Query Summary:
Quad IS (San Mateo (3712253))

Print Close

CNDDB Element Query Results

Scientific Name	Common Name	Taxonomic Group	Element Code	Total Occs	Returned Occs	Federal Status	State Status	Global Rank	State Rank	CA Rare Plant Rank	Other Status	Habitats
Acanthomintha duttonii	San Mateo thorn-mint	Dicots	PDLAM01040	5	2	Endangered	Endangered	G1	S1	1B.1	SB_UCBG-UC Botanical Garden at Berkeley	Chaparral, Ultramafic, Valley & foothill grassland
Acipenser medirostris pop. 1	green sturgeon - southern DPS	Fish	AFCAA01031	14	1	Threatened	None	G2T1	S1	null	AFS_VU-Vulnerable, IUCN_EN-Endangered	Aquatic, Estuary, Marine bay, Sacramento/San Joaquin flowing waters
Allium peninsulare var. franciscanum	Franciscan onion	Monocots	PMLIL021R1	25	6	None	None	G4G5T2	S2	1B.2	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Cismontane woodland, Ultramafic, Valley & foothill grassland
Amsinckia lunaris	bent-flowered fiddleneck	Dicots	PDBOR01070	93	4	None	None	G3	S3	1B.2	BLM_S-Sensitive, SB_UCBG-UC Botanical Garden at Berkeley, SB_UCSC-UC Santa Cruz	Cismontane woodland, Coastal bluff scrub, Valley & foothill grassland
Antrozous pallidus	pallid bat	Mammals	AMACC10010	420	2	None	None	G4	S3	null	BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern, USFS_S-Sensitive	Chaparral, Coastal scrub, Desert wash, Great Basin grassland, Great Basin scrub, Mojavean desert scrub, Riparian woodland, Sonoran desert scrub, Upper montane coniferous forest, Valley & foothill grassland
Astragalus pycnostachyus var. pycnostachyus	coastal marsh milk-vetch	Dicots	PDFAB0F7B2	24	1	None	None	G2T2	S2	1B.2	BLM_S-Sensitive, SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden, SB_SBBG-Santa Barbara Botanic Garden, SB_UCBG-UC Botanical Garden at Berkeley	Coastal dunes, Coastal scrub, Marsh & swamp, Wetland
Athene cunicularia	burrowing owl	Birds	ABNSB10010	2011	1	None	None	G4	S2	null	BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, IUCN_LC-Least Concern, USFWS_BCC-Birds of Conservation Concern	Coastal prairie, Coastal scrub, Great Basin grassland, Great Basin scrub, Mojavean desert scrub, Sonoran desert scrub, Valley & foothill grassland
Bombus caliginosus	obscure bumble bee	Insects	IIHYM24380	181	1	None	None	G2G3	S1S2	null	IUCN_VU-Vulnerable	null
Bombus occidentalis	western bumble bee	Insects	IIHYM24252	306	2	None	Candidate Endangered	G3	S1	null	IUCN_VU-Vulnerable, USFS_S-Sensitive	null
Calicina minor	Edgewood blind harvestman	Arachnids	ILARA13020	2	1	None	None	G1	S1	null	null	Ultramafic, Valley & foothill grassland
Charadrius nivosus nivosus	western snowy plover	Birds	ABNNB03031	138	1	Threatened	None	G3T3	S3	null	CDFW_SSC-Species of Special Concern	Great Basin standing waters,

												Sand shore, Wetland
Chloropyron maritimum ssp. palustre	Point Reyes salty bird's-beak	Dicots	PDSCR0J0C3	80	1	None	None	G4?T2	S2	1B.2	BLM_S-Sensitive, SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Marsh & swamp, Salt marsh, Wetland
Cirsium fontinale var. fontinale	fountain thistle	Dicots	PDAST2E161	5	1	Endangered	Endangered	G2T1	S1	1B.1	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Chaparral, Cismontane woodland, Meadow & seep, Ultramafic, Valley & foothill grassland, Wetland
Collinsia multicolor	San Francisco collinsia	Dicots	PDSCR0H0B0	36	6	None	None	G2	S2	1B.2	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden, SB_UCSC-UC Santa Cruz	Closed-cone coniferous forest, Coastal scrub, Ultramafic
Dipodomys venustus venustus	Santa Cruz kangaroo rat	Mammals	AMAFD03042	29	1	None	None	G4T1	S1	null	null	Chaparral
Dirca occidentalis	western leatherwood	Dicots	PDTHY03010	90	4	None	None	G2	S2	1B.2	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Broadleaved upland forest, Chaparral, Cismontane woodland, Closed-cone coniferous forest, North coast coniferous forest, Riparian forest, Riparian woodland
Emys marmorata	western pond turtle	Reptiles	ARAAD02030	1522	5	Proposed Threatened	None	G3G4	S3	null	BLM_S-Sensitive, CDFW_SSC-Species of Special Concern, IUCN_VU-Vulnerable, USFS_S-Sensitive	Aquatic, Artificial flowing waters, Klamath/North coast flowing waters, Klamath/North coast standing waters, Marsh & swamp, Sacramento/San Joaquin flowing waters, Sacramento/San Joaquin standing waters, South coast flowing waters, South coast standing waters, Wetland
Eriophyllum latilobum	San Mateo woolly sunflower	Dicots	PDAST3N060	8	1	Endangered	Endangered	G1	S1	1B.1	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Cismontane woodland, Coastal scrub, Lower montane coniferous forest, Ultramafic
Euphydryas editha bayensis	Bay checkerspot butterfly	Insects	IILEPK4055	30	2	Threatened	None	G5T1	S3	null	null	Coastal dunes, Ultramafic, Valley & foothill grassland
Falco peregrinus anatum	American peregrine falcon	Birds	ABNKD06071	73	1	Delisted	Delisted	G4T4	S3S4	null	CDF_S-Sensitive	null
Fritillaria biflora var. ineziana	Hillsborough chocolate lily	Monocots	PMLIL0V0M1	2	2	None	None	G3G4T1	S1	1B.1	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden, SB_UCBG-UC Botanical Garden at Berkeley, SB_USDA-US Dept of Agriculture	Cismontane woodland, Ultramafic, Valley & foothill grassland
Fritillaria liliacea	fragrant fritillary	Monocots	PMLIL0V0C0	82	3	None	None	G2	S2	1B.2	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden, USFS_S-Sensitive	Cismontane woodland, Coastal prairie, Coastal scrub, Ultramafic, Valley & foothill grassland

Hesperevax sparsiflora var. brevifolia	short-leaved evax	Dicots	PDASTE5011	72	1	None	None	G4T3	S3	1B.2	BLM_S-Sensitive, SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Coastal bluff scrub, Coastal dunes, Coastal prairie
Hesperolinon congestum	Marin western flax	Dicots	PDLIN01060	27	5	Threatened	Threatened	G1	S1	1B.1	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden, SB_UCBG-UC Botanical Garden at Berkeley	Chaparral, Ultramafic, Valley & foothill grassland
Hydrochara rickseckeri	Ricksecker's water scavenger beetle	Insects	IICOL5V010	13	1	None	None	G2?	S2?	null	null	Aquatic, Sacramento/San Joaquin flowing waters, Sacramento/San Joaquin standing waters
Ischnura gemina	San Francisco forktail damselfly	Insects	IIODO72010	7	1	None	None	G2	S2	null	IUCN_EN-Endangered	null
Lasiurus cinereus	hoary bat	Mammals	AMACC05032	238	2	None	None	G3G4	S4	null	IUCN_LC-Least Concern	Broadleaved upland forest, Cismontane woodland, Lower montane coniferous forest, North coast coniferous forest
Laterallus jamaicensis coturniculus	California black rail	Birds	ABNME03041	303	1	None	Threatened	G3T1	S2	null	BLM_S-Sensitive, CDFW_FP-Fully Protected, IUCN_EN-Endangered	Brackish marsh, Freshwater marsh, Marsh & swamp, Salt marsh, Wetland
Lessingia arachnoidea	Crystal Springs lessingia	Dicots	PDAST5S0C0	11	4	None	None	G2	S2	1B.2	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Cismontane woodland, Coastal scrub, Ultramafic, Valley & foothill grassland
Malacothamnus arcuatus	arcuate bush-mallow	Dicots	PDMAL0Q0E0	34	4	None	None	G2Q	S2	1B.2	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Chaparral, Cismontane woodland
Melospiza melodia pusillula	Alameda song sparrow	Birds	ABPBXA301S	38	2	None	None	G5T2T3	S2	null	CDFW_SSC-Species of Special Concern, USFWS_BCC-Birds of Conservation Concern	Salt marsh
Monolopia gracilens	woodland woollythreads	Dicots	PDAST6G010	94	1	None	None	G3	S3	1B.2	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Broadleaved upland forest, Chaparral, Cismontane woodland, North coast coniferous forest, Ultramafic, Valley & foothill grassland
Nannopterum auritum	double-crested cormorant	Birds	ABNFD01020	39	1	None	None	G5	S4	null	CDFW_WL-Watch List, IUCN_LC-Least Concern	Riparian forest, Riparian scrub, Riparian woodland
Neotoma fuscipes annectens	San Francisco dusky-footed woodrat	Mammals	AMAFF08082	42	3	None	None	G5T2T3	S2S3	null	CDFW_SSC-Species of Special Concern	Chaparral, Redwood
Northern Coastal Salt Marsh	Northern Coastal Salt Marsh	Marsh	CTT52110CA	53	2	None	None	G3	S3.2	null	null	Marsh & swamp, Wetland
Pentachaeta bellidiflora	white-rayed pentachaeta	Dicots	PDAST6X030	14	1	Endangered	Endangered	G1	S1	1B.1	SB_UCBG-UC Botanical Garden at Berkeley	Ultramafic, Valley & foothill grassland
Plagiobothrys chorisianus var. chorisianus	Choris' popcornflower	Dicots	PDBOR0V061	42	1	None	None	G3T1Q	S1	1B.2	BLM_S-Sensitive, SB_UCSC-UC Santa Cruz	Chaparral, Coastal prairie, Coastal scrub
Pomatiopsis californica	Pacific walker	Mollusks	IMGASJ9020	4	1	None	None	G1	S1	null	IUCN_DD-Data Deficient	null
Rallus obsoletus obsoletus	California Ridgway's rail	Birds	ABNME05011	99	4	Endangered	Endangered	G3T1	S2	null	CDFW_FP-Fully Protected	Brackish marsh, Marsh & swamp,

												Salt marsh, Wetland
Rana draytonii	California red-legged frog	Amphibians	AAABH01022	1764	9	Threatened	None	G2G3	S2S3	null	CDFW_SSC-Species of Special Concern, IUCN_VU-Vulnerable	Aquatic, Artificial flowing waters, Artificial standing waters, Freshwater marsh, Marsh & swamp, Riparian forest, Riparian scrub, Riparian woodland, Sacramento/San Joaquin flowing waters, Sacramento/San Joaquin standing waters, South coast flowing waters, South coast standing waters, Wetland
Reithrodontomys raviventris	salt-marsh harvest mouse	Mammals	AMAFF02040	144	1	Endangered	Endangered	G1G2	S3	null	CDFW_FP-Fully Protected, IUCN_EN-Endangered	Marsh & swamp, Wetland
Senecio aphanactis	chaparral ragwort	Dicots	PDAST8H060	98	1	None	None	G3	S2	2B.2	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden, SB_CRES-San Diego Zoo CRES Native Gene Seed Bank	Chaparral, Cismontane woodland, Coastal scrub
Serpentine Bunchgrass	Serpentine Bunchgrass	Herbaceous	CTT42130CA	22	2	None	None	G2	S2.2	null	null	Valley & foothill grassland
Speyeria zerene myrtleae	Myrtle's silverspot butterfly	Insects	IILEPJ608C	17	1	Endangered	None	G5T1	S1	null	null	Coastal dunes
Spirinchus thaleichthys	longfin smelt	Fish	AFCHB03010	46	1	Candidate	Threatened	G5	S1	null	IUCN_LC-Least Concern	Aquatic, Estuary
Thamnophis sirtalis tetrataenia	San Francisco gartersnake	Reptiles	ARADB3613B	66	2	Endangered	Endangered	G5T2Q	S2	null	CDFW_FP-Fully Protected	Artificial standing waters, Marsh & swamp, Sacramento/San Joaquin standing waters, Wetland
Trifolium hydrophilum	saline clover	Dicots	PDFAB400R5	56	1	None	None	G2	S2	1B.2	null	Marsh & swamp, Valley & foothill grassland, Vernal pool, Wetland
Triphysaria floribunda	San Francisco owl's-clover	Dicots	PDSCR2T010	50	2	None	None	G2?	S2?	1B.2	null	Coastal prairie, Coastal scrub, Ultramafic, Valley & foothill grassland

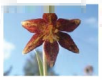
CNPS Rare Plant Inventory

Search Results

32 matches found. Click on scientific name for details

Search Criteria: Quad is one of [3712253]

▲ SCIENTIFIC NAME	COMMON NAME	FAMILY	LIFEFORM	BLOOMING PERIOD	FED LIST	STATE LIST	GLOBAL RANK	STATE RANK	CA RARE PLANT RANK	CA ENDEMIC	DATE ADDED	PHOTO
Acanthomintha duttonii	San Mateo thorn-mint	Lamiaceae	annual herb	Apr-Jun	FE	CE	G1	S1	1B.1	Yes	1974-01-01	 © 2011 Aaron Schusteff
Allium peninsulare var. franciscanum	Franciscan onion	Alliaceae	perennial bulbiferous herb	(Apr)May-Jun	None	None	G4G5T2	S2	1B.2	Yes	2001-01-01	 © 2019 Aaron Arthur
Amsinckia lunaris	bent-flowered fiddleneck	Boraginaceae	annual herb	Mar-Jun	None	None	G3	S3	1B.2	Yes	1974-01-01	 © 2011 Neal Kramer
Arctostaphylos regismontana	Kings Mountain manzanita	Ericaceae	perennial evergreen shrub	Dec-Apr	None	None	G2	S2	1B.2	Yes	1994-01-01	No Photo Available
Astragalus pycnostachyus var. pycnostachyus	coastal marsh milk-vetch	Fabaceae	perennial herb	(Apr)Jun-Oct	None	None	G2T2	S2	1B.2	Yes	2001-01-01	 ©2009 Neal Kramer
Calochortus umbellatus	Oakland star-tulip	Liliaceae	perennial bulbiferous herb	Mar-May	None	None	G3?	S3?	4.2	Yes	1980-01-01	No Photo Available
Calochortus uniflorus	pink star-tulip	Liliaceae	perennial bulbiferous herb	Apr-Jun	None	None	G4	S4	4.2		2010-03-04	 © 2021 Scot Loring

Castilleja ambigua var. *ambigua*	johnny-nip	Orobanchaceae	annual herb (hemiparasitic)	Mar-Aug	None	None	G4T4	S3S4	4.2		2009-02-04	 ©2011 Dylan Neubauer
Chloropyron maritimum ssp. *palustre*	Point Reyes salty bird's-beak	Orobanchaceae	annual herb (hemiparasitic)	Jun-Oct	None	None	G4?T2	S2	1B.2		1974-01-01	 ©2017 John Doyen
Cirsium fontinale var. *fontinale*	fountain thistle	Asteraceae	perennial herb	(Apr)May-Oct	FE	CE	G2T1	S1	1B.1	Yes	1974-01-01	No Photo Available
Collinsia multicolor	San Francisco collinsia	Plantaginaceae	annual herb	(Feb)Mar-May	None	None	G2	S2	1B.2	Yes	1974-01-01	No Photo Available
Dirca occidentalis	western leatherwood	Thymelaeaceae	perennial deciduous shrub	Jan-Mar(Apr)	None	None	G2	S2	1B.2	Yes	1974-01-01	 © 2017 Steve Matson
Elymus californicus	California bottle-brush grass	Poaceae	perennial herb	May-Aug(Nov)	None	None	G4	S4	4.3	Yes	1974-01-01	No Photo Available
Eriophyllum latilobum	San Mateo woolly sunflower	Asteraceae	perennial herb	May-Jun	FE	CE	G1	S1	1B.1	Yes	1974-01-01	No Photo Available
Erysimum franciscanum	San Francisco wallflower	Brassicaceae	perennial herb	Mar-Jun	None	None	G3	S3	4.2	Yes	1974-01-01	No Photo Available
Fritillaria biflora var. *ineziana*	Hillsborough chocolate lily	Liliaceae	perennial bulbiferous herb	Mar-Apr	None	None	G3G4T1	S1	1B.1	Yes	1994-01-01	 © 2012 Toni Corelli
Fritillaria liliacea	fragrant fritillary	Liliaceae	perennial bulbiferous herb	Feb-Apr	None	None	G2	S2	1B.2	Yes	1974-01-01	 © 2004 Carol W. Witham
Hesperevax sparsiflora var. *brevifolia*	short-leaved evax	Asteraceae	annual herb	Mar-Jun	None	None	G4T3	S3	1B.2		1994-01-01	 © 2006 Doreen L. Smith
Hesperolinon congestum	Marin western flax	Linaceae	annual herb	Apr-Jul	FT	CT	G1	S1	1B.1	Yes	1974-01-01	 © 2009 Neal Kramer

Hosackia gracilis	harlequin lotus	Fabaceae	perennial rhizomatous herb	Mar-Jul	None	None	G3G4	S3	4.2		2004-01-01	 © 2015 John Doyen
Iris longipetala	coast iris	Iridaceae	perennial rhizomatous herb	Mar-May(Jun)	None	None	G3	S3	4.2	Yes	2006-10-12	 © 2014 Aaron Schusteff
Leptosiphon ambiguus	serpentine leptosiphon	Polemoniaceae	annual herb	Mar-Jun	None	None	G4	S4	4.2	Yes	1994-01-01	 © 2010 Aaron Schusteff
Lessingia arachnoidea	Crystal Springs lessingia	Asteraceae	annual herb	Jul-Oct	None	None	G2	S2	1B.2	Yes	1994-01-01	 © 2008 Neal Kramer
Lessingia hololeuca	woolly-headed lessingia	Asteraceae	annual herb	Jun-Oct	None	None	G2G3	S2S3	3	Yes	1994-01-01	 © 2015 Aaron Schusteff
Malacothamnus arcuatus	arcuate bush-mallow	Malvaceae	perennial deciduous shrub	Apr-Sep	None	None	G2Q	S2	1B.2	Yes	1974-01-01	 © 2017 Keir Morse
Monolopia gracilens	woodland woollythreads	Asteraceae	annual herb	(Feb)Mar-Jul	None	None	G3	S3	1B.2	Yes	2010-04-06	 © 2016 Richard Spellenberg
Pentachaeta bellidiflora	white-rayed pentachaeta	Asteraceae	annual herb	Mar-May	FE	CE	G1	S1	1B.1	Yes	1974-01-01	No Photo Available
Plagiobothrys chorisianus var. chorisianus	Choris' popcornflower	Boraginaceae	annual herb	Mar-Jun	None	None	G3T1Q	S1	1B.2	Yes	1984-01-01	No Photo Available
Ranunculus lobbii	Lobb's aquatic buttercup	Ranunculaceae	annual herb (aquatic)	Feb-May	None	None	G4	S3	4.2		1974-01-01	No Photo Available
Senecio aphanactis	chaparral ragwort	Asteraceae	annual herb	Jan-Apr(May)	None	None	G3	S2	2B.2		1994-01-01	No Photo Available

Trifolium hydrophilum	saline clover	Fabaceae	annual herb	Apr-Jun	None	None	G2	S2	1B.2	Yes	2001-01-01	 © 2005 Dean Wm Taylor
Triphysaria floribunda	San Francisco owl's-clover	Orobanchaceae	annual herb	Apr-Jun	None	None	G2?	S2?	1B.2	Yes	1974-01-01	No Photo Available

Showing 1 to 32 of 32 entries

Suggested Citation:
California Native Plant Society, Rare Plant Program. 2023. Rare Plant Inventory (online edition, v9.5). Website https://www.rareplants.cnps.org [accessed 4 December 2023].

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
Phone: (916) 414-6600 Fax: (916) 414-6713

In Reply Refer To:
Project Code: 2024-0022689
Project Name: Twin Pines Park Storm Water Capture

December 04, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through IPaC by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see Migratory Bird Permit | What We Do | U.S. Fish & Wildlife Service (fws.gov).

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
(916) 414-6600

PROJECT SUMMARY

Project Code: 2024-0022689

Project Name: Twin Pines Park Storm Water Capture

Project Type: Drainage Project

Project Description: The City of Belmont (the City) proposes the Twin Pines Park Stormwater Detention Project (Project), which would construct an underground stormwater storage facility beneath the parking lots or other areas of the 10-acre Twin Pines Park located at 1 Twin Pines Lane in Belmont, California. The Project is designed to attenuate the peak stormwater flow of Belmont Creek, to trap sediment and debris, to reduce flood risk in the flood-prone lower creek reach downstream of El Camino Real, and to provide ancillary water quality benefits. A diversion weir would divert high flows from Belmont Creek to the 9-acre-foot underground storage facility, where water would remain before flowing back into Belmont Creek through a 12-inch outlet pipe. The Project would also include a sediment chamber, bank stabilization along Belmont Creek, and an in-stream check structure in Belmont Creek. The Project site is located on four parcels (Accessor Parcel Numbers 045-170-080, 045-181-250, 045-181-230, and 045-181-280) adjacent to Twin Pines Lane east of Ralston Avenue, and south of 6th Avenue in Belmont.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@37.5166348,-122.2787311304873,14z

Counties: San Mateo County, California

ENDANGERED SPECIES ACT SPECIES

There is a total of 16 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Salt Marsh Harvest Mouse *Reithrodontomys raviventris* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/613	Endangered

BIRDS

NAME	STATUS
California Clapper Rail *Rallus longirostris obsoletus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4240	Endangered
California Least Tern *Sterna antillarum browni* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8104	Endangered
Marbled Murrelet *Brachyramphus marmoratus* Population: U.S.A. (CA, OR, WA) There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/4467	Threatened
Western Snowy Plover *Charadrius nivosus nivosus* Population: Pacific Coast population DPS-U.S.A. (CA, OR, WA), Mexico (within 50 miles of Pacific coast) There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/8035	Threatened

REPTILES

NAME	STATUS
Green Sea Turtle *Chelonia mydas* Population: East Pacific DPS No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6199	Threatened
Northwestern Pond Turtle *Actinemys marmorata* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1111	Proposed Threatened
San Francisco Garter Snake *Thamnophis sirtalis tetrataenia* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5956	Endangered

AMPHIBIANS

NAME	STATUS
California Red-legged Frog *Rana draytonii* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/2891	Threatened
Foothill Yellow-legged Frog *Rana boylii* Population: Central Coast Distinct Population Segment (Central Coast DPS) No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5133	Threatened

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

FLOWERING PLANTS

NAME	STATUS
Fountain Thistle *Cirsium fontinale var. fontinale* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7939	Endangered
Marin Dwarf-flax *Hesperolinon congestum* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5363	Threatened
San Mateo Thornmint *Acanthomintha obovata ssp. duttonii* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2038	Endangered
San Mateo Woolly Sunflower *Eriophyllum latilobum* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7791	Endangered
White-rayed Pentachaeta *Pentachaeta bellidiflora* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7782	Endangered

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

IPAC USER CONTACT INFORMATION

Agency: Environmental Science Associates
Name: Jiemin G.
Address: 787 The Alameda, Suite 250
City: san jose
State: CA
Zip: 95126
Email jguo@esassoc.com
Phone: 4086604011

Appendix E

Belmont Creek Watershed Plan

Michael Baker
INTERNATIONAL

1 Kaiser Plaza, Suite 1150, Oakland, CA, 94612
Office: 510.213.7943
Contact: Darren Choy (Darren.Choy @mbakerintl.com)
JN 162588

Belmont Creek Watershed Management Plan

August 6, 2019 (Final Submittal)

Prepared for: County of San Mateo, City of Belmont, City of San Carlos

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1. PROJECT DESCRIPTION

BACKGROUND

Belmont Creek is a series of natural and urban reaches located in the City of Belmont and runs southwest to northeast, discharging into San Francisco Bay via the Belmont Slough. As a major storm drainage collector for the City of Belmont (City), San Mateo County (County), and City of San Carlos, Belmont Creek comprises vegetated channel banks, rock lining, concrete-rubble lining, concrete lining, and concrete culverts. The watershed is approximately 1,900 acres, originating from the Pulgas Ridge to the east.

Figure 1 shows Belmont Creek and its various reaches:

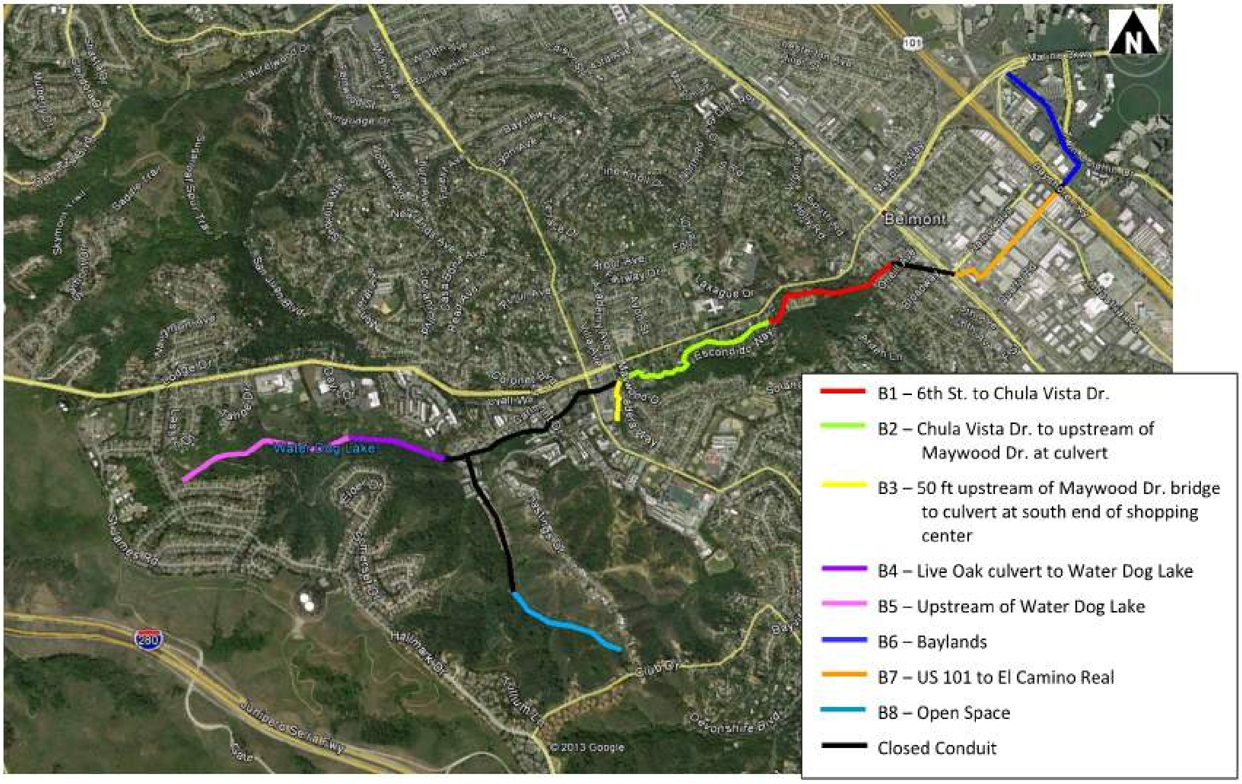


Figure 1 Belmont Creek Reaches (WRECO 2014)

FLOODING HISTORY

Belmont Creek enters a flat, tidally influenced industrial area (Harbor/Industrial Area [HIA]) prior to discharging into the Belmont Slough. Flooding of the creek occurs in the HIA, particularly between El Camino Real and US 101 (Bayshore Freeway); the flooding is caused by a combination of sediment deposits, which are removed periodically via dredging (records indicate dredging in 2008, 2010, and 2013; see Appendix F for 2013 dredging results), and head losses from changes in creek geometry (bends, culvert entrance/exit).

PREVIOUS WORK

Previous studies have been performed to analyze causes of and develop conceptual solutions for the flooding, as well as evaluate other components of Belmont Creek:

- Progress Report: Identification of Watershed Management Areas for PCBs and Mercury; SMCWPPP, 2016
- Belmont Creek Watershed Study, Creek Assessment, and Recommendations for Sustainable Improvements (2014 Study); WRECO, 2014
    - WRECO also conducted a survey for certain portions of Belmont Creek to develop HEC-RAS modeling
- Biological Assessment of Belmont Creek and Comparison with Existing San Mateo County Data; BioAssessment Services, 2007
- Harbor Industrial District Storm Drain Report; BKF, 1998

PROJECT SCOPE

The mission of the County's Flood Resilience Program is to implement resilient flood risk reduction measures. To implement this mission for Belmont Creek, the Collaborative (City of Belmont, City of San Carlos, and County of San Mateo) has contracted Michael Baker International (Michael Baker) to develop this Watershed Management Plan (WMP), which:

- Utilizes background research, previous work, and updates of previous work to:
    - further evaluate and screen the eight alternatives identified in the 2014 Study
    - develop preliminary alternatives that will provide multi-benefit solutions while considering opportunities to incorporate Capital Improvement Projects (CIP)
- Develops an implementation plan to help the Collaborative prioritize planning and construction of the preliminary alternatives
- Identifies funding opportunities and potential stakeholder partnerships, and evaluates the feasibility of obtaining funding for each preliminary alternative in a funding strategy
- Develops a community engagement plan to inform the local communities of the WMP's preliminary alternatives, flood management strategies, funding, and implementation schedule

The Collaborative will use this WMP as a decision-making tool to help prioritize the preliminary alternatives to build flood resiliency in the watershed. In this WMP, flood resiliency is achieved by keeping stormwater contained within Belmont Creek (i.e., no flooding).

2. COMMUNITY ENGAGEMENT PLAN

The purpose of the Community Engagement Plan (provided in Appendix H) is to ensure that balanced and effective communication occurs through an inclusive community-wide outreach and engagement campaign. The Community Engagement Plan outlines the community involvement objectives of the WMP and describes engagement strategies the Collaborative used to reach key target audiences and stakeholders.

The Collaborative implemented the Community Engagement Plan through individual meetings with property stakeholders, the Harbor Industrial Association, a local homeowners association, the City Parks Commission, City Council, and the public. After several iterations of developing preliminary alternatives, the Community Engagement Plan culminated with a public education and workshop meeting on November 29, 2018, as described in Section 5 below.

As a part of the Community Engagement Plan, Michael Baker developed a project fact sheet and other presentation materials to the Collaborative. They are provided in Appendix H.

3. FUNDING STRATEGY

Michael Baker identified funding opportunities for the project and evaluated the feasibility of obtaining funding for each preliminary alternative of the WMP. Potential partnerships among stakeholders are also identified. A Funding Strategy is provided in Appendix G, including a Funding Matrix and Grant Application Timeline for 2019 that will help the Collaborative prioritize and plan its application efforts.

4. BACKGROUND RESEARCH AND UPDATE OF PREVIOUS WORK

SITE SURVEY

Michael Baker surveyed Belmont Creek cross sections and flowlines where the creek intersects Shoreway Road (two locations, approximately 2,700’ apart). Michael Baker’s survey data was combined with WRECO’s survey data to augment the HEC-RAS model of the 2014 Study.

RESEARCH

In addition to augmenting the previous work, Michael Baker conducted additional research on potentially contributing factors and data. The following summarizes Michael Baker’s additional research (select excerpts are provided in Appendix F):

1. Caltrans as-builts of adjacent systems to determine impact to the creek, including Sem Lane
    - Reviewed as-builts of Caltrans storm drain facilities to determine potential impacts
2. Identified PCB/TMDL/environmental sites
    - Implementing projects at these sites would result in a multi-benefit solution
3. NOAA Redwood City tidal gauge
    - Adjacent NOAA tidal gauge data was used to determine tidal influence on Belmont Creek, particularly during storm events from 2016-2017
4. Balance Hydrologics, Inc. creek gauge data, 2016-2018
5. Water Dog Lake outfall structure, function, and ownership
    - Originally built as an irrigation source
    - Currently used for recreational purposes (no swimming)
    - City staff opens the dam outlet on November 1 and closes it on April 1

- City staff provides minimal maintenance in the form of rodent removal and vegetation upkeep, primarily to meet the requirements of the Division of Dam Safety
  - Currently no prioritized work to remove sediment from the dam
- Notre Dame de Namur University owns approximately 50 acres around the dam, which presents additional construction, permitting, and coordination efforts
- City provided schematic exhibits of the dam and its outfall structure

6. Previous dredging results/amounts based on records
   - 11 days to excavate and remove 540 cubic yards of channel bed sediments from open gravel bars along a 724' section of Belmont Creek (see Appendix F for Belmont Creek Sediment Removal Project – Project Completion: 7 Hour Post-Construction Notification, by Biological Resources Services, dated September 23, 2013)
7. City of Belmont Parks Department – Parks Master Plan coordination/background info
   - Coordination with City of Belmont Parks director Brigitte Shearer about integrating with Parks Master Plan (currently in development)
     - Installing flood control features are acceptable
     - Parks considered reconfiguration to move picnic area to front of park (where there are lights, electricity, and parking), and restoring the current, underutilized picnic area to a natural creek bed with widened banks
     - Planned plantings for shade along creek
     - Plan for depositional areas that can dissipate energy and have planned excavations
8. Collaborative Public Works Directors
   - City of Belmont – Afshin Oskoui
   - City of San Carlos – Steven Machida
   - County of San Mateo – Jim Porter (Director), Ann Stillman (Deputy Director)

FIELD INVESTIGATION

Michael Baker's geomorphic and sediment transport engineer conducted watershed reconnaissance field visits in October 2017 to investigate the sediment and erosion conditions of the watershed, as well as verify and augment the information of the 2014 Study.

Michael Baker concluded that the sediment in Belmont Creek near Industrial Road is a cumulative contribution from the entire watershed (i.e., the majority does not originate from one specific source or location).

This watershed reconnaissance also noted that the reach within Twin Pines Park is likely within Phase IV or Phase V of the Channel Evolution Model process, described by the following figure:

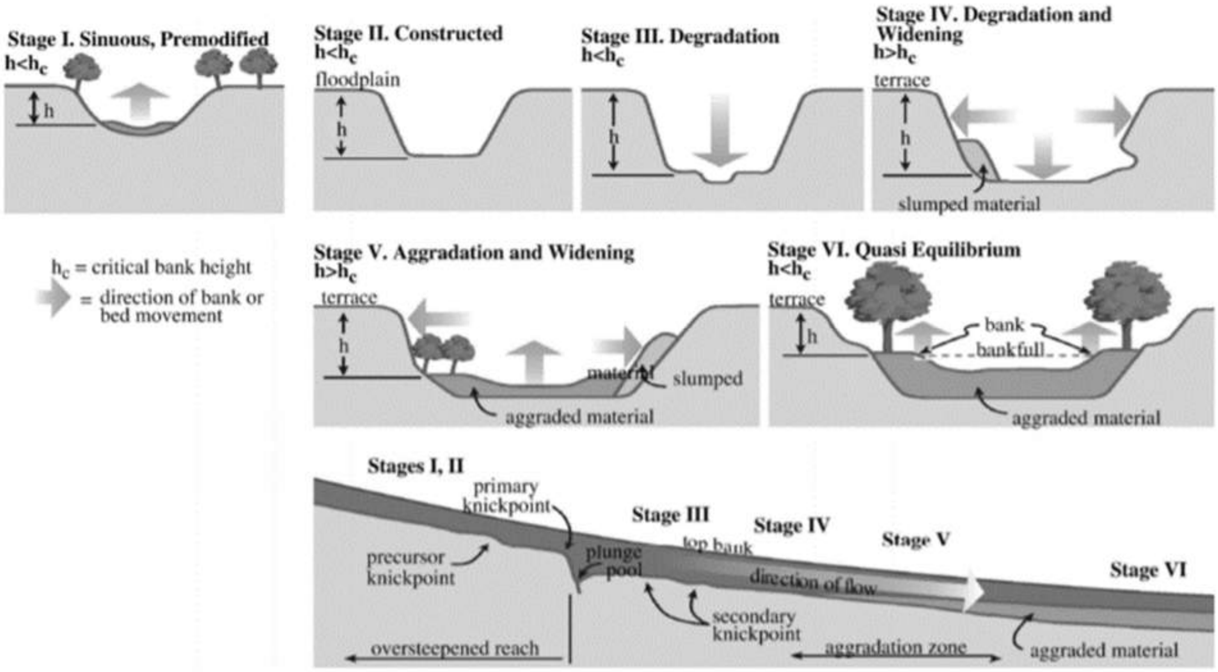


Figure 2 Channel Evolution Model Stages (Simon and Rinaldi 2006)

The Twin Pines Park reach of Belmont Creek will continue to experience bank failure unless external intervention (e.g., engineered solution) occurs. The findings and recommendations of the watershed reconnaissance are included in the WMP's preliminary alternatives. Detailed findings and recommendations of the watershed reconnaissance are provided in the Watershed Reconnaissance Memo in Appendix E.

UPDATE OF PREVIOUS HYDROLOGY AND HYDRAULIC MODELS

The 2014 Study found that the capacity of Belmont Creek at the HIA is approximately 630 cubic feet per second (cfs) in the existing, undredged condition.

The 2014 Study used HEC-HMS and PCSWMM to develop the original hydrologic and hydraulic models, respectively.

For this WMP, Michael Baker continued to use HEC-HMS for hydrologic modeling but converted the 2014 Study PCSWMM hydraulic model to a HEC-RAS hydraulic model to provide the Collaborative with a model that uses publicly available software (HEC-RAS is free; PCWSMM requires a fee). Digital versions of the model are provided with this WMP.

Michael Baker updated the model using the site survey, research, and field investigation described above.

For detention basin preliminary alternatives, underground detention basins (2' freeboard) were assumed for consistency; generally, property owners indicated their desire to recapture the usable space above the underground detention basins. Where feasible, aboveground detention basins (e.g., bioretention) are specified as an option in the preliminary alternatives descriptions below in Section 6.

5. PRELIMINARY ALTERNATIVES METHODOLOGY

The following describes the project objectives of this WMP and the assumptions used by Michael Baker:

Flood Protection

Improving flooding conditions as compared to existing conditions is the most important evaluation criteria in this analysis. In this WMP, “flood protection” is defined as eliminating flooding (i.e., containing runoff within Belmont Creek) impacts to private properties in a particular storm event.

Using public 2017 property tax data from the County of San Mateo’s Treasurer-Tax Collector website, Michael Baker researched the values (land and improvements combined) of properties impacted by various flooding conditions for each alternative's design storm event. Properties impacted by flooding conditions were identified by overlaying the HEC-RAS flooding limits over a GIS parcel map. Without mitigation, approximately $206.5 million in combined property values are impacted during a 50-year, 3-hour storm event, and $633.8 million in a 100-year, 12-hour event.

Cost

General, high-level cost estimates were developed for alternatives using Caltrans District 4’s latest available cost data (2016 at the time of this analysis) and input from Michael Baker’s construction managers and engineers. Costs not available in the Caltrans data will be based on similar past project costs.

Potholing is assumed to be $2,500 per pothole (per Michael Baker’s construction managers) and potholing would occur for six utilities (sewer, water, storm drain, gas, electric, telecom) every 200’.

The following maintenance staff and equipment costs assumptions apply to all projects but can be modified based on a particular owner or agency’s specific staff and equipment availability and job order contractors contracts:

- Operations and maintenance (O&M) assumes $12,000 per day for two large maintenance equipment rentals (per Michael Baker’s construction managers) such as excavators, dump trucks, and vac trucks.
- Four maintenance staff are assumed for every maintenance activity at $170 per day each (per recent Indeed.com salary reports).
- Surface O&M (e.g., landscape maintenance, weeding, irrigation, street sweeping, restriping, repainting) is not included in this cost estimate.

Clearing and grubbing of existing vegetation to construct underground detention basins includes shrubs, trees, tree stumps, rock, and the top 1’ of soil, averaging ~1.5 tons per square yard. Disposal from clearing and grubbing activities costs $50 per ton per Michael Baker’s construction managers.

Environmental clearance and permitting does not include any agency-required mitigation design and construction.

Each alternative's cost and property values affected by flooding are not intended to prioritize or rank an alternative in this WMP.

Detailed cost estimates, alternative-specific cost assumptions and exclusions, and flood-impacted property value research are found in Appendix B.

Protect and Enhance Water Quality

Opportunities to incorporate water quality treatment and/or enhancement were considered when developing the alternatives, resulting in multi-benefit projects. The County prioritizes these multi-benefit projects as a means of implementing the goals of its Stormwater Resource Plan (February 2017), which focuses on reducing flooding and pollution associated with stormwater runoff. Other agencies such as Caltrans and the San Francisco Estuary Partnership have developed similar goals for the San Mateo region; partnering with these agencies on projects identified in this WMP would expand the benefits for multiple stakeholders, as well as provide additional funding sources. An alternative's ability to provide water quality benefits is described below in Section 6.

Public Support

Alternatives were developed to a conceptual stage, then presented to the Collaborative for further evaluation and feasibility. Based on the feedback of the Collaborative, Michael Baker revised the alternatives and presented them to the public (residents and businesses) at the November 29, 2018, meeting to gauge local support and receive comments.

The meeting minutes, photos, and comments are provided in Appendix H.

Environmental Permitting and Constructability

Each alternative considered construction feasibility, methodology, and impacts. Michael Baker's Construction Department provided input for traffic control, public inconveniences, and construction duration.

Each project is located relatively close to Belmont Creek to allow efficient creek diversion and outlet opportunities. Work near and adjacent to bodies of water typically require additional environmental permitting. Michael Baker's Construction Management Department and environmental planners provided input on the permitting efforts needed for each alternative.

Construction impacts and permit efforts are summarized for each alternative in Section 6.

Enhance Ecosystems and Habitat

Belmont Creek is a natural ecosystem and habitat. The Collaborative is sensitive to maintaining this resource and its role in the watershed. Opportunities to enhance ecosystems and habitat are identified below in Section 6.

Social Benefits

In addition to reducing flooding, social benefits such as improved public creek access and recreational benefits are considered in each alternative and described below in Section 6.

Operations and Maintenance

In the existing condition, Collaborative O&M staff dredge and clean various reaches of Belmont Creek. Alternatives provide opportunities to consolidate/localize O&M activities to improve O&M efficiency, freeing up Collaborative resources for other O&M priorities.

Resiliency to Climate Change

Climate change in the form of sea level rise and more intense storm events presents future flooding issues. The location and components of the alternatives consider resiliency to current and future climate change challenges. The State of California Sea-Level Rise Guidance (2018) for San Francisco and NOAA MSL data were used for modeling the downstream condition, matching other state agencies' (Coastal Commission, Caltrans) sea level rise guidance. Excerpts are provided in Appendix F.

6. PRELIMINARY ALTERNATIVES

ALTERNATIVES DEVELOPMENT

Between January 2018 and May 2018, Michael Baker developed several iterations of preliminary alternatives that included detention basins, hydraulic improvements, and bypass culverts based upon alternatives 2, 5, 6, and 7 of the 2014 Study, updated hydrologic and hydraulic modeling, and discussions with property stakeholders. Michael Baker's recommendations during this period were documented in technical memorandums (multiple revisions) and were presented at multiple meetings to the Collaborative, City Parks Commission, City Council, Carlmont High School, City Parks Department, Notre Dame de Namur University, and the Harbor Industrial Association.

Michael Baker explored the operations and design of Water Dog Lake (Alternative 1 of the WRECO study). Water Dog Lake and the existing dam currently provide enough capacity to contain the 50-year, 6-hour storm (~25 cfs) of the contributing 306-acre subwatershed; the Water Dog Lake subwatershed contributes ~2 percent of flows to the Belmont Creek WMP watershed. This determination is based on City-provided maintenance, operation, and design information. City maintenance does not involve dredging; future studies may consider dredging in Water Dog Lake to increase capacity. The City currently opens the dam's 24-inch outlet pipe from November 1 to April 1 to convey the rainy season flows. While the City operates and maintains Water Dog Lake, Notre Dame de Namur University controls ~50 acres surrounding the dam, which presents additional construction, permitting, and coordination efforts. Due to the lake's low contributions to the Belmont Creek WMP watershed (~2%), existing capacity, and land ownership, Michael Baker does not recommend developing a project at Water Dog Lake for the Belmont Creek WMP.

The WMP also considered two locations for underground detention basins: The Church of the Immaculate Heart of Mary and Silverado Belmont Hills Memory Care Facility. Key personnel were contacted at both locations; no responses were provided. Therefore these locations are excluded from the WMP. Michael

Baker recommends acknowledging the Church of the Immaculate Heart of Mary and Silverado Belmont Hills Memory Care Facility as watershed stakeholders for future planning of flood resiliency projects in the watershed.

As a part of the Community Engagement Plan, Michael Baker and the Collaborative introduced the WMP, presented the conveyance and detention basin alternatives described below, and gathered public feedback at November 29, 2018, meeting. Preliminary alternatives were presented in four combinations, each with varying degrees of flood protection benefits and costs.

After a February 2019 meeting, the Collaborative instructed Michael Baker to base the implementation of the WMP on constructing all the preliminary alternatives, providing the highest level of flood protection that was presented at the November 29, 2018, meeting.

HEC-RAS modeling indicated that flood resiliency is achieved (i.e., no flooding from Belmont Creek) in the 50-year, 3-hour storm event when all preliminary alternatives are implemented. Flood condition comparison exhibits showing the 50-year, 3-hour event flooding before and after implementation are provided in Appendix D. Refer to the Alternative Implementation section below for specific scenario descriptions.

An alternatives overview exhibit and individual alternatives exhibits are provided in Appendix A. Overall and individual alternative cost estimates are provided in Appendix B.

PRELIMINARY ALTERNATIVE 1: CONVEYANCE IMPROVEMENTS

Preliminary Alternative 1 (50-year, 3-hour flood protection) consists of 3,200 linear feet of a 10’ by 4’ bypass reinforced concrete box (RCB) culvert in Harbor Boulevard (from Old Country Road to Belmont Creek).

The project also includes a 3’-high floodwall on the left (west) bank of Belmont Creek from approximately 80’ upstream of Industrial Boulevard to Industrial Boulevard, matching the existing floodwall on the opposite bank. The floodwalls help increase the capacity of Belmont Creek at a high flooding area. The cost of this alternative assumes a 6’-high wall to account for unknown geotechnical conditions and structural design. Belmont Creek is dredged periodically, but the culverts under US 101 and Industrial Boulevard are not dredged. Michael Baker assumed a permanent sediment layer in the culverts crossing US 101 and Industrial Avenue in existing condition modeling. Targeted O&M of the culverts under US 101 and Industrial Boulevard will improve conveyance in Belmont Creek. By implementing the O&M component, the hydraulic model assumes a no clogging scenario in the proposed condition. The floodwall and O&M components represent minimal to no right-of-way acquisition scenarios with minimal traffic impacts. Construction of the wall and O&M could be performed as a separate construction project from the RCB bypass component. Hydrographs for Preliminary Alternative 1 are not provided, as runoff is diverted but not detained.

This alternative is based on Alternative #6 of the WRECO Study and is considered to have the highest traffic control and local business impacts. Construction phasing, using precast materials, and other construction methodology could minimize traffic control and local closure impacts. The preliminary design assumes trenching with shoring construction for the portion south of US 101 and trenchless jack and bore construction for the remaining project to avoid closing any portion of US 101 (Bayshore Freeway) for construction. The project is feasible with significant Caltrans coordination as Caltrans has performed non-trenching construction on similar projects along US 101.

If jack and bore construction is used, then a transition from RCB to equivalent-sized reinforced concrete pipe(s) (RCP) is needed for the jack and bore portion (jack and bore is typically used for circular culverts, not box culverts). This WMP assumes dual 60-inch RCPs will be used, although the size and shapes should be determined and modeled during final design after coordination with Caltrans and verifying jack and bore construction methodology will be used.

Due to the large size of the RCB, an additional 10’ of open trench (with shoring) is required on both sides of the RCB trench, along with a full lane closure on each side to provide parking for construction equipment. Harbor Boulevard is ~74’ wide curb-to-curb and could feasibly maintain one travel lane in each direction during construction. The ~30’ -wide open trench would be ~12’ deep, considering 4’ cover, wall thickness, RCB size, and additional subgrade excavation. Repaving, restriping, green infrastructure, and other surface improvements would take place after the construction of the RCB.

Green infrastructure improvements include sidewalk, curb, gutter, bulbout, storm drain, and landscaping improvements along the ~1,900’-long Harbor Boulevard corridor between Old County Road and Karen Road. Green infrastructure improvements assume 4’-wide bioretention facilities on both sides of the road with under drains throughout and drainage inlets and cleanouts every 200’.

Trash capture devices can be implemented within curb inlets, bioretention facilities, RCB, RCPs, and/or outlet structures to help the Collaborative and/or Caltrans meet their trash capture stormwater requirements. As of 2019, adjacent portions of El Camino Real and US 101 are considered high and very high trash-generating areas, respectively, per the County’s Trash Generation Map in Appendix A. A multi-agency, multi-benefit trash capture project is highly attractive for grant and funding opportunities.

Traffic calming and road diet improvements (not a part of this WMP) can improve pedestrian, bicycle, and vehicular flow and safety. Green infrastructure can incorporate many of these traffic improvements, resulting in a sustainable street project. Michael Baker recommends additional traffic studies and planning to determine the feasibility and benefits of incorporating sustainable streets improvements.

Temporary dams and dewatering operations would be needed to construct the downstream end of this project at the connection point to Belmont Creek. A 20’ by 20’ temporary dewatered/dammed construction area is assumed at the downstream connection to Belmont Creek.

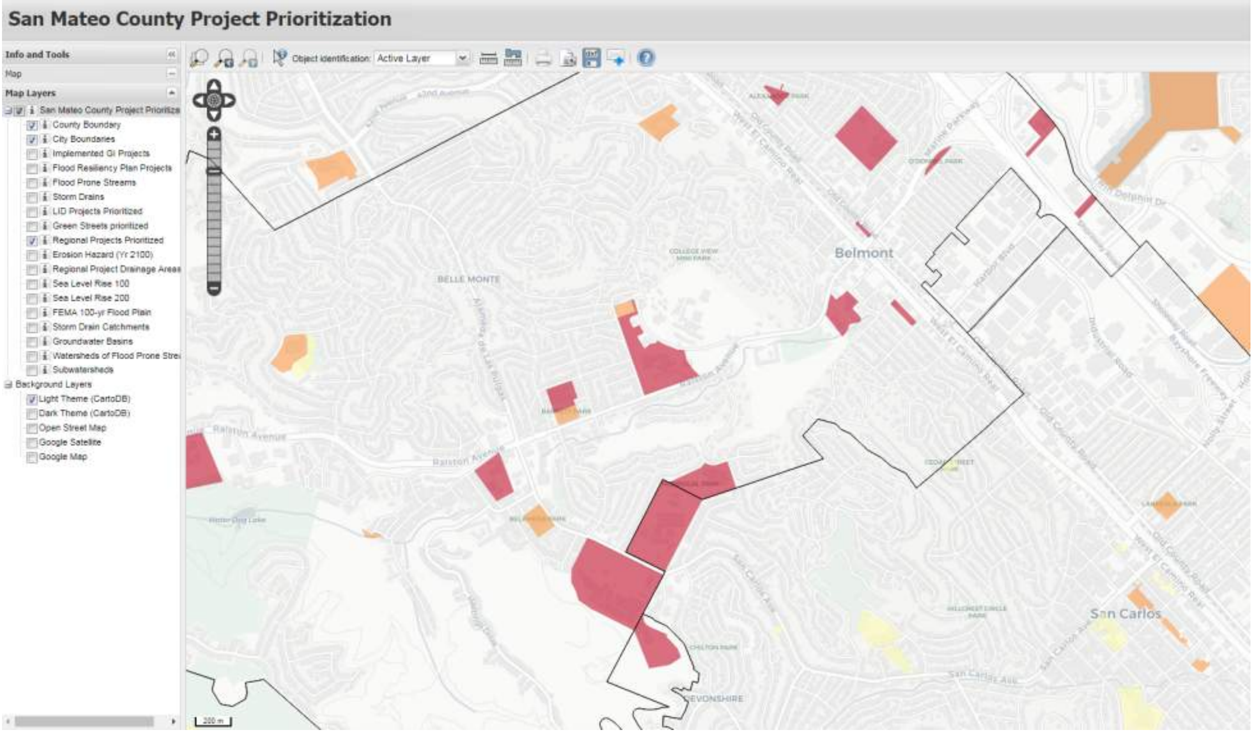
This project considers only conveyance improvements downstream of El Camino Real without any of the detention storage options of Preliminary Alternative 2. This lack of detention and water quality components puts Alternative 1 at a disadvantage when applying for water quality/stormwater-focused funding and grants.

Depending on the construction methodology, use of precast materials, construction phasing, bid schedule, and the contractor's capabilities, this project could take as few as two dry seasons or as long as several years to construct all components. Local businesses, including the Harbor Industrial Association, and residents should be consulted when developing construction phasing.

The total cost of this preliminary alternative, including a 30 percent contingency, is $19.0 million.

PRELIMINARY ALTERNATIVE 2: DETENTION BASINS

Preliminary Alternative 2 consists of potential detention basins and regional stormwater capture projects as presented on the San Mateo County Project Prioritization website per the San Mateo County Stormwater Resource Plan: http://54.183.214.51/maps/SMC_project_prioritization. Project locations in this WMP considered public and private properties, proximity to Belmont Creek and its tributaries, available open space (parking lots and fields), and watershed contributions.



San Mateo County Project Prioritization

Info and Tools

Map

Map Layers

- ☑ San Mateo County Project Prioritize
  - ☑ County Boundary
  - ☑ City Boundaries
  - ☐ Implemented GI Projects
  - ☐ Flood Resiliency Plan Projects
  - ☐ Flood Prone Streams
  - ☐ Storm Drains
  - ☐ LID Projects Prioritized
  - ☐ Green Streets prioritized
  - ☑ Regional Projects Prioritized
  - ☐ Erosion Hazard (Yr 2100)
  - ☐ Regional Project Drainage Areas
  - ☐ Sea Level Rise 100
  - ☐ Sea Level Rise 200
  - ☐ FEMA 100-yr Flood Plain
  - ☐ Storm Drain Catchments
  - ☐ Groundwater Basins
  - ☐ Watersheds of Flood Prone Stre
  - ☐ Subwatersheds
- Background Layers
  - ☑ Light Theme (CartoDB)
  - ☐ Dark Theme (CartoDB)
  - ☐ Open Street Map
  - ☐ Google Satellite
  - ☐ Google Map

Object identification: Active Layer

Figure 3 Stormwater Resource Plan (CCAG)

Preliminary Alternative 2 consists of constructing the following detention basins:

2A: Hidden Canyon Park Detention

2B: Notre Dame de Namur Softball Field

2C: Notre Dame de Namur Soccer Field

2D: Carlmont High School Softball Field

2E: Twin Pines Park

Runoff from Belmont Creek will be diverted to the proposed underground detention basins, where it will either be infiltrated or slowly released back into Belmont Creek via outlet control. Reducing flows in Belmont Creek will improve downstream flooding conditions. If infiltration is feasible, groundwater recharge and treatment are additional benefits. Detention basins can also trap sediment in a centralized, maintenance-friendly system; trapping sediment will help reduce sediment bar-induced flooding in the HIA. Geotechnical investigations for groundwater, infiltration, and soil stability are not included in this WMP and should be performed during planning or final design.

Underground detention basins come in various forms such as concrete boxes, arch pipes, and circular pipes. There are open bottom and closed system options. Vehicular and structural loading should be considered when selecting a product and/or configuration. Michael Baker contacted an underground detention basin manufacturer for sample pricing, design, and specifications. Precast products will reduce construction time and allow for consistent manufacturing quality. Example products are provided in Appendix I. This WMP is a public document and Michael Baker recommends that all feasible products should be considered.

Detention basin options include aboveground options such as vegetated bioretention basins and underground options such as pipe storage. Modeling and preliminary design assume underground detention basins for consistency with 2’ of freeboard.

Figure 4 Underground (left) and Aboveground (right) Detention Basin Examples (StormTrap, Michael Baker International)

Preliminary footprints for each detention basin were delineated based on aerial imagery and proximity to Belmont Creek, prioritizing parking lots and grassed areas (play fields, parks, etc.). These preliminary footprints will be adjusted during final design based on site-specific constraints (materials specifications, existing utilities, traffic flow, geotechnical, etc.).

Based on information provided by manufacturers, underground detention basins have an expected design life of 100 years, depending on their materials, construction method, soil conditions, O&M, and other factors. The Collaborative should consult with specific product vendors/manufacturers to determine the appropriate product for project-specific constraints.

Aboveground detention basin design life is approximately equal to underground detention basins but require stricter O&M activities to ensure the vegetation survives, soil does not erode, storm drain infrastructure does not get clogged, and other aboveground factors do not damage the basin. Aboveground detention basins may also require additional appurtenances compared to underground detention basins, such as access roads, protective fencing, and prohibitive signage.

The detention basins should include a trash capture component via a hydrodynamic separator. It will allow for an additional water quality component by permitting capture of PCBs and metals though sediment capture, as well as a water supply component by allowing for infiltration into the existing aquifer. Hydrodynamic separator maintenance primarily consists of a vacuum truck (i.e., no manhole access maintenance).

Each detention basin was run in the 50-year, 3-hour storm event to determine its individual effectiveness (i.e., not in series) and provide a metric for implementation. Individual detention basin HEC-HMS hydrographs are provided in Appendix C. When the detention basins are run in series (i.e., combined implementation), their effectiveness at reducing runoff is much greater than individual implementation. HEC-HMS hydrographs for combined implementation are provided in Appendix D and described in the Alternative Implementation section below.

2A: Hidden Canyon Park Detention Basin

The Hidden Canyon Park detention basin consists of approximately 4.14 acre-feet (Ac-ft) of storage accomplished by replacing an existing 60-inch RCP and installing an 18-inch outfall pipe and an emergency overflow structure. An aboveground detention basin, such as bioretention, is also feasible but would require additional coordination with the City of Belmont for the design and aesthetics.

The 27,300-square-foot underground detention basin requires 9,100 cubic yards of excavation, along with landscaping and surface restoration.

The existing parking lot, fencing, and access roads south of Carlmont Drive would need to be replaced due to damage from heavy construction equipment. Repaving or asphalt concrete overlay of Carlmont Drive is not included in this project.

This project is in a low trash-generating area in the upper portion of the Belmont Creek watershed.

This detention basin would facilitate sediment and debris removal before the material enters the storm drain system.

Construction is estimated to take two months. The recommended construction dates are during non-rainy months. Portions of Hidden Canyon Park would be closed but the public could still access the park and the adjacent open space through construction phasing, staging, and controlled access routes.

The total cost of this preliminary alternative, including a 30 percent contingency, is $3.9 million.

2B: Notre Dame de Namur Softball Field Detention Basin

The Notre Dame de Namur softball field detention basin consists of approximately 11.12 Ac-ft of storage accomplished by a 128-inch by 83-inch arch pipe and installing 24-inch inlet and outlet pipes and an emergency overflow structure. The 102,840-square-foot underground detention basin requires 38,089 cubic yards of excavation, along with softball field-specific surface improvements.

An existing play court, parking lot, and softball field would be excavated and replaced; costs for the softball field portion of this project assume turf-related surface improvements. Structural improvements (bleachers, batting cages, dugouts, etc.) and heavy-duty machinery (irrigation pumps, recycled water treatment) are not included in the cost estimate. Additional softball field improvements should be negotiated between the stakeholders and the City and/or County. The current land use makes an aboveground detention basin infeasible.

The existing play court and parking lot would need specific improvements and appurtenances such as play equipment, wheel stops, and signing and striping. Notre Dame de Namur campus access roads are assumed adequate for construction equipment and would not need replacing/repairing.

This project is in a moderate trash-generating area in the lower portion of the Belmont Creek watershed and could include a trash capture device.

This detention basin would facilitate sediment and debris removal before the material enters the storm drain system.

Construction is estimated to take two to three months. Construction dates should be coordinated with Notre Dame de Namur as the softball field hosts many activities throughout the year. The play court, parking lot, and softball field would be inaccessible to the public until construction is completed and the turf is established.

The total cost of this preliminary alternative, including a 30 percent contingency, is $10.3 million.

2C: Notre Dame de Namur Soccer Field Detention Basin

The Notre Dame de Namur soccer field detention basin consists of approximately 8.77 Ac-ft of storage accomplished by a 137-inch by 87-inch arch pipe and installing 24-inch inlet and outlet pipes and an emergency overflow structure. The 72,000-square-foot underground detention basin requires 26,667 cubic yards of excavation, along with soccer field-specific surface improvements.

The existing soccer field and some fencing would be excavated and replaced; the project footprint assumes the existing bleachers and other structures will be protected in place. Costs assume turf-related surface improvements. Structural improvements (bleachers, training area, scoreboards, etc.) and heavy-duty machinery (irrigation pumps, recycled water treatment) are not included in the cost estimate. Additional improvements should be negotiated between the stakeholders and the City and/or County. The current land use makes an aboveground detention basin infeasible.

Notre Dame de Namur campus access roads are assumed adequate for construction equipment and would not need replacing/repairing.

This project is in a moderate trash-generating area in the lower portion of the Belmont Creek watershed and could include a trash capture device.

This detention basin would facilitate sediment and debris removal before the material enters the storm drain system.

Construction is estimated to take two to three months. Construction dates should be coordinated with Notre Dame de Namur as the soccer field hosts many activities throughout the year. The soccer field would be inaccessible to the public until construction is completed and the turf is established.

The total cost of this preliminary alternative, including a 30 percent contingency, is $8.1 million.

2D: Carlmont High School Softball Field Detention Basin

The Carlmont High School softball field detention basin consists of approximately 13.08 Ac-ft of storage accomplished by a 112-inch by 75-inch arch pipe, and installing a 36-inch inlet pipe, a 24-inch outlet pipe, and an emergency overflow structure. The 131,574-square-foot underground detention basin requires 38,985 cubic yards of excavation, along with softball field-specific surface improvements.

An existing parking lot and softball field would be excavated and replaced; costs for the softball field portion of this project assume turf-related surface improvements. Structural improvements (bleachers, batting cages, dugouts, etc.) and heavy-duty machinery (irrigation pumps, recycled water treatment) are not included in the cost estimate. Additional softball field improvements should be negotiated between the stakeholders and the City and/or County. The current land use makes an aboveground detention basin infeasible.

The existing parking lot would need specific improvements and appurtenances such as light poles, trees, wheel stops, and signing and striping. Carlmont High School campus access roads are assumed adequate for construction equipment and would not need replacing/repairing.

This project is in a moderate trash-generating area in the upper portion of the Belmont Creek watershed and could include a trash capture device.

This detention basin would facilitate sediment and debris removal before the material enters the storm drain system.

Construction is estimated to take two to three months. The recommended construction dates are during non-school months. The parking lot and softball field would be inaccessible to the public until construction is completed and the turf is established.

The total cost of this preliminary alternative, including a 30 percent contingency, is $13.0 million.

2E: Twin Pines Park Detention Basin

The Twin Pines Park detention basin consists of approximately 21.52 Ac-ft of storage accomplished by 142-inch by 91-inch arch pipe, and installing a 60-inch inlet pipe, a 24-inch outlet pipe, and an emergency overflow structure. The 43,000-square-foot underground detention basin requires 37,481 cubic yards of excavation, along with parking lot-specific surface improvements.

This project should be coordinated with the City of Belmont's Twin Pines Park Master Plan (2019), to ensure the goals of this project and the Twin Pines Park Master Plan are met.

The ~1,600-linear-foot reach of Belmont Creek in Twin Pines Park is heavily eroded, causing sediment to discharge into the creek and existing trees to fall. Creek restoration such as riprap and vegetation is included in this project. A sediment basin about halfway through Twin Pines Park with a low flow channel is also included in the design to create a centralized O&M area for sediment removal, thus reducing the dredging and clogging effects downstream near the HIA. All work within Belmont Creek should consider improving public access to the creek.

Structural improvements (buildings, statues, etc.) and heavy-duty machinery (irrigation pumps, recycled water treatment) are not included in the cost estimate. Additional improvements should be negotiated between the stakeholders and the City and/or County. The current land use could incorporate aboveground detention/treatment, and other low-impact development (LID) improvements (e.g., green infrastructure).

The existing parking lot would need specific improvements and appurtenances such as light poles, trees, wheel stops, and signing and striping.

This project is in a moderate trash-generating area in the lower portion of the Belmont Creek watershed and could include a trash capture device.

This detention basin would facilitate sediment and debris removal before the material enters the storm drain system.

Repaving or improving Ralston Avenue and 6th Avenue is not included in this project.

Construction is estimated to take three to four months. Construction dates should be coordinated with all City departments as Twin Pines Park hosts many activities throughout the year. The parking lot and portions of the park would be inaccessible to the public until construction is completed and the turf is established. However, the public could still access the park through construction phasing, staging, and controlled access routes.

The total cost of this preliminary alternative, including a 30 percent contingency, is $17.6 million.

Detention Basin Summary

Table 1 presents the footprint, total storage in Ac-ft, and costs per Ac-ft of storage for each storage area. Footprints and storage values were estimated using aerial images of available areas (e.g., sports fields, open areas, parking lots), aerial elevations, and storm drain data provided by the County. Table 1 shows Twin Pines Park is the most cost-efficient storage area when using the metric of cost per storage volume.

Table 1 Storage Area Costs per Acre-Foot

Preliminary Alternative	Detention Basin Name	Footprint (SF)	Storage (AC-FT)	Cost ($ million)	Cost/AC-FT ($ million)
2A	Hidden Canyon Park	27,300	4.14	$3.9	$0.94
2B	Notre Dame de Namur Softball Field	102,840	11.12	$10.3	$0.93
2C	Notre Dame de Namur Soccer Field	72,000	8.77	$8.1	$0.92
2D	Carlmont High School Softball Field	131,574	13.08	$13.0	$0.99
2E	Twin Pines Park	43,000	21.52	$17.6	$0.82

Table 2 presents the HEC-HMS model individual peak inflow in cfs, peak discharge leaving the storage area in cfs, peak flow reduction in cfs, and costs per peak flow reduction in cfs for each storage area. Individual hydrographs showing the flow rates (with and without the detention basin) are provided in Appendix C. The flow reductions are much higher if these detention basin preliminary alternatives are connected in series, as described in the Alternative Implementation section below. Table 2 shows Hidden Canyon Park is the most cost-efficient storage area when using the metric of cost per cfs of peak storage reduction when each detention basin is modeled individually.

Table 2 Storage Area Costs per Peak Flow Reduction in cfs (50-year, 3-hour Storm Event)

Preliminary Alternative	Detention Basin Name	Inflow (cfs)	Discharge (cfs)	Flow Reduction (cfs)	Cost ($ million)	Cost/cfs Reduced ($ million)
2A	Hidden Canyon Park	69	32	37	$3.9	$0.11
2B	Notre Dame de Namur Softball Field	118	48	70	$10.3	$0.15
2C	Notre Dame de Namur Soccer Field	104	36	68	$8.1	$0.12
2D	Carlmont High School Softball Field	27	11	16	$13.0	$0.81
2E	Twin Pines Park	808	782	26	$17.6	$0.68

Per the HEC-HMS and HEC-RAS results, the 50-year, 3-hour storm generates approximately 857 cfs in flows, exceeding the approximate 630 cfs capacity (per the 2014 Study) of Belmont Creek at the HIA. Based on the HEC-HMS and HEC-RAS modeling, implementing the five detention basins (i.e., in series) and the conveyance improvements of Alternative 1 will reduce the flows from 857 cfs to approximately 421 cfs (~50% reduction), keeping stormwater within Belmont Creek (from El Camino Real to the properties 500’ east of US 101), and thereby eliminating flooding during the 50-year, 3-hour storm. While the proposed condition of 421 cfs is much lower than the 630 cfs capacity of Belmont Creek at the HIA, downstream conditions such as box culvert capacity, sea level rise, and tidal influence prevent flood mitigation for events larger than the 50-year, 3-hour storm without adding additional upstream detention or other flood resiliency measures.

This implementation of all preliminary alternatives is known as Scenario 7, described in the Alternative Implementation section below. Scenario 7 hydrograph and flood limit exhibits are provided in Appendix D.

ALTERNATIVE IMPLEMENTATION

It is unlikely that all projects could be constructed at once due to funding, resource availability, traffic impacts, etc. Michael Baker recommends the following to occur in the next stage of design to implement each project:

- Research and identify existing utilities to determine extent of any proposed relocation efforts and establish project-specific footprints, alignments, and/or configurations of proposed design elements.
- Investigate geotechnical constraints, environmental permitting requirements, and construction feasibility to identify critical design and schedule impacts.
- Perform site topographic survey to create base map for beginning final design and evaluate existing surface elements.
- Initiate public outreach, as each project is considered disruptive to users at each location.
- Begin funding and grant applications per the Funding Strategy in Appendix G.

Project Specific Implementation

Michael Baker recommends that the following project-specific improvements and actions be considered during design to maximize the improvements built during construction closures:

Preliminary Alternative 1: Conveyance Improvements

Extensive outreach and coordination with stakeholders (including but not limited to the Harbor Industrial Association and Caltrans), local businesses, and residents along the proposed bypass culvert alignment to help determine construction phasing. Investigate right-of-way impacts to begin negotiations for any potential easements, encroachments, and/or acquisitions. Remove vegetation and sediment in Belmont Creek between Old County Road and US 101 to improve conveyance. Evaluate condition of existing floodwall on east bank to determine if repairs, retrofits, or replacement sections are needed.

Incorporate green infrastructure, trash capture devices, parking, and traffic-calming improvements (i.e., sustainable streets improvements) for multi-discipline solution. Multi-benefit projects provide relevant infrastructure for future mixed-use zoning, promote water quality resiliency, enhance pedestrian and bicycle mobility and safety, and are highly eligible for grants/funding.

Preliminary Alternative 2A: Hidden Canyon Park Detention Basin

The design should be coordinated with the City of Belmont and its Parks Department. Consider LID features such as permeable pavement and bioretention for treating parking lot runoff. Install pumps and treatment system to use captured stormwater for park irrigation. Replace existing concrete channels to alleviate ponding and subsequent vector issues.

Preliminary Alternative 2B: Notre Dame de Namur Softball Field Detention Basin

The design, O&M, and access should be coordinated with Notre Dame de Namur. Install pumps and treatment system to use captured stormwater for field irrigation and/or toilet flushing. Construct other surface features such as dugouts, bleachers, accessible walkways, and fencing.

Preliminary Alternative 2C: Notre Dame de Namur Soccer Field Detention Basin

The design, O&M, and access should be coordinated with Notre Dame de Namur. Install pumps and treatment system to use captured stormwater for field irrigation and/or toilet flushing. Construct other surface features such as bleachers, accessible walkways, and fencing.

Preliminary Alternative 2D: Carlmont High School Softball Field Detention Basin

The design, O&M, and access should be coordinated with Carlmont High School and Sequoia Union High School District. Install pumps and treatment system to use captured stormwater for field irrigation and/or toilet flushing. Construct other surface features such as dugouts, bleachers, accessible walkways, and fencing. Consider LID features such as permeable pavement and bioretention for treating parking lot runoff.

Preliminary Alternative 2E: Twin Pines Park Detention Basin

The design should be coordinated with the City of Belmont and its Parks Department. Construct parking lot and adjacent sidewalk improvements per the Twin Pines Park Master Plan. Consider LID features such as permeable pavement and bioretention for treating parking lot runoff. Install pumps and treatment system to use captured stormwater for park irrigation and/or toilet flushing. Construct erosion protection and slope repair measures in Belmont Creek.

Implementation Order

Alternative 1 (Conveyance Improvements) includes flood walls, O&M, and bypass RCB components. Implementation assumes that the walls and O&M components will be implemented first (Scenario 1) followed by the bypass RCB (Scenario 2). Detention basins are implemented in subsequent scenarios based on the Collaborative’s input and the basins’ individual effectiveness at reducing runoff.

The following table describes Michael Baker’s recommended implementation order of projects to achieve incremental increases in flood reduction until ultimately reaching a 50-year, 3-hour storm event protection. Flood condition comparison exhibits for each scenario are provided in Appendix D, showing the incremental reduction in flooding in the HIA for the 50-year, 3-hour storm event. Scenario 7 (all alternatives implemented) in Appendix D shows a negligible amount of flooding, achieving flood resiliency for the 50-year, 3-hour storm event.

Table 3 Alternative Implementation Summary (50-year, 3-hour Storm Event)

Scenario	Preliminary Alternatives Implemented	Existing Inflow (cfs)	Peak Discharge (cfs)	Peak Flow Reduction (cfs)	Cost ($ million)	% of 50 Yr, 3 Hr Storm Event Flow Reduced
1	1: Conveyance Improvements (Walls + O&M)	N/A*	N/A*	N/A*	$0.2	15%**
2	1: Conveyance Improvements (Walls + O&M + RCB Bypass)	857	570	287	$19.0	66%
3	1: Conveyance Improvements (Walls + O&M + RCB Bypass) 2E: Twin Pines Park Detention Basin	857	500	357	$36.6	82%
4	1: Conveyance Improvements (Walls + O&M + RCB Bypass) 2E: Twin Pines Park Detention Basin 2B: NDNU Softball Field Detention Basin	857	471	386	$46.9	89%
5	1: Conveyance Improvements (Walls + O&M + RCB Bypass) 2E: Twin Pines Park Detention Basin 2B: NDNU Softball Field Detention Basin 2C: NDNU Soccer Field Detention Basin	857	456	401	$55.0	92%
6	1: Conveyance Improvements (Walls + O&M + RCB Bypass) 2E: Twin Pines Park Detention Basin 2B: NDNU Softball Field Detention Basin 2C: NDNU Soccer Field Detention Basin 2A: Hidden Canyon Park Detention Basin	857	441	416	$58.9	95%
7	1: Conveyance Improvements (Walls + O&M + RCB Bypass) 2E: Twin Pines Park Detention Basin 2B: NDNU Softball Field Detention Basin 2C: NDNU Soccer Field Detention Basin 2A: Hidden Canyon Park Detention Basin 2D: Carlmont High School Softball Field Detention Basin	857	421	436	$71.8	100%

*No detention component implemented; existing capacity of Belmont Creek slightly increased.

**Approximately 15% reduction in flooded area (i.e., area that no longer floods in Scenario 1 compared to existing conditions)

The implementation order for alternatives in this WMP is subject to change based on funding availability, the Collaborative's priorities, and public influence.

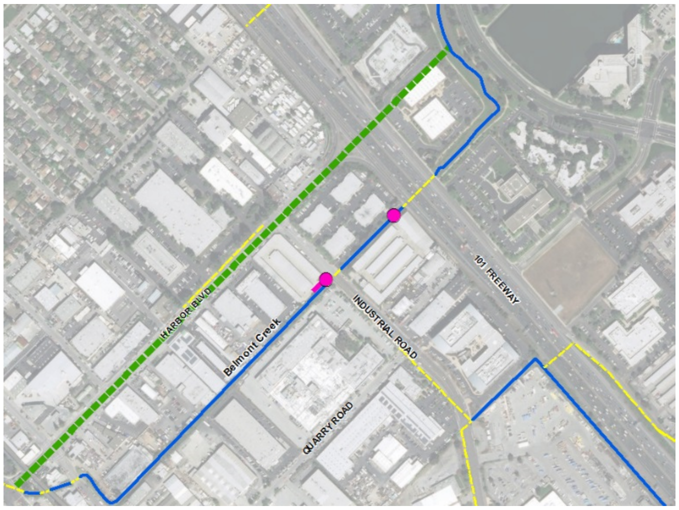
Failing to implement these preliminary alternatives or any other flood protection measures would result in continued flooding in the HIA. The extent of flooding (and subsequent damage) may worsen due to increased hydraulic clogging from sediment, erosion/deposition, sea level rise, and climate change.

PROJECT ALTERNATIVE SUMMARIES

The information shown on the following fact sheets assume individually constructed projects on their own (i.e., not in series). Depending on the order of construction/implementation, the peak flow reduction and storm events could increase (beneficial) and the construction costs and seasons could decrease (beneficial).

PRELIMINARY ALTERNATIVE 1
CONVEYANCE IMPROVEMENTS (RCB BYPASS, FLOODWALLS, O&M)

Construct 3,200 linear feet of a 10’ by 4’ reinforced concrete box (RCB) culvert in Harbor Boulevard (from Old Country Road to Belmont Creek), a 3’ floodwall, and perform targeted O&M. This project is based on Alternative #6 of the WRECO Study and is considered to have the highest traffic control and local business impacts. Final design should include exploring construction methodologies such as boring and tunneling to avoid closing any portion of US 101 (Bayshore Freeway) for construction; Caltrans has performed similar non-trenching construction along 101.



Incorporating green infrastructure, trash capture devices, parking, and traffic-calming improvements (i.e., sustainable streets improvements) will result in a multi-discipline solution. Multi-benefit projects provide relevant infrastructure for future mixed-use zoning, promote water quality resiliency, enhance pedestrian and bicycle mobility and safety, and are highly eligible for grants/funding.

Traffic control impacts and construction duration could be reduced through construction phasing, methodology, precast materials, and/or contactor capabilities.

Funding Opportunities:
Including sustainable streets and trash capture to create a multi-benefit project could make this project attractive for grants/funding.

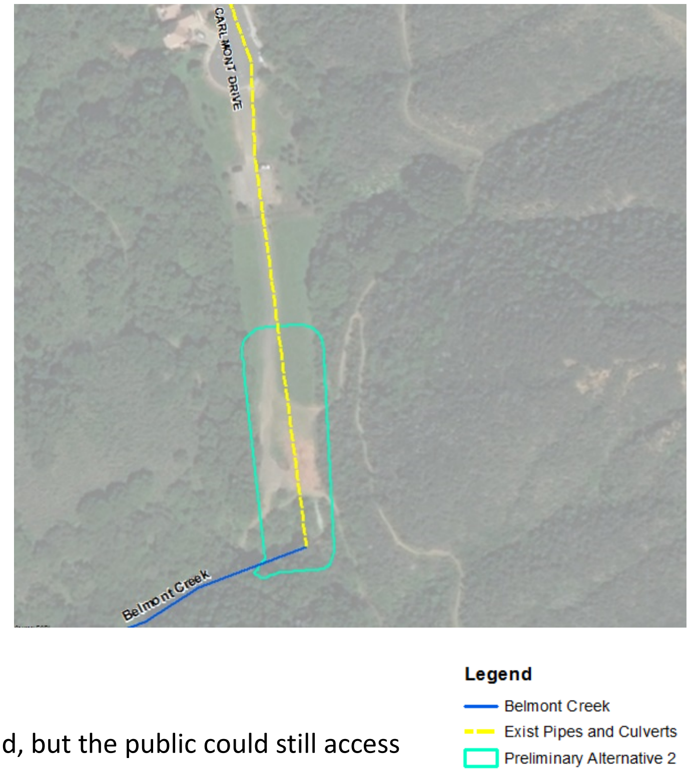
Adaptability:
Lack of climate change adaptability due to tidal influence and sea level rise. Existing utilities and high construction impacts make it difficult to widen/expand the RCB in the future.

Environmental Benefits:
Able to include trash capture device(s) to meet water quality goals. Green infrastructure along Harbor Boulevard will provide treatment of runoff prior to entering RCB.

Peak flow reduction: 287 cfs
Design life: 100 years (RCB/RCP Only)*
*American Concrete Pipe Association

Construction Periods: 2 dry seasons (minimum)
Estimated Annual O&M: $51k
Estimated cost: $19 million

PRELIMINARY ALTERNATIVE 2A
HIDDEN CANYON PARK DETENTION BASIN



The Hidden Canyon Park detention basin consists of approximately 4.14 Ac-ft of storage. An aboveground detention basin, such as bioretention, is also feasible but would require additional coordination with the City of Belmont for the design and aesthetics.

The 27,300-square-foot underground detention basin requires 9,100 cubic yards of excavation, along with landscaping and surface restoration.

The existing parking lot, fencing, and access roads south of Carlmont Drive would need to be replaced due to damage from heavy construction equipment. Repaving or asphalt concrete overlay of Carlmont Drive is not included in this project.

Portions of Hidden Canyon Park would be closed, but the public could still access the park and the adjacent open space through construction phasing, staging, and controlled access routes.

Funding Opportunities:
This detention basin is eligible for grants related to stormwater detention, park improvements, and creek restoration.

Adaptability:
This detention basin is located high enough in the watershed to avoid sea level rise impacts. The detention system is expandable to accommodate different configurations and larger storm events.

Environmental Benefits:
This detention basin would facilitate sediment and debris removal before the material enters the storm drain system.

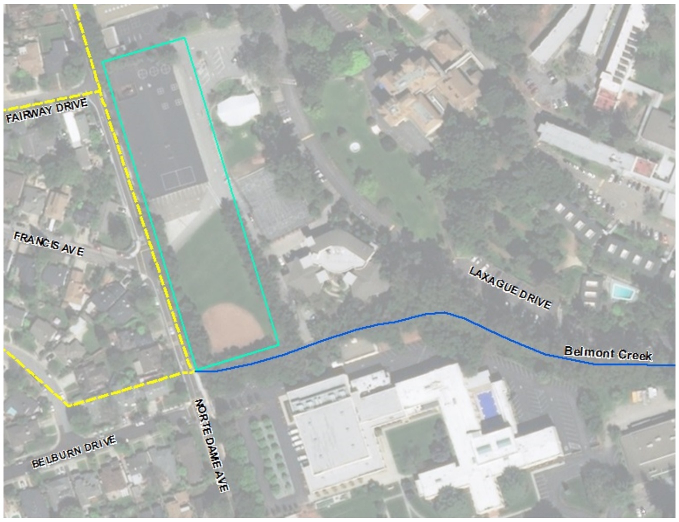
Peak flow reduction: 37 cfs
Design life: 100 years (detention basin only)

Construction Periods: 2 months
Estimated Annual O&M: $38k
Estimated cost: $3.9 million

PRELIMINARY ALTERNATIVE 2B
NOTRE DAME DE NAMUR SOFTBALL FIELD DETENTION BASIN

The Notre Dame de Namur softball field detention basin consists of approximately 11.12 Ac-ft of storage. The 102,840-square-foot underground detention basin requires 38,089 cubic yards of excavation, along with softball field-specific surface improvements.

An existing play court, parking lot, and softball field would be excavated and replaced; costs for the softball field portion of this project assume turf-related surface improvements. Additional softball field improvements should be negotiated between the stakeholders and the City and/or County. The current land use makes an aboveground detention basin infeasible.



The existing play court and parking lot would need specific improvements and appurtenances such as play equipment, wheel stops, and signing and striping. Notre Dame de Namur campus access roads are assumed adequate for construction equipment and would not need replacing/repairing.

The play court, parking lot, and softball field would be inaccessible to the public until construction is completed and the turf is established.

Funding Opportunities:
This detention basin is eligible for grants related to stormwater detention, school improvements, and creek restoration.

Adaptability:
This detention basin is located high enough in the watershed to avoid sea level rise impacts. The detention system is expandable to accommodate different configurations and larger storm events.

Environmental Benefits:
This detention basin would facilitate sediment and debris removal before the material enters the storm drain system. This project is in a moderate trash-generating area and could include a trash capture device.

Peak flow reduction: 70 cfs
Design life: 100 years (detention basin only)

Construction Periods: 2-3 months
Estimated Annual O&M: $38k
Estimated cost: $10.3 million

PRELIMINARY ALTERNATIVE 2C
NOTRE DAME DE NAMUR SOCCER FIELD DETENTION BASIN

The Notre Dame de Namur soccer field detention basin consists of approximately 8.77 Ac-ft of storage. The 72,000-square-foot underground detention basin requires 26,667 cubic yards of excavation, along with soccer field-specific surface improvements.

The existing soccer field and some fencing would be excavated and replaced; the project footprint assumes the existing bleachers and other structures will be protected in place. Costs assume turf-related surface improvements. Additional improvements should be negotiated between the stakeholders and the City and/or County. The current land use makes an aboveground detention basin infeasible.

Notre Dame de Namur campus access roads are assumed adequate for construction equipment and would not need replacing/repairing.

The soccer field would be inaccessible to the public until construction is completed and the turf is established

Funding Opportunities:
This detention basin is eligible for grants related to stormwater detention, school improvements, and creek restoration.

Adaptability:
This detention basin is located high enough in the watershed to avoid sea level rise impacts. The detention system is expandable to accommodate different configurations and larger storm events.

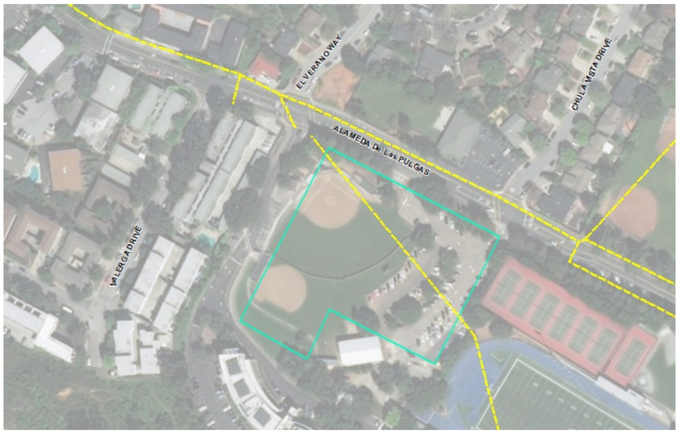
Environmental Benefits:
This detention basin would facilitate sediment and debris removal before the material enters the storm drain system. This project is in a moderate trash-generating area and could include a trash capture device.

Peak flow reduction: 68 cfs
Design life: 100 years (detention basin only)

Construction Periods: 2-3 months
Estimated Annual O&M: $38k
Estimated cost: $8.1 million

PRELIMINARY ALTERNATIVE 2D
CARLMONT HIGH SCHOOL SOFTBALL FIELD DETENTION BASIN

The Carlmont High School softball field detention basin consists of approximately 13.08 Ac-ft of storage. The 131,574-square-foot underground detention basin requires 38,985 cubic yards of excavation, along with softball field-specific surface improvements.



An existing parking lot and softball field would be excavated and replaced; costs for the softball field portion of this project assume turf-related surface improvements. Additional softball field improvements should be negotiated between the stakeholders and the City and/or County. The current land use makes an aboveground detention basin infeasible.

The existing parking lot would need specific improvements and appurtenances such as light poles, trees, wheel stops, and signing and striping. Carlmont High School campus access roads are assumed adequate for construction equipment and would not need replacing/repairing.

The parking lot and softball field would be inaccessible to the public until construction is completed and the turf is established.

Funding Opportunities:
This detention basin is eligible for grants related to stormwater detention, school improvements, and creek restoration.

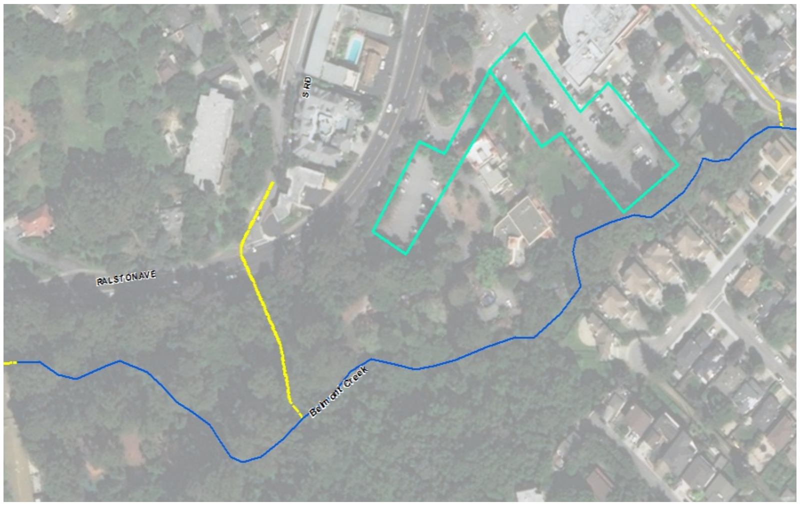
Adaptability:
This detention basin is located high enough in the watershed to avoid sea level rise impacts. The detention system is expandable to accommodate different configurations and larger storm events.

Environmental Benefits:
This detention basin would facilitate sediment and debris removal before the material enters the storm drain system. This project is in a moderate trash-generating area and could include a trash capture device.

Peak flow reduction: 16 cfs
Design life: 100 years (detention basin only)

Construction Periods: 2-3 months
Estimated Annual O&M: $38k
Estimated cost: $13.0 million

PRELIMINARY ALTERNATIVE 2E
TWIN PINES PARK DETENTION BASIN



The Twin Pines Park detention basin consists of approximately 21.52 Ac-ft. The 43,000-square-foot underground detention basin requires 37,481 cubic yards of excavation, along with parking lot-specific surface improvements.

The ~1,600 linear feet of creek restoration such as riprap and vegetation is included in this project. A sediment basin about halfway through Twin Pines Park with a low flow channel is also included in the design to create a centralized O&M area for sediment removal.

Additional improvements should be negotiated between the stakeholders and the City and/or County. The current land use could incorporate aboveground detention/treatment, and other low impact development improvements (e.g. green infrastructure).

The existing parking lot would need specific improvements and appurtenances such as light poles, trees, wheel stops, and signing and striping.

The parking lot and portions of the park would be inaccessible to the public until construction is completed and the turf is established.

Funding Opportunities:
This detention basin is eligible for grants related to stormwater detention, school improvements, and creek restoration.

Adaptability:
This detention basin is located high enough in the watershed to avoid sea level rise impacts. The detention system is expandable to accommodate different configurations and larger storm events.

Environmental Benefits:
This detention basin would facilitate sediment and debris removal before the material enters the storm drain system. This project is in a moderate trash generating area and could include a trash capture device.

Peak flow reduction: 26 cfs
Design life: 100 years (detention basin only)

Construction Periods: 3-4 months
Estimated Annual O&M: $38k
Estimated cost: $17.6 million

7. CONCLUSION

RESULTS

The table below summarizes the flood reduction achieved (in cfs) as each project is implemented, incrementally building flood resiliency in the Belmont Creek watershed. Constructing all projects ultimately results in mitigating the 50-year, 3-hour flood event (i.e., flooding does not occur):

Table 4 Preliminary Projects Summary

Preliminary Projects Implemented	Peak Flow Reduction (cfs)	% of 50 Yr, 3 Hr Storm Event Reduced	Cost ($ million)
1: Conveyance Improvements (Walls + O&M)	N/A*	N/A*	$0.2
1: Conveyance Improvements (Walls + O&M + RCB Bypass)	287	66%	$19.0
1: Conveyance Improvements (Walls + O&M + RCB Bypass) 2E: Twin Pines Park Detention Basin	357	82%	$36.6
1: Conveyance Improvements (Walls + O&M + RCB Bypass) 2E: Twin Pines Park Detention Basin 2B: NDNU Softball Field Detention Basin	386	89%	$46.9
1: Conveyance Improvements (Walls + O&M + RCB Bypass) 2E: Twin Pines Park Detention Basin 2B: NDNU Softball Field Detention Basin 2C: NDNU Soccer Field Detention Basin	401	92%	$55.0
1: Conveyance Improvements (Walls + O&M + RCB Bypass) 2E: Twin Pines Park Detention Basin 2B: NDNU Softball Field Detention Basin 2C: NDNU Soccer Field Detention Basin 2A: Hidden Canyon Park Detention Basin	416	95%	$58.9
1: Conveyance Improvements (Walls + O&M + RCB Bypass) 2E: Twin Pines Park Detention Basin 2B: NDNU Softball Field Detention Basin 2C: NDNU Soccer Field Detention Basin 2A: Hidden Canyon Park Detention Basin 2D: Carlmont High School Softball Field Detention Basin	436	100%	$71.8

The order of implementation is flexible as the Collaborative may have other priorities such as street improvements, park master plans, or other CIP projects that will influence the timing and funding for the proposed projects in this WMP. The HEC-HMS and HEC-RAS files are included in this WMP and different implementation scenarios can be run to determine the applicable flood reduction results.

Appendix A

Preliminary Alternatives Exhibits

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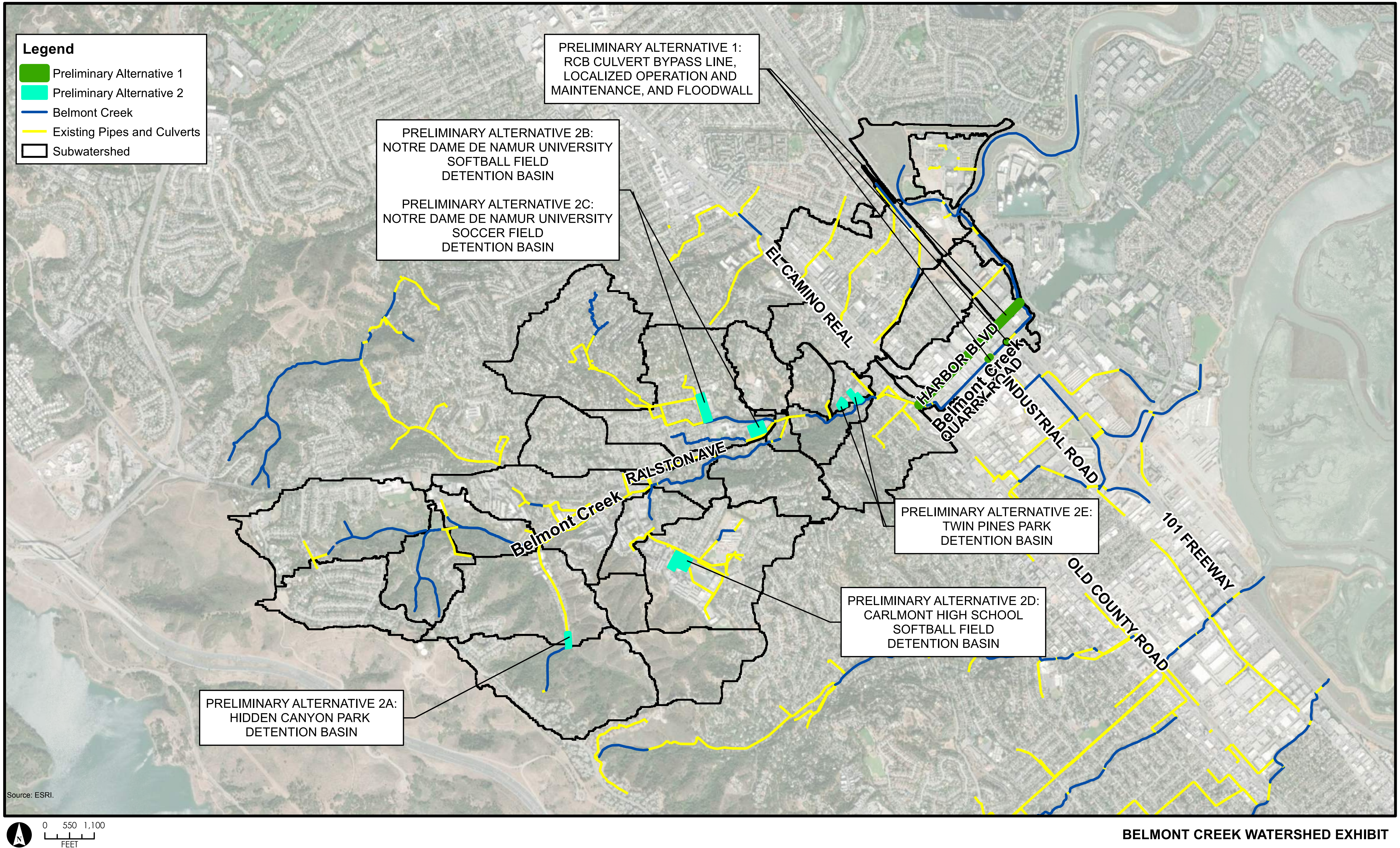

BELMONT CREEK WATERSHED EXHIBIT

BELMONT CREEK FLOOD MANAGEMENT PLAN | COUNTY OF SAN MATEO

Michael Baker INTERNATIONAL

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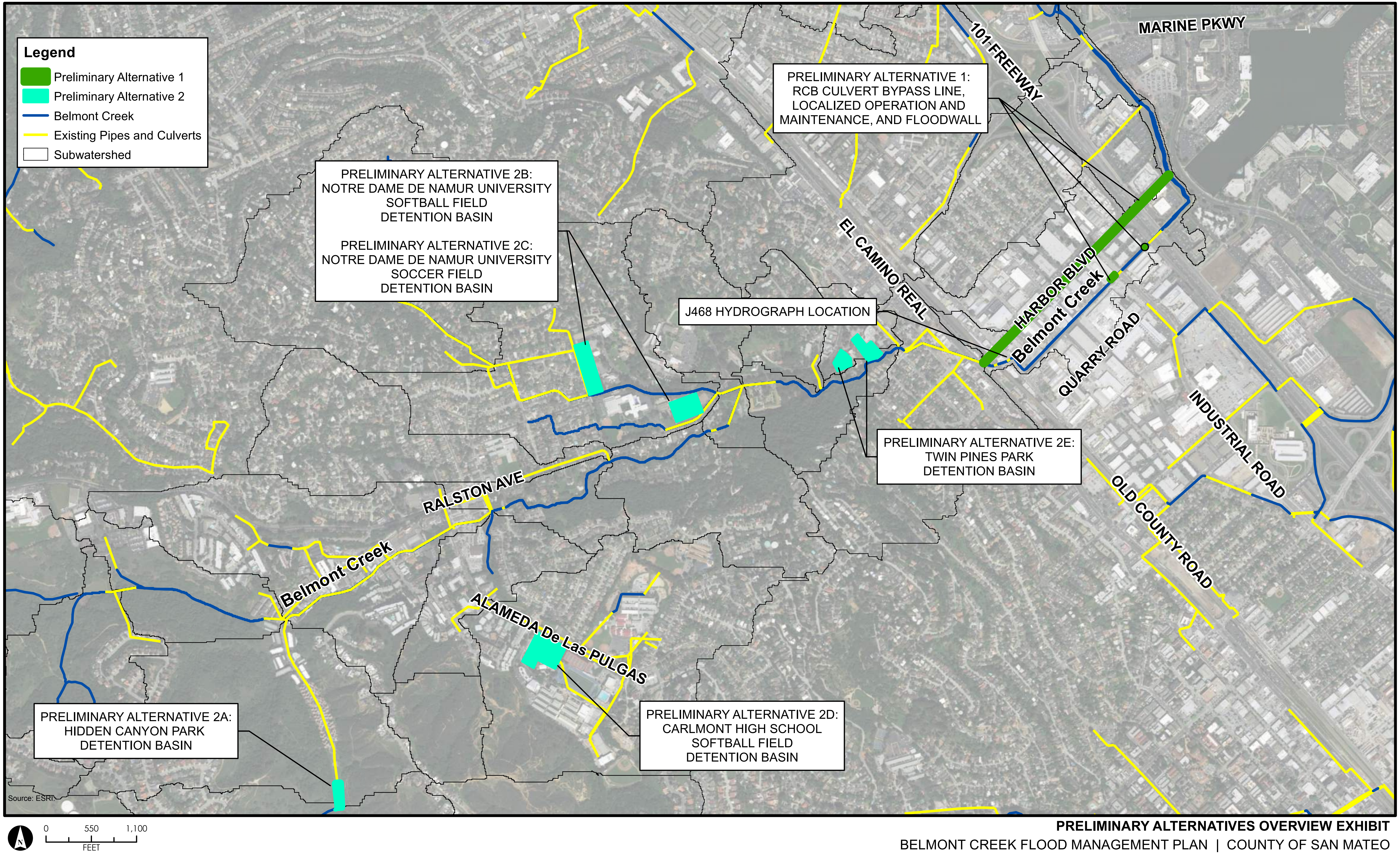

PRELIMINARY ALTERNATIVES OVERVIEW EXHIBIT

BELMONT CREEK FLOOD MANAGEMENT PLAN | COUNTY OF SAN MATEO

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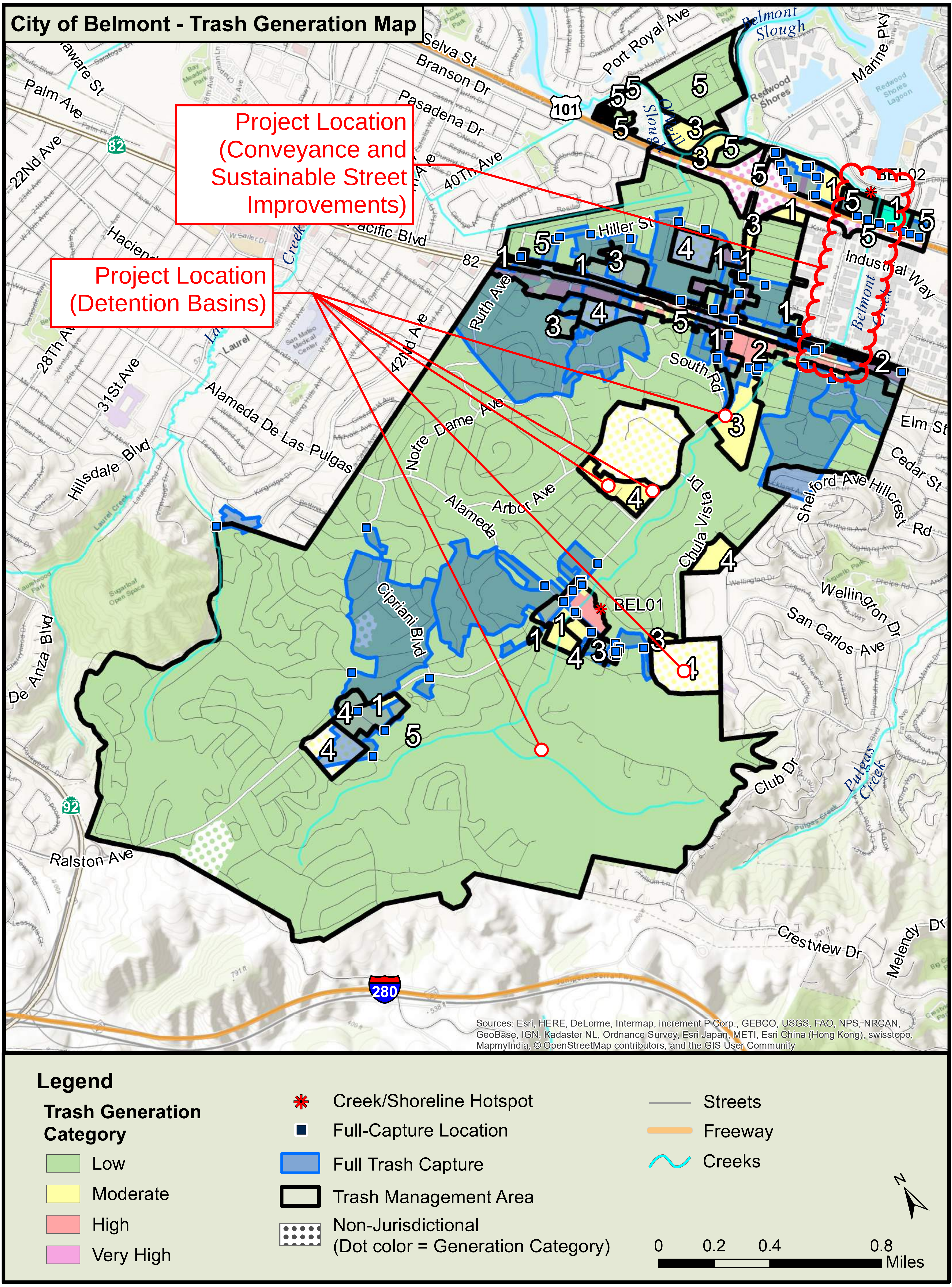
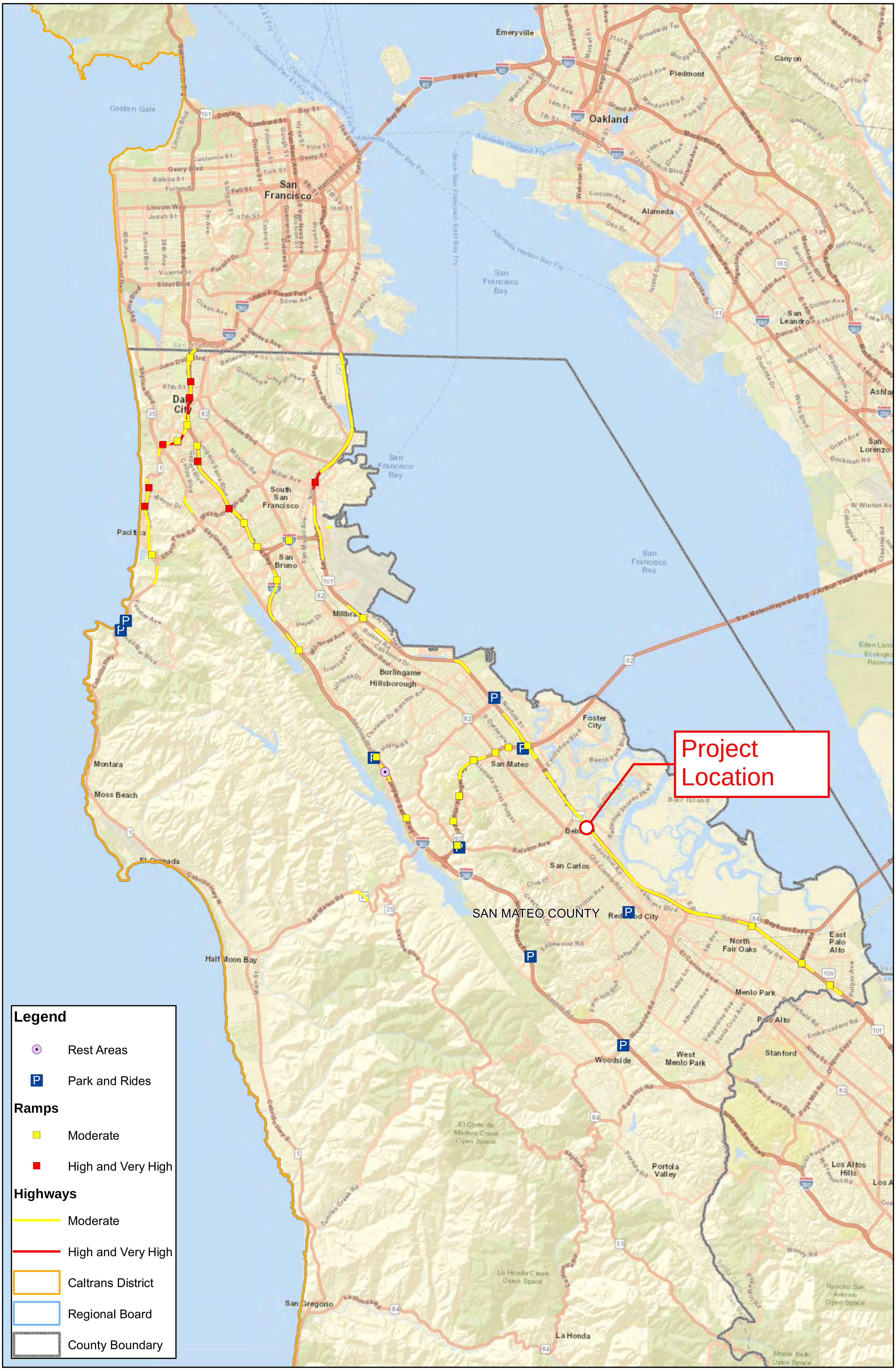
City of Belmont - Trash Generation Map



Project Location (Conveyance and Sustainable Street Improvements)

Project Location (Detention Basins)

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community



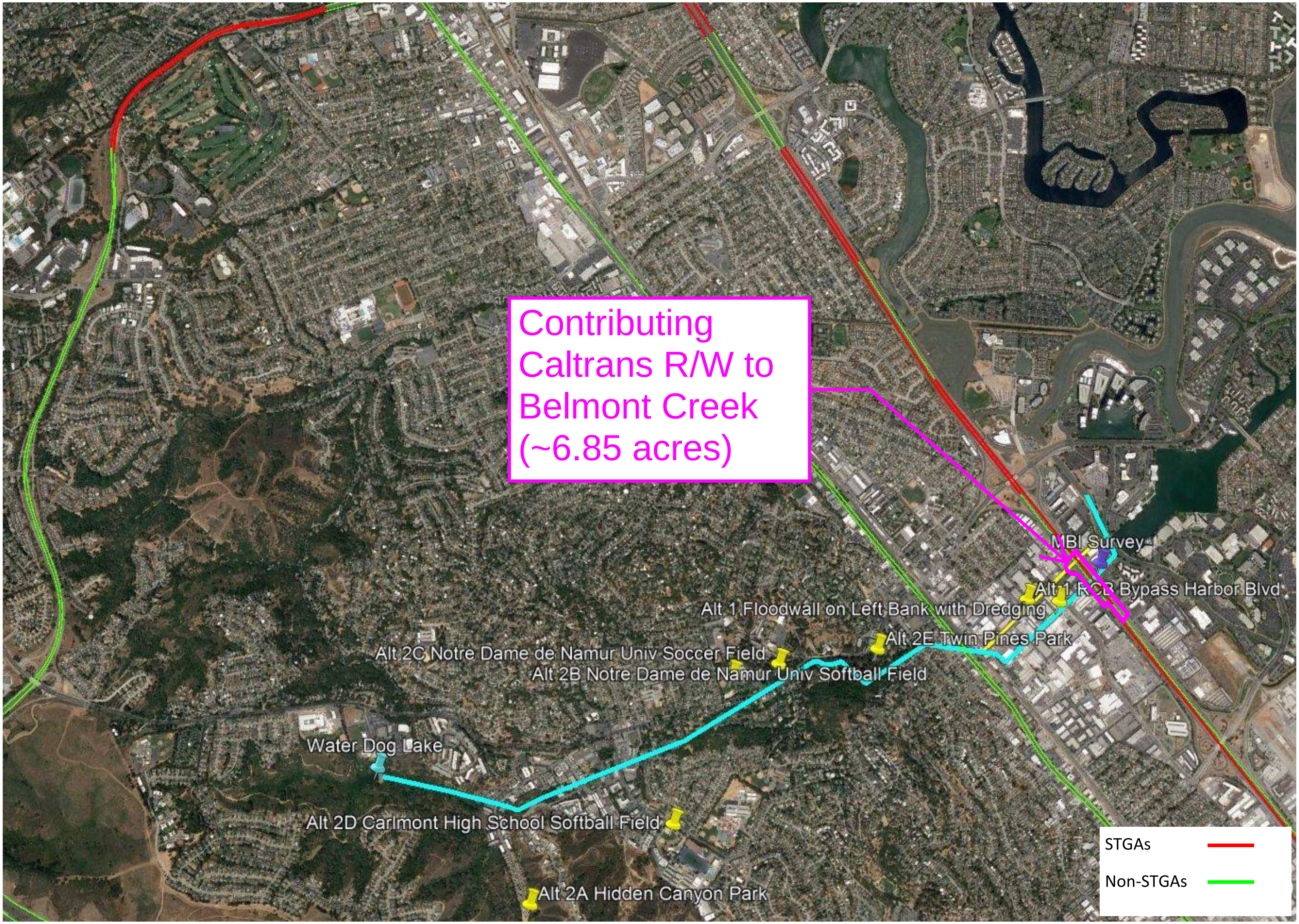
Caltrans

Source: Caltrans; ESRI; RWQCB; USGS

2018 Trash Level Map

San Mateo County

Appendix A



Contributing Caltrans R/W to Belmont Creek (~6.85 acres)

Appendix A

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NORTH

0 150 300 450 600 feet
SCALE 1"= 300'

PRELIMINARY ALTERNATIVE 1: CONVEYANCE IMPROVEMENTS
BELMONT CREEK FLOOD MANAGEMENT PLAN
COUNTY OF SAN MATEO

Appendix A

PHOTO 1

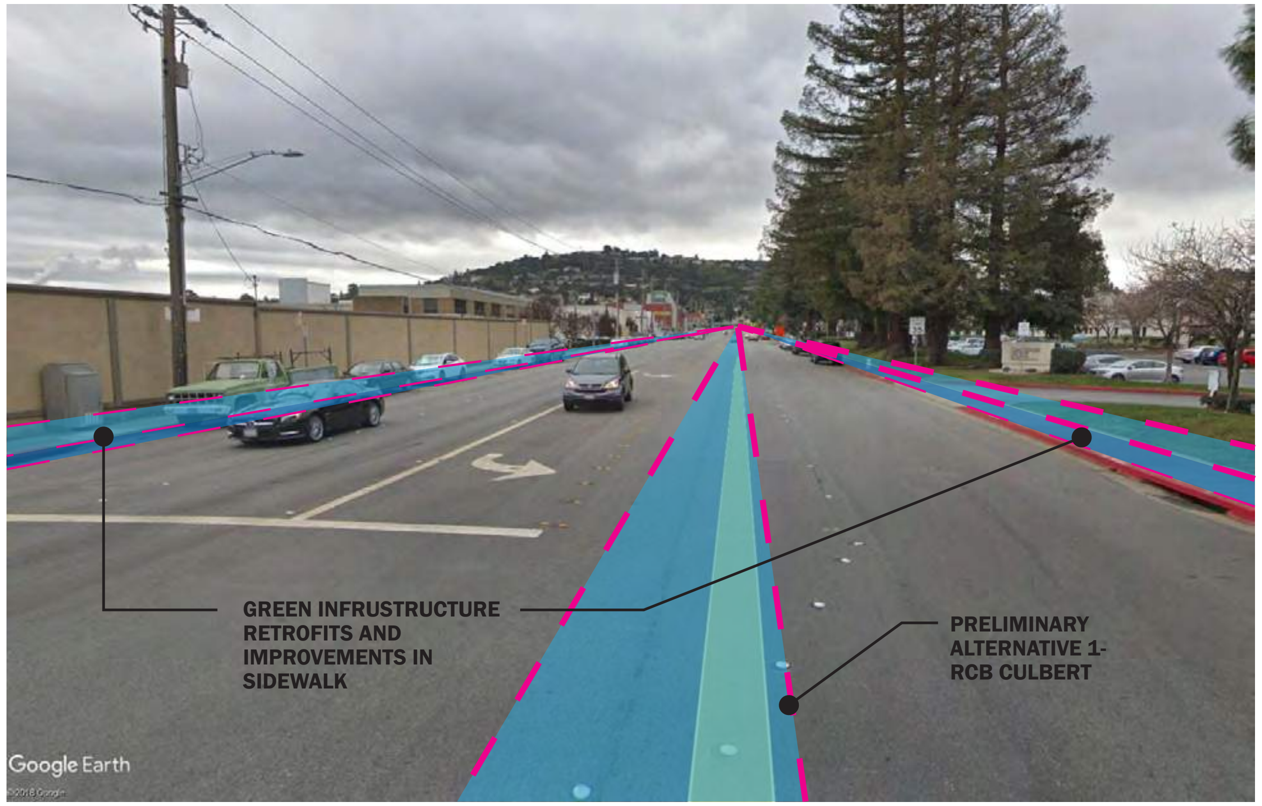
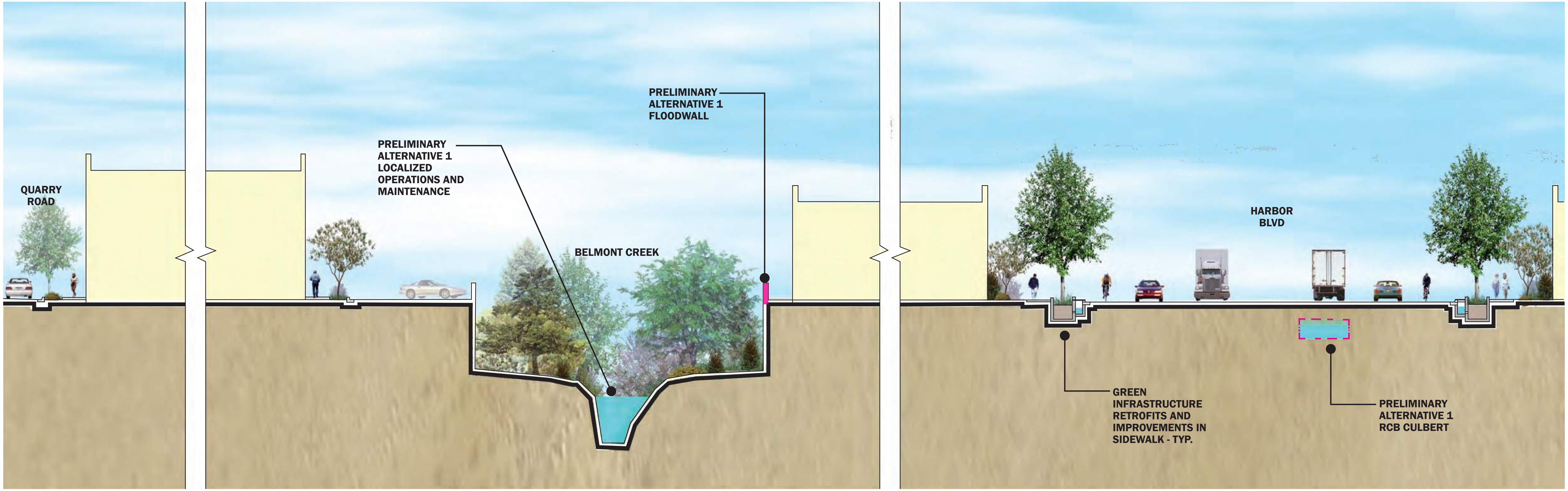


PHOTO 2



TYPICAL SECTION
NTS

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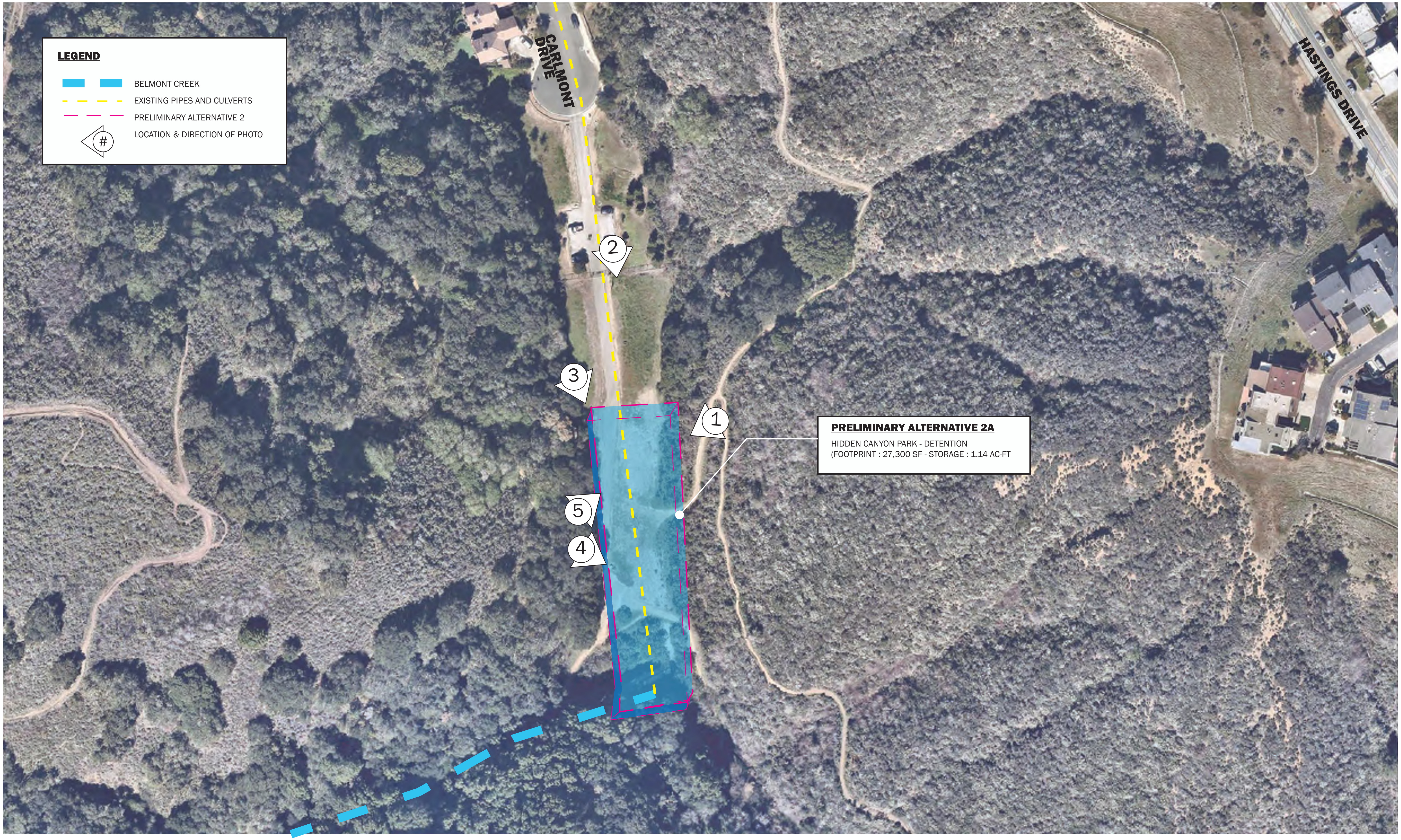
INTERNATIONAL

PRELIMINARY ALTERNATIVE 1: CONVEYANCE IMPROVEMENTS
BELMONT CREEK FLOOD MANAGEMENT PLAN
COUNTY OF SAN MATEO



PRELIMINARY ALTERNATIVE 2A

HIDDEN CANYON PARK - DETENTION
(FOOTPRINT : 27,300 SF - STORAGE : 1.14 AC-FT

Michael Baker
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NORTH

0 50 100 150 200 feet

SCALE 1"= 100'

PRELIMINARY ALTERNATIVE 2A: HIDDEN CANYON PARK
BELMONT CREEK FLOOD MANAGEMENT PLAN
COUNTY OF SAN MATEO

PHOTO 1

PHOTO 2

PHOTO 3

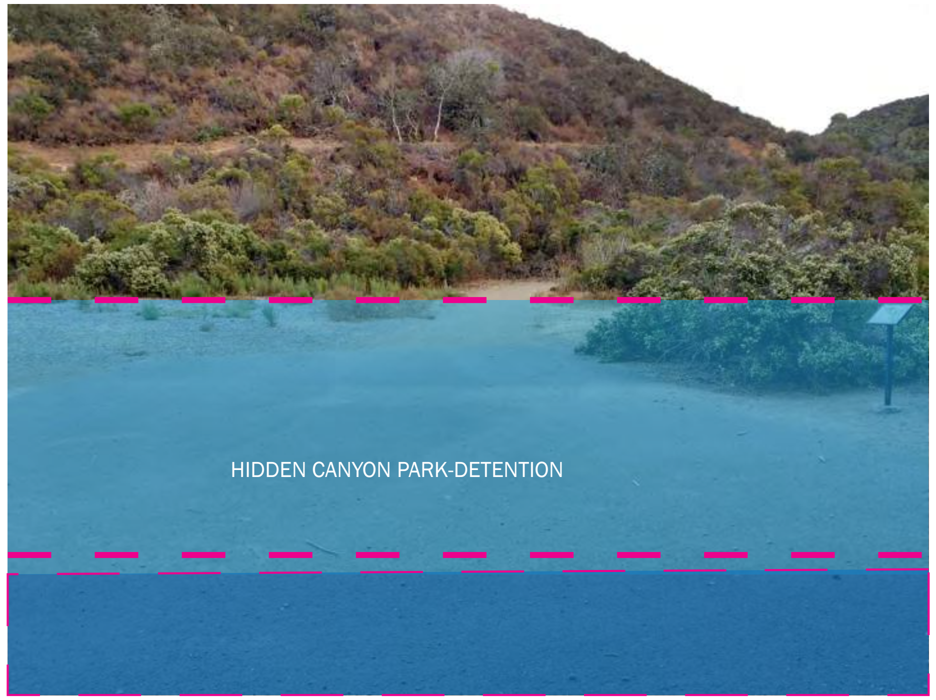

PHOTO 4

PHOTO 5

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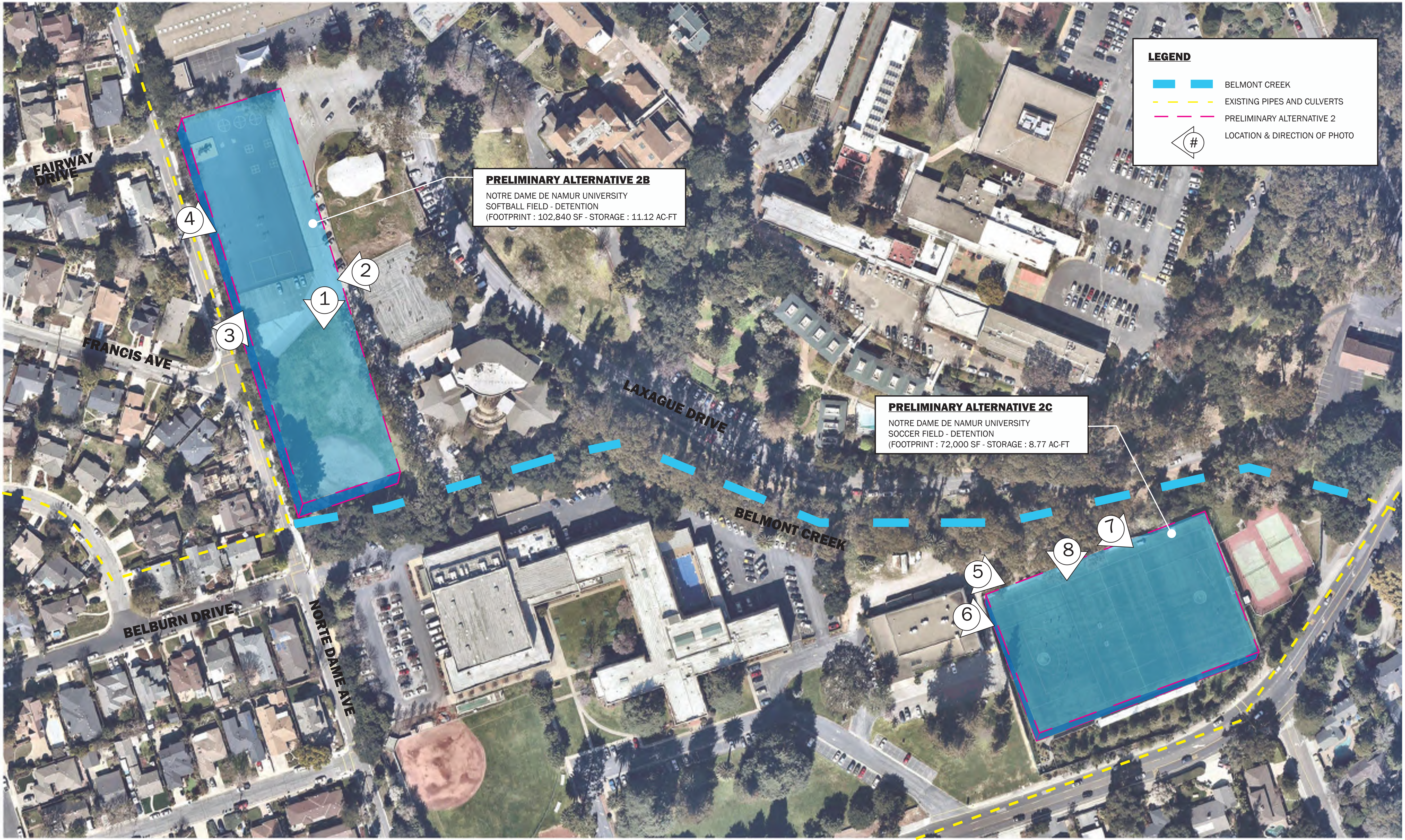
INTERNATIONAL

PRELIMINARY ALTERNATIVE 2A: HIDDEN CANYON PARK
BELMONT CREEK FLOOD MANAGEMENT PLAN
COUNTY OF SAN MATEO



Michael Baker INTERNATIONAL

NORTH

0 62.5 125 137.7 250 feet

SCALE 1"= 125'

PRELIMINARY ALTERNATIVE 2B AND 2C: NOTRE DAME DE NAMUR UNIVERSITY

BELMONT CREEK FLOOD MANAGEMENT PLAN

COUNTY OF SAN MATEO

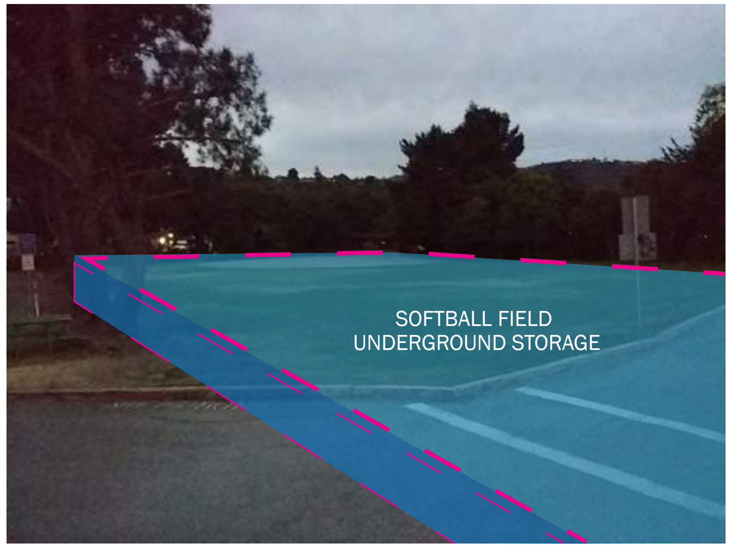


PHOTO 1

PHOTO 2

PHOTO 3

PHOTO 4

PHOTO 5

PHOTO 6

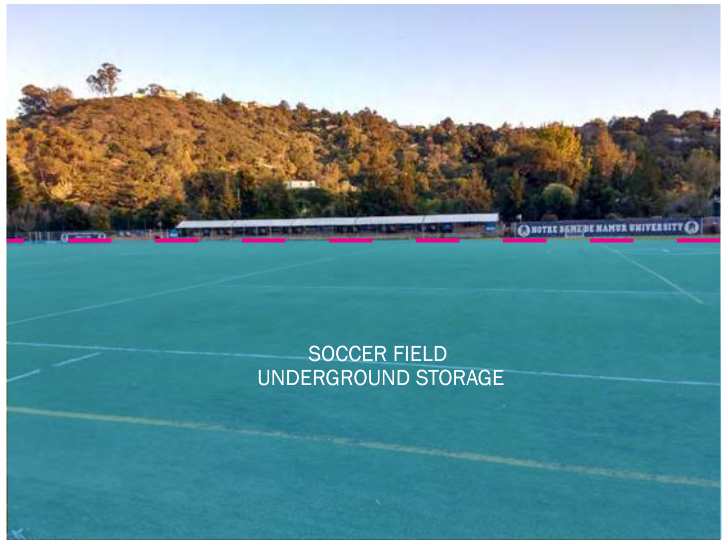


PHOTO 7

PHOTO 8

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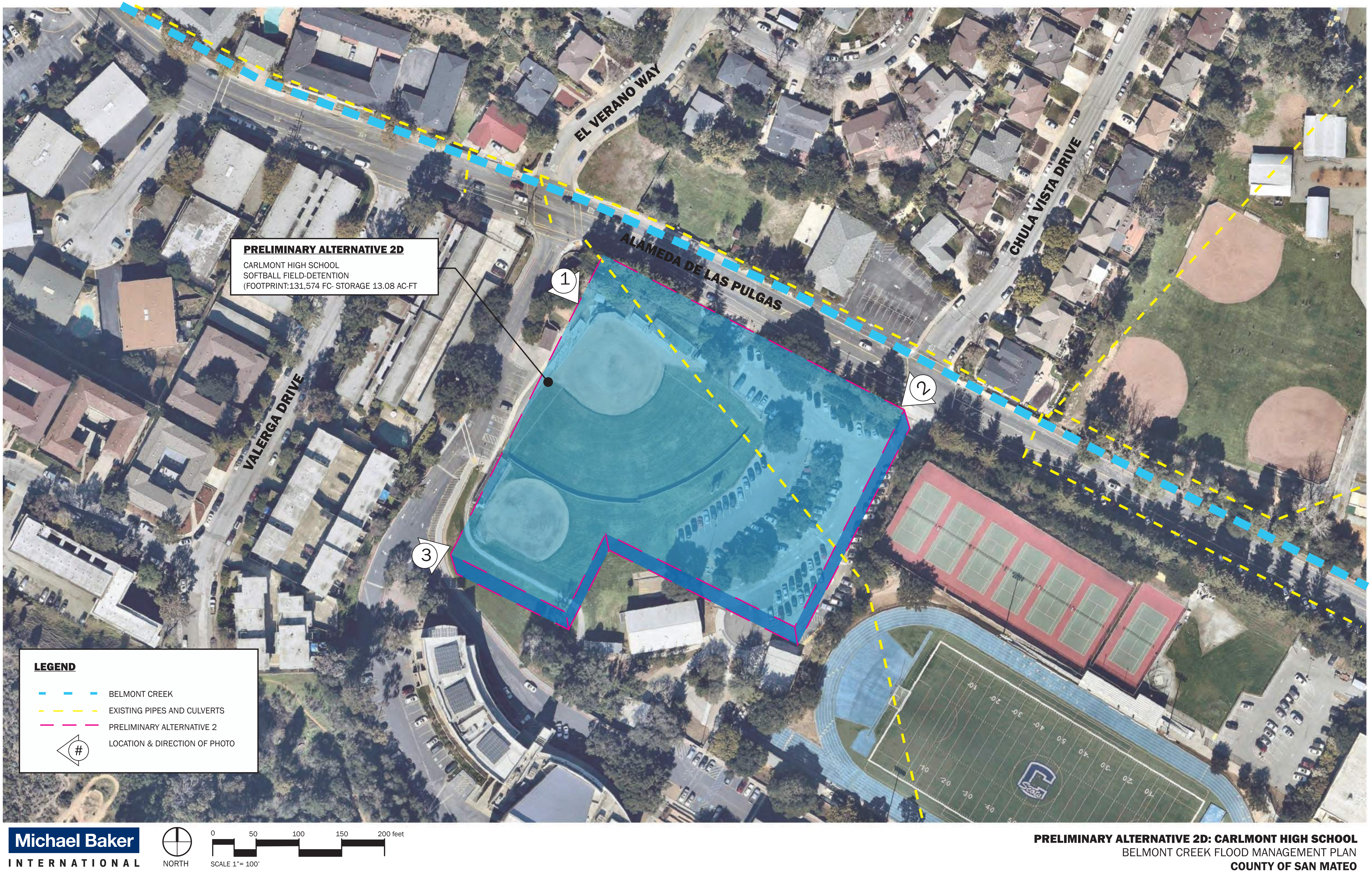
PRELIMINARY ALTERNATIVE 2B AND 2C: NOTRE DAME DE NAMUR UNIVERSITY
BELMONT CREEK FLOOD MANAGEMENT PLAN
COUNTY OF SAN MATEO



PRELIMINARY ALTERNATIVE 2D

CARLMONT HIGH SCHOOL
SOFTBALL FIELD-DETENTION
(FOOTPRINT:131,574 FC- STORAGE 13.08 AC-FT

LEGEND

- BELMONT CREEK
- EXISTING PIPES AND CULVERTS
- PRELIMINARY ALTERNATIVE 2
- (#) LOCATION & DIRECTION OF PHOTO

Michael Baker
INTERNATIONAL

PRELIMINARY ALTERNATIVE 2D: CARLMONT HIGH SCHOOL
BELMONT CREEK FLOOD MANAGEMENT PLAN
COUNTY OF SAN MATEO

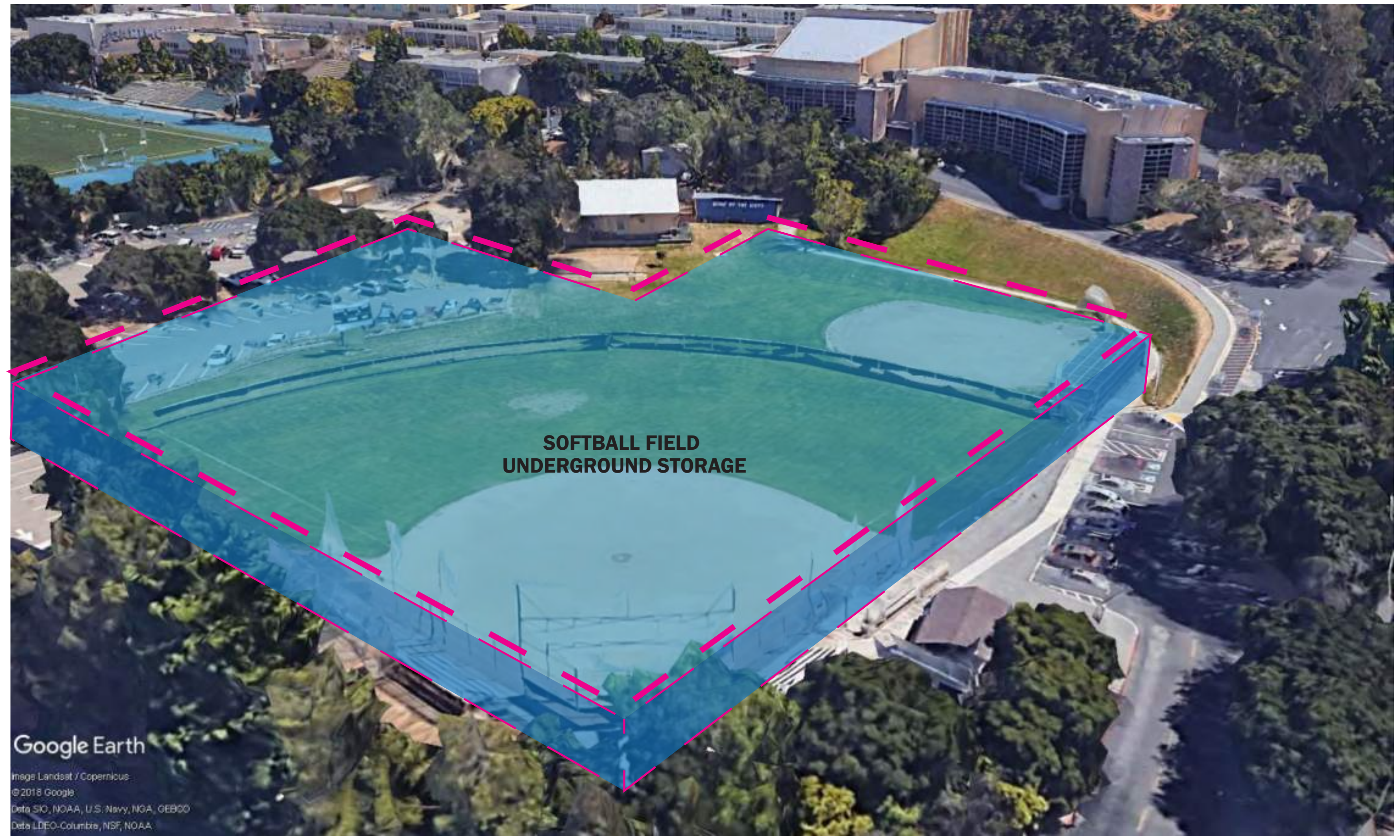


PHOTO 1

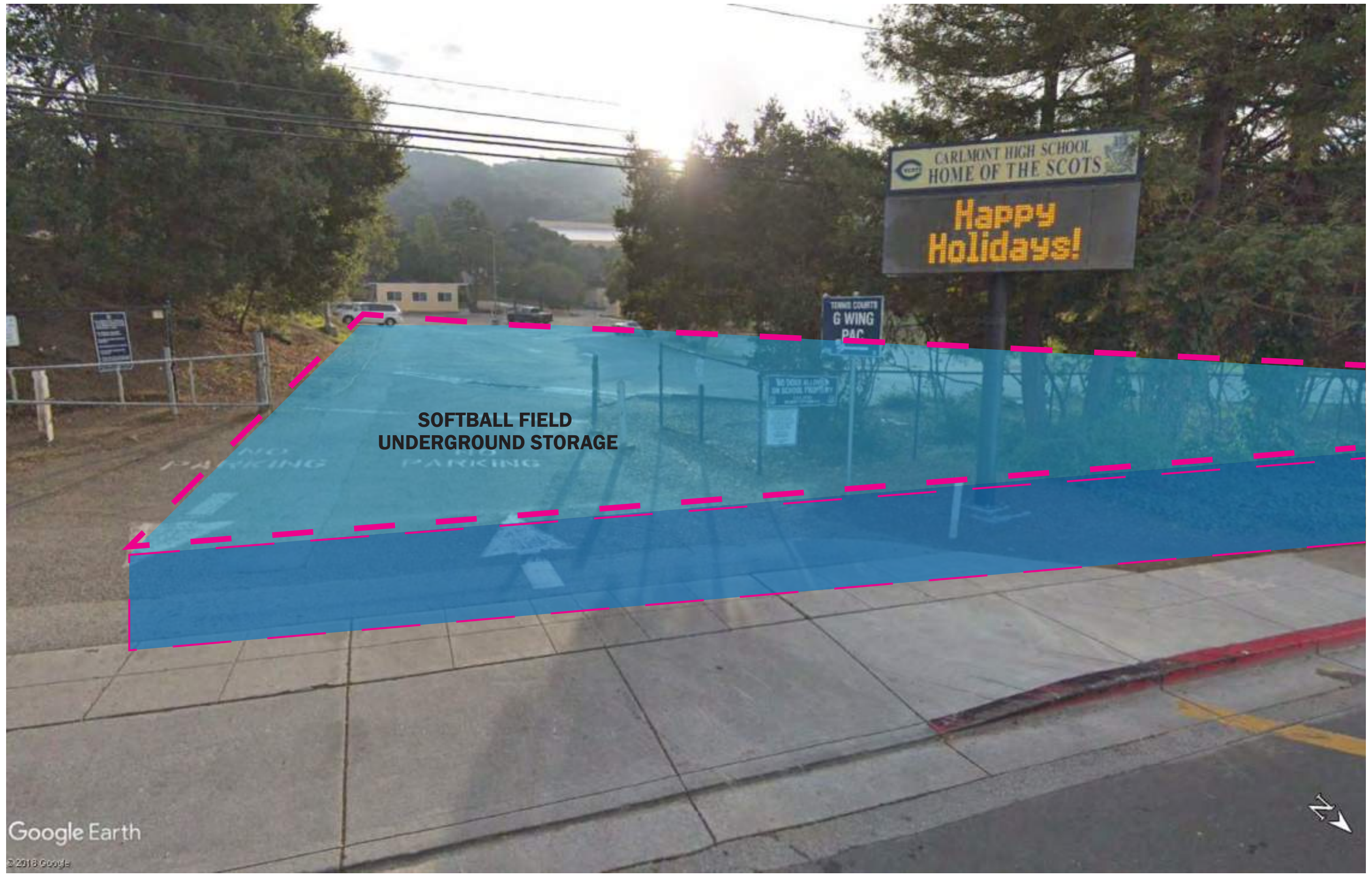


PHOTO 2

PHOTO 3

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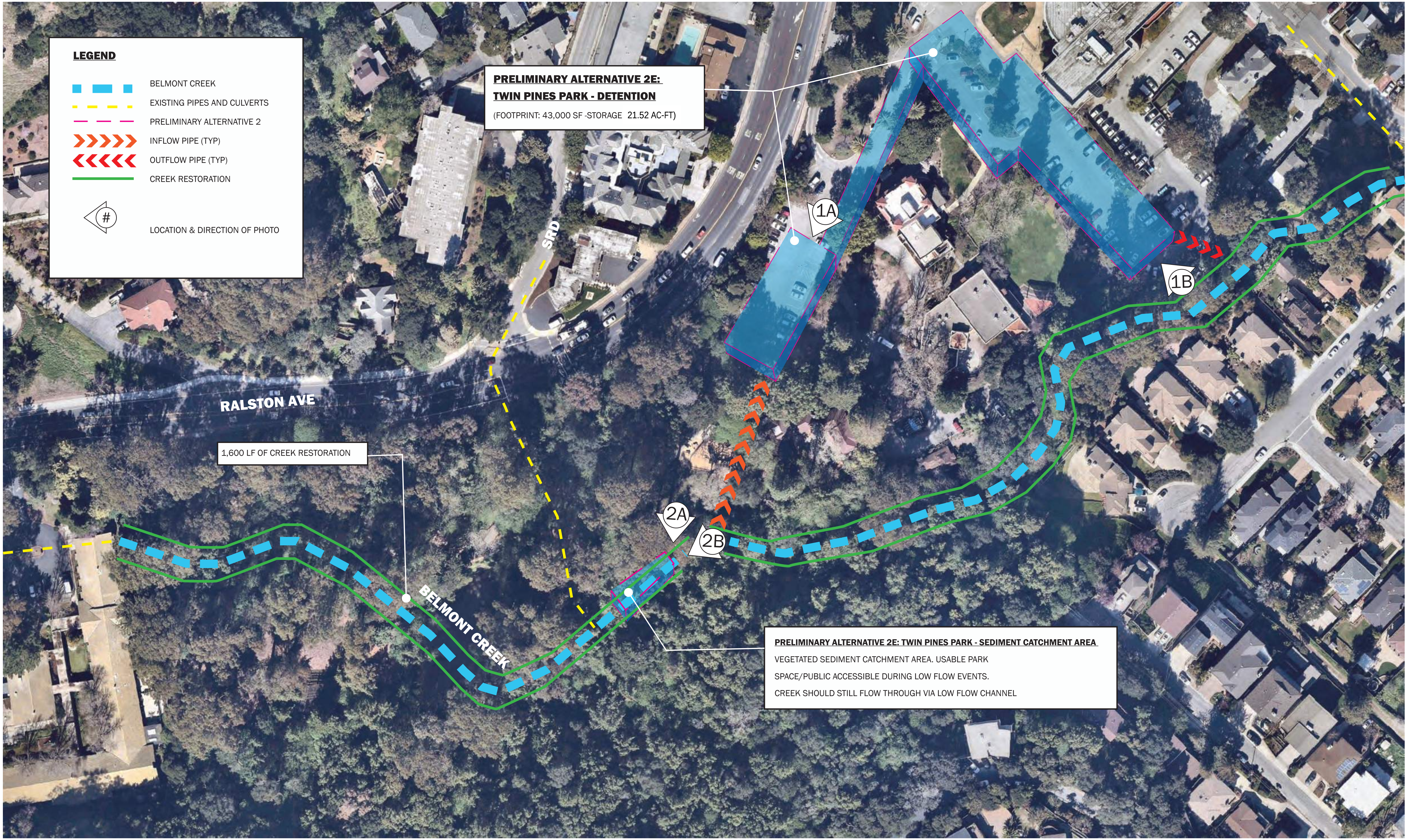
INTERNATIONAL

PRELIMINARY ALTERNATIVE 2D: CARLMONT HIGH SCHOOL
BELMONT CREEK FLOOD MANAGEMENT PLAN
COUNTY OF SAN MATEO
Appendix A



PRELIMINARY ALTERNATIVE 2E: TWIN PINES PARK - DETENTION

(FOOTPRINT: 43,000 SF -STORAGE 21.52 AC-FT)

1,600 LF OF CREEK RESTORATION

PRELIMINARY ALTERNATIVE 2E: TWIN PINES PARK - SEDIMENT CATCHMENT AREA

VEGETATED SEDIMENT CATCHMENT AREA. USABLE PARK SPACE/PUBLIC ACCESSIBLE DURING LOW FLOW EVENTS.

CREEK SHOULD STILL FLOW THROUGH VIA LOW FLOW CHANNEL

Michael Baker
INTERNATIONAL

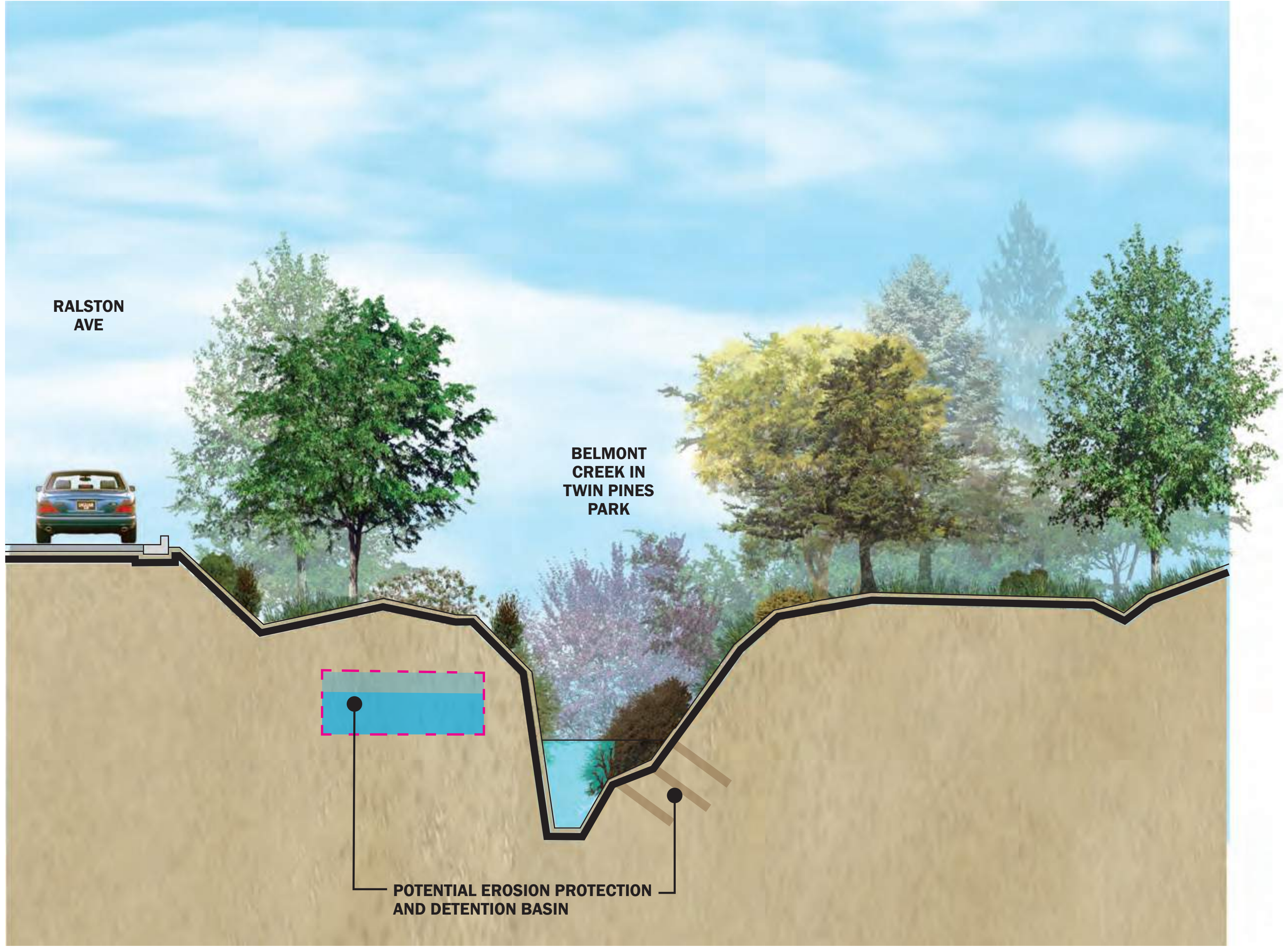
NORTH

0 50 100 150 200 feet
SCALE 1"= 100'

PRELIMINARY ALTERNATIVE 2E: TWIN PINES PARK
BELMONT CREEK FLOOD MANAGEMENT PLAN
COUNTY OF SAN MATEO

PHOTO 1A

PHOTO 1B



TYPICAL SECTION
NTS

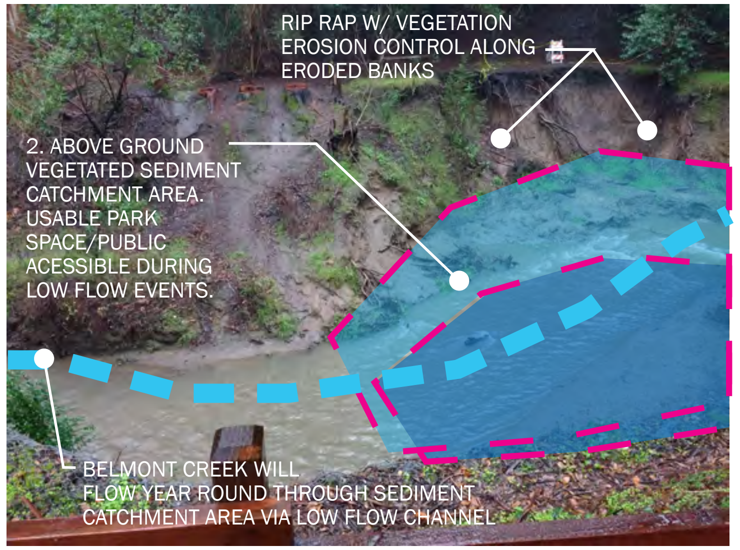


PHOTO 2A

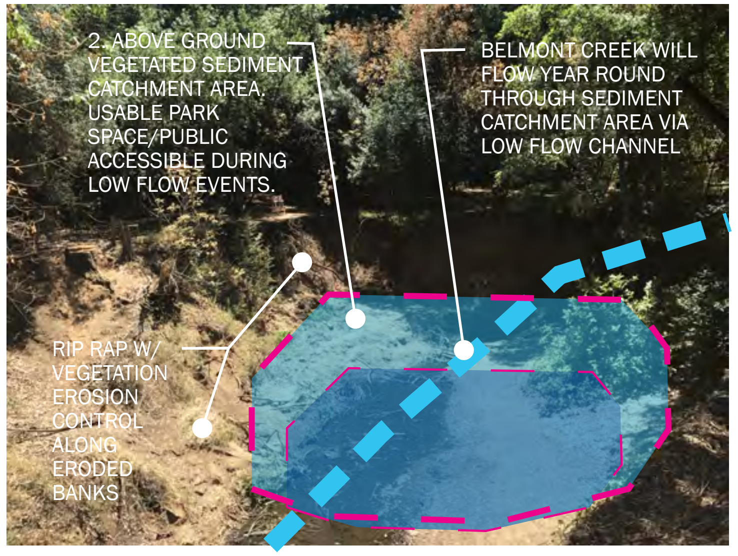


PHOTO 2B

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INTERNATIONAL

PRELIMINARY ALTERNATIVE 2E: TWIN PINES PARK
BELMONT CREEK FLOOD MANAGEMENT PLAN
COUNTY OF SAN MATEO

Appendix B

Preliminary Alternatives Cost Estimates

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Belmont Creek Watershed Management Plan

County of San Mateo

Preliminary Alternatives Cost Estimate

PRELIMINARY PROJECT COST SUMMARY

Project	Title	AMOUNT
1	BYPASS CULVERT, FLOOD WALLS, O&M	$18,865,115
2A	HIDDEN CANYON PARK DETENTION BASIN	$3,918,328
2B	NOTRE DAME DE NAMUR SOFTBALL FIELD DETENTION BASIN	$10,330,881
2C	NOTRE DAME DE NAMUR SOCCER FIELD DETENTION BASIN	$8,120,056
2D	CARLMONT HIGH SCHOOL SOFTBALL FIELD DETENTION BASIN	$12,978,909
2E	TWIN PINES PARK DETENTION BASIN	$17,607,607
	ALL PROJECTS	**$71,820,897**

Notes and Assumptions

Costs do not include easement acquisition fees.

Costs are high-level, based on 2016 Caltrans available cost data, previous Michael Baker International project experience, and input from Michael Baker International's construction management group.

Belmont Creek Watershed Management Plan

County of San Mateo

Preliminary Alternatives Cost Estimate

PRELIMINARY PROJECT 1: BYPASS CULVERT, FLOOD WALLS, O&M

ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT
	Construction - General				
1	Mobilization	1	LS	$501,922	$501,922
2	Traffic Control	1	LS	$1,564,266	$1,564,266
3	Construction Survey	1	LS	$100,384	$100,384
4	SWPPP	1	LS	$30,000	$30,000
5	Soils, Concrete, and Material Testing	1	LS	$200,769	$200,769
	Construction - Materials				
6	Dewatering	1	LS	$100,000	$100,000
7	Construction Dam	60	LF	$30	$1,800
8	Concrete Headwall	2	EA	$7,000	$14,000
9	Trench Excavation	30,667	CY	$100	$3,066,667
10	10'x4' RCB - Phased Trenching	2,300	LF	$800	$1,840,000
11	Shoring	2,300	LF	$30	$69,000
12	60" RCP - Jack and Bore	1,800	LF	$1,600	$2,880,000
13	60" Flap Gate	2	EA	$20,000	$40,000
14	Connect to Existing Storm Drain	2	EA	$1,500	$3,000
15	Concrete Diversion Structure	2	EA	$20,000	$40,000
16	Remove Existing Asphalt Pavement	96,600	SF	$6	$579,600
17	New Asphalt Pavement with Striping (including AC, base course, and subgrade preparation)	96,600	SF	$8	$772,800
18	Remove Existing Sidewalk	352	CY	$250	$87,963
19	Remove Existing Curb and Gutter	35	CY	$250	$8,796
20	Concrete Sidewalk	352	CY	$800	$281,481
21	6" Curb and Gutter	35	CY	$800	$28,148
22	8" PVC Underdrain	70	LF	$145	$10,204
23	SD Cleanout	10	EA	$7,000	$70,000
24	SD Catch Basin	20	EA	$6,000	$120,000
25	Landscaping	281	SF	$12	$3,378
26	3' High Masonry Wall	480	SF	$45	$21,600
27	Utility Relocation Allowance (including potholing)	1	LS	$390,000	$390,000
	Construction Subtotal				**$12,825,778**
	Construction Contingency	30%			$3,847,733
	Construction Total				**$16,673,511**

	Design Services				
28	Design Fee	1	LS	$769,547	$769,547
29	Environmental Clearance and Permitting	1	LS	$256,516	$256,516
30	Construction Management	1	LS	$769,547	$769,547
31	Engineering Services Through Construction and As-Builts	1	LS	$256,516	$256,516
	Design Services Total				**$2,052,124**
	Operations and Maintenance				
32	1st Year O&M	1	LS	$88,760	$88,760
33	Annual O&M	1	LS	$50,720	$50,720
	Operations and Maintenance Total				**$139,480**
	Project Total				**$18,865,115**

Notes and Assumptions

Traffic control costs assume work along Harbor Boulevard only; 101 (Bayshore Freeway) traffic control is subject to construction methodology selection (trenching, tunneling, boring, etc.).

Costs do not include easement acquisition fees.

Costs are high-level, based on 2016 Caltrans available cost data, previous Michael Baker International project experience, and input from Michael Baker International's construction management group.

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Belmont Creek Flood Management Plan

County of San Mateo

Preliminary Alternatives Cost Estimate

PRELIMINARY ALTERNATIVE 2A: HIDDEN CANYON PARK DETENTION BASIN

ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT
	Construction - General				
1	Mobilization	1	LS	$116,536	$116,536
2	Traffic Control	1	LS	$93,229	$93,229
3	Construction Survey	1	LS	$23,307	$23,307
4	SWPPP	1	LS	$10,000	$12,000
5	Soils, Concrete, and Material Testing	1	LS	$46,614	$46,614
	Construction - Materials				
6	Clear and Grub	27,300	SF	$1	$27,300
7	Clear and Grub Disposal	4,550	TON	$50	$227,500
8	Excavation	9,100	CY	$35	$318,500
9	Underground Detention Storage System	4.1	AC-FT	$259,530	$1,074,454
10	Concrete Headwall	2	EA	$7,000	$14,000
11	Remove Existing Storm Drain	350	LF	$100	$35,000
12	Connect to Existing Storm Drain	2	EA	$1,500	$3,000
13	Remove Existing Asphalt Pavement	11,490	SF	$6	$68,940
14	Remove Existing Chain Link Fence	100	LF	$10	$1,000
15	New Chain Link Fence	100	LF	$25	$2,500
16	New Asphalt Pavement with Striping (including AC, base course, and subgrade preparation)	11,490	SF	$8	$91,920
17	18" RCP	200	LF	$160	$32,000
18	60" RCP	100	LF	$380	$38,000
19	Hydrodynamic Separator	1	EA	$15,000	$15,000
20	SD Cleanout	2	EA	$7,000	$14,000
21	Landscaping	27,300	SF	$12	$327,600
22	Utility Relocation Allowance (including potholing)	1	LS	$40,000	$40,000
	Construction Subtotal				**$2,622,400**
	Construction Contingency	30%			$786,720
	Construction Total				**$3,409,120**

	Design Services				
23	Design Fee	1	LS	$209,792	$209,792
24	Environmental Clearance and Permitting	1	LS	$52,448	$52,448
25	Construction Management	1	LS	$131,120	$131,120
26	Engineering Services Through Construction and As-Builts	1	LS	$52,448	$52,448
	Design Services Total				**$445,808**
	Operations and Maintenance				
27	1st Year O&M	1	LS	$25,360	$25,360
28	Annual O&M	1	LS	$38,040	$38,040
	Operations and Maintenance Total				**$63,400**
	Project Total				**$3,918,328**

Notes and Assumptions

Costs assume no pavement or surface improvements on Carlmont Dr.

Costs do not include easement acquisition fees.

Costs are high-level, based on 2016 Caltrans available cost data, previous Michael Baker International project experience, and input from Michael Baker International's construction management group.

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Belmont Creek Flood Management Plan

County of San Mateo

Preliminary Alternatives Cost Estimate

PRELIMINARY ALTERNATIVE 2B: NOTRE DAME DE NAMUR SOFTBALL FIELD DETENTION BASIN

ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT
	Construction - General				
1	Mobilization	1	LS	$307,792	$307,792
2	Traffic Control	1	LS	$184,675	$184,675
3	Construction Survey	1	LS	$61,558	$61,558
4	SWPPP	1	LS	$20,000	$12,000
5	Soils, Concrete, and Material Testing	1	LS	$123,117	$123,117
	Construction - Materials				
6	Clear and Grub	40,875	SF	$1	$40,875
7	Clear and Grub Disposal	6,813	TON	$50	$340,625
8	Excavation	38,089	CY	$35	$1,333,111
9	Underground Detention Storage System	11.1	AC-FT	$259,530	$2,885,974
10	Concrete Headwall	2	EA	$7,000	$14,000
11	Connect to Existing Storm Drain	1	EA	$1,500	$1,500
12	Remove Existing Asphalt Pavement	61,965	SF	$6	$371,790
13	New Asphalt Pavement with Striping (including AC, base course, and subgrade preparation)	61,965	SF	$8	$495,720
14	New Play court Appurtenances	1	LS	$20,000	$20,000
15	24" RCP	300	LF	$165	$49,500
16	Hydrodynamic Separator	1	EA	$15,000	$15,000
17	SD Cleanout	2	EA	$7,000	$14,000
18	Turf Landscaping	40,875	SF	$10	$408,750
19	Softball Field Surface Improvements (Non Structural)	1	LS	$100,000	$100,000
20	Utility Relocation Allowance (including potholing)	1	LS	$65,000	$65,000
	Construction Subtotal				**$6,844,988**
	Construction Contingency	30%			$2,053,496
	Construction Total				**$8,898,484**

	Design Services				
21	Design Fee	1	LS	$684,499	$684,499
22	Environmental Clearance and Permitting	1	LS	$136,900	$136,900
23	Construction Management	1	LS	$342,249	$342,249
24	Engineering Services Through Construction and As-Builts	1	LS	$205,350	$205,350
	Design Services Total				**$1,368,998**
	Operations and Maintenance				
25	1st Year O&M	1	LS	$25,360	$25,360
26	Annual O&M	1	LS	$38,040	$38,040
	Operations and Maintenance Total				**$63,400**
	Project Total				**$10,330,881**

Notes and Assumptions

Costs do not include easement acquisition fees.

Costs are high-level, based on 2016 Caltrans available cost data, previous Michael Baker International project experience, and input from Michael Baker International's construction management group.

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Belmont Creek Flood Management Plan

County of San Mateo

Preliminary Alternatives Cost Estimate

PRELIMINARY ALTERNATIVE 2C: NOTRE DAME DE NAMUR SOCCER FIELD DETENTION BASIN

ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT
	Construction - General				
1	Mobilization	1	LS	$244,671	$244,671
2	Traffic Control	1	LS	$146,802	$146,802
3	Construction Survey	1	LS	$48,934	$48,934
4	SWPPP	1	LS	$20,000	$12,000
5	Soils, Concrete, and Material Testing	1	LS	$97,868	$97,868
	Construction - Materials				
6	Clear and Grub	72,000	SF	$1	$72,000
	Clear and Grub Disposal	12,000	TON	$50	$600,000
7	Excavation	26,667	CY	$35	$933,333
8	Underground Detention Storage System	8.8	AC-FT	$259,530	$2,276,078
9	Concrete Headwall	2	EA	$7,000	$14,000
10	Connect to Existing Storm Drain	2	EA	$1,500	$3,000
11	24" RCP	500	LF	$165	$82,500
12	Hydrodynamic Separator	1	EA	$15,000	$15,000
13	SD Cleanout	2	EA	$7,000	$14,000
14	Remove Existing Chain Link Fence	100	LF	$10	$1,000
15	New Chain Link Fence	100	LF	$25	$2,500
16	Turf Landscaping	72,000	SF	$10	$720,000
17	Soccer Field Surface Improvements (Non Structural)	1	LS	$100,000	$100,000
18	Utility Relocation Allowance (including potholing)	1	LS	$60,000	$60,000
	Construction Subtotal				**$5,443,687**
	Construction Contingency	30%			$1,633,106
	Construction Total				**$7,076,793**

	Design Services				
19	Design Fee	1	LS	$435,495	$435,495
20	Environmental Clearance and Permitting	1	LS	$108,874	$108,874
21	Construction Management	1	LS	$272,184	$272,184
22	Engineering Services Through Construction and As-Builts	1	LS	$163,311	$163,311
	Design Services Total				**$979,864**
	Operations and Maintenance				
23	1st Year O&M	1	LS	$25,360	$25,360
24	Annual O&M	1	LS	$38,040	$38,040
	Operations and Maintenance Total				**$63,400**
	Project Total				**$8,120,056**

Notes and Assumptions

Costs do not include easement acquisition fees.

Costs are high-level, based on 2016 Caltrans available cost data, previous Michael Baker International project experience, and input from Michael Baker International's construction management group.

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Belmont Creek Flood Management Plan

County of San Mateo

Preliminary Alternatives Cost Estimate

PRELIMINARY ALTERNATIVE 2D: CARLMONT HIGH SCHOOL SOFTBALL FIELD DETENTION BASIN

ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT
	Construction - General				
1	Mobilization	1	LS	$377,934	$377,934
2	Traffic Control	1	LS	$377,934	$377,934
3	Construction Survey	1	LS	$75,587	$75,587
4	SWPPP	1	LS	$25,000	$12,000
5	Soils, Concrete, and Material Testing	1	LS	$151,174	$151,174
	Construction - Materials				
6	Clear and Grub	83,574	SF	$1	$83,574
7	Clear and Grub Disposal	13,929	TON	$50	$696,450
8	Excavation	38,985	CY	$35	$1,364,471
9	Underground Detention Storage System	13.1	AC-FT	$259,530	$3,394,652
10	Concrete Headwall	1	EA	$7,000	$7,000
11	Connect to Existing Storm Drain	2	EA	$1,500	$3,000
12	Remove Existing Asphalt Pavement	48,000	SF	$6	$288,000
13	New Asphalt Pavement with Striping (including AC, base course, and subgrade preparation)	48,000	SF	$8	$384,000
14	Remove Existing Wheel Stop	120	EA	$10	$1,200
15	New Wheel Stop	120	EA	$50	$6,000
16	Remove Existing Light Pole	5	EA	$7,000	$35,000
17	New Light Pole	5	EA	$10,000	$50,000
18	Remove Existing Chain Link Fence	800	LF	$10	$8,000
19	New Chain Link Fence	800	LF	$25	$20,000
20	Remove and Dispose Existing Trees	8	EA	$500	$4,000
21	New Tree (48" Box)	8	EA	$700	$5,600
22	24" RCP	200	LF	$165	$33,000
23	36" RCP	200	LF	$190	$38,000
24	Hydrodynamic Separator	1	EA	$15,000	$15,000
25	SD Cleanout	3	EA	$7,000	$21,000
26	Turf Landscaping	83,574	SF	$10	$835,740
27	Softball Field Surface Improvements (Non Structural)	1	LS	$200,000	$200,000
28	Utility Relocation Allowance (including potholing)	1	LS	$65,000	$65,000
	Construction Subtotal				**$8,553,317**
	Construction Contingency	30%			$2,565,995
	Construction Total				**$11,119,312**

	Design Services				
29	Design Fee	1	LS	$855,332	$855,332
30	Environmental Clearance and Permitting	1	LS	$171,066	$171,066
31	Construction Management	1	LS	$513,199	$513,199
32	Engineering Services Through Construction and As-Builts	1	LS	$256,600	$256,600
	Design Services Total				**$1,796,197**
	Operations and Maintenance				
33	1st Year O&M	1	LS	$25,360	$25,360
34	Annual O&M	1	LS	$38,040	$38,040
	Operations and Maintenance Total				**$63,400**
	Project Total				**$12,978,909**

Notes and Assumptions

Costs do not include easement acquisition fees.

Costs are high-level, based on 2016 Caltrans available cost data, previous Michael Baker International project experience, and input from Michael Baker International's construction management group.

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Belmont Creek Flood Management Plan

County of San Mateo

Preliminary Alternatives Cost Estimate

PRELIMINARY ALTERNATIVE 2E: TWIN PINES PARK DETENTION BASIN

ITEM NO.	DESCRIPTION	QUANTITY	UNITS	UNIT PRICE	AMOUNT
	Construction - General				
1	Mobilization	1	LS	$484,319	$484,319
2	Traffic Control	1	LS	$968,639	$968,639
3	Construction Survey	1	LS	$96,864	$96,864
4	SWPPP	1	LS	$25,000	$12,000
5	Soils, Concrete, and Material Testing	1	LS	$193,728	$193,728
	Construction - Materials				
6	Clear and Grub	3,000	SF	$1	$3,000
7	Clear and Grub Disposal	500	TON	$50	$25,000
8	Excavation	37,481	CY	$35	$1,311,852
9	Underground Detention Storage System	21.5	AC-FT	$259,530	$5,585,086
10	Concrete Headwall	4	EA	$7,000	$28,000
11	Remove Existing Asphalt Pavement	43,000	SF	$6	$258,000
12	New Asphalt Pavement with Striping (including AC, base course, and subgrade preparation)	43,000	SF	$8	$344,000
13	Remove Existing Wheel Stop	100	EA	$10	$1,000
14	New Wheel Stop	100	EA	$50	$5,000
15	Remove Existing Light Pole	5	EA	$7,000	$35,000
16	New Light Pole	5	EA	$10,000	$50,000
17	Remove and Dispose Existing Trees	3	EA	$500	$1,500
18	New Tree (48" Box)	3	EA	$700	$2,100
19	24" RCP	600	LF	$165	$99,000
20	60" RCP	50	LF	$380	$19,000
21	Hydrodynamic Separator	1	EA	$15,000	$15,000
22	SD Cleanout	2	EA	$7,000	$14,000
23	1 Ton Rip Rap with Backing	10,370	CY	$140.00	$1,451,852
24	Channel Vegetation Restoration	80,000	SF	$4.00	$320,000
25	Turf Block Access Road	3,000	SF	$16.00	$48,000
26	Utility Relocation Allowance (including potholing)	1	LS	$70,000	$70,000
	Construction Subtotal				**$11,441,939**
	Construction Contingency	30%			$3,432,582
	Construction Total				**$14,874,521**

	Design Services				
27	Design Fee	1	LS	$1,144,194	$1,144,194
28	Environmental Clearance and Permitting	1	LS	$228,839	$228,839
29	Construction Management	1	LS	$915,355	$915,355
30	Engineering Services Through Construction and As-Builts	1	LS	$343,258	$343,258
	Design Services Total				**$2,631,646**
	Operations and Maintenance				
31	1st Year O&M	1	LS	$63,400	$63,400
32	Annual O&M	1	LS	$38,040	$38,040
	Operations and Maintenance Total				**$101,440**
	Project Total				**$17,607,607**

Notes and Assumptions

Costs do not include easement acquisition fees.

Costs are high-level, based on 2016 Caltrans available cost data, previous Michael Baker International project experience, and input from Michael Baker International's construction management group.

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Belmont Creek Watershed Management Plan

County of San Mateo
Preliminary Alternatives Cost Estimate

PROPERTY VALUE ESTIMATE

PRELIMINARY PROJECT	COST OF PRELIMINARY ALTERNATIVE	PROPERTIES PROTECTED	TOTAL VALUE OF PROPERTIES PROTECTED**
All Projects (1, 2A, 2B, 2C, 2D, 2E) Implemented	$71,820,897	41	$206,531,482

Notes and Assumptions
*Protection is defined as no flows leaving the channel in the Harbor/Industrial Area between Old County Road and Industrial Road

**Property values taken from County of San Mateo Treasurer-Tax Collector website for 2017:
http://www.sanmateocountytaxcollector.org/SMCWPS/pages/secureSearch.jsp

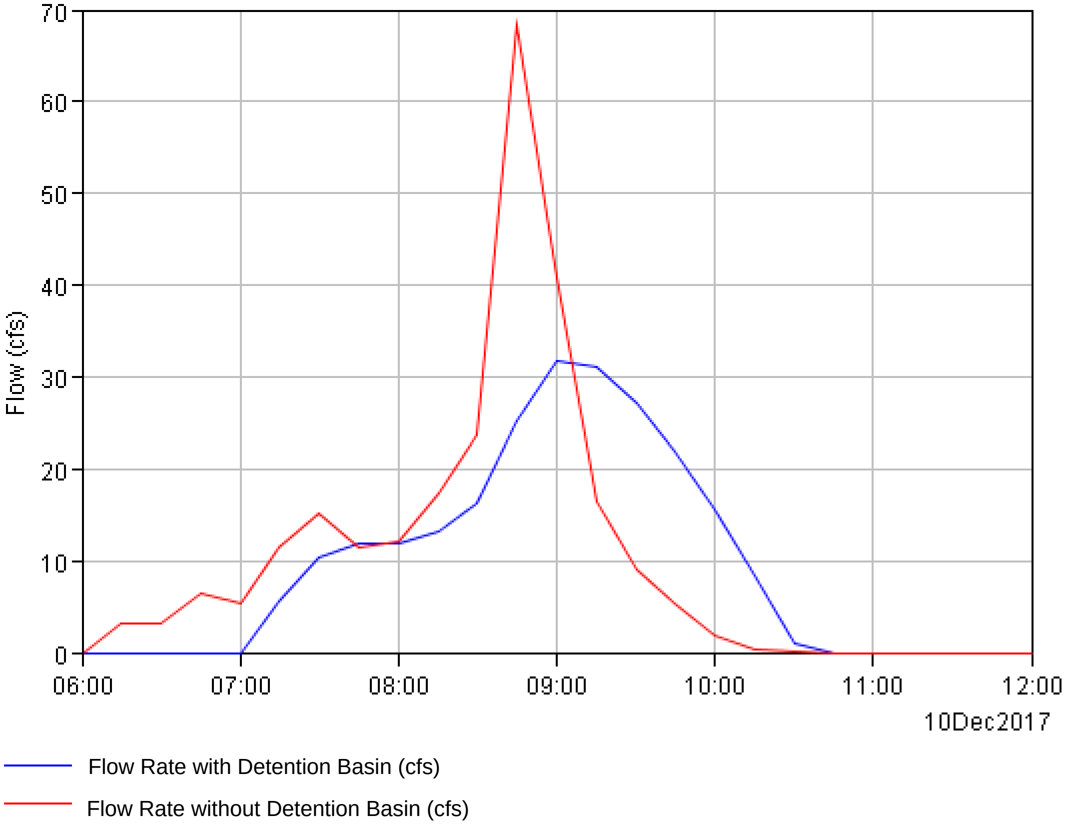
Costs are high-level, based on 2016 Caltrans available cost data, previous Michael Baker International project experience, and input from Michael Baker International's construction management group.

Appendix C

Detention Basin: Individual Hydrographs

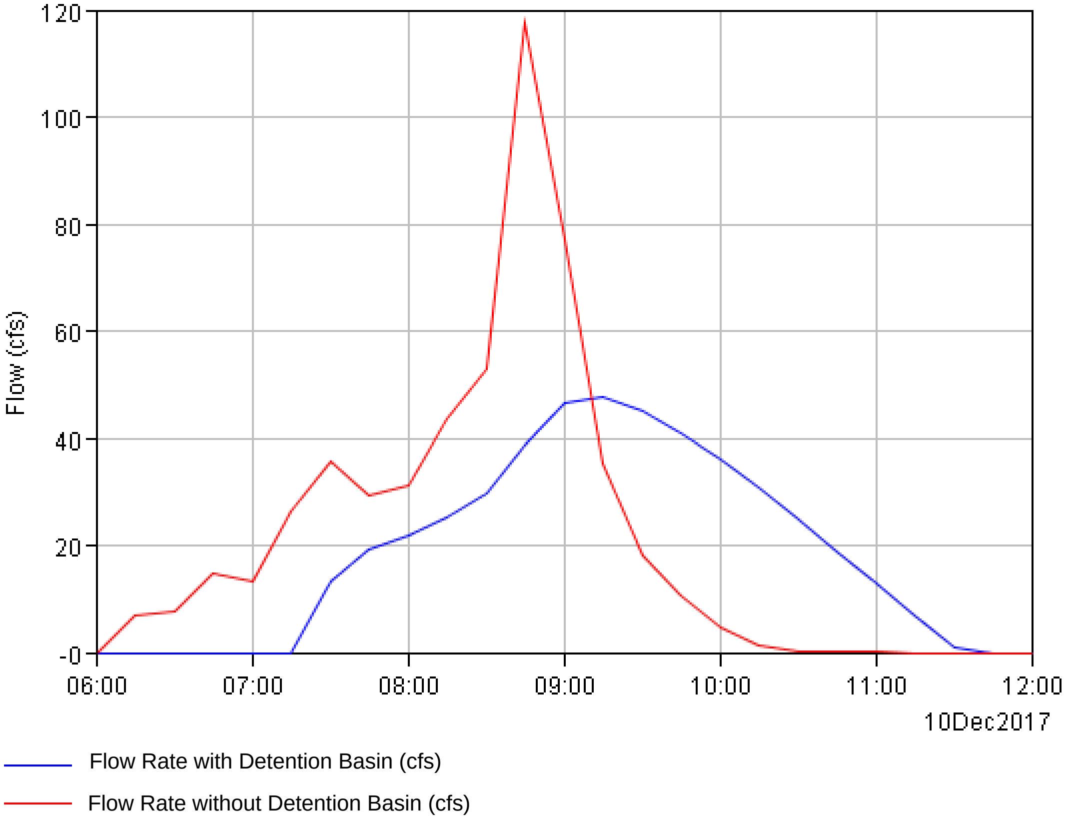
ALTERNATIVE 2A HYDROGRAPH
50 YEAR, 3 HOUR STORM

HIDDEN CANYON PARK



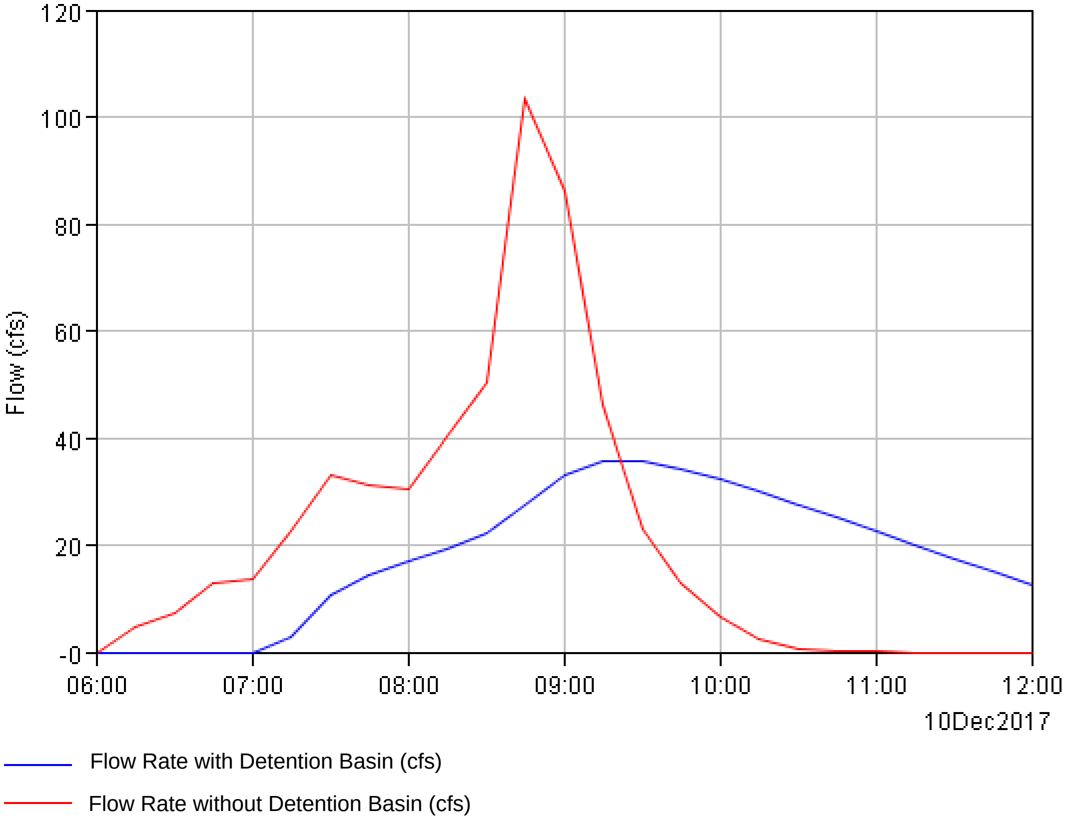
ALTERNATIVE 2B HYDROGRAPH
50 YEAR, 3 HOUR STORM

NOTRE DAME DE NAMUR
SOFTBALL FIELD



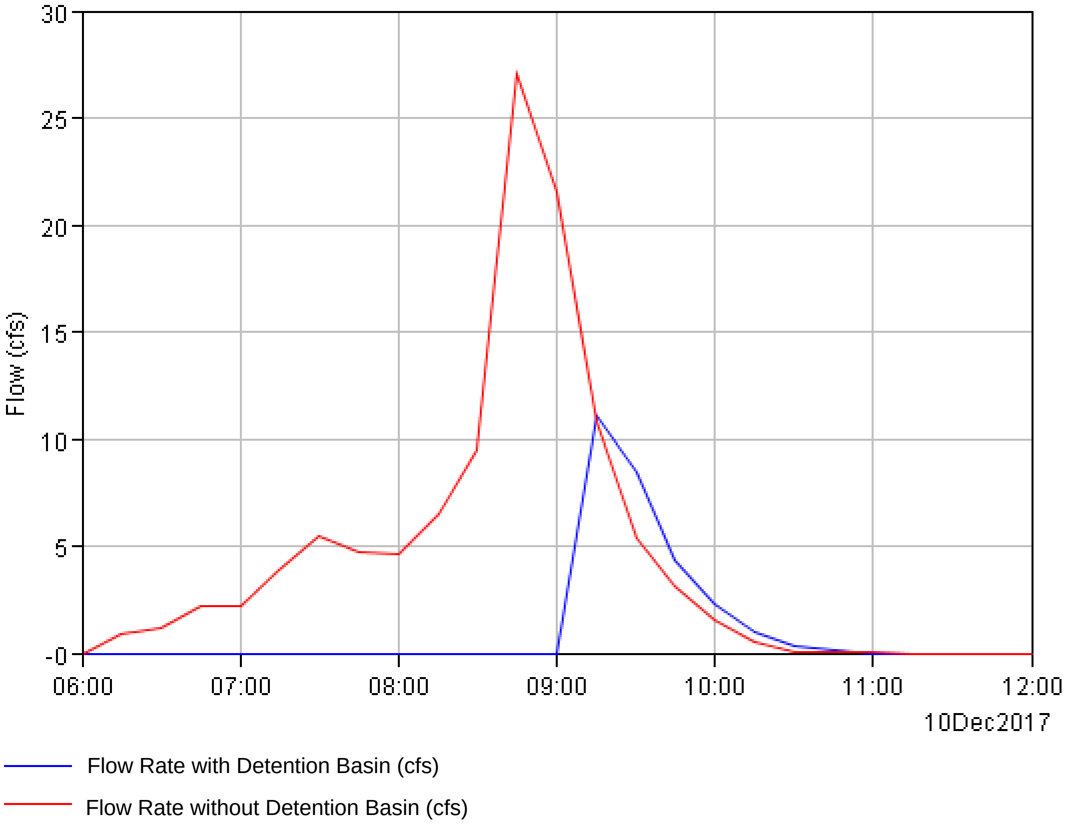
ALTERNATIVE 2C HYDROGRAPH
50 YEAR, 3 HOUR STORM

NOTRE DAME DE NAMUR
SOCCER FIELD



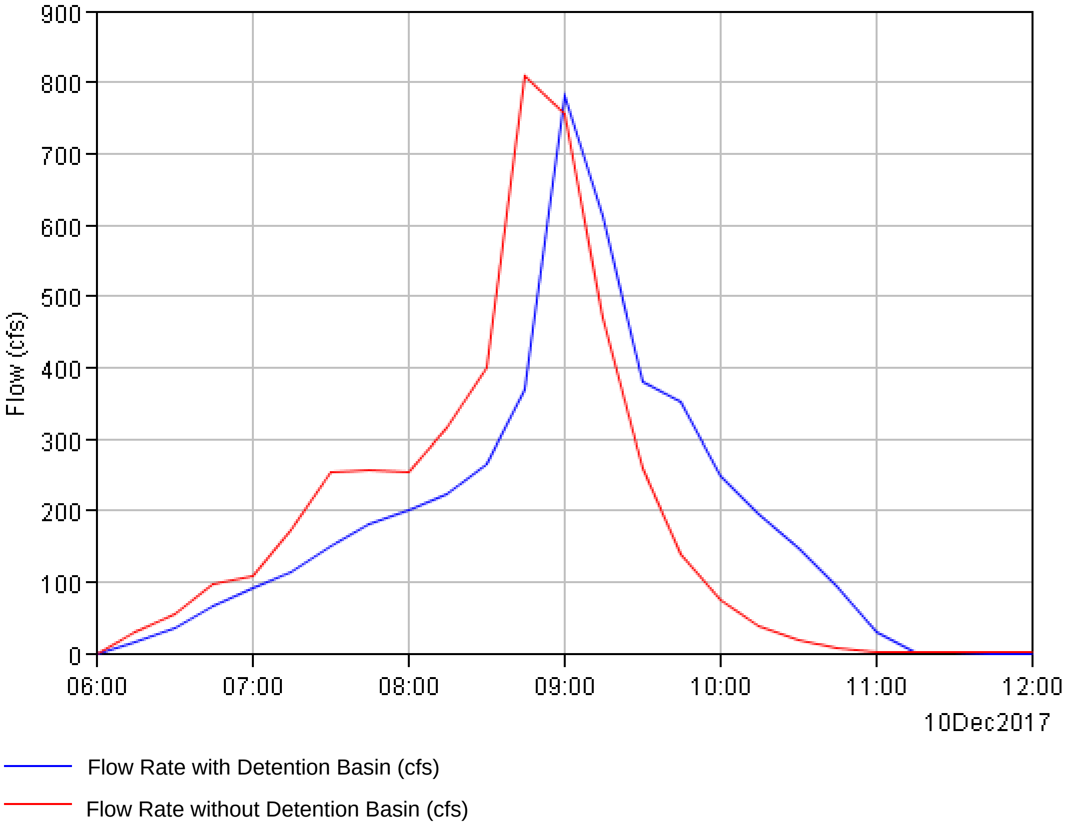
ALTERNATIVE 2E HYDROGRAPH
50 YEAR, 3 HOUR STORM

CARLMONT HIGH SCHOOL
SOFTBALL FIELD



ALTERNATIVE 2F HYDROGRAPH
50 YEAR, 3 HOUR STORM

TWIN PINES PARK



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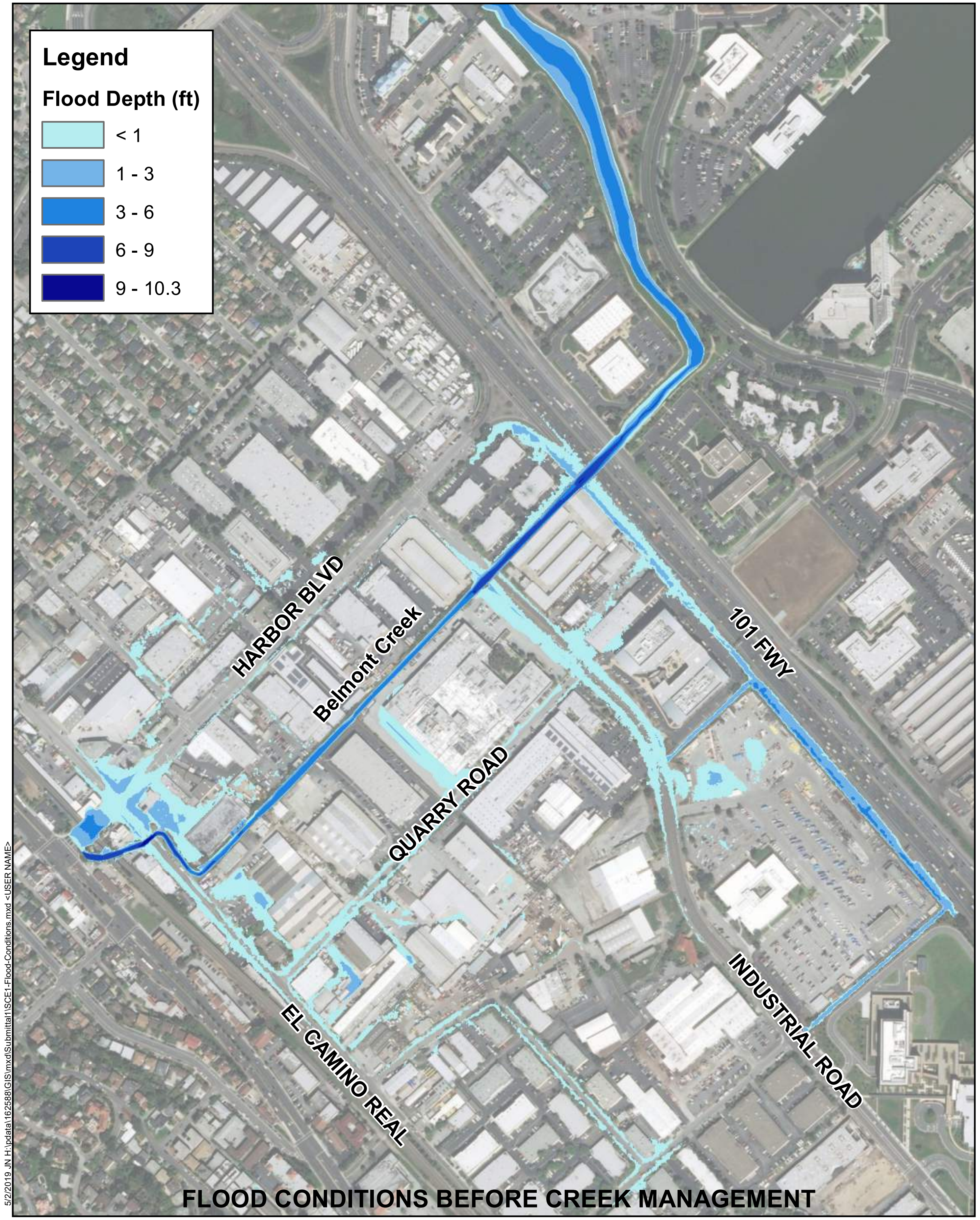
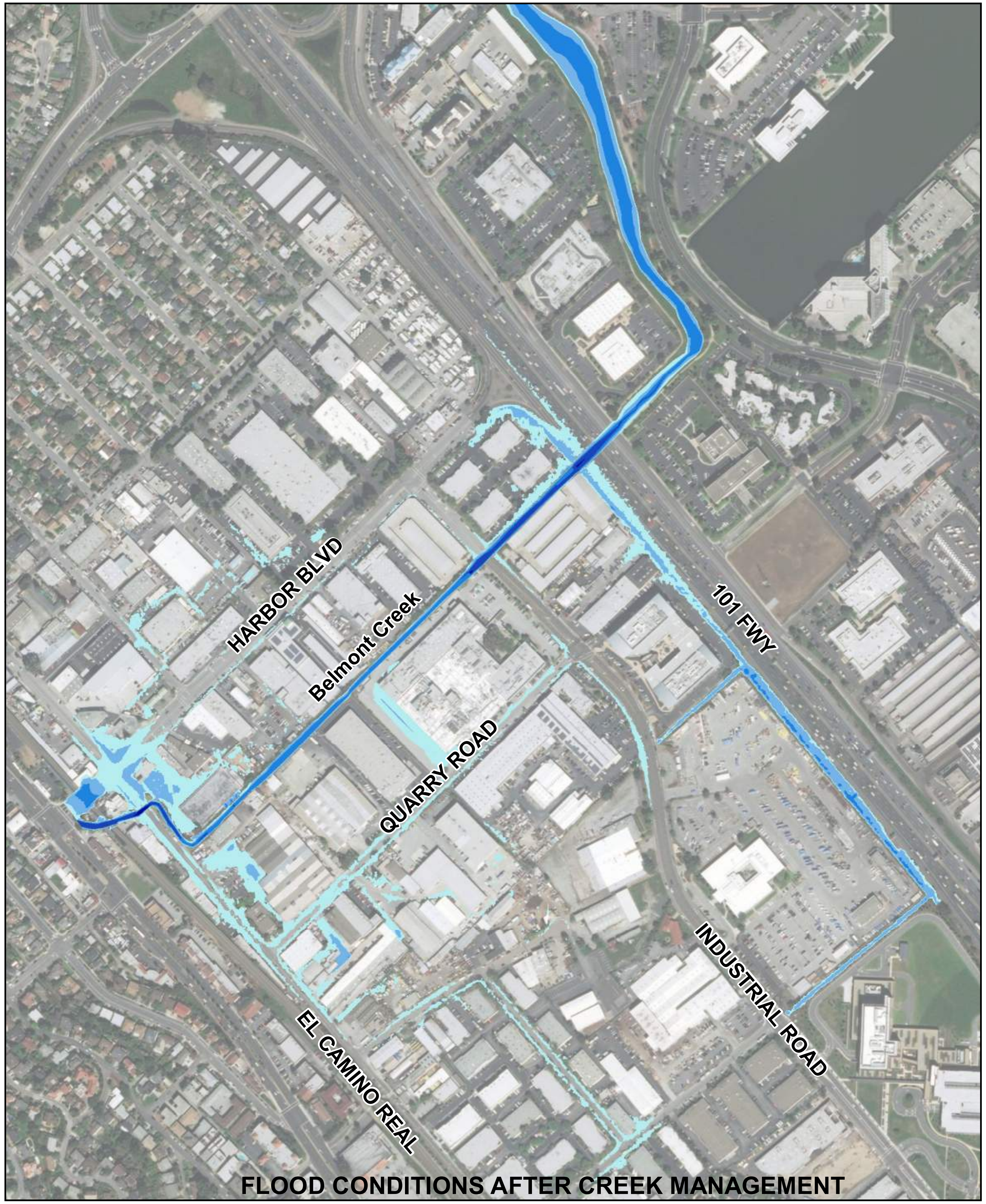
Appendix D

Implementation Flood Condition Comparison Exhibits and Hydrographs



FLOOD CONDITIONS BEFORE CREEK MANAGEMENT



FLOOD CONDITIONS AFTER CREEK MANAGEMENT

5/2/2019 JN H:\pdata\162588\GIS\mxd\Submittal1\SCE1-Flood-Conditions.mxd <USER NAME>

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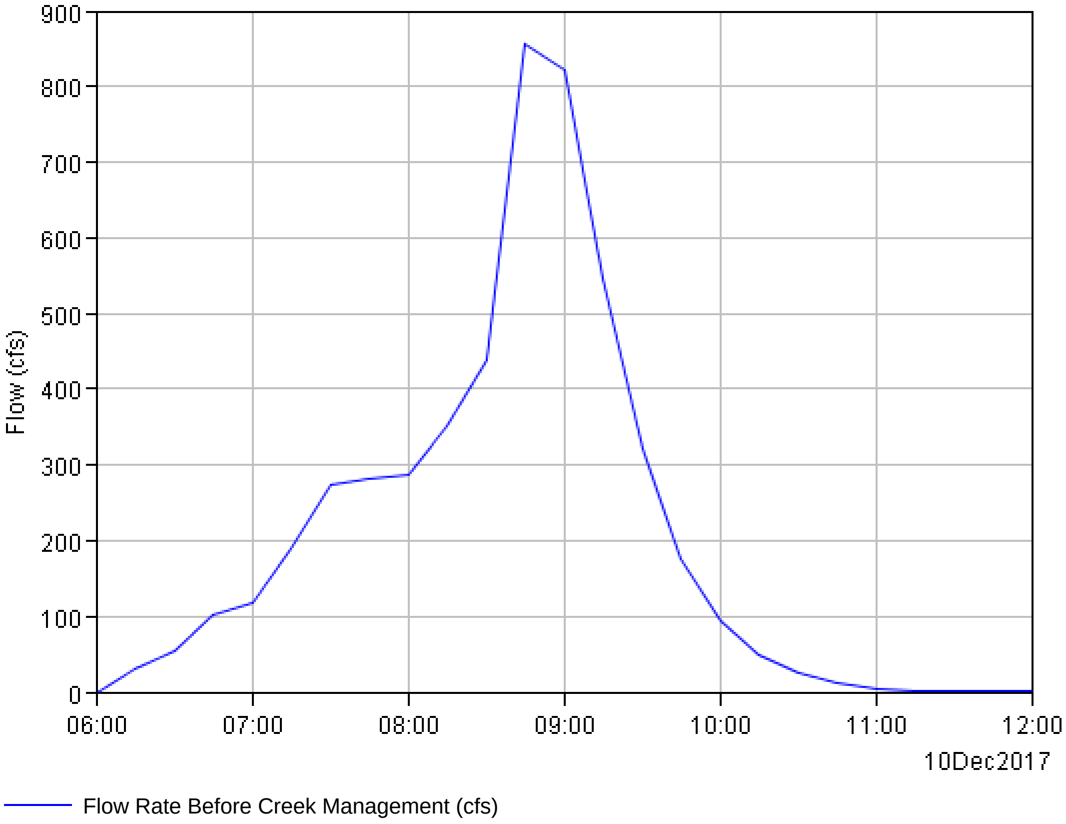
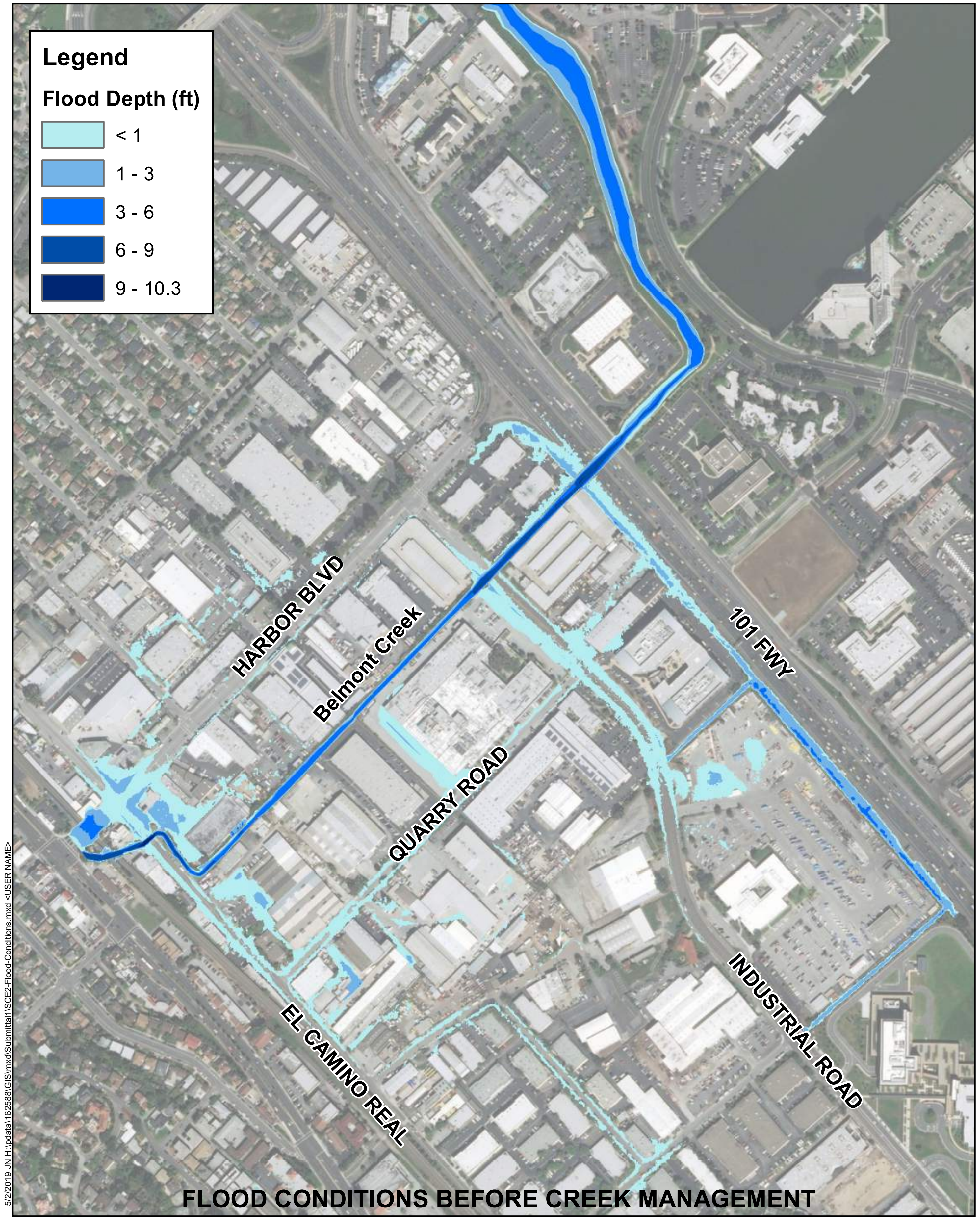
0 250 500 1,000
Feet

SCENARIO 1: FLOOD CONDITION COMPARISON 50-YEAR 3-HOUR STORM

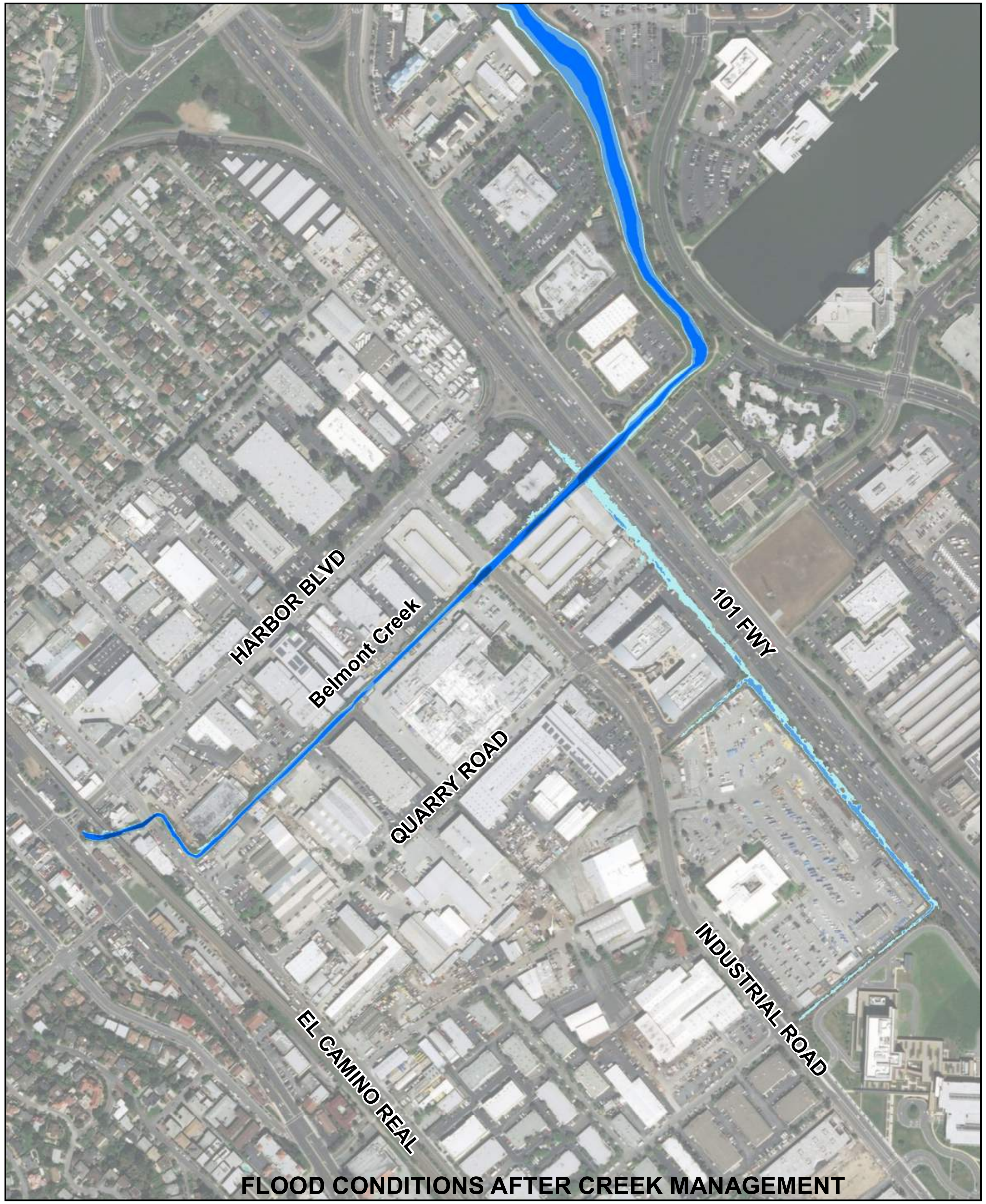
BELMONT CREEK FLOOD MANAGEMENT PLAN | COUNTY OF SAN MATEO

SCENARIO 1 HYDROGRAPH
50 YEAR, 3 HOUR STORM





FLOOD CONDITIONS BEFORE CREEK MANAGEMENT



FLOOD CONDITIONS AFTER CREEK MANAGEMENT

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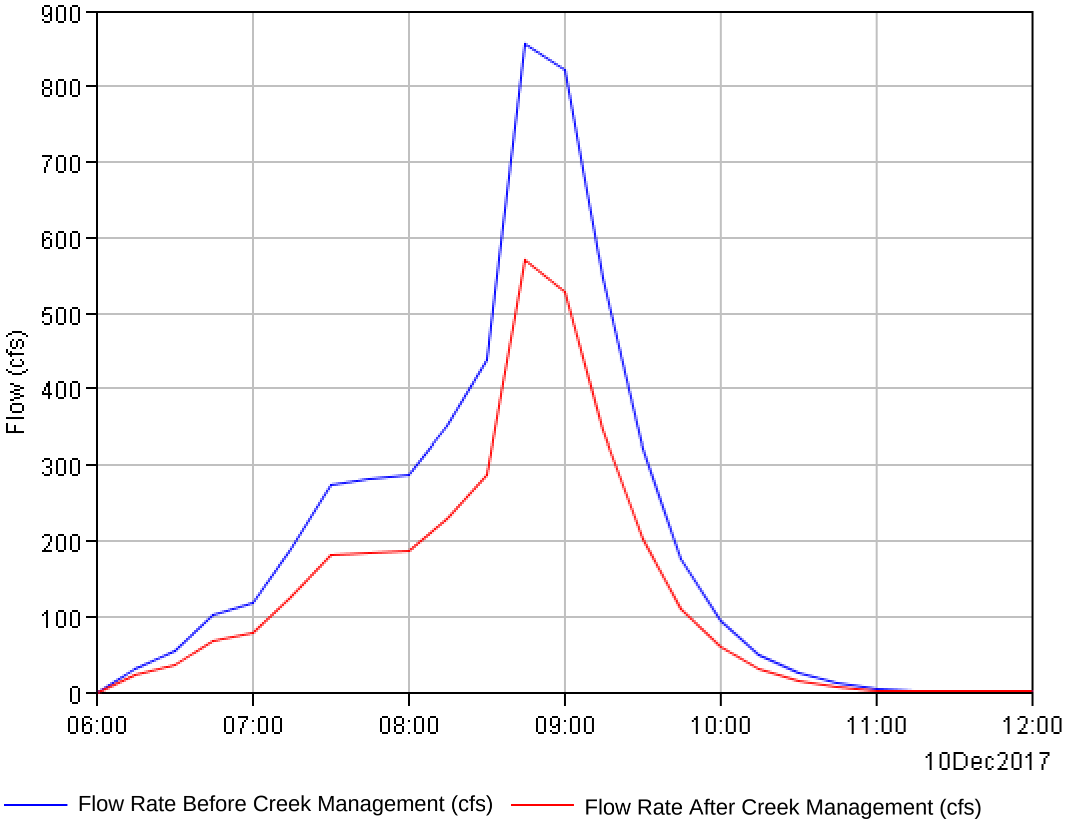
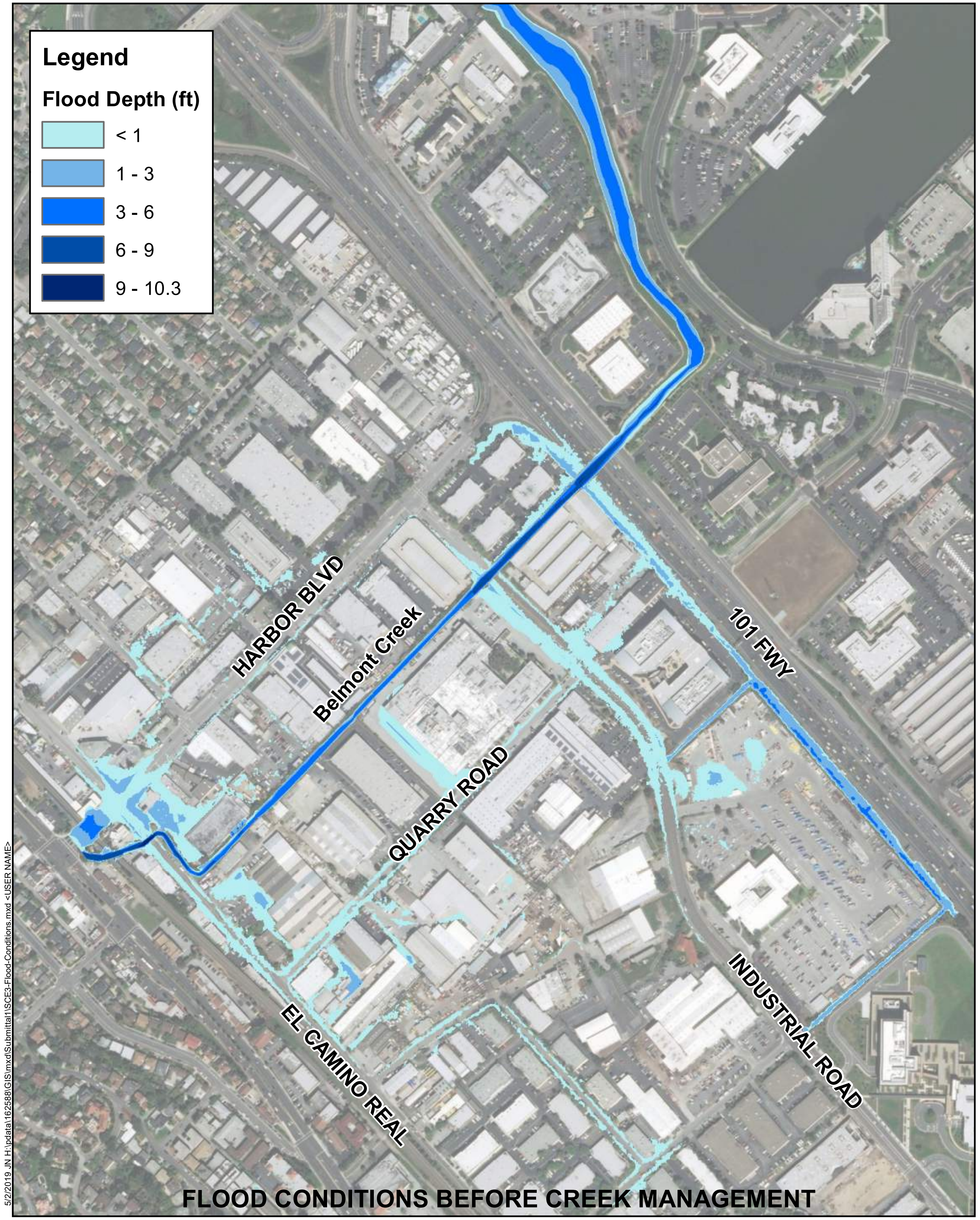
0 250 500 1,000
Feet

SCENARIO 2: FLOOD CONDITION COMPARISON 50-YEAR 3-HOUR STORM

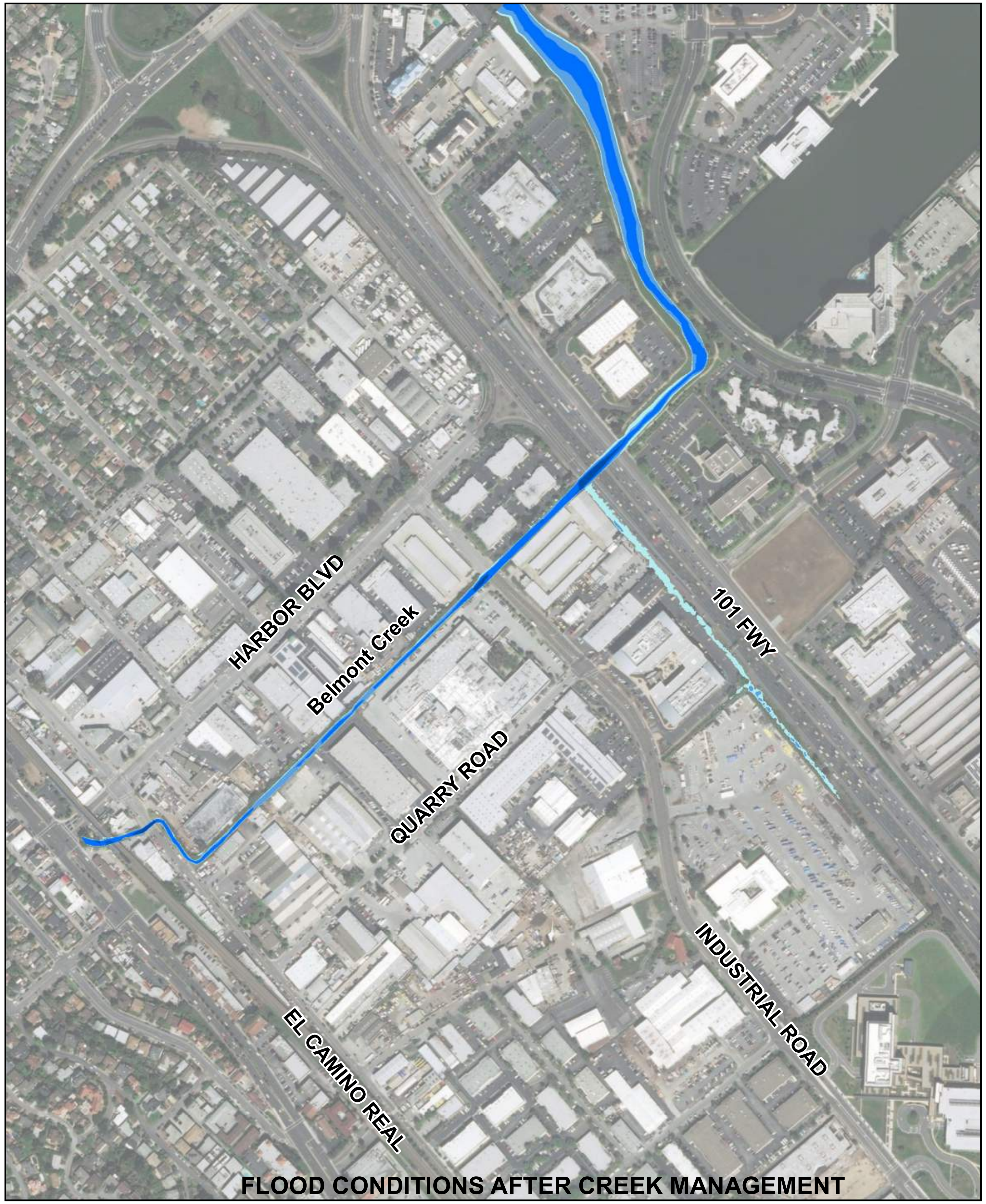
BELMONT CREEK FLOOD MANAGEMENT PLAN | COUNTY OF SAN MATEO

SCENARIO 2 HYDROGRAPH
50 YEAR, 3 HOUR STORM





FLOOD CONDITIONS BEFORE CREEK MANAGEMENT



FLOOD CONDITIONS AFTER CREEK MANAGEMENT

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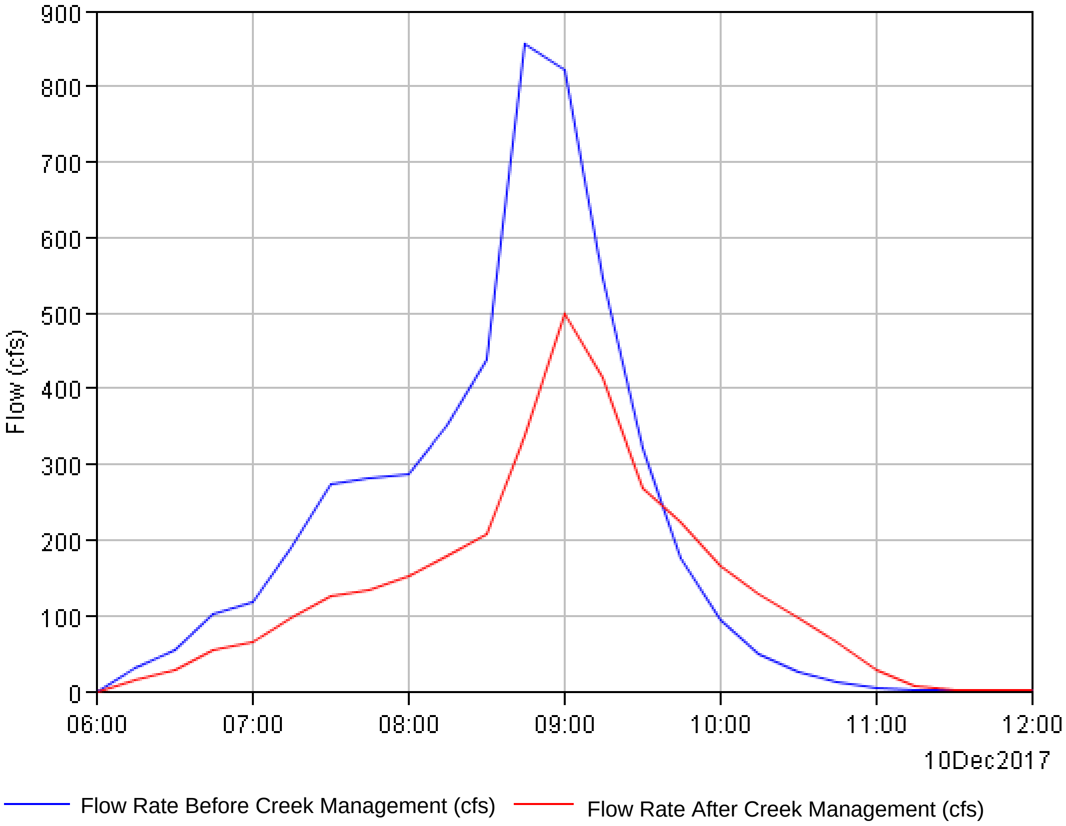
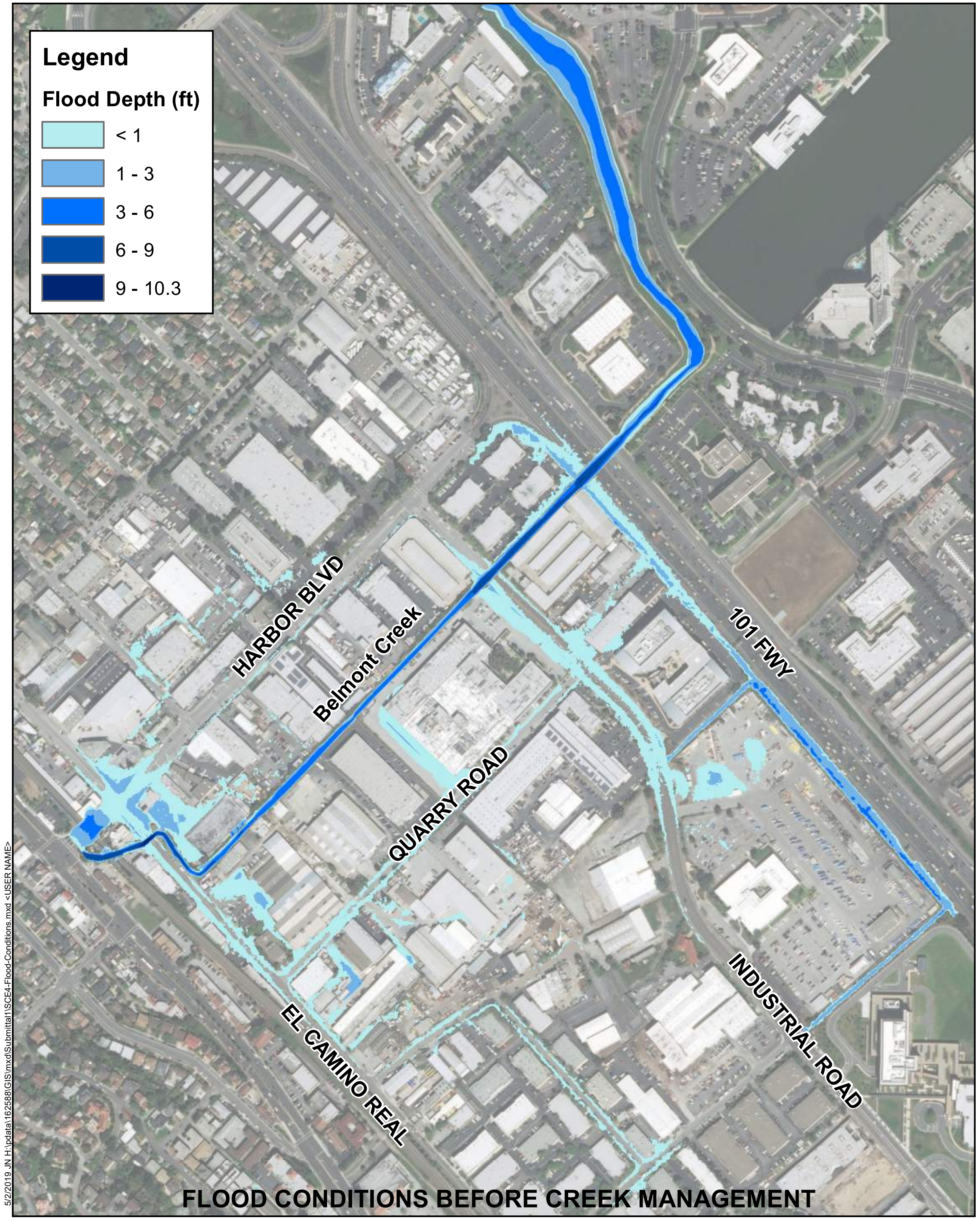
0 250 500 1,000
Feet

SCENARIO 3: FLOOD CONDITION COMPARISON 50-YEAR 3-HOUR STORM

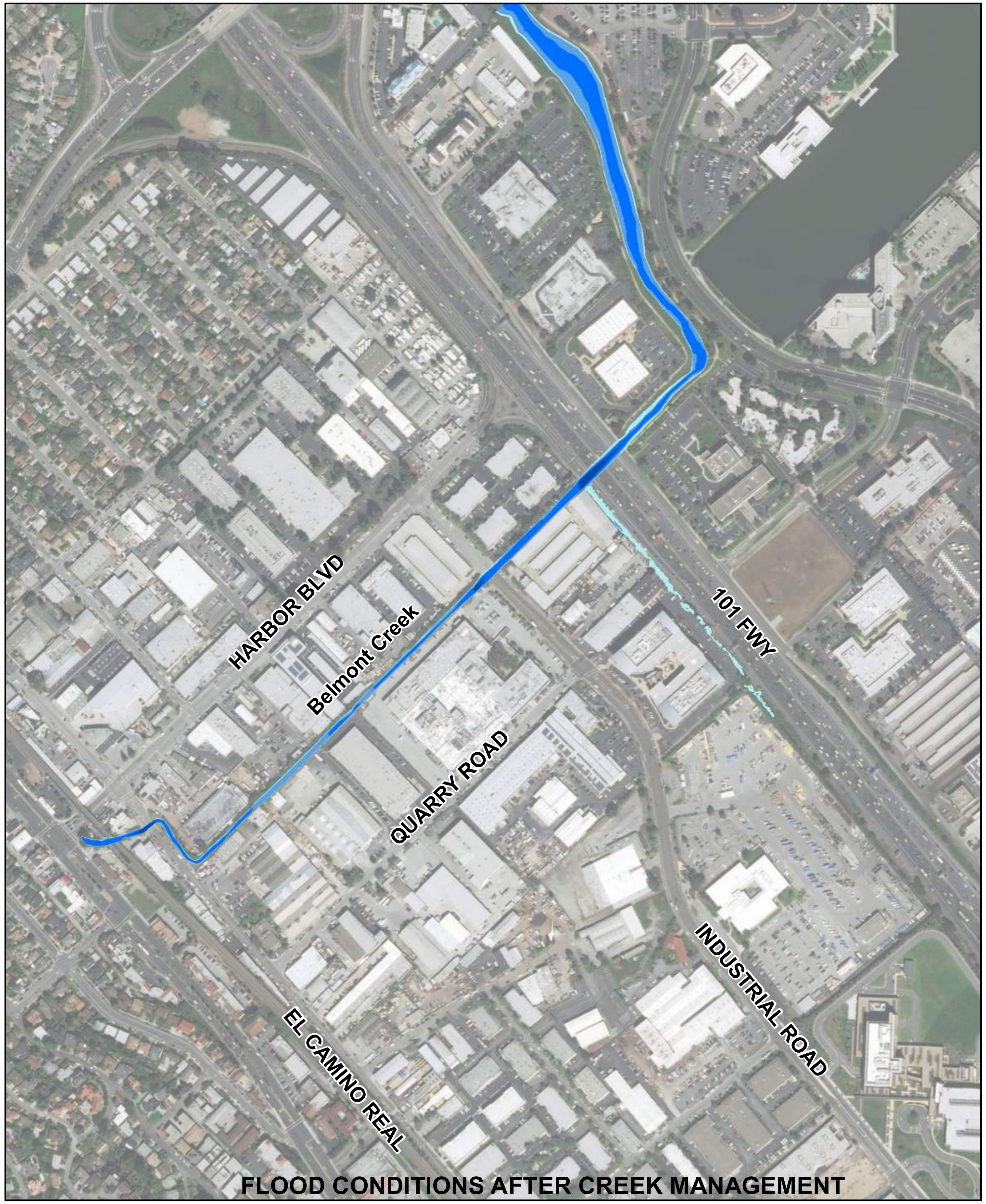
BELMONT CREEK FLOOD MANAGEMENT PLAN | COUNTY OF SAN MATEO

SCENARIO 3 HYDROGRAPH
50 YEAR, 3 HOUR STORM





FLOOD CONDITIONS BEFORE CREEK MANAGEMENT



FLOOD CONDITIONS AFTER CREEK MANAGEMENT

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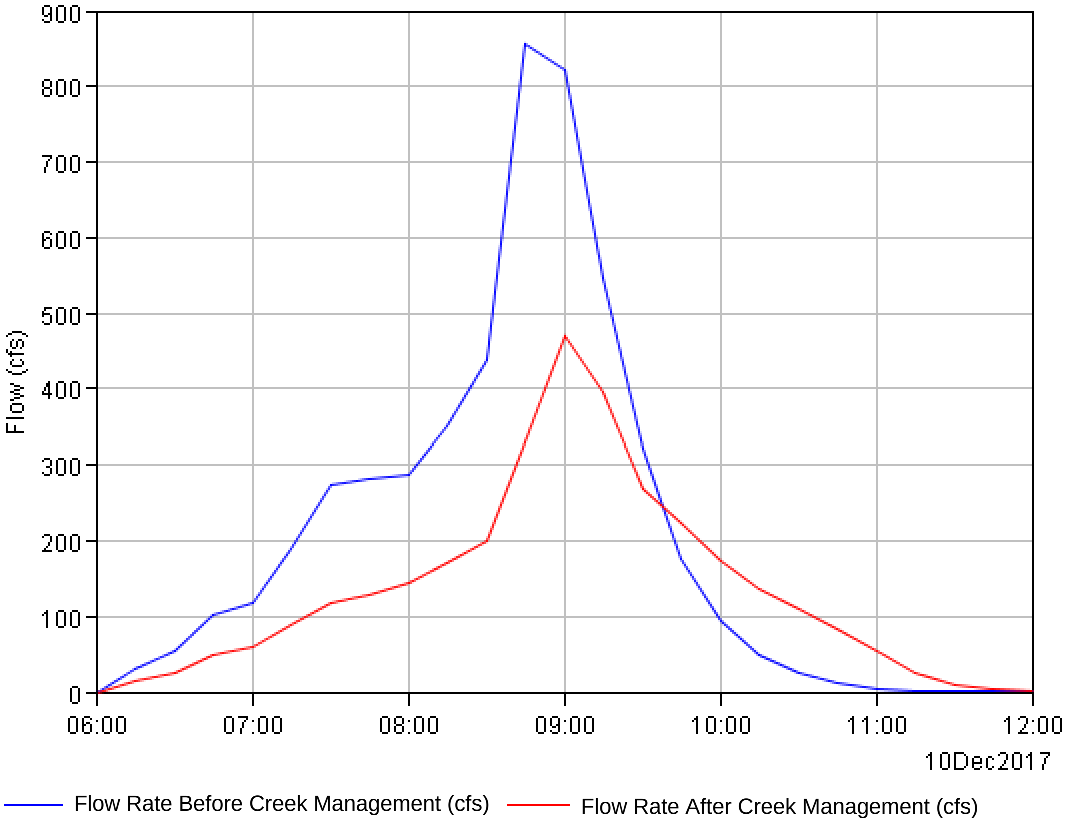
Michael Baker
INTERNATIONAL

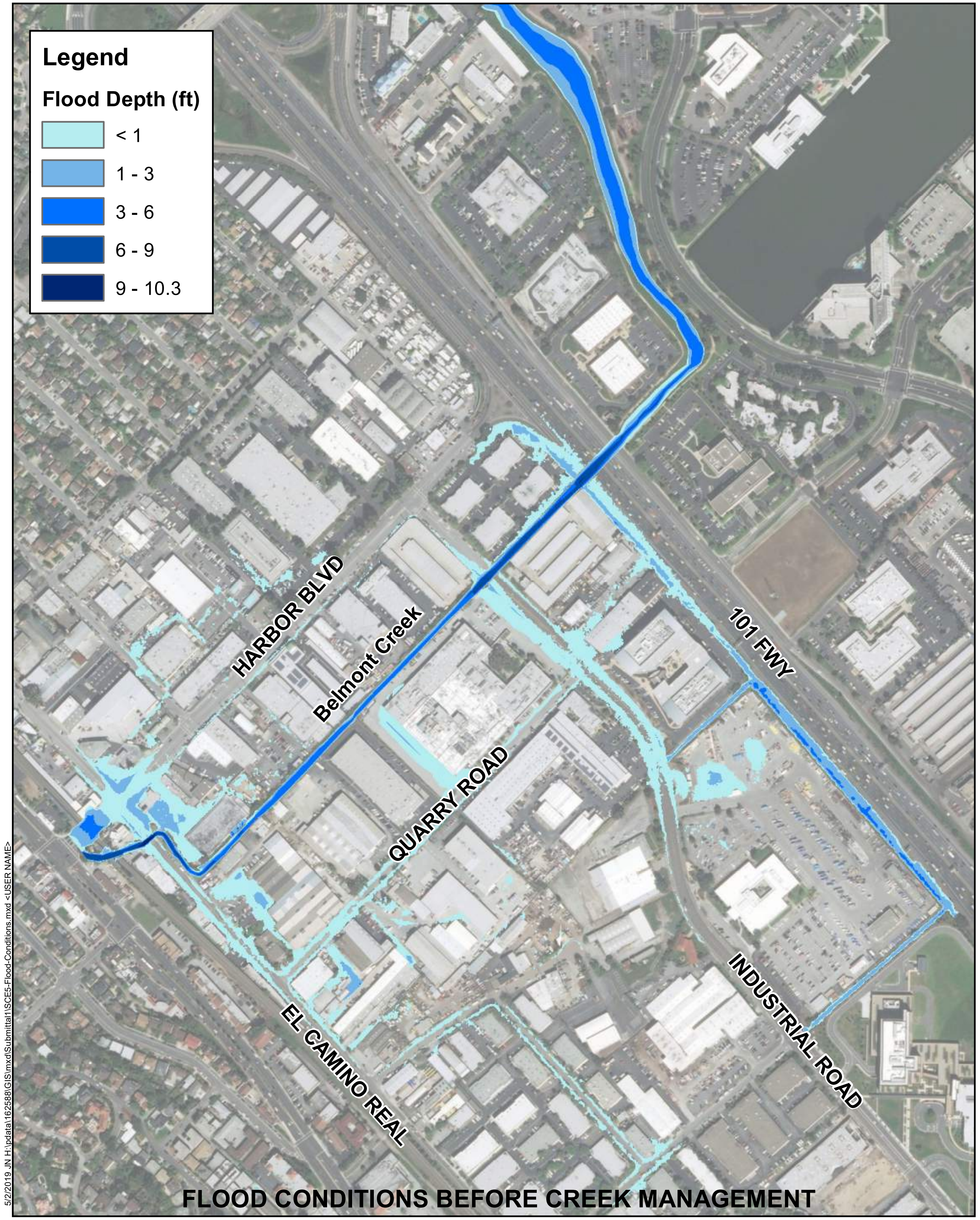
0 250 500 1,000
Feet

SCENARIO 4: FLOOD CONDITION COMPARISON 50-YEAR 3-HOUR STORM

BELMONT CREEK FLOOD MANAGEMENT PLAN | COUNTY OF SAN MATEO

SCENARIO 4 HYDROGRAPH
50 YEAR, 3 HOUR STORM





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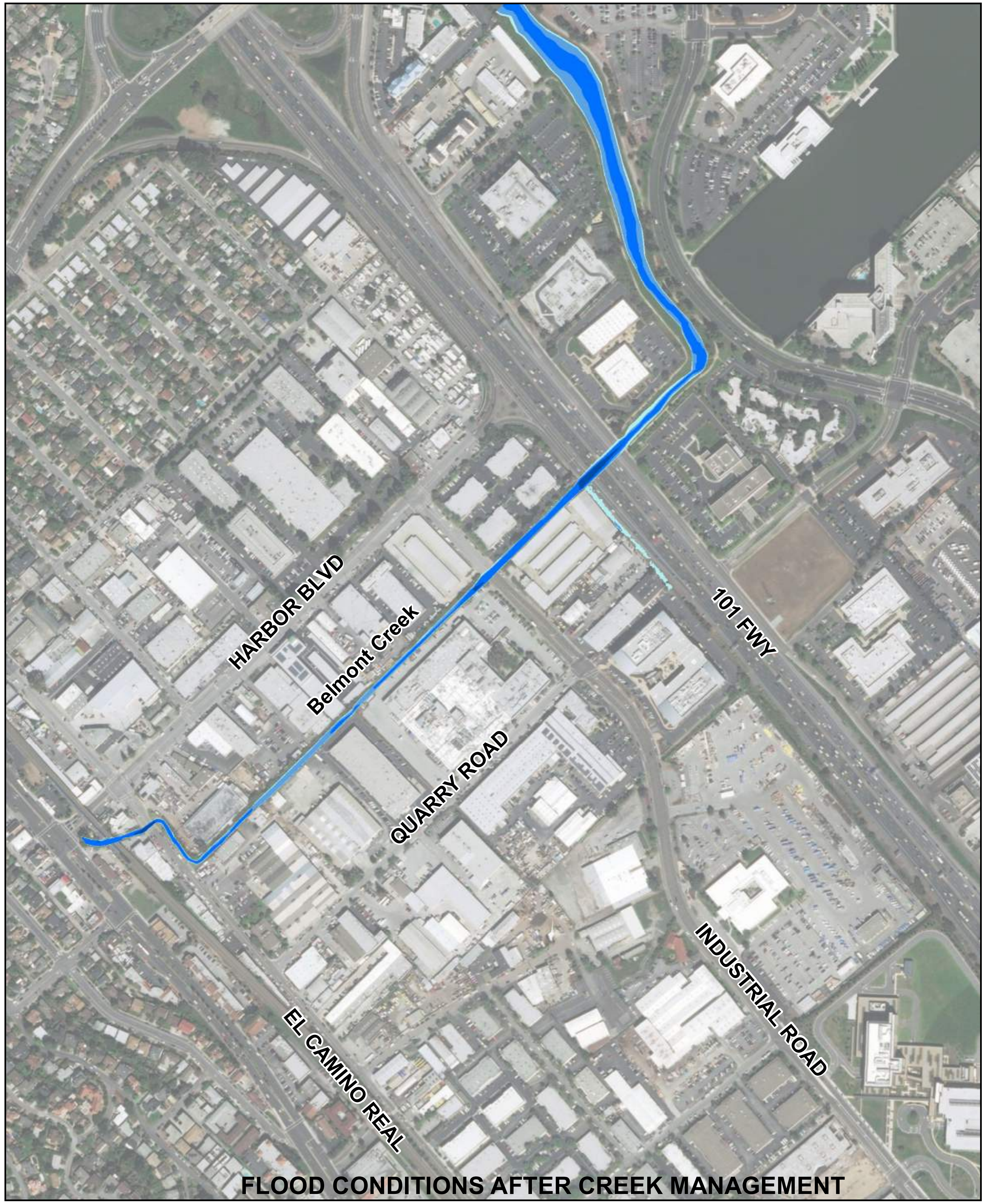

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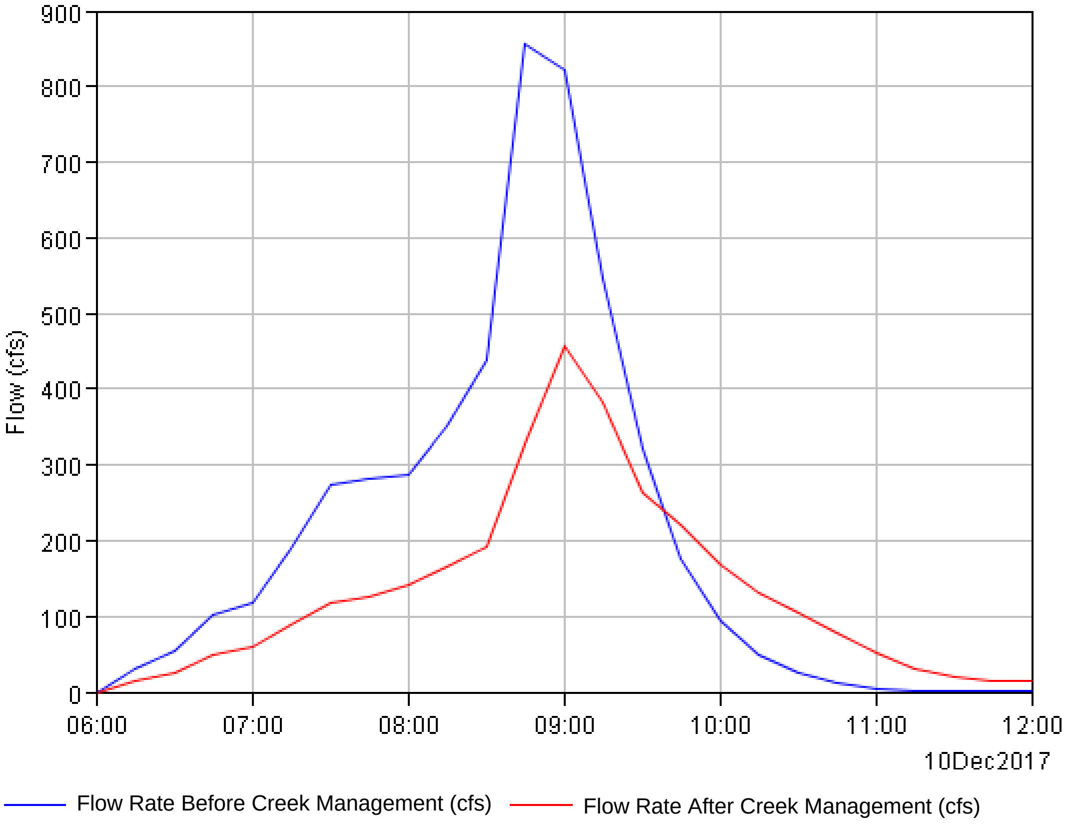
Michael Baker
INTERNATIONAL

0 250 500 1,000
Feet

SCENARIO 5: FLOOD CONDITION COMPARISON 50-YEAR 3-HOUR STORM

BELMONT CREEK FLOOD MANAGEMENT PLAN | COUNTY OF SAN MATEO

SCENARIO 5 HYDROGRAPH
50 YEAR, 3 HOUR STORM



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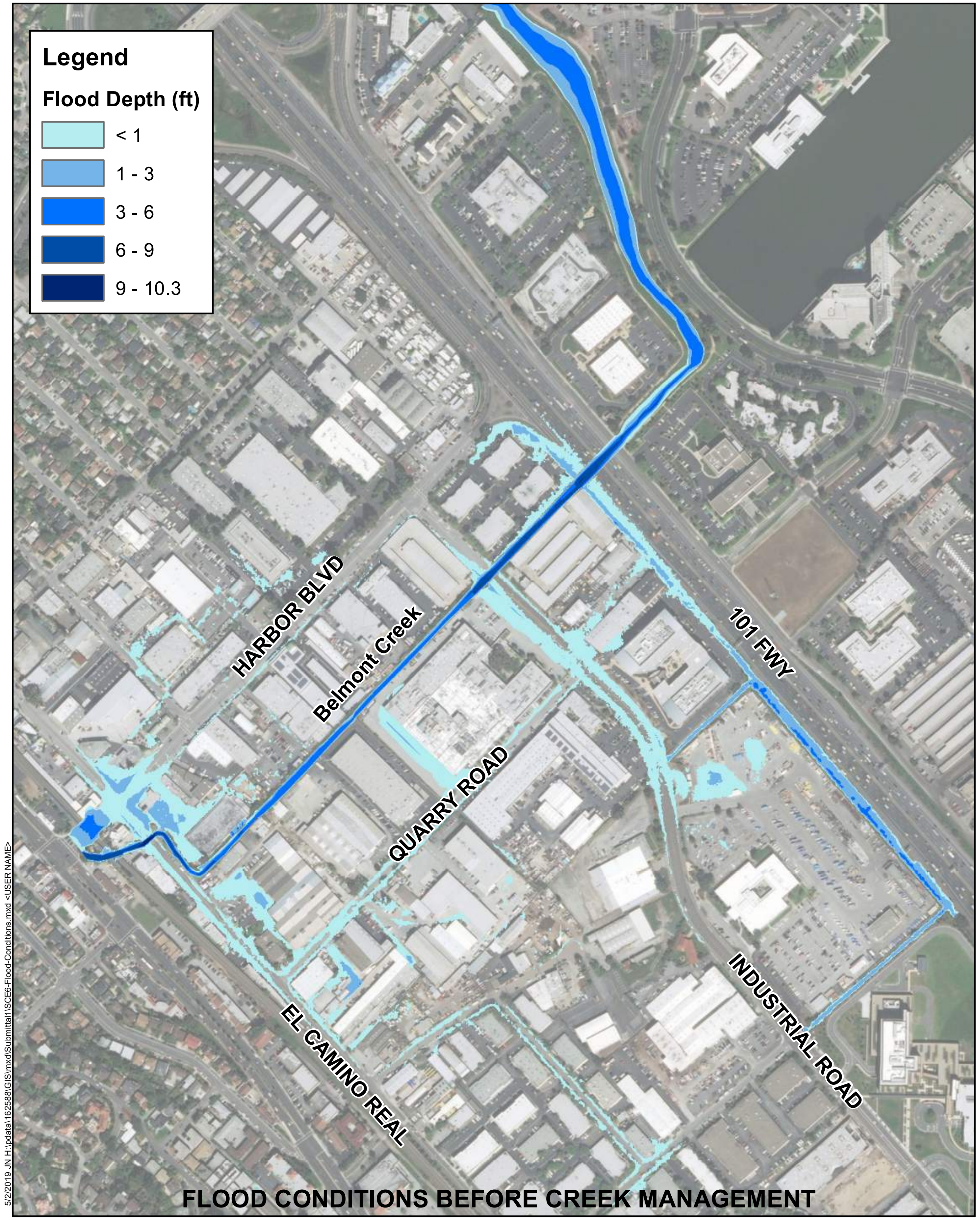
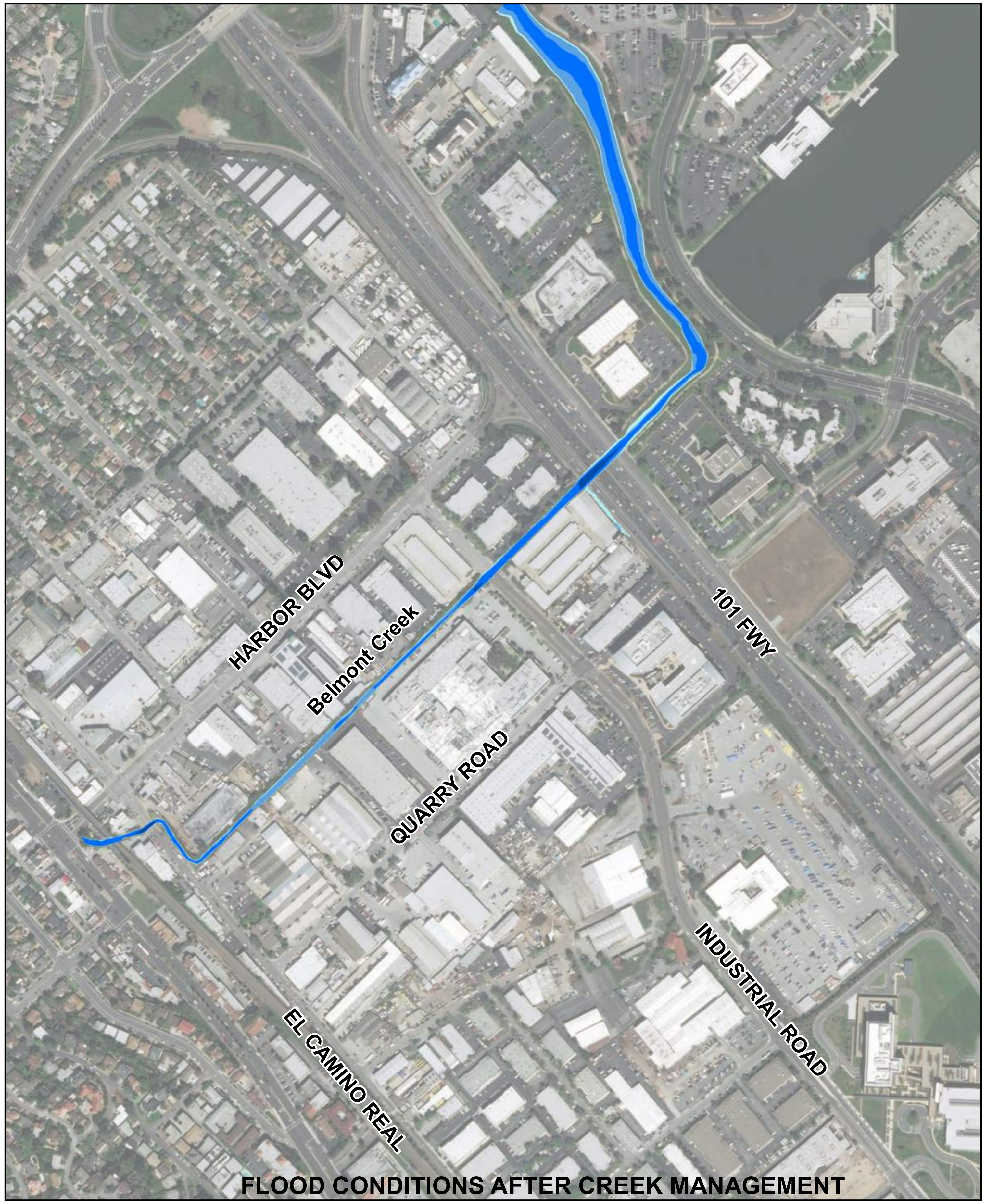


FLOOD CONDITIONS BEFORE CREEK MANAGEMENT



FLOOD CONDITIONS AFTER CREEK MANAGEMENT

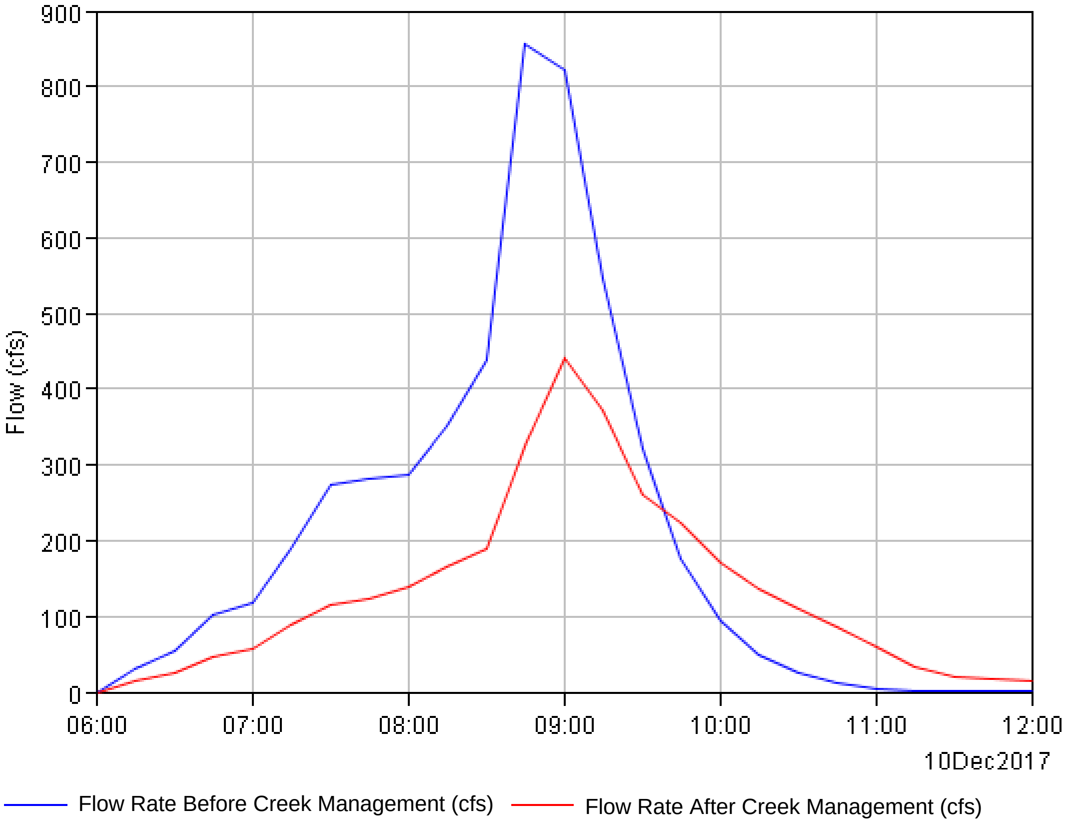
Michael Baker
INTERNATIONAL

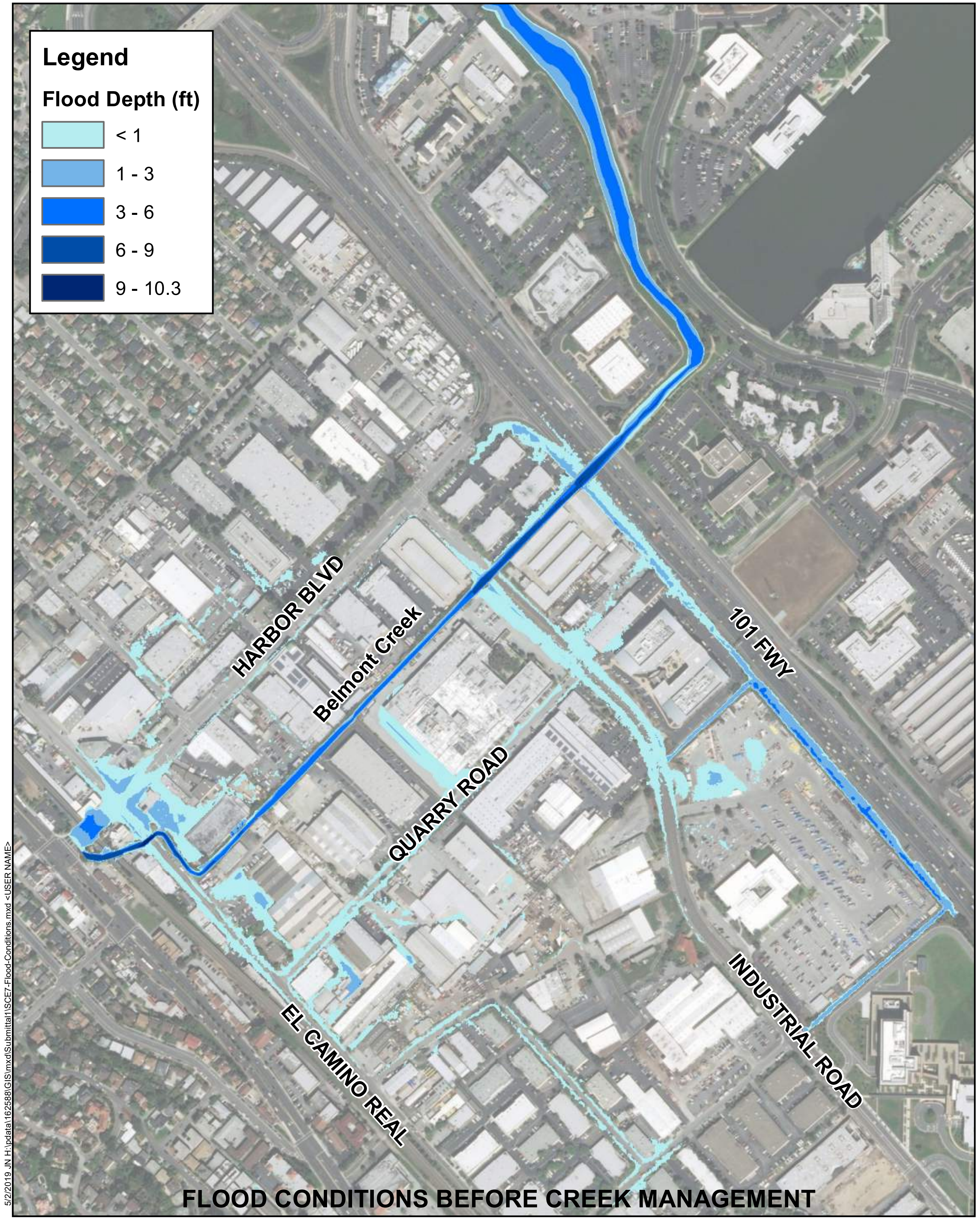
0 250 500 1,000
Feet

SCENARIO 6: FLOOD CONDITION COMPARISON 50-YEAR 3-HOUR STORM

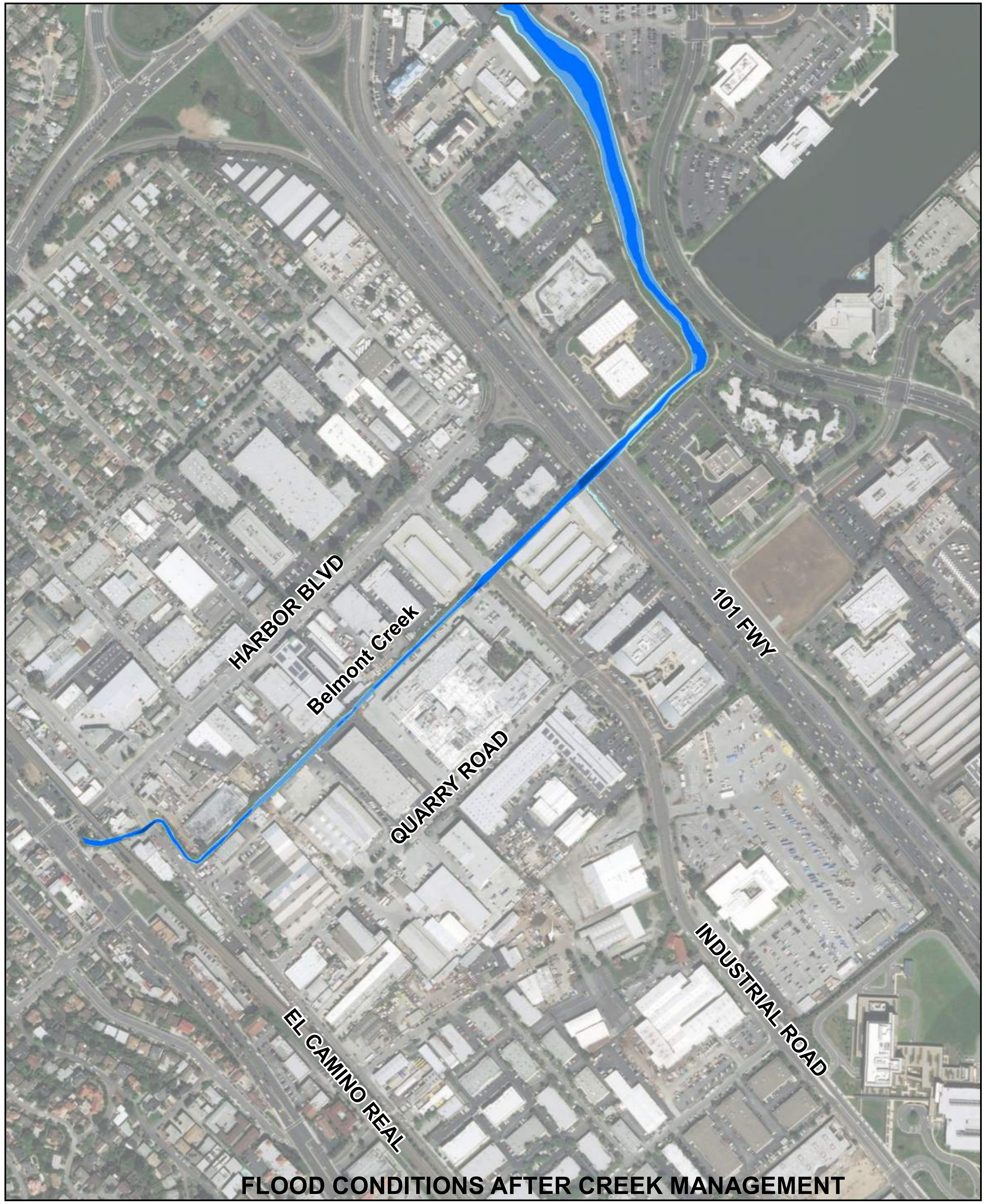
BELMONT CREEK FLOOD MANAGEMENT PLAN | COUNTY OF SAN MATEO

SCENARIO 6 HYDROGRAPH
50 YEAR, 3 HOUR STORM





FLOOD CONDITIONS BEFORE CREEK MANAGEMENT



FLOOD CONDITIONS AFTER CREEK MANAGEMENT

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Michael Baker
INTERNATIONAL

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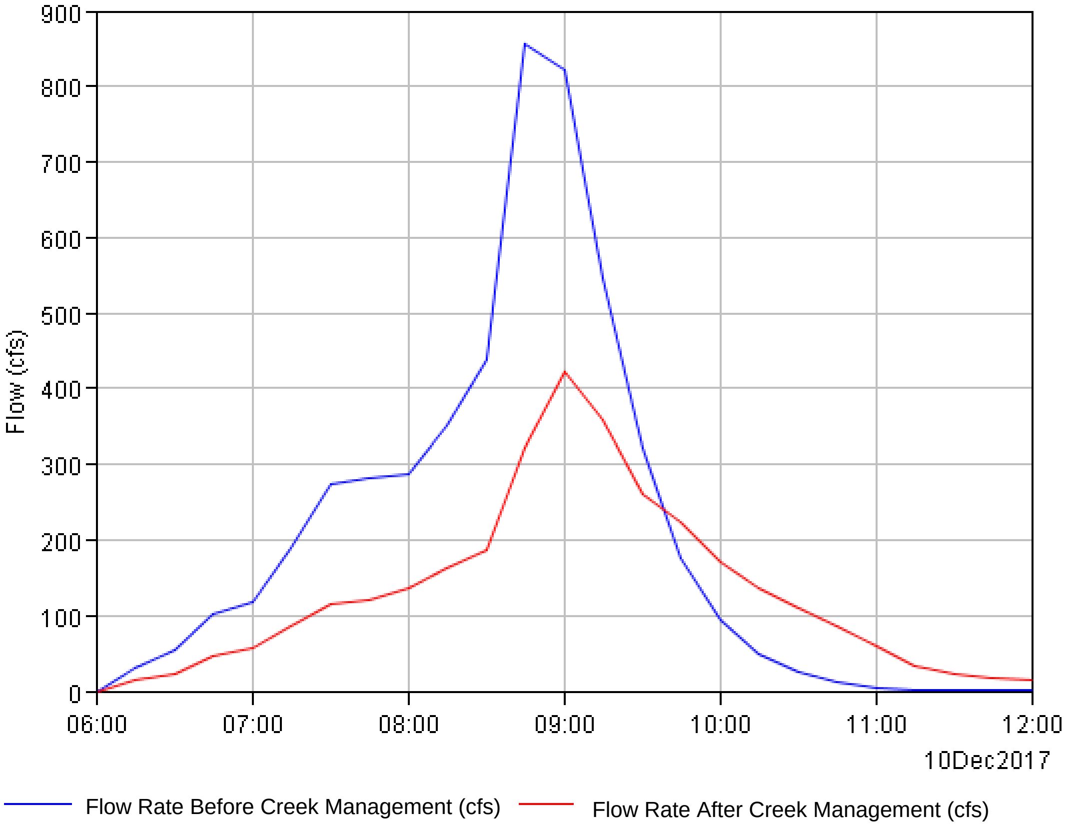
Feet

SCENARIO 7: FLOOD CONDITION COMPARISON 50-YEAR 3-HOUR STORM

BELMONT CREEK FLOOD MANAGEMENT PLAN | COUNTY OF SAN MATEO

SCENARIO 7 HYDROGRAPH
50 YEAR, 3 HOUR STORM



Appendix E

Watershed Reconnaissance Memo

Michael Baker
INTERNATIONAL

We Make a Difference

MEMO

To: Maggie Osbahr
Erika Powell

FLOOD RESILIENCE PROGRAM, COUNTY OF SAN MATEO PUBLIC WORKS

From: Russ Anderson

Cc: David Mueller
Darren Choy

Date: December 15, 2017

Re: Belmont Creek Flood Management Plan - Watershed Reconnaissance Memo

INTRODUCTION

The County of San Mateo is actively working towards reducing flood risk in flood-prone areas along Belmont Creek in the City of Belmont, CA. A number of studies have been conducted within the Belmont Creek watershed (WRECO, 2014; BioAssessment Services, 2007; BKF, 1998; SMCWPPP, 2006; Cotton Shires & Associates, 2003), and recently San Mateo County has contracted with Michael Baker International (Michael Baker) to develop a flood management plan for Belmont Creek to reduce or eliminate the flood risk along lower Belmont Creek.

WATERSHED / STREAM CHANNEL ASSESSMENT

A targeted field reconnaissance of Belmont Creek and its watershed was performed in October 2017. Michael Baker project team members (David Mueller, Darren Choy, Russ Anderson) visited the project area on October 23 and October 24, 2017 to document and evaluate site conditions, assess stream channel, riparian corridor, and watershed conditions, and identify and discuss opportunities and constraints to potential alternatives to alleviate the flood risks as well as provide multi-benefits. This assessment is not intended to reproduce the work performed under previous studies, but to provide a site-specific analysis regarding the geomorphic considerations that will be utilized in refining the details of design alternatives to reduce flood risk. In general, our assessment is consistent with information presented in the previous studies. Additional relevant information from the discussion is presented below. To maintain consistency with the previous studies, Belmont Creek reach designation used herein will follow the B1 through B8 reach identifiers used by WRECO (2014) according to the table below (and Figure 1).

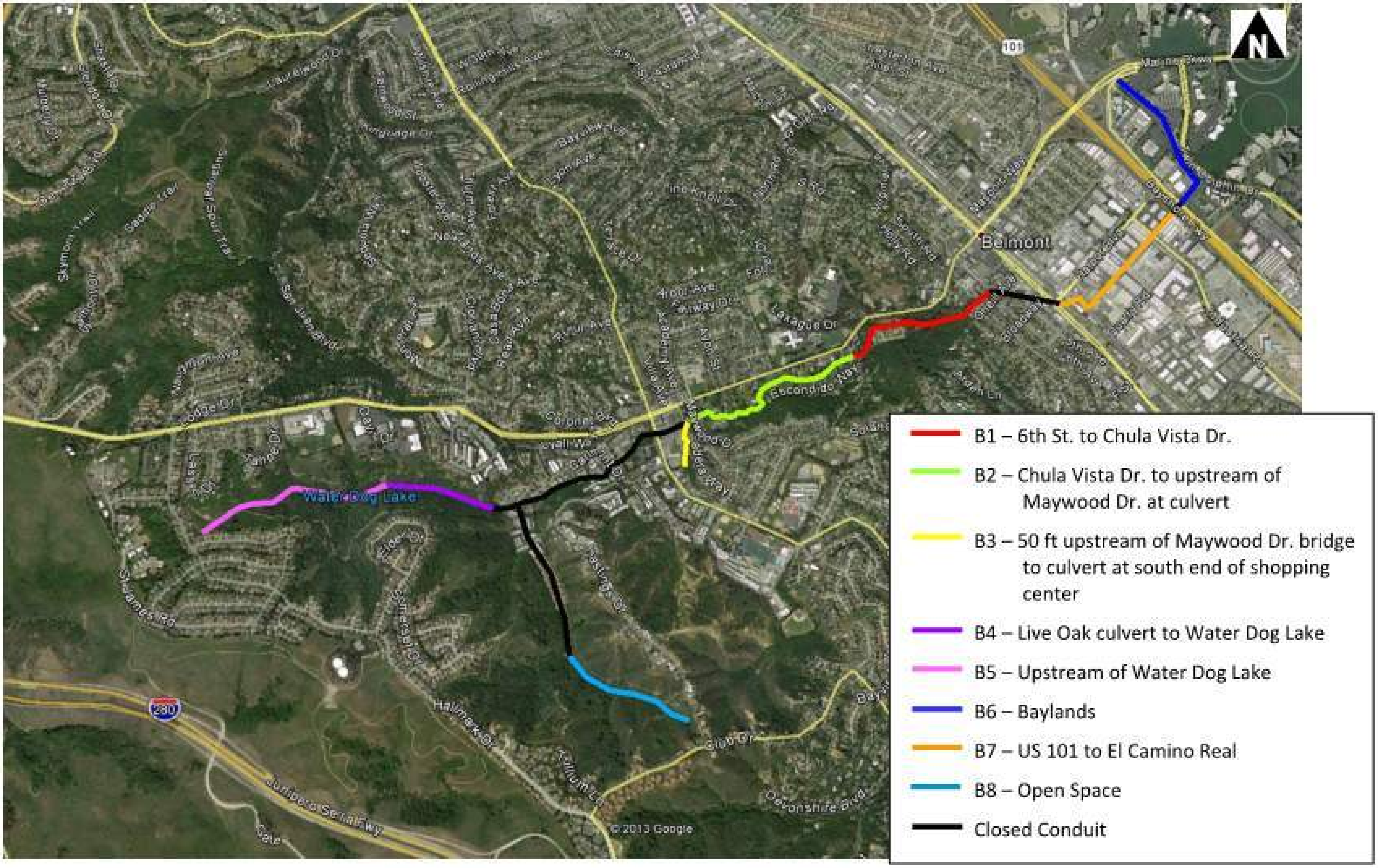


Figure 1. Belmont Creek Reaches (WRECO, 2014).

Table 1. Belmont Creek reach labels

Reach Identifier	Reach Boundary
B1	6th Street to Chula Vista Drive
B2	Chula Vista Drive to upstream end of Maywood Drive at culvert
B3	50 ft upstream of Maywood Drive bridge to culvert at south end of shopping center
B4	Live Oak culvert to Water Dog Lake
B5	Upstream of Water Dog Lake
B6	Baylands
B7	US 101 to El Camino Real
B8	Open Space area above Carlmont Drive

KEY FINDINGS

Information for all reaches is reported in previous studies and this information was reviewed as part of this assessment. The information previously reported was augmented by additional observations / confirmation during the field visit for reaches B1, B4, B7, and B8. Additionally, a contributing drainage in the vicinity of Reach B8 within the open space area was inspected as this drainage conveys a significant portion of the open space sub-watershed, was deemed a significant enough drainage within the drainage as indicated by the presence of a concrete lined channel, and was not previously reported in the previous studies. This reach is labeled Reach 8a, and joins with Reach 8 at the culvert inlet located near the end of Carlmont Drive.

Reach B7 Assessment

This reach is the principal area of concern and has experienced repeated flooding events and lies principally within an industrial portion of the City of Belmont. Our assessment confirms previous reports that geomorphically, this area represents a depositional zone for sediment transported from upstream reaches. Given this area represents the lower gradient zone of the typical concave stream profile prior to discharging into the tidally influenced slough areas of the San Francisco Bay, sediment deposition is the normal geomorphic response and typically these locations along a stream have broad floodplains in which streams are able to access overbank areas during typical peak flow events, spreading water and sediment across the floodplain, providing room for channel migration, and storing and transporting sediment in a state of dynamic equilibrium.

As documented, this reach of Belmont Creek has been relocated, straightened, channelized, and is no longer is able to function appropriately under the fluxes of water and sediment supplied to it in its current configuration. Additionally, the hydraulic capacity of Belmont Creek is adversely affected by a number of constraints, including: undersized culverts, reduced cross sectional geometry, abnormal planform geometry (e.g. sharp 90° bends), and vegetation encroachment in the conveyance area. As a response to these limitations, sediment deposition tends to occur in this specific reach, which in turn reduces the gradient, reduces hydraulic conveyance, and further exacerbates the flood issues in the reach.

A quick review of available documentation suggests that within the last eight years alone, dredging activities were implemented at least three times (2008, 2010, 2013) to remove sediment from the channel at various locations along the reach. It does not appear that sediment removal as a continual maintenance activity is likely to abate without implementation of specific plans which either address the supply of sediment to the reach, the ability of the channel to convey the sediment through the reach, or some combination. A number of other specific actions have been proposed or evaluated over the years, but it is unclear if any have been implemented beyond sediment removal and targeted vegetation control. At the time of the October 2017 site visit, there was a crew removing brush and vegetation from the lower part of Reach B7 near US Highway 101 (Photo 1), and improvised flood walls (plastic lined sandbags) had been recently installed (Photos 2 and 3). The following flood control measures were observed or reported in the reach:

- Concrete-filled sand bags have been installed at various locations through Reach B7 as a means of providing targeted, localized bank protection (Photo 4).

- Broken concrete and rubble installed at downstream 90° bend at Old County Road, as well as along channel in downstream direction (Photo 5).

- Evidence of berming at between Old County Road between the two 90° bend (Photo 6).

- Concrete guidebank and concrete-filled sand bags installed on 90° bend immediately downstream of Old County Road culvert (Photo 7).

- Rock bank protection installed at inlet to Old County Road culvert (Photo 8).

- Evidence of recent bank erosion and corrective fixes to stabilize bank on left bank between CalTrain crossing and Old County Road. It appears large rock has been incorporated into streambank material in effort to stabilize banks both sides of Belmont Creek (Photos 9 – 11).

- Evidence of bank failure on right bank between CalTrain and Old County Road as indicated by nearly vertical banks and exposed roots and large rock bank protection (Photo 12). Note the deposition of finer-grained sediment at toe of right bank appears to be incipient formation of mini-floodplain feature / low streambank that are likely washed out during high flow events and may re-form as flood peaks recede or built up during a series of low to moderate peak flow events occur (Photo 13).

The upstream end of Reach B7 is the culvert outlet which daylights at the eastern wall of the Harbor Boulevard – El Camino Real interchange, located approximately 100 feet upstream of the CalTrain culvert inlet. The total length of Belmont Creek within Reach B7 is approximately 2,700 feet.

Photo 1

Photo 2

Photo 3

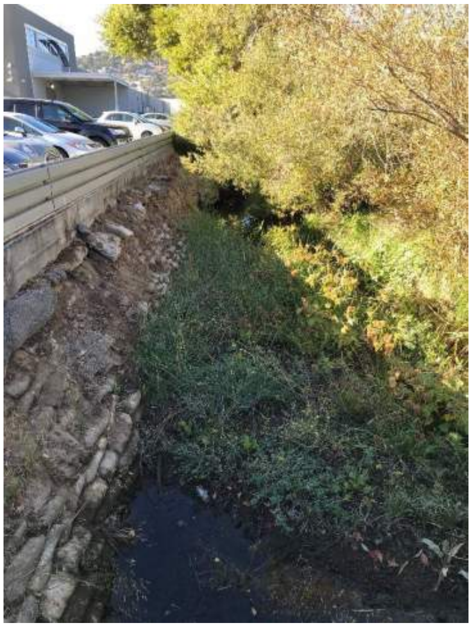


Photo 4

Photo 5

Photo 6

Photo 7

Photo 8

Photo 9

Photo 10

Photo 11

Photo 12

Photo 13

Reach B1 Assessment

The downstream extent of Reach B1 is a culvert inlet located at 6th Avenue near the intersection of 6th Avenue and Oneill Avenue. The upstream extent of Reach B1 is Chula Vista Drive. The overall channel length of Reach B1 is approximately 2,400 feet. Between Reaches B1 and B7, Belmont Creek is routed through an approximately 1,100 feet culvert.

Belmont Creek within Reach B1 lies primarily within the City of Belmont's Twin Pines Park, and as the park is primarily open space, the creek is not subject to the same lateral constraints or infrastructure constraints that are present in other reaches of Belmont Creek, in particular those that are described in Reach B7. Reach B1 is significantly steeper than Reach B7, with significantly greater capacity to transport incoming sediment load as well as mobilize sediment generated within the reach. However, the sediment transport capacity within Reach B1 is not unlimited and there are locations where point bar development is evident (indicative of sediment transport and deposition patterns developed through flood pulses). Additionally, localized bank failure at one location has created a source of sediment that Belmont Creek has yet to fully mobilize and transport to downstream reaches. Another very significant characteristic of Reach B1 is the degree to which it is incised and disconnected from any sort of developed floodplain. The majority of the Reach B1 streambed and channel sits well over 10 feet below the surrounding ground surface, approaching 20 feet deep in some areas. The degree of incision in Reach B1 is in stark contrast to other reaches of Belmont Creek, even those that exhibit some degree of incision, and suggests that this location of Belmont Creek is in some state of adjustment to changes in the duration and quantity of water and sediment delivery. These adjustments are manifest via downcutting through the adjacent ground surface. This process has been studied and described through a geomorphic process known as the Channel Evolution Model (CEM – Schumm et al., 1984; Simon, 1989; Simon and Rinaldi, 2006).

Figure 1. Channel Evolution Model Stages (Simon and Rinaldi, 2006)

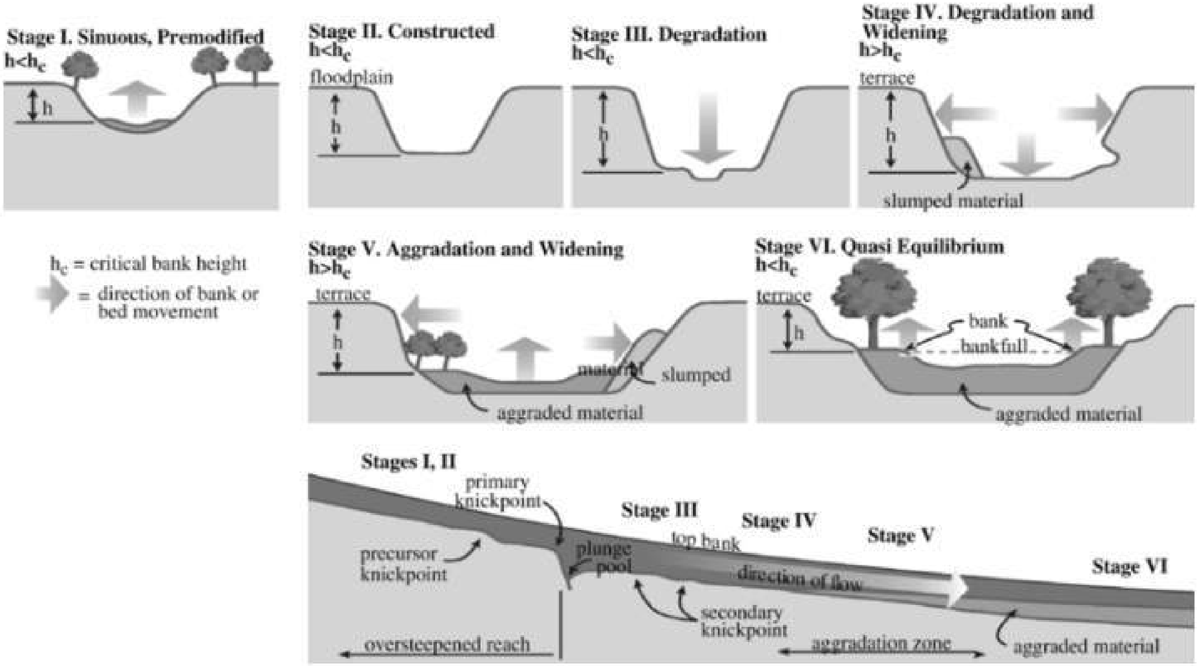


Figure 1 represents the Channel Evolution Model process; the following describes the process as it relates to Belmont Creek:

I. Premodified state where bank height (h) is less than the maximum (critical) bank height for stability (h_c)

II. Channelization or other event occurs, but bank is less than critical bank height

III. Degradation or downcutting occurs in response to the channelization or other disturbance, but bank height remains less than critical bank height.

IV. Bank height exceeds critical bank height and bank failure occurs. Stream channel widens as a result and sediment transport capacity is reduced. Bank material slumps into the channel. The previous top of bank is no longer overtopped, even during high flow events, and becomes a terrace feature.

V. The combination of aggradation and channel widening results in aggradation, which raises the streambed elevation such that bank height transitions from being greater than the critical bank height to less than critical bank height as the process enters phase VI.

VI. The stream channel enters a new state of quasi equilibrium whereby the bank material that entered the channel through bank failure/slumping becomes deposited within the channel, raising the bed elevation, creating new banks and inset floodplains within the previous banks which become terraces. The new channel banks stabilize and become vegetated, providing overbank areas for channel flow during peak flow events. Bank heights are less than critical bank height.

Reach B1 of Belmont Creek is likely in Phase IV or Phase V of the Channel Evolution Model process. There’s evidence that bank heights may still be greater than critical bank height, and bank failure may continue to occur within the reach unless an intervention external to the natural process takes place. Complicating the application of this simplified process to Belmont Creek is the fact that geologic factors and other watershed features/process play a part in what is happening (or what has happened historically) within Belmont Creek. Notably, incision is an inherent process natural to some settings (e.g. arid settings with cohesive soils). The streambanks within Belmont Creek in Reach B1 are much higher (and steeper) than normally observed in alluvial rivers. While previous studies document that the local geology includes alluvium of the Holocene age and sandstones, it does not appear that the stream banks within Reach B1 are sandstone. Thus, Reach B1 stream banks are within alluvial deposits, but the vertical configuration suggests a significant presence of cohesive material to support the bank angles. While cohesive soils do have resistance to erosion, they are still susceptible to bank failure and erosion as documented within Reach B1 (Photos 18 and 19). The following are specific observations derived from the site reconnaissance in Reach B1:

- Prior to entering the culvert at the lower extent of Reach B1, Belmont Creek is constrained by infrastructure located on both streambanks (e.g. buildings, parking lots, fences, picnic areas, etc.), which also have a high degree of streambank armoring to protect the infrastructure (Photos 14 and 15).

- Other areas within Reach B1 without direct infrastructure risks have a high degree of streambank armoring to prevent bank failure, which could adversely impact park areas beyond the streambanks and contribute to sediment loading in downstream reaches (Photos 16 and 17).

- Recent bank failure at one location demonstrates the likely future trajectory of Belmont Creek within Reach B1 as unstable banks fail and reach-wide Belmont Creek transitions to Phase VI of the Channel Evolution Model (Photos 18 and 19). Rough estimates of the volume of sediment that may have been released into Belmont Creek from this bank failure is on the order of 200 yd^3. By comparison, the volume of sediment removed from the lower reach (Reach B7) in 2013 was 540 yd^3.
- Indication that Belmont Creek in Reach B1 is in the latter phases of the CEM is supported by locations where alluvial features such as point bars and mini floodplain benches have developed within the previous confining streambanks, which now act as terrace features. Younger riparian vegetation is establishing along these alluvial features which are contrasted against the very large, mature vegetation at the ground level atop the high banks. (Photos 19 through 21).
- There are locations of exposed bedrock which will resist erosion and provide stable streambanks and limit downcutting (Photos 22 and 23).
- Large rocks, concrete blocks, and other debris are present in Reach B1.
- Additional evidence supporting the incision process by downcutting is present at the outfall of the culvert that is located at the upper end of Twin Pines Park (Photos 24 and 25). It appears that the creek has lowered by approximately 3 feet at this location since from the culvert was installed. Photo 26 indicates that historically, the streambed was likely at an elevation several feet higher than the current elevation based on the presence of a well-defined gravel layer several feet above the existing streambed.
- There appears to be a relatively long history of sediment delivery to downstream reaches of Belmont Creek (Reaches B6 and B7) from this specific reach given the evidence of downcutting and bank stabilization efforts within Reach B1. This does not include sediment transported into Reach B1, which in turn appears to pass directly through Reach B1, as there was no evidence of substantial aggradation, nor reports of sediment removal from Reach B1. The specific timeline of the sediment delivery is unknown, but based on reports that the 2013 dredging was performed to remove material from 2011 high flow events, it is likely that sediment is transported in pulses corresponding to higher flow events when the creek has sufficient energy to cause bed and bank erosion, as well as sufficient transport capacity to move the sediment to downstream reaches.

Reach B2 Assessment

Conditions in Reach B2 are incised, down to bedrock in some locations, and has been described in the previous studies as generally not stable. The reach flows through residential areas, and has been highly modified to protect homes and other structures. Bank protection includes large rock, concrete filled sandbags, poured concrete, shotcrete, tarps, chain link, brick, and concrete structures. The performance of the bank protection is varied, and there are many locations where erosion is undercutting the bank protection, and other locations where bank failures are occurring. Although previous reports identify at least one location within Reach B2 that has sediment deposition, overall, this reach appears to be a significant source of sediment to the downstream reaches. As discussed above, sediment from this reach enters and passes through Reach B1, contributing to the sediment deposition in Reaches B6 and B7.

Photo 14

Photo 15

Photo 16

Photo 17

Photo 18

Photo 19

Photo 20

Photo 21

Photo 22

Photo 23

Photo 24

Photo 25

Photo 26

Reach B4 Assessment

Reach B4 begins immediately downstream of Water Dog Lake and ends where it enters a culvert at Live Oak Way (near Carlmont Drive). Belmont Creek is contained in the pipeline until it daylights into the creek channel upstream of Maywood Drive. Water Dog Lake is impounded by an earthen fill embankment (Notre Dame Dam Number 619) that completely impounds flows entering Water Dog Lake from upstream drainages. Relevant observations from Reach B4:

- Outlet flowpaths of Water Dog Lake into the Belmont Creek channel below are either through the control gates and outlet works (Photos 27 and 28) or the spillway located at the right abutment (Photos 29 and 30).

- This reach of Belmont Creek is located within Water Dog Lake Park, and is heavily wooded and free from the residential and industrial encroachments present in other reaches (e.g. Reaches B2, B6, and B7). Belmont Creek in Reach B4 is relatively steep, and areas of the channel below the spillway and outlet works outfalls exhibit strong signs of erosion and scour typical of streams below impoundments where sediment transport continuity is interrupted by the impoundment. Water leaving the reservoir has significant sediment transport capacity, but lacks sediment supply due to the interruption of sediment load at the impoundment. Thus, the channel scours and erodes material below the impoundment as it strives to restore the balance between sediment transport capacity of the water with the sediment load it carries. Photos 31 and 32 illustrate the degree of erosion below the impoundment and show that scour has occurred in the channel, eroding the streambanks and exposing bedrock and very large rocks and boulders.

- Efforts have been taken to stabilize banks below the impoundment, with varying degrees of effectiveness (Photos 33 and 34).

- Further downstream from the immediate outfall location, there is evidence of redistribution of sediment, with eroding banks and indication of sediment deposition within the channel (Photos 35 and 36).

- Other general observations within this reach is that there is evidence of previous slope instability from the adjacent hillslopes (Photo 37), which can be a potentially significant source of sediment. The reach does have a fairly dense, continuous, riparian vegetated corridor, which tends to promote channel and streambank stability (Photos 38 and 39).

- The lower part of Reach B4 has sections where the channel has incised through previous depositional features and are characterized by very narrow channel widths with deep (up to 4 to 5 feet), vertical streambanks (Photos 40 and 41).

These observations show that the portion of Belmont Creek below Water Dog Lake is responding to the impoundment that captures any sediment load delivered by reaches upstream of Water Dog Lake. The response is in Reach B4 is erosion of the streambed and banks below the outfalls, with channel widening and/or downcutting. It appears that some portion of the eroded sediment is redistributed within the stream channel, and large magnitude flow events or sediment fluxes (e.g. hillslope failures) may have deposited sediment across a broader area, which over time has revegetated, and the existing channel appears to be downcutting through any deposited sediment. Thus, the net result of the stream channel response below Water Dog Lake is that there is substantial sediment delivery to downstream reaches (through the pipe system between Reaches B4 and B2), but it does not appear the sediment delivery is in high rates, but may have been consistent over time since the impoundment was constructed. In terms of overall impact to Belmont Creek, sediment transported out of Reach B4 likely is delivered directly to Reach B2 (assumes no deposition within pipe system between the reaches). As described above, Reach B2 appears to be in a state of instability, but sediment coming into Reach B2 from upstream sources does not appear to be to be depositing within Reach B2. The incoming sediment is transported through Reach B2 to Reach B1, which in turn appears to be transporting sediment down to the lower reaches.

Reach B8 / Hidden Canyon Park Assessment

In previous reports, Reach B8 was identified as a tributary (Canyon Creek) to Belmont Creek located in Hidden Canyon Park. This reach is essentially a headwaters tributary that forms from a series of drainages/draws that are located above Carlmont Drive, and below the Hallmark Drive, Crestview Drive, Club Drive, Hastings Drive areas. There is another drainage that meets up with Canyon Creek within Hidden Canyon Park, and this joins Canyon Creek at the inlet of a large culvert (Photo 42) that pipes these two drainages to the Belmont Creek culvert in the vicinity of Carlmont Drive and Live Oak Way intersection. This field reconnaissance included Canyon Creek (identified as Reach B8) and the second tributary (unnamed) in Hidden Canyon Park (referred to hereafter as Reach B8a). Reaches B8 and B8a were investigated primarily to determine if there were conditions in this portion of the Belmont Creek watershed that contributed substantial sediment load to Belmont Creek, potentially affecting the flood risk in the lower portions of Belmont Creek.

The following are the observations made in Reaches B8 and B8a:

Reach B8 (Canyon Creek)

- Canyon Creek flows in an open channel to the culvert in a northwesterly direction and is an ephemeral channel.

- As reported in previous studies, the watershed that drains Canyon Creek is vegetated with what appears to be a robust, mature, oak and scrubland vegetation community (Photo 43). There was no evidence of recent fire history; post-fire can provide very large fluxes of sediment to downstream channels, creating very substantial deposition patterns, clogging open channels and closed conduits with excessive sediment.

- There are indications that Canyon Creek does experience minor erosion during runoff events when sediment appears to mobilize from streambanks and the creek bed (Photo 44). However, the erosion does not appear to be severe, and the episodic events result in redistribution within the creek channel and overbanks, as well as delivering some portion of the sediment load to downstream reaches (Photos 45 and 46).

Photo 27

Photo 28

Photo 29

Photo 30

Photo 31

Photo 32

Photo 33

Photo 34

Photo 35

Photo 36

Photo 37

Photo 38

Photo 39

Photo 40

Photo 41

Photo 42

Photo 43

Photo 44

Photo 45

Photo 46

Reach B8a (Unnamed Tributary)

- Reach B8a flows in a concrete-lined open channel to the culvert in an easterly direction and although it had a trickle flow in the concrete lined channel, is best described as ephemeral. The source of the water is a side drainage to the unnamed tributary and appears to be a result of connectivity with ground water that is infiltration from irrigating nearby residential lawns (Photo 47).

- As described above, previous studies note that the watershed is vegetated with what appears to be a robust, mature, oak and scrubland vegetation community (Photo 43). There was no evidence of recent fire history.

- There are indications that Reach 8a does experience erosion during runoff events where it contacts streambanks outside of the concrete-lined channel (Photo 48), and historically may have been a significant source of sediment, which is why the channel was lined with concrete. While it appears that the concrete lining received some repair and is maintained, there are locations upstream where the concrete is cracked, broken, or missing (Photos 49 and 50). However, it does not appear that degradation of the concrete liner in the upper reaches have significantly altered the effectiveness of the lined channel to reduce erosion and sediment transport to lower reaches. Lined channels generate a hydrologic response in the sub-watershed by delivering water much more rapidly, generating peaks that are larger than a natural channel. If the natural balance of sediment load is altered, areas downstream of the concrete lined reach could be subject to scour and higher rates of erosion. It is uncertain whether runoff from Reach B8a is significantly large relative to other tributaries and Belmont Creek to adversely affect the overall water – sediment balance.

RECOMMENDATIONS

The overall condition of Belmont Creek and its watershed has been significantly altered from the likely historic range of conditions by over 150 years of anthropogenic impacts. While the impacts to the upper-most portions of Belmont Creek and watershed are subtler, the establishment of Notre Dame Dam #619 and Water Dog Lake, concrete-lined drainages, and urbanization along the upper margins do affect the conditions in downstream reaches. Similarly, urbanization and nearly complete build-out of the middle and lower portions of the watershed have resulted in numerous alterations to the watershed and creek, including the significant rerouting of the creek into culvert pipe networks, channelizing, straightening, and relocating Belmont Creek, greatly increasing the impervious area, and the installing infrastructure associated with urbanization that impedes stream channel function. One result of these alterations is the increased frequency and severity of flooding in the lower reaches of Belmont Creek east (downstream) of the CalTrain crossing of Belmont Creek. There are some features within Belmont Creek and its watershed that create opportunities to reduce the flood risk or severity. This section discusses potential actions that can be implemented to improve potential flooding issues in lower Belmont Creek.

Photo 47

Photo 48

Photo 49

Photo 48

Lower Belmont Creek (Reaches B6 and B7)

- To a large extent, Belmont Creek in the lower reaches (Reaches B6 and B7) function primarily as stormwater drainage to the San Francisco Bay. Thus, actions that can be implemented to improve the conveyance capacity and efficiency through these reaches are most likely to have the greatest benefit. Alternatives for making these improvements have been presented and evaluated in a number of previous studies and are being refined by work that includes this geomorphic / watershed assessment. A separate document will be prepared that synthesizes information from this document within the context of a specific flood management plan that can be presented to the stakeholders and decision makers in order to implement a preferred alternative.

- Coupled with improving hydraulic conveyance through the lower reaches (Reaches B6 and B7), there is evidence of some streambank erosion and instability that likely is deposited within the lower reaches when sediment transport capacity is reduced. Specifically, the left streambank immediately downstream of the CalTrain crossing appears to have recently received some stabilization measures. A general trend in many streambank stabilization situations is that when conditions allow, the preferred stream bank stabilization measures are those that utilize bio-engineering approaches rather than hard armoring. However, given the level of stream channel alterations in the lower Belmont Creek reaches, degree to which infrastructure has encroached upon the creek, and the need to minimize the risk of failure of stabilization measures, bio-engineered methods at this location is not recommended. Riprap bank protection may be the best solution at this site, and new techniques or proprietary products using vegetation with structural components can provide some of the benefits of bioengineered bank protection while providing hard-armored bank protection. A critical element of streambank stabilization is to provide adequate toe protection and carry the bank protection down below the streambed elevation to protect against undermining the bank protection measure.

- At locations within the lower reaches, removal of brush, trees, or other woody vegetation would improve conveyance, and revegetation measures using appropriate grass species can provide an element of bank protection (through relatively deep and dense root mass) without reducing conveyance and reduce the potential for invasive and other undesirable vegetation species to establish along the creek.

Reach B1

- Reach B1 lies within Twin Pines Park and although there is some encroachment of structures on Belmont Creek in the lower section of Reach B1, the nature and space of the park setting provide opportunities to improve stream channel function and reduce the causes of flood risk to downstream reaches. Belmont Creek in Reach B1 is incised, with very high and steep streambanks. It appears that Belmont Creek within Reach B1 is in the mid- to latter stages of the Channel Evolution Model, where the final state is a stream channel within wider terrace features that were formerly at existing top-of-bank elevation, with mini floodplain features within the terrace features, and a stable stream channel with a well-defined bankfull channel and stable, vegetated streambanks. Restoration activities within Twin Pines Park could be implemented to accelerate the natural process of reaching the final state by widening the existing top of bank to form terrace features, building a single thread stream channel with pool-riffle features within the channel and floodplain features in overbank areas, and regrading the new terrace features down to the new floodplain features at a stable slope to reduce the risk of slope failure and sediment deposition. These activities could be done in a targeted and phased approach starting with higher risk locations and working in phases as funding becomes available.

- Installing a sediment basin would capture sediment from upstream sources or from the Reach B1 sub watershed. The sediment basin should be sized to reduce the stream channel velocity (a surrogate for sediment transport capacity) and will need to be located and designed to facilitate periodic maintenance to remove sediment captured within the basin. The sediment basin should be located as far downstream in Reach B1 as feasible in order to maximize its effectiveness in preventing sediment from being delivered to downstream reaches.

Reach B2

- Previous studies document the degree of instability Belmont Creek within Reach B2. A complicating factor is the influence of the high number of private residences that line the creek in this reach. Some of the instability appears to be a result of channel changes driven by factors that have led Belmont Creek to go through the channel incision, bank instability, widening, and depositional processes described by the Channel Evolution Model. Other sources of instability appear to be a result of actions taken protect property and infrastructure. Potential actions to address channel instability as described in Reach B1 could be an effective solution, but may be difficult given the degree of encroachment of property and infrastructure on the creek. These constraints are somewhat analogous to those described in Reach B7, although the influences are residential rather than industrial. If softer stabilization approaches that are more bioengineering in nature are not possible, it may be necessary to implement more hard-armoring stabilization methods within Reach B2. These could include vegetative riprap methods as described for the site in Reach B7. Standard riprap bank protection might be considered, as well as other methods, such as the concrete filled sand bags or rock filled gabions that are currently applied in other locations along Belmont Creek. Consideration for toe protection and scour protection will prevent undermining the stabilization method, which has been identified as a current issue at many locations within Reach B2.

- As with Reach B1, Reach B2 is a source of sediment to downstream reaches. The sediment transported by Reach B2 is a combination of sediment that it receives from upstream reaches and sediment that is from the channel and eroding streambanks. As with Reach B1, a sediment basin should be considered to capture sediment generated and transported within Reach B2 before it discharges into Reach B1. Additional analyses would be required to determine the location and design of the sediment basin, but the basin should be sized to trap the transported sediment, provide access for maintenance and sediment removal, and located as far down Reach B2 as feasible to trap sediment before entering Reach B1.

Reach B4

- Belmont Creek functions in a state of imbalance between the sediment transport capacity of the creek and the sediment load that it carries, due to the presence the Water Dog Lake impoundment. This imbalance results in scour of the streambed and bank erosion below the impoundment. There is evidence of previous hillslope instability, which may also be a significant source to sediment to Belmont Creek during and following the slope failure. As a result, Belmont Creek appears to be actively eroding streambanks below the impoundment and deliver the sediment to downstream reaches (Reach B2 and below) after it flows through a stormwater collection piping system. Operation of Water Dog Lake appears to provide flows in the channel below the dam intermittently. These intermittent flows can result in sediment loads that are both episodic in timing and significant in volume. These events only occur when significant flows are released from the outlet works or when the impoundment flows over the spillway. Thus, Reach B4 may not be a primary source of sediment, and measures to reduce sediment in this reach should be considered a lower priority.

- Although the degree of incision and streambank instability in Belmont Creek within Reach B4 is substantially less than Reaches B2 and B1, there are opportunities to implement streambank stabilization measures that could improve stream channel function through this reach and reduce the sediment load provided to downstream reaches. Recommended methods to provide streambank stabilization within Reach B4 differ from those recommended in Reaches B1 and B2. Large-scale regrading does not appear to be necessary, and targeted bank regrading could be implemented to establish appropriate stream channel dimensions with well-defined bankfull widths and depths. Bioengineered methods such as incorporating encapsulated soil lifts to establish and initially maintain bank heights would be coupled with planting appropriate native riparian vegetation along the streambanks to provide longer-term bank stability. It appears that connectivity to ground water below the Notre Dame Dam Number 619 will support successful riparian revegetation effort, even though flows through Belmont Creek in this reach are not perennial. Additional information regarding releases from Water Dog Lake would be required to understand and evaluate the hydrology and hydraulics in this reach.

- A sediment basin should be considered near the lower section of Reach B4 to reduce the sediment load that is transported to lower reaches. The same considerations for the proposed Reach B2 sediment basin apply to the design and location of this basin, and as noted above, this reach could be considered lower in priority.

Reach B8/B8a

- The assessment of tributaries to Belmont Creek flowing out of Hidden Canyon Park suggest that these drainages are fairly small, ephemeral stream flows, and don't appear to contribute large amounts of sediment load to Belmont Creek. However, since flooding issues in the lower reaches of Belmont Creek appear to have a sedimentation component to the flooding, consideration should be given to implementing sediment abatement actions in Hidden Canyon Park. The unnamed tributary within Hidden Canyon Park (Reach 8a) was lined with a concrete channel, suggesting that erosion was previously considered a significant concern; unless the concrete channel undergoes substantial repair and maintenance, sedimentation from this unnamed tributary has the potential to increase in the future. Although current conditions in these upper drainages appear to be relatively stable, with a robust upland oak/scrub forest, there is potential risk that these conditions could change (e.g. wildfire, landslide, etc.), which could result in large fluxes of sediment load into Belmont Creek. Thus, a sediment basin in Hidden Canyon Park should be considered to capture sediment before it enters the culvert and is transported into Belmont Creek. As with the other reaches, the same considerations apply to the design and location of this basin. It appears that there is sufficient space to place a basin near the confluence of Canyon Creek and the unnamed tributary prior to the combined flows entering the culvert near Carlmont Drive.

- While bank stabilization measures have been recommended for other reaches, stabilization opportunities appear to be limited within Hidden Valley Park. As previously noted, the unnamed tributary is concrete lined, although there is at least one location (Photo 48) where the concrete liner is damaged. Temporary measures have been installed to keep flows within the concrete channel and prevent additional erosion at this location. Additional work should be performed at this location to prevent future erosion without the need for the sandbags and temporary culvert. Within Canyon Creek, stabilization measures could be implemented at a few targeted locations where some downcutting has occurred and where trail runoff creates erosion. Some of these actions could be incorporated into trail maintenance and/or performed by park staff. Given the exposed and dry conditions within and along the creek, it may be difficult to establish a riparian corridor, and the system is likely to continue with characteristics consistent with arroyo development.

Appendix F

Background Information

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	SM	101	5.6/17.7	1	686

ACNH-Q101(018)E

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

PROJECT PLANS FOR CONSTRUCTION ON
STATE HIGHWAY
IN SAN MATEO COUNTY
IN SAN MATEO, BELMONT, SAN CARLOS AND REDWOOD CITY
FROM 0.2 KM SOUTH OF ROUTE 84/101 SEPARATION
TO 0.2 KM SOUTH OF HILLSDALE BOULEVARD OVERCROSSING

To be supplemented by Standard Plans dated July, 1999.

INDEX OF SHEETS

Sheet No.	Description
1	Title and Location Map
2-15	Typical Cross Sections
16	Key Map and Line Index
17-43	Layouts
44-65	Profiles
66-144	Construction Details
145-152	Temporary Water Pollution Control Details
153-183	Erosion Control Plans and Details
184-186	Contour Grading
187-262	Drainage Plans, Details and Quantities
263	Sanitary Sewer Plan
264-299	Utility Plans, Profile and Details
300-357	Stage Construction Plans
358-377	Traffic Handling Plans
378	Construction Area Signs
379-410	Pavement Delineation Plans and Quantities
411-420	Summary of Quantities
421-445	Sign Plans, Details and Quantities
446-456	Retaining Wall Plans, Details and Quantities
457-476	Sound Wall Plans, Details and Quantities
477-558	Highway Planting Plans
559-642	Electrical Plans
643-663	Revised Standard Plans

STRUCTURE PLANS

664-671	Cordilleras Creek Bike Path Bridge
672-676	Belmont Creek Box Culvert Extension Br No 35-0018
677-678	Route 101/84 Separation Br No 35-0083
679-680	Redwood Creek Bridge Br No 35-0145
681-682	Redwood Harbor Overhead Br No 35-0065
683-686	Retaining Wall No. 3

THE STANDARD PLANS LIST APPLICABLE TO THIS CONTRACT
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AND SPECIAL PROVISIONS BOOK.

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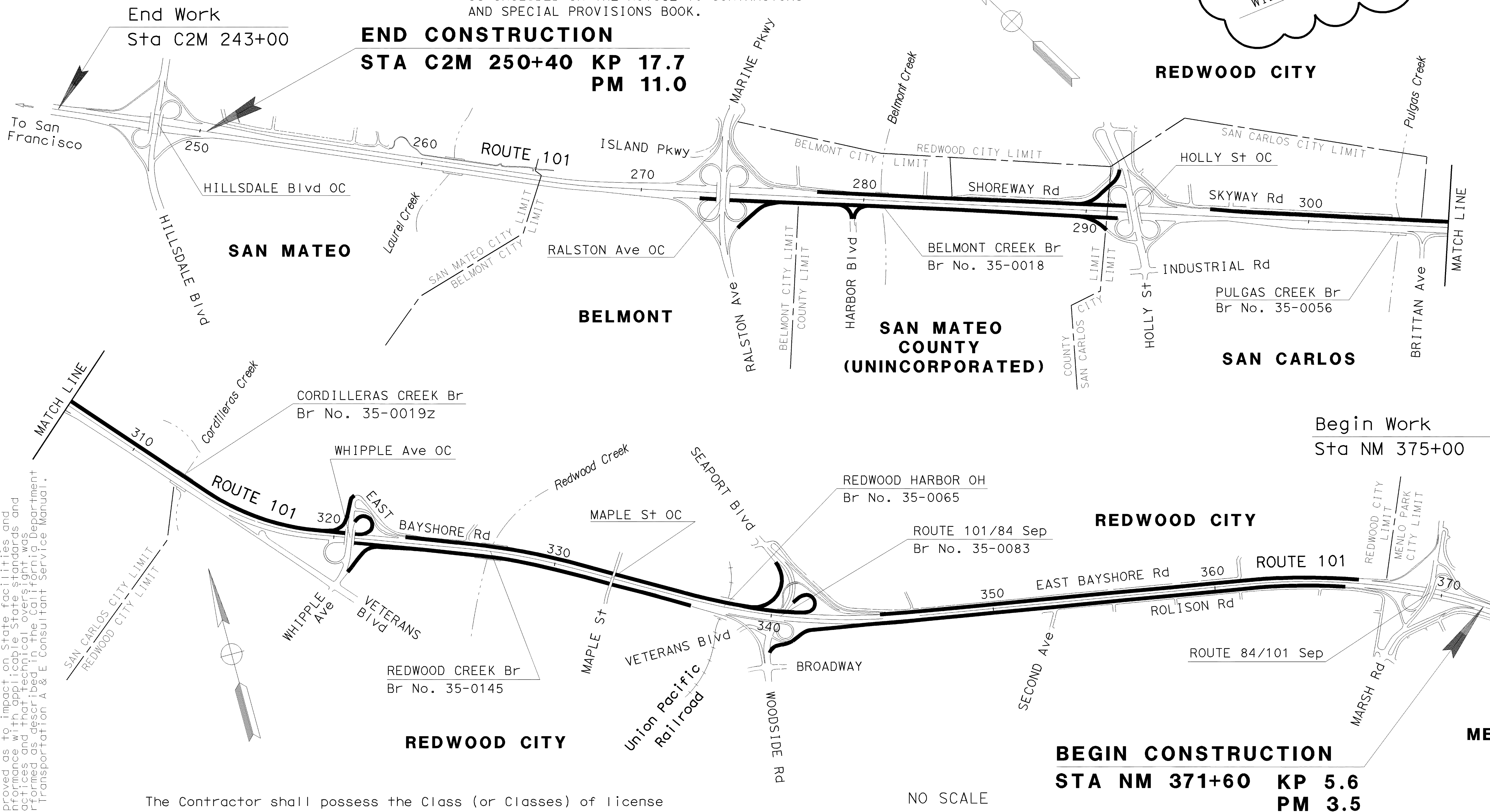
TYPE OF WORK: WIDEN EXISTING HIGHWAY



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APPROVED AS TO FEATURES AFFECTING CITY OF SAN CARLOS — 04/04/02 DATE

Jon K. Lynch
APPROVED AS TO FEATURES AFFECTING CITY OF REDWOOD CITY — 04/04/02 DATE

J Costantini 03/31/02
PROJECT ENGINEER DATE
REGISTERED CIVIL ENGINEER

JIM COSTANTINI
No. 51415
Exp. 6/30/06
CIVIL

September 16, 2002
PLANS APPROVAL DATE

NO Construction Changes

CONTRACT No. 04-2357a4
DATE ACCEPTED 07/14/06
AS BUILT
RESIDENT ENGINEER D Schram

SAN MATEO COUNTY
TRANSPORTATION AUTHORITY
1250 SAN CARLOS AVENUE
SAN CARLOS, CA 94070

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503 SEAPORT CT, STE. 105
REDWOOD CITY, CA 94063

Contract No. **04-2357A4**

PROJECT ENGINEER	DESIGN OVERSIGHT APPROVAL	REGISTRATION No	DATE
	PRINTED NAME M. REYES SIGNATURE Michael Reyes	51789	5/02

Approved as to impact on State facilities and conformance with applicable State standards and practices and that technical oversight was performed as described in the California Department of Transportation A & E Consultant Service Manual.

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LAST REVISION 04-04-02

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Appendix F

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DRAINAGE PLAN

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D-2

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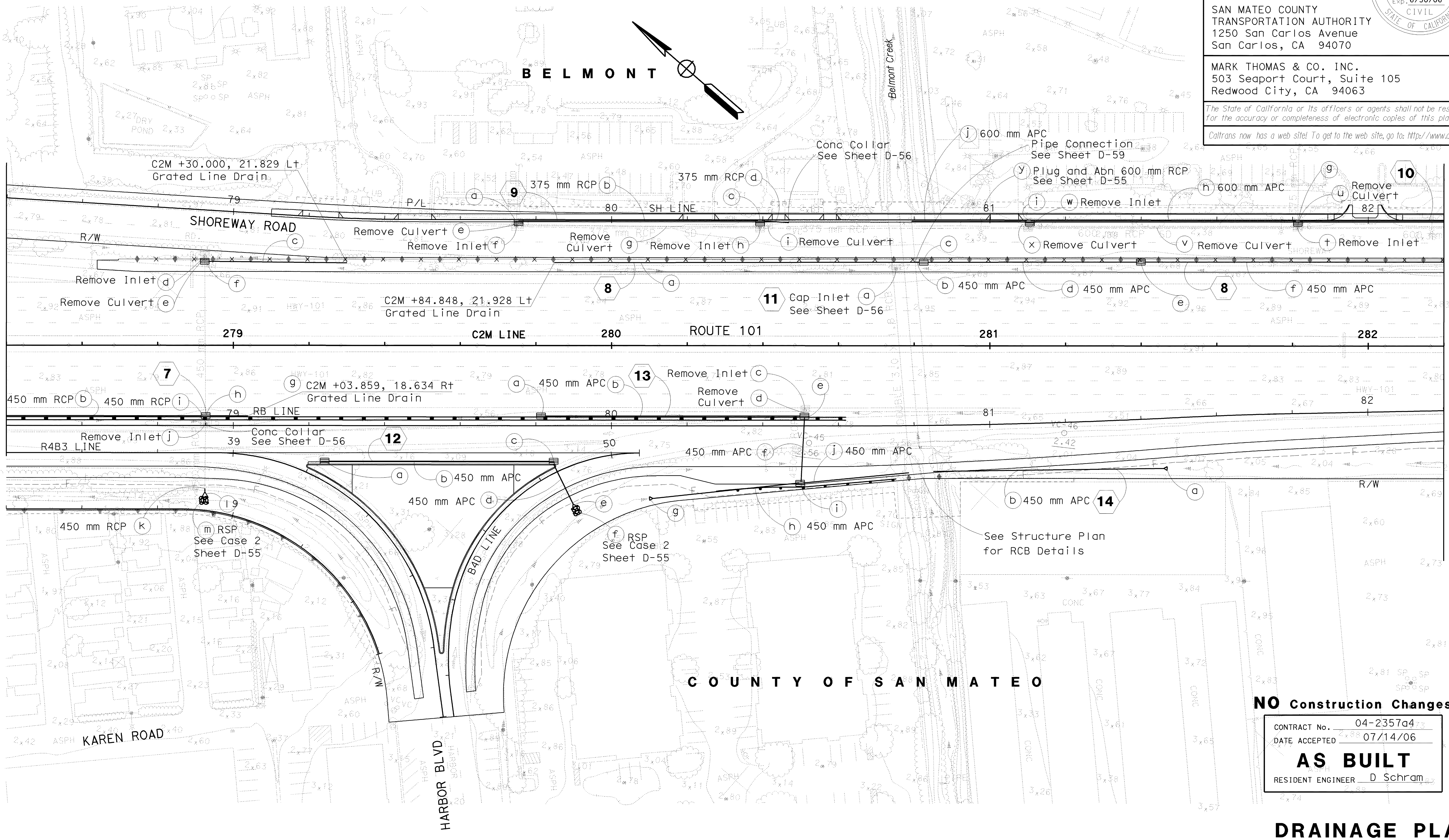

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DRAINAGE PLAN

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FORM DC-DE-92-PF (REV. 3/88)

LEGEND

▬	Grated Line Drain - Variable Depth, Slope of 0.6%
—	Grated Line Drain - Constant Depth
▨	Minor Concrete backfill

NOTES:

Length of ductile iron solid cover portion of grated line drain at connection to drainage Inlet/RCB shall be 0.5m unless otherwise shown.

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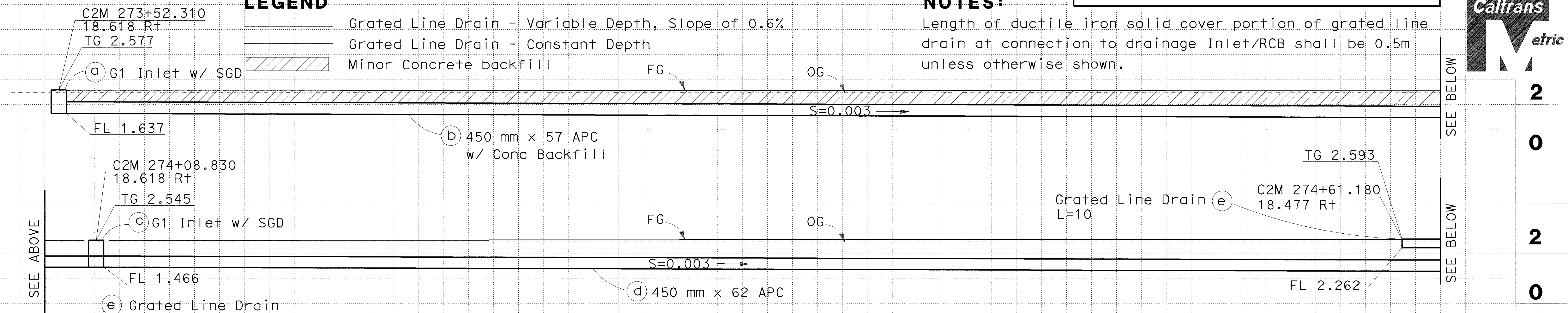

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DRAINAGE PROFILES

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D-30

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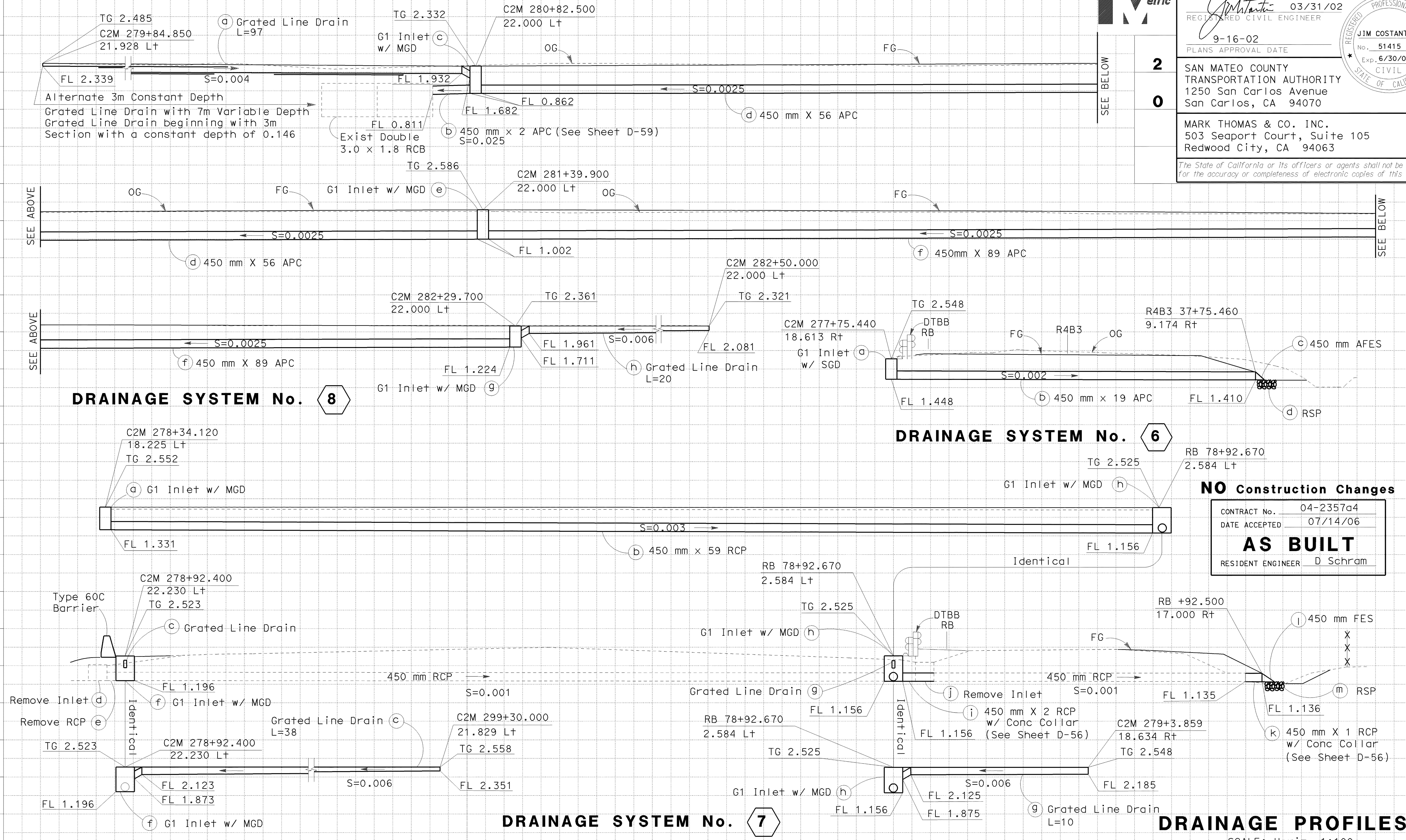

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DRAINAGE SYSTEM No. 6

DRAINAGE SYSTEM No. 7

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DRAINAGE PROFILES

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D-31

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DRAINAGE SYSTEM No. 10

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DRAINAGE PROFILES

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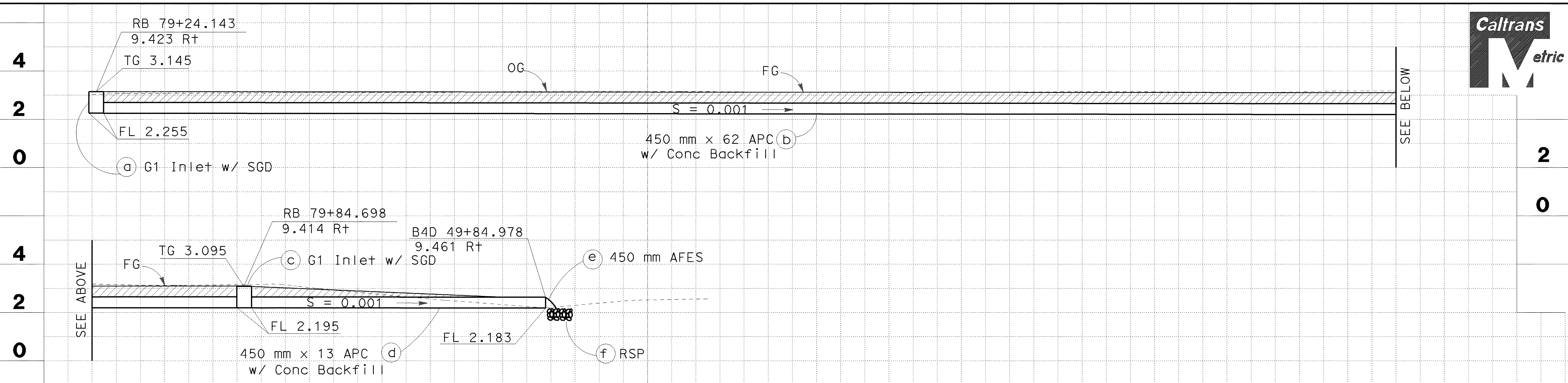

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DRAINAGE PROFILES

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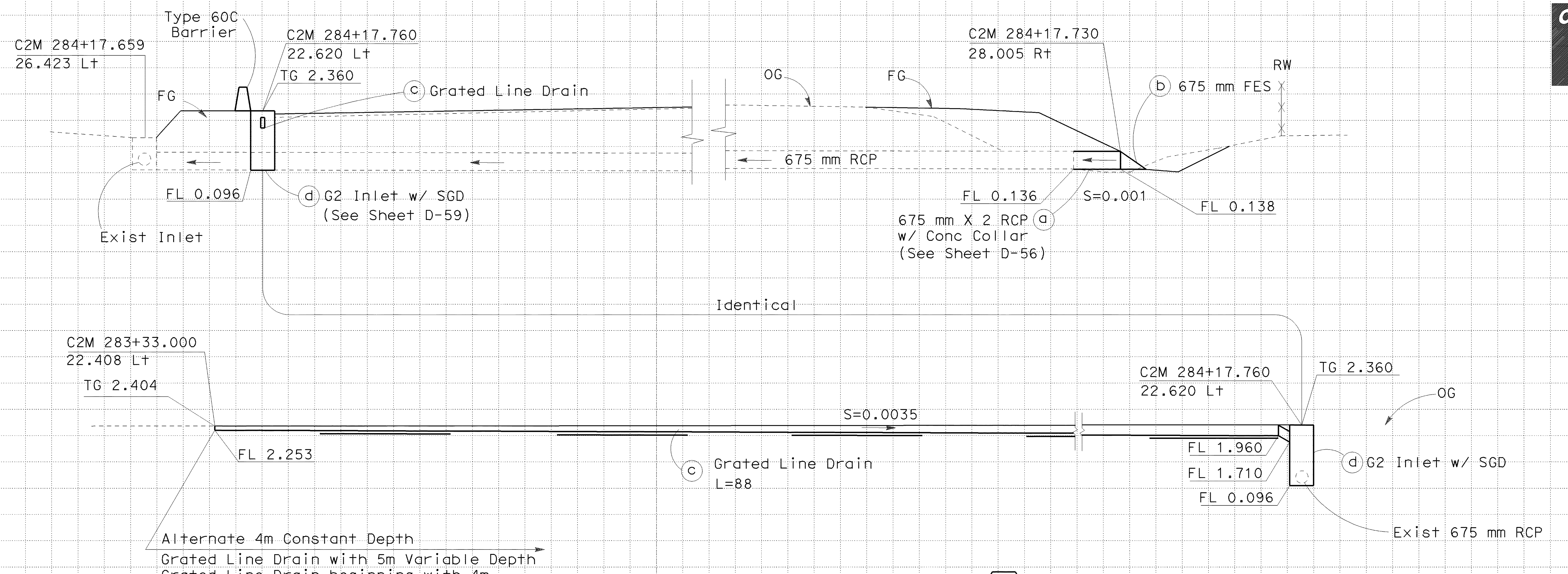

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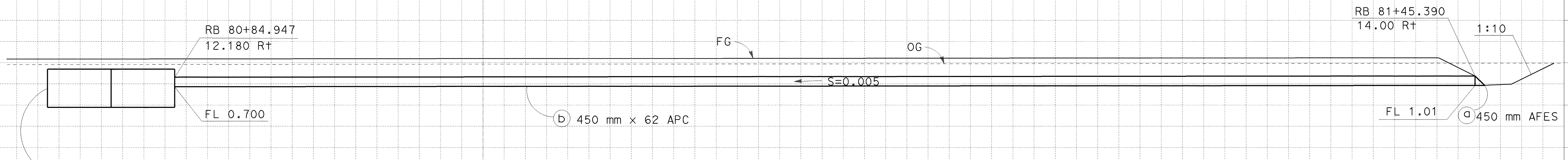

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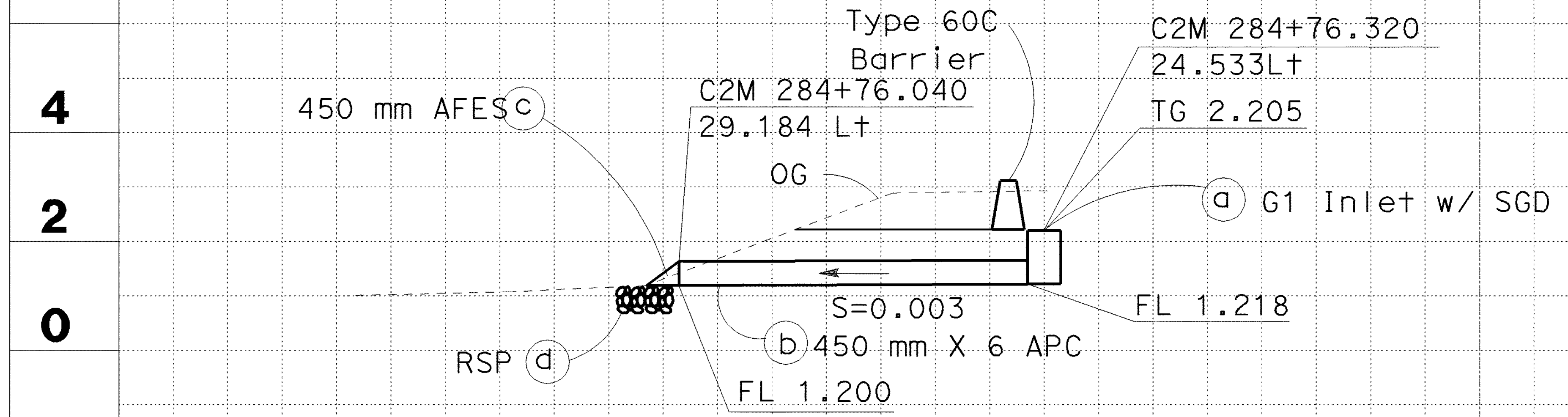

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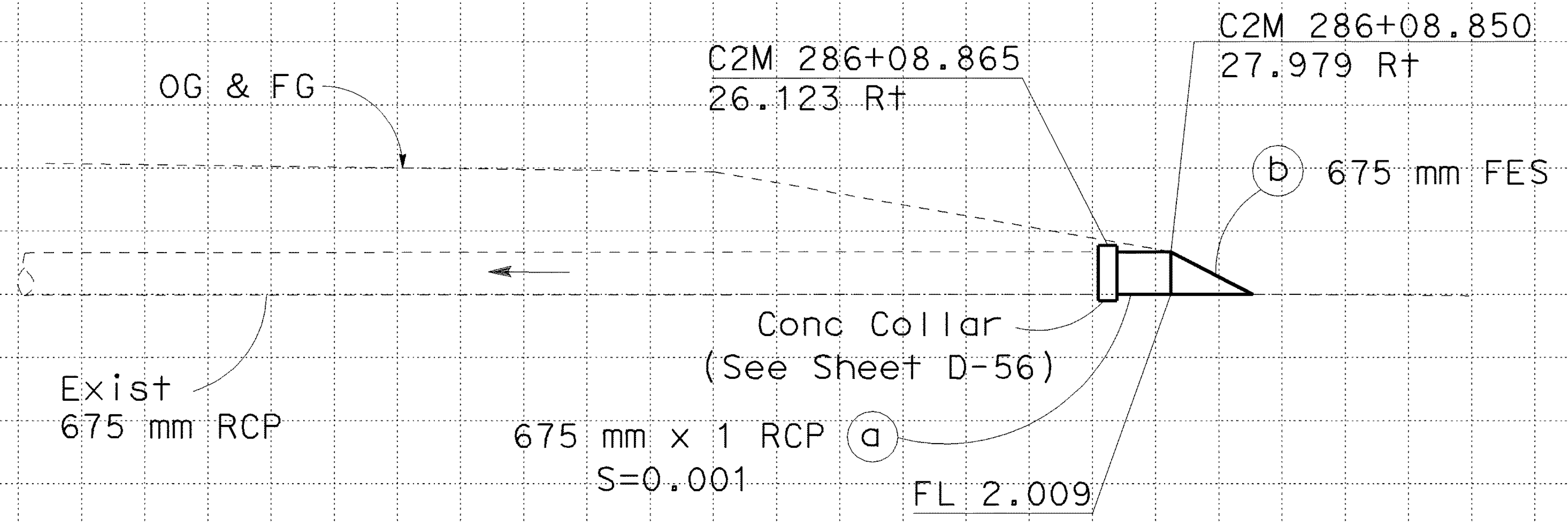

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NO Construction Changes

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RESIDENT ENGINEER D Schram

DRAINAGE PROFILES

SCALE: Horiz 1:100
Vert 1:100

D-34

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Appendix F

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SM	101	5.6/17.7	241	686

Jim Costantini 03/31/02
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9-16-02
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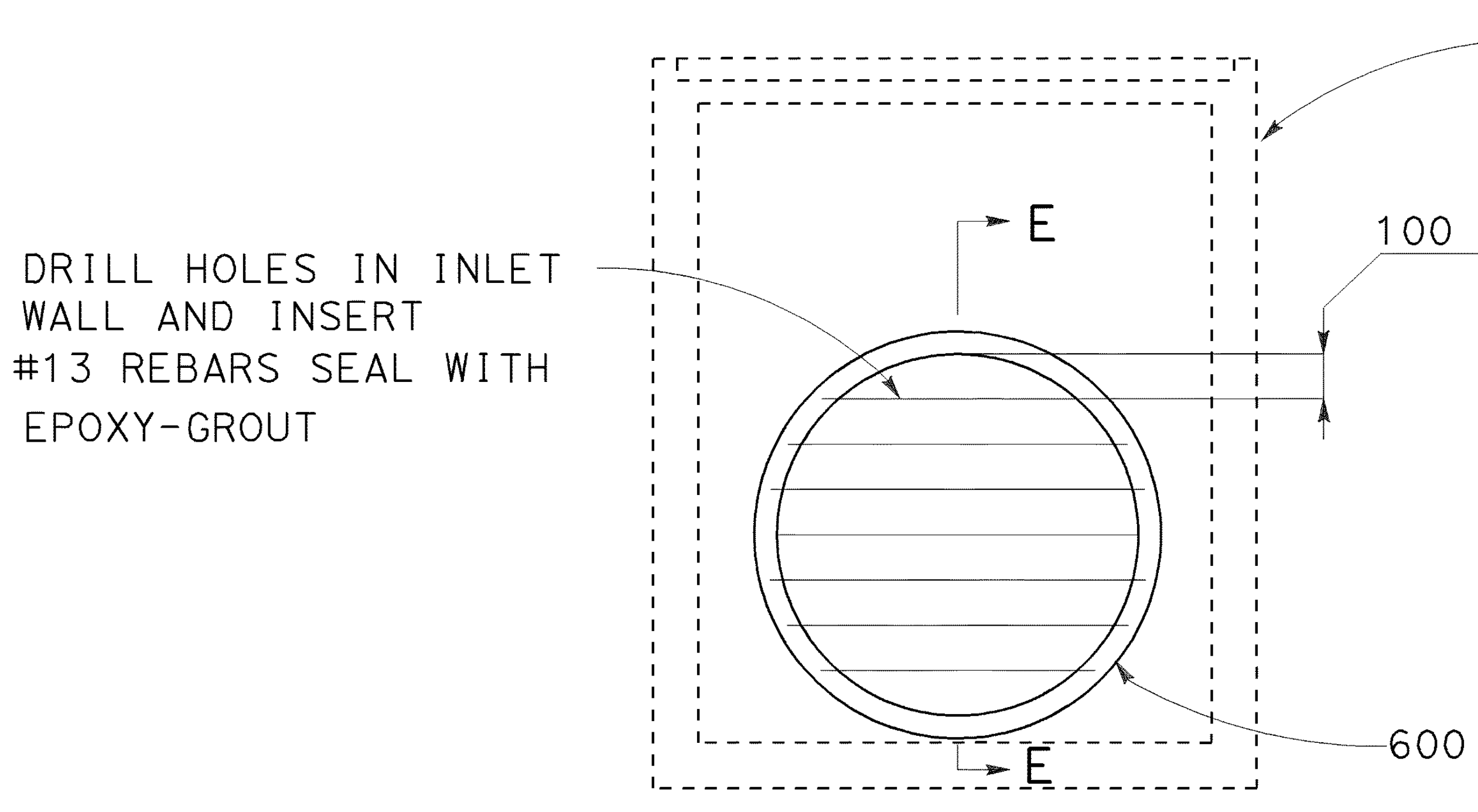
CIVIL

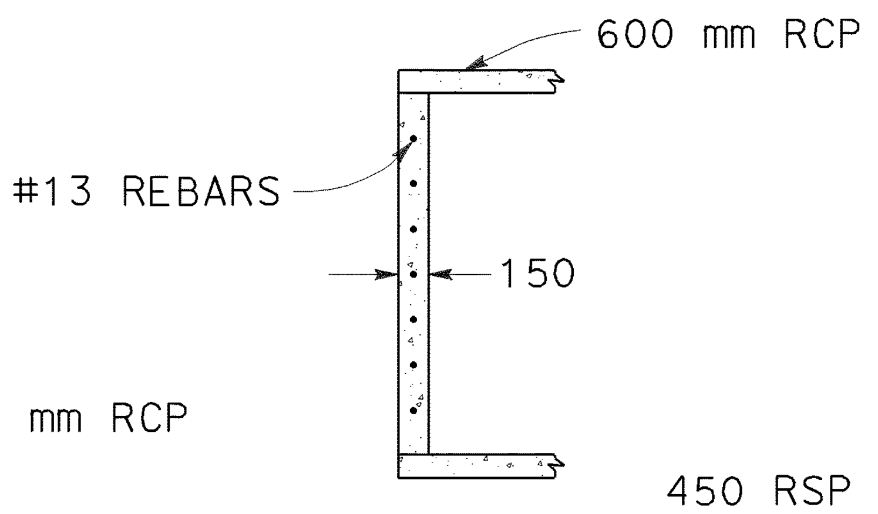
SAN MATEO COUNTY
TRANSPORTATION AUTHORITY
1250 San Carlos Avenue
San Carlos, CA 94070

MARK THOMAS & CO. INC.
503 Seaport Court, Suite 105
Redwood City, CA 94063

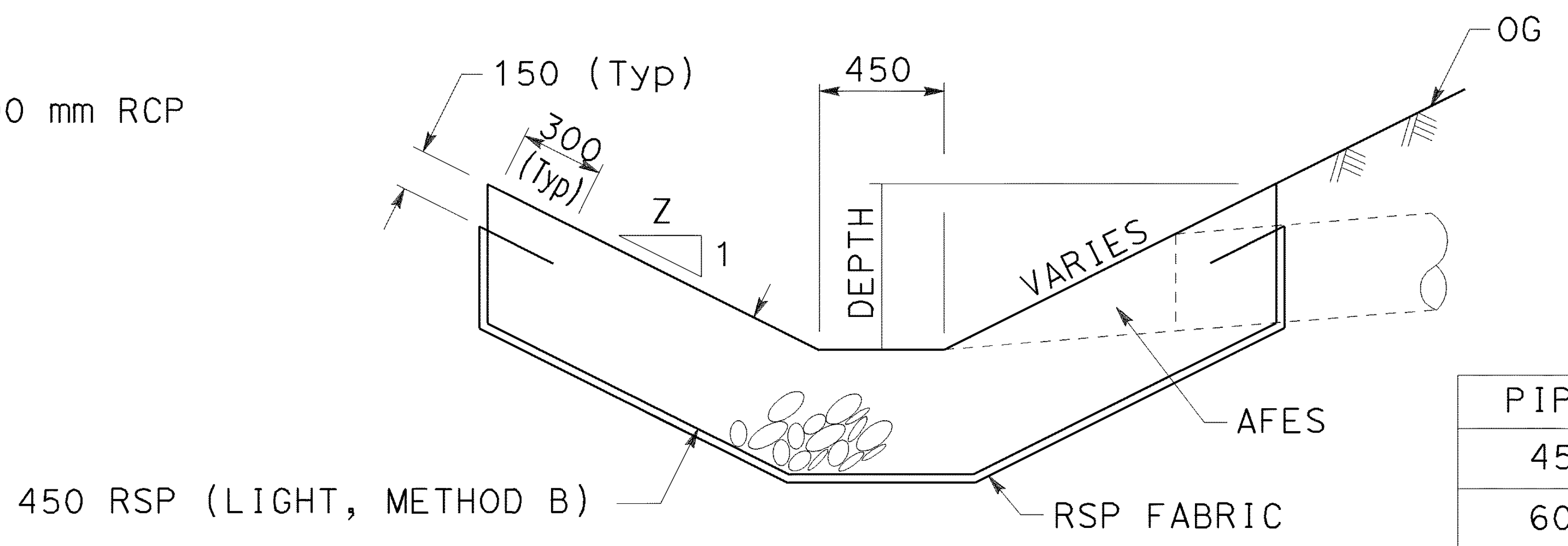


600 mm RCP PLUG

10 y



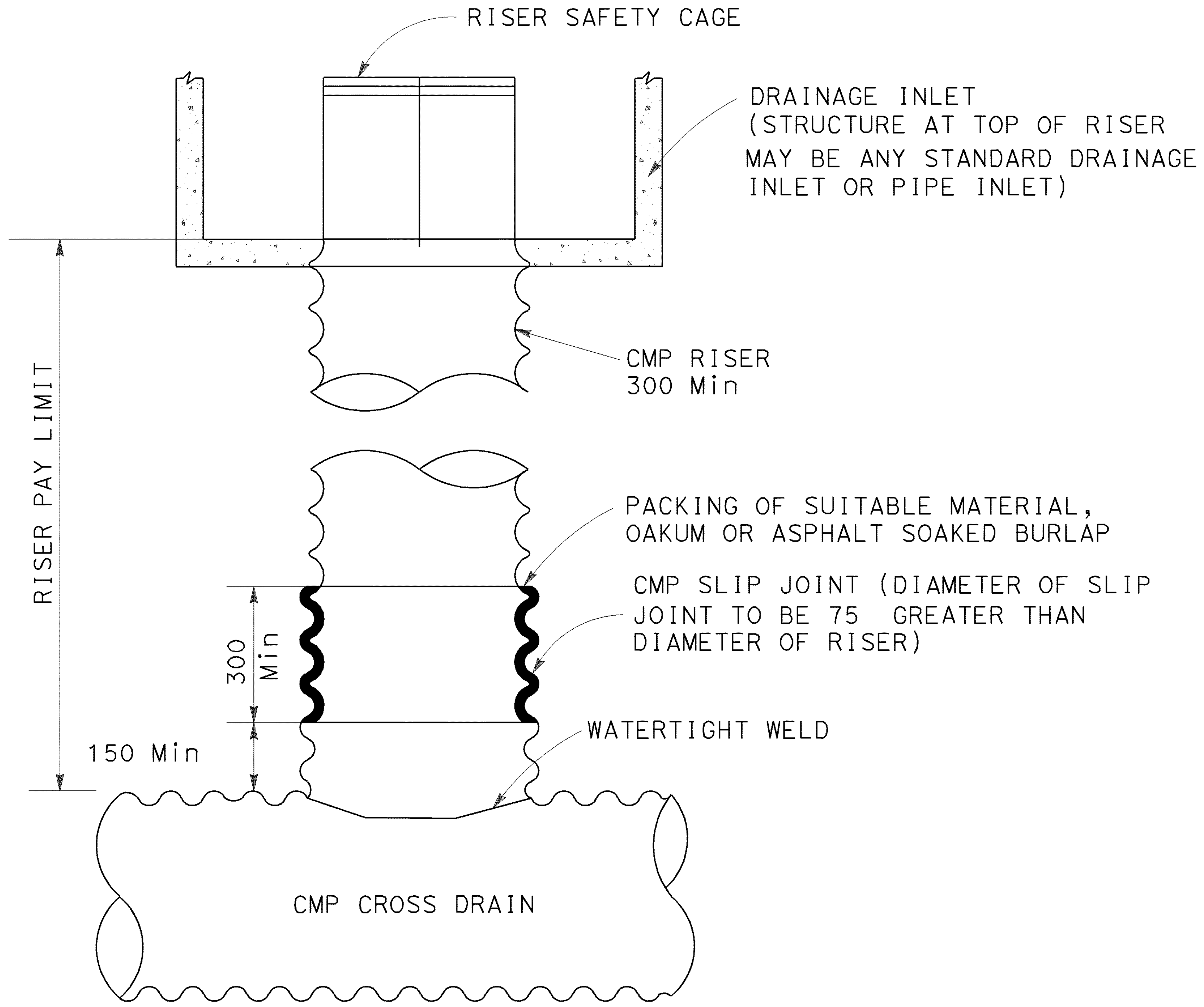
SECTION E-E



SECTION A-A

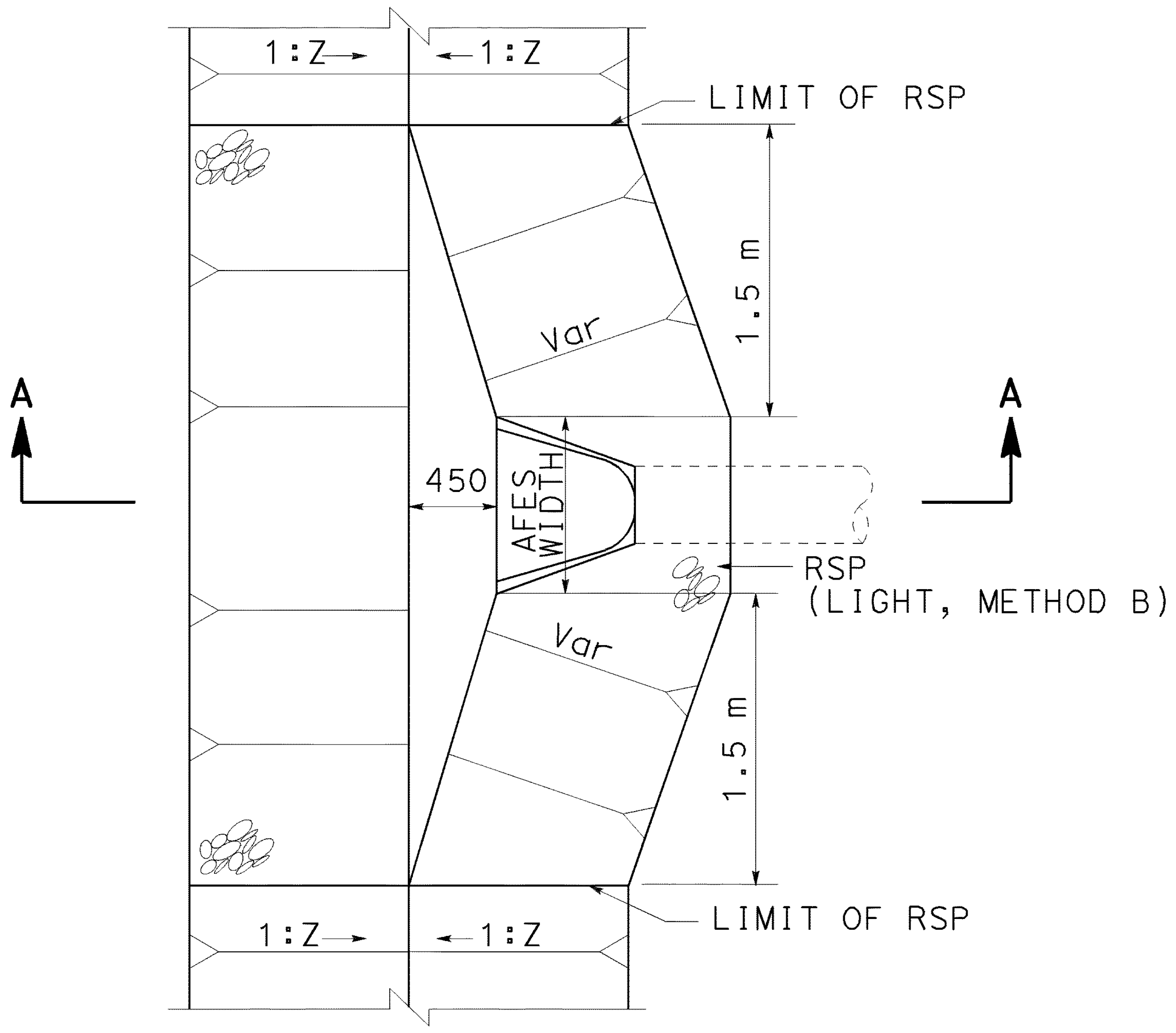
Z=2 UNLESS OTHERWISE SHOWN

PIPE Dia	DEPTH
450 mm	650 mm
600 mm	870 mm
750 mm	1.00 m
1650 mm	2.39 m



RISER CONNECTION TO EXIST CULVERT DETAIL

21 a

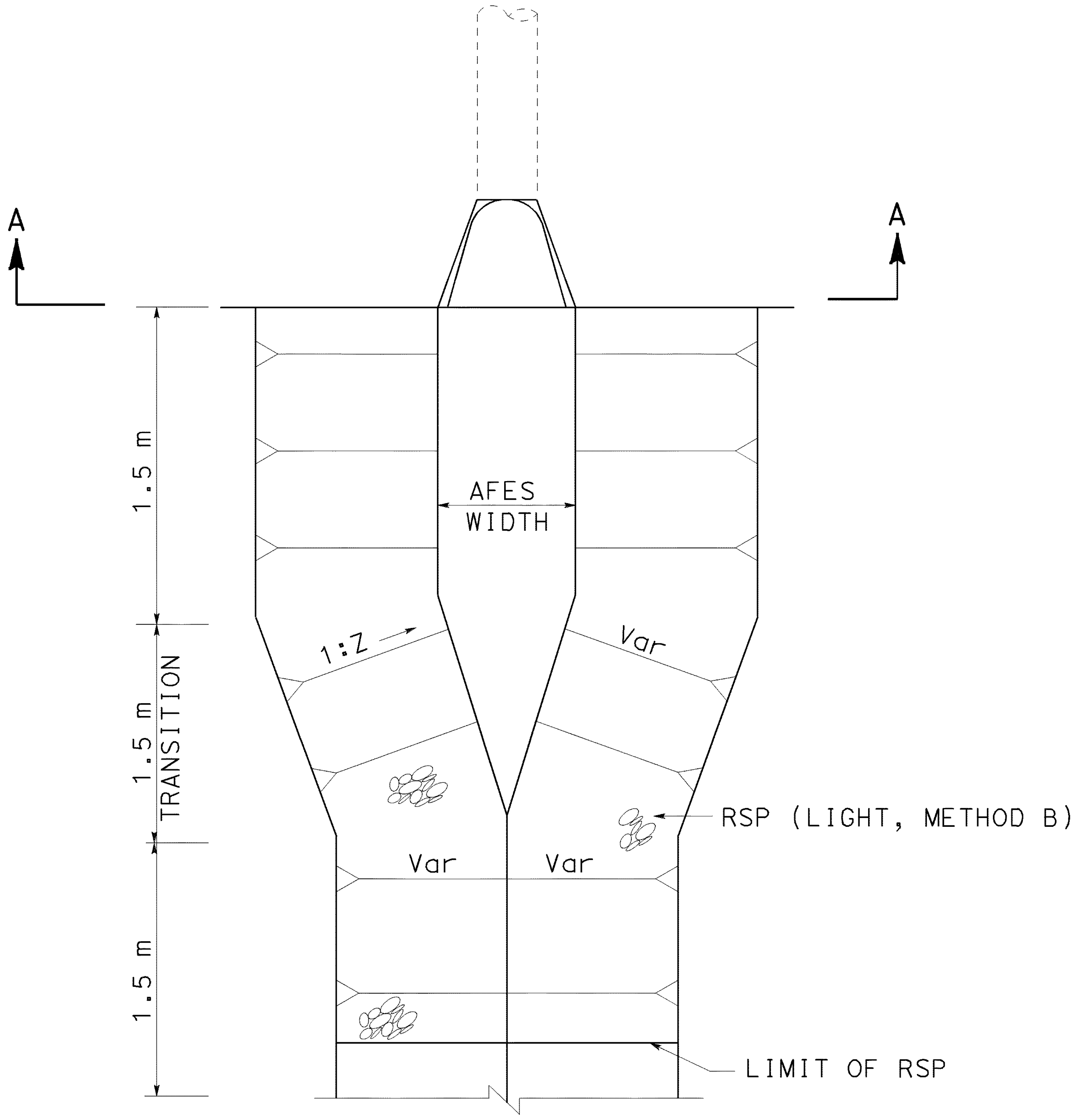


DITCH TRANSITION (CASE 2)

Z= 2 UNLESS OTHERWISE SHOWN

7 m 12 f 16 d

40 d 44 c



DITCH TRANSITION (CASE 1)

Z= 2 UNLESS OTHERWISE SHOWN

2 p 5 q 43 a

NO Construction Changes

CONTRACT No. 04-2357a4
DATE ACCEPTED 07/14/06
AS BUILT
RESIDENT ENGINEER D Schram

DRAINAGE DETAILS

NOT TO SCALE

D-55

THIS SHEET ACCURATE FOR DRAINAGE DETAILS ONLY
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SHOWN

CALCULATED/ DESIGNED BY	JK	DATE 3/02	REVISED BY
CHECKED BY	BL	3/02	DATE REVISED

DESIGN OVERSIGHT
DIXON LAU

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80 100

COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

April 5, 2017
E0234A

Mr. David A. Gutierrez
Chief
DEPARTMENT OF WATER RESOURCES – DIVISION OF SAFETY OF DAMS
P.O. Box 942836
Sacramento, California 94236-0001

SUBJECT: **Annual Survey Monument and Piezometer Monitoring and Evaluation**
RE: Notre Dame Dam No. 619
Belmont, California

REFERENCE: Geotechnical Investigation of Dam Stability and Piezometer Installation Report, Notre Dame Dam No. 619, Belmont, California, prepared by Cotton, Shires and Associates, Inc., dated October 21, 2005.

Dear Mr. Gutierrez:

With this letter report, Cotton, Shires and Associates, Inc. (CSA) is presenting the results of our annual monitoring of the survey monuments and piezometers at the Notre Dame Dam No. 619, located in Belmont, California. This monitoring was performed on March 20, 2017.

Survey Monument Monitoring

Using the monument Benchmarks installed in October 2004 (SM-1 and SM-5), CSA reoccupied the survey grid (created in October 2004) on March 20, 2017, and measured locations of the three survey monuments located across the dam crest (SM-2 through SM-4). Northings, eastings and elevations for the three survey monuments were compared and horizontal and vertical differences relative to our initial October 8, 2004 survey were calculated. The magnitude and direction of the difference for each survey monument is shown on the attached graphs and Figure No. 1.

The three survey monuments show relatively minor (0.4 inch to 0.6 inch) apparent horizontal differences compared to initial measurements. The positive directions of horizontal differences were measured as southwesterly (SM-2), northeasterly (SM-3) and northerly (SM-4). The monitoring results indicate that SM-2, SM-3 and SM-4 settled 0.6 inch, 0.8 inch and 0.3 inch, respectively when compared to the initial measurements. It should be noted that a significant portion of the total apparent settlement in SM-2 and SM-3 was recorded between February 2013 and February 2016 (0.4 inch and 0.6 inch respectively). During this time interval, the site experienced extreme drought conditions and these conditions may be exacerbating the typical shrink-swell behavior of the clayey material used in the embankment fill. Both SM-2 and SM-3 exhibited a minor rebound (heave) between February 2016 and March 2017 which coincides with average to above average precipitation. The graphs of horizontal differences (upstream and downstream horizontal differences) and vertical differences (apparent uplift or settlement) for each survey monument show that the measured differences are within a range of -0.03 feet (downstream) to 0.03 feet (upstream) of apparent horizontal differences and a range of -0.07 feet (settlement) to 0.03 feet (uplift) of apparent vertical differences from previous measurements (see attachments of graphical plots of the survey monument displacements). It is our opinion that all of these measured differences are within the precision limits of the total station theodolite survey instrument and survey procedure used for the distances surveyed, and within anticipated levels of minor seasonal ground movement.

Piezometer Monitoring

The City of Belmont provided us with their monthly piezometer readings (and lake levels) between June 2005 and March 2017. We also measured the water levels in the lake and the piezometers in July and August 2005, in January and November 2006, February 2007, March 2008, March 2009, March 2010, February 2011, February 2012, February 2013, February 2014, February 2015, February 2016 and March 2017. The results of the piezometer monitoring are plotted on Section A-A' (figure 2) and are also shown graphically on the attached figures where we present the measured water level elevation in each piezometer along with the elevation of the lake over time. The two tables present the results of CSA's and the City's piezometer monitoring (in elevation of water surface and depth to water).

The two foundation piezometers installed in the summer of 2005 (CSA/P-1 and CSA/P-4) indicate fairly constant water levels based on the CSA readings (depth to water of 26 to 32 feet in CSA/P-1 and 29 to 31 feet in CSA/P-4); however, City of Belmont readings indicated fluctuations in water level depths between 14 feet and 64 feet for CSA/P-1, and 6 feet and 43 feet for CSA/P-4. The low water levels in CSA/P-1 and CSA/P-4 measured by the City of Belmont in 2006 are lower than any readings from 2007 through March 2017. The above average precipitation during this current winter (2016/2017) correlated with elevated groundwater levels in the foundation piezometers. Piezometer CSA/P-1 showed depths of groundwater between 19.4 and 31.9 feet. It should be noted that piezometer CAS/P-1 could not be accessed in January and February 2017 due the reservoir level. Piezometer CSA/P-4 showed depths of groundwater between 22.3 and 30.3 feet. The groundwater levels measured in the foundation piezometers CSA/P-1 and CSA/P-4 are below the groundwater level analyzed in our slope stability analysis.

The two embankment piezometers installed in the summer of 2005 (CSA/P-2 and CSA/P-3) indicated erratic water levels from 2005 through 2007, and mostly consistent water levels from 2007 through March 2017. The CSA readings indicated fluctuations of 6.6 feet in CSA/P-2 and 4.3 feet in CSA/P-3, while the City of Belmont readings indicated fluctuations of up to 23 feet in CSA/P-2 and 24 feet in CSA/P-3. The low water levels measured by the City of Belmont in 2005 and 2006 are near the bottom of the piezometer casings and were taken when the lake level was rising. During the past year (March 2016 to March 2017), the readings for CSA/P-2 showed groundwater depths ranging from 42.3 to 46.3 feet. Piezometer CSA/P-3 showed groundwater depths ranging from 26.3 to 31.8 feet. Both CSA/P-2 and CSA/P-3 showed higher groundwater levels following above average precipitation during the winter of 2016/2017.

The measurements of two of the three original piezometers (P-1and P-3) over the past year (March 2016 to March 2017) indicate water levels within their historic ranges. Piezometer P-1 showed depths to groundwater between 15.7 to 24.6 feet. Piezometer P-3 showed depths to groundwater ranging from 20.6 to 25.5 feet. The depth of groundwater in piezometer P-2 remained essentially unchanged between March 2016 and January 2017 (32.2 feet depth); however, in February of 2017 piezometer P-2 rose 10.6 feet to a depth of 21.6 feet and remained elevated through our recent reading in March 2017 (28.1 feet depth). Piezometer P-2 has shown little change over the previous six years, the last significant increase in the groundwater level measured in P-2 was in March 2011.

Conclusions

It is our judgment that the measured vertical differences from the survey monument monitoring are related to seasonal expansion of the clayey materials within the embankment fill exacerbated by the historical drought conditions experienced over the past several years and the elevated precipitation levels during the 2016/2017 winter. The measured horizontal differences in SM-3 are likely the result of the monument being disturbed between 2011 and 2012. The measured differences recorded by the survey monument monitoring over the past year are within the survey precision limits of the equipment used. Based on our observations and monitoring of the survey monuments, it appears that the dam is stable at this time.

Based on our review of the piezometer measurements, it appears that the four piezometers installed in 2005 (CSA/P-1, CSA/P-2, CSA/P-3 and CSA/P-4) are accurately measuring the water levels in the foundation and embankment of the dam. It appears that the groundwater level in both the foundation and embankment rose during the winter of 2016/2017. The original piezometers continue to indicate water levels within historic ranges, however P-2 exhibited the first increase in groundwater since March 2011. It appears that P-1 does not accurately measure the phreatic surface in the dam, rather rainfall infiltration. Piezometer P-2 and CSA/P-3 (embankment) measure a similar elevation of water; consequently P-2 is likely an embankment piezometer. Similarly, P-3 is likely an embankment piezometer as well.

Based on the presented piezometer data, it appears that the phreatic surface used for our slope stability analysis and presented in our above-referenced report remains appropriate.

In general, the monthly piezometer readings for this past year (2016/2017) appear to be reasonable and consistent with the historical range of readings.

Recommendations

1) When performing the monthly piezometer measurements, the depths to water should be compared in the field against previous measurements, and if there is a difference of more than 5 feet, the depths should be re-checked; and

2) The City should continue to read the water levels in the piezometers (and measure the lake level) on a monthly basis.

Limitations

Our services consist of professional opinions and recommendations made in accordance with generally accepted engineering geology and geotechnical engineering principles and practices. No warranty, expressed or implied, or merchantability of fitness, is made or intended in connection with our work, by the proposal for consulting or other services, or by the furnishing of oral or written reports or findings.

We trust that this provides you with the information that you need at this time. If you have any questions, please don't hesitate to call.

Respectfully submitted,

COTTON, SHIRES AND ASSOCIATES, INC.

David T. Schrier

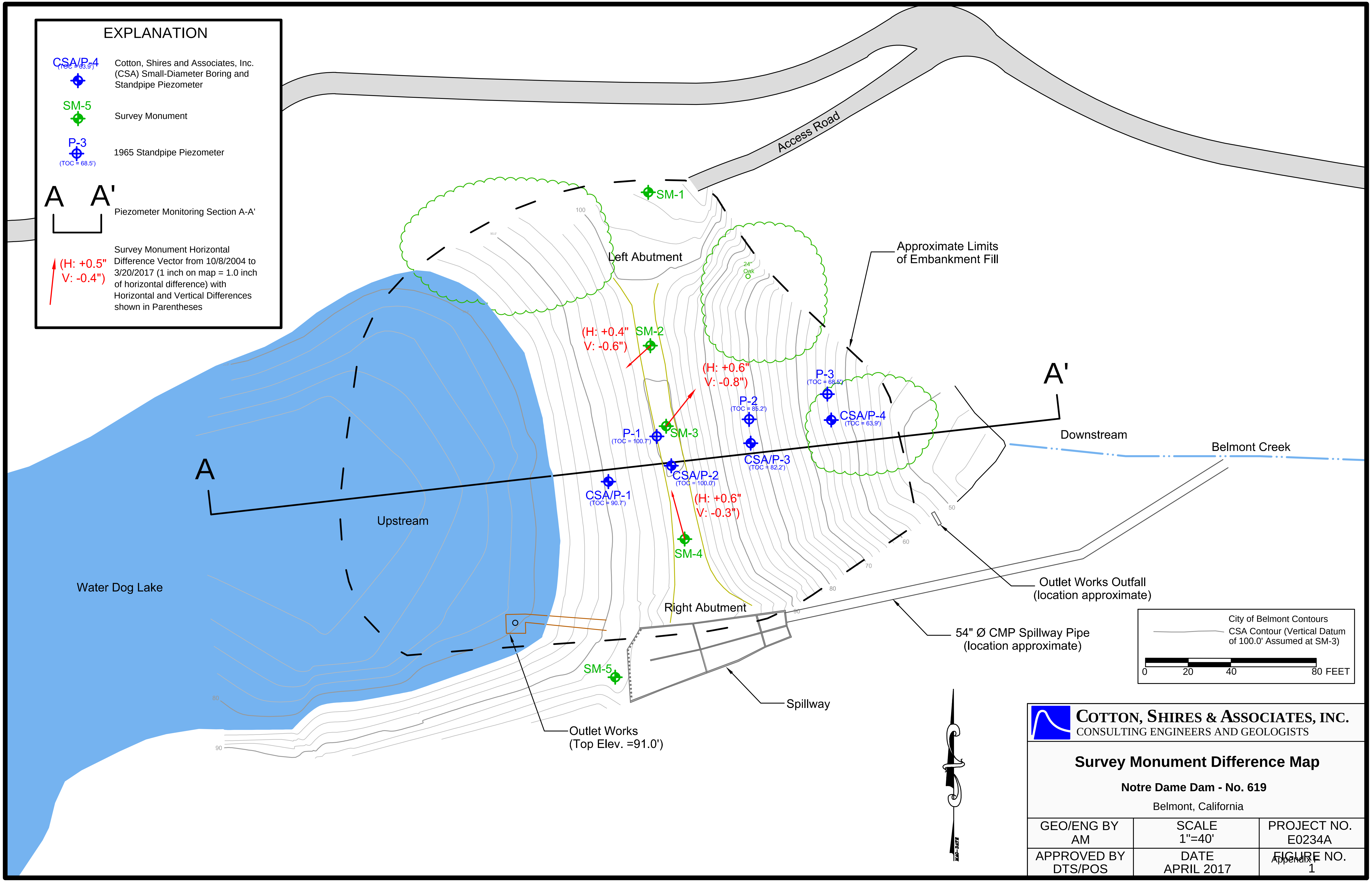
David T. Schrier
Principal Geotechnical Engineer
GE 2334

REGISTERED PROFESSIONAL ENGINEER
DAVID T. SCHRIER
NO. 2334
EXP. 12/31/17
GEOTECHNICAL
STATE OF CALIFORNIA

DTS:AM:st

Attachments:
- Figure 1 (Survey Monument Displacement Map),
- Figure 2 (Piezometer Monitoring Section A-A'),
- Graphical plots of the survey monument displacements,
- CSA Piezometer Monitoring Table,
- City of Belmont Piezometer Monitoring Table,
- Graphical plot of reservoir lake level,
- Graphical plot of foundation piezometers,
- Graphical plot of embankment piezometers,
- Graphical plot of original 1965 piezometers,
- Graphical plots of piezometers CSA/P-1 through CSA/P-4 (4 pages), and
- Graphical plots of the original piezometers, P-1 through P-3 (3 pages)

cc: Gilbert Yau (City of Belmont, Public Works Dept., One Twin Pines Lane, Suite 385, Belmont, Ca 94002)



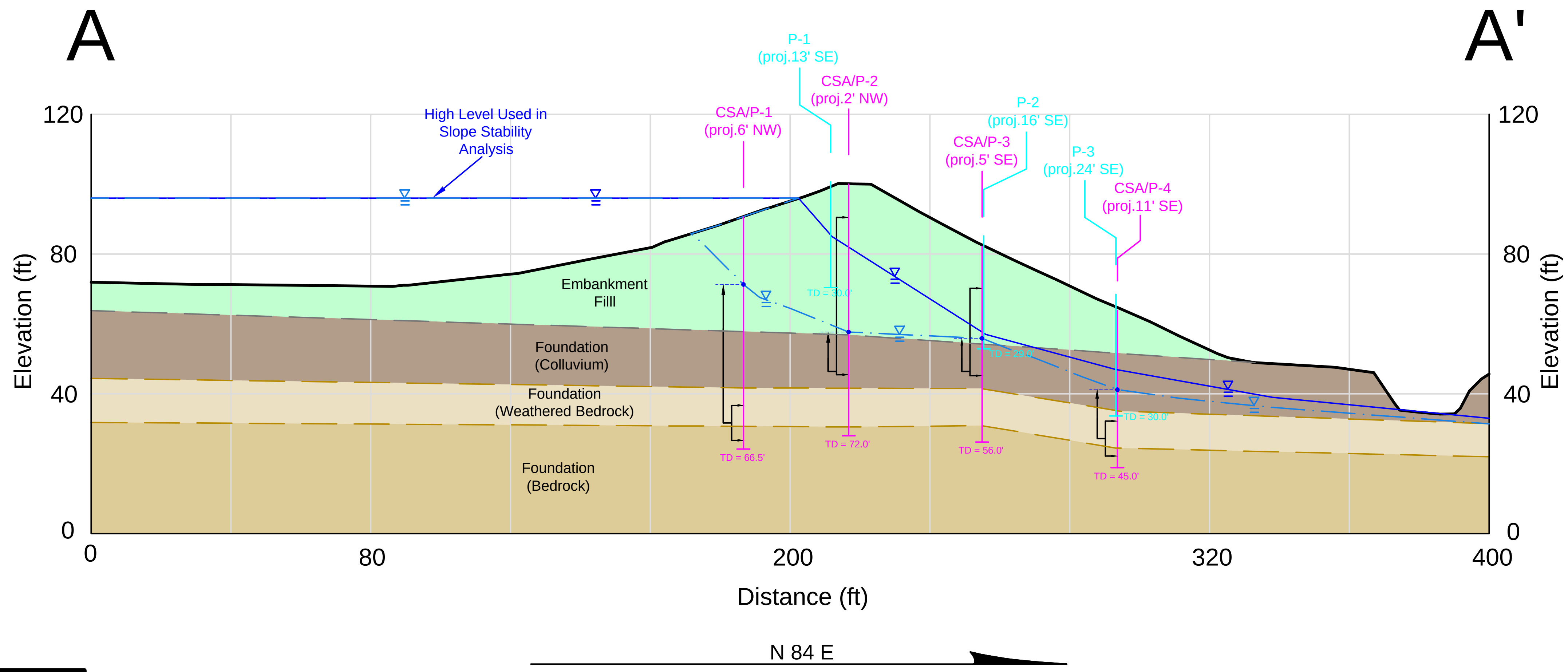
COTTON, SHIRES & ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Survey Monument Difference Map

Notre Dame Dam - No. 619

Belmont, California

GEO/ENG BY	SCALE	PROJECT NO.
AM	1"=40'	E0234A
APPROVED BY	DATE	FIGURE NO. Appendix F
DTS/POS	APRIL 2017	1



EXPLANATION

TD = 66.5' — Cotton, Shires and Associates, Inc. (CSA) Small-Diameter Boring and Standpipe Piezometer

[— Screened Zone of CSA Standpipe Piezometer

| — 1965 Standpipe Piezometer

High Groundwater Level used in Slope Stability Analysis

Highest Groundwater Level Reading from 2016/17 Readings of CSA Piezometers

COTTON, SHIRES & ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

Piezometer Monitoring Section A-A'

Notre Dame Dam - No. 619

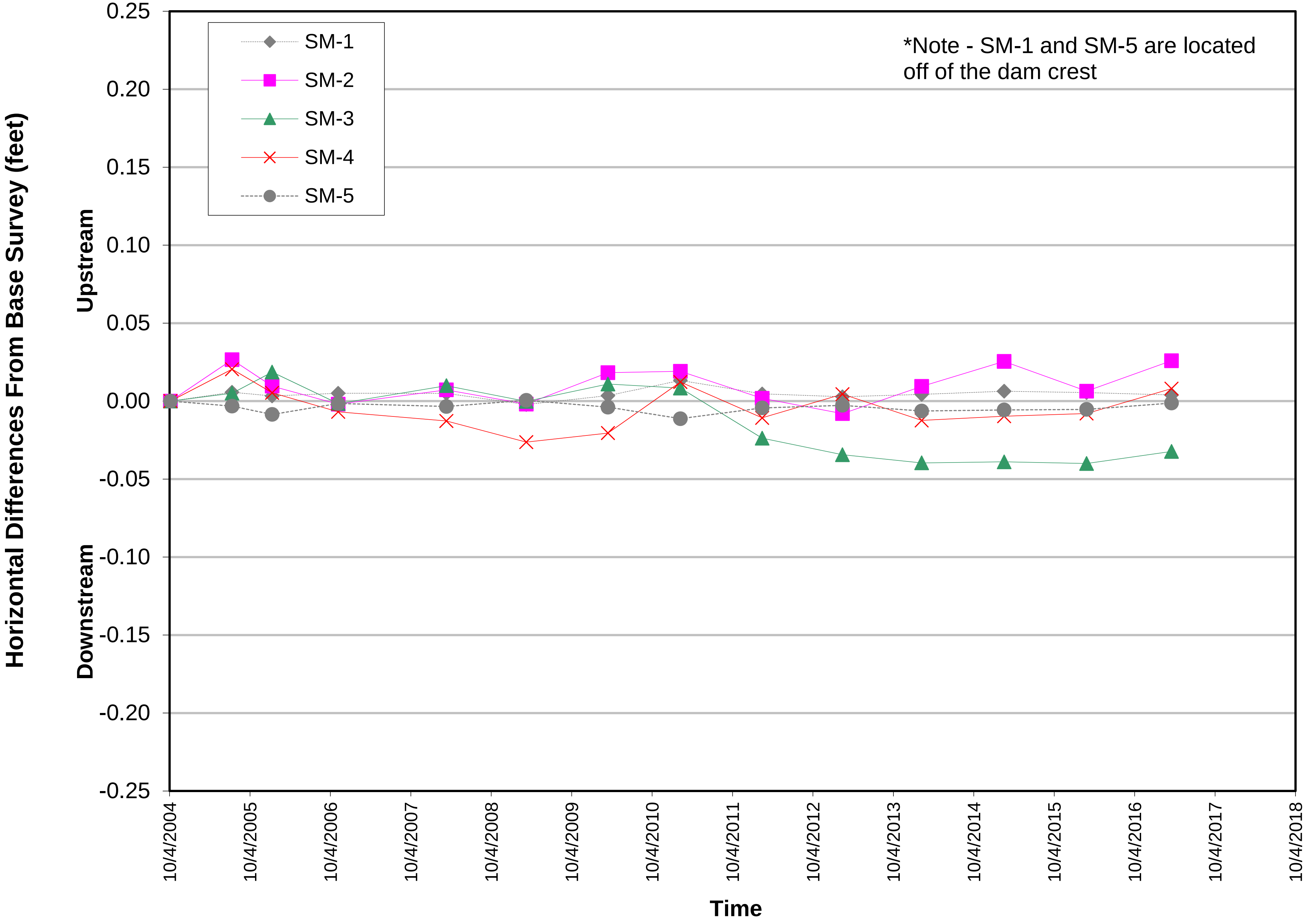
Belmont, California

GEO/ENG BY AM	SCALE 1"=40'	PROJECT NO. E0234A
APPROVED BY DTS/POS	DATE APRIL 2017	FIGURE NO. 2

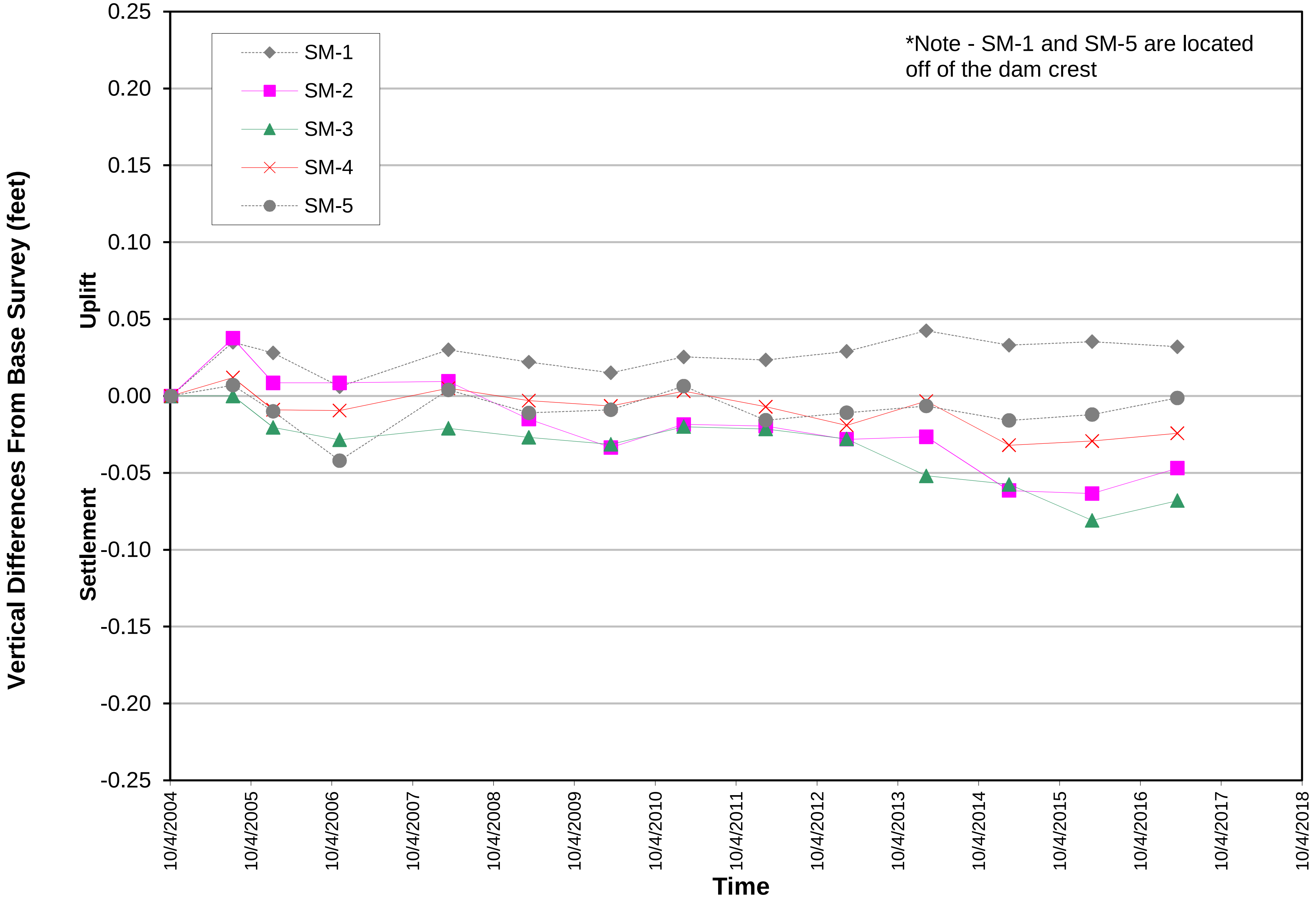
Appendix F

Notre Dame Dam No. 619

Horizontal Differences of Survey Monuments SM-1 to SM-5



Notre Dame Dam No. 619
Vertical Differences of Survey Monuments SM-1 to SM-5



Cotton, Shires and Associates, Inc.
PIEZOMETER MONITORING

Notre Dame Dam, No. 619
Standpipe Piezometer Monitoring

	Elevation of Water (feet)							
Date	**CSA/P-1**	**CSA/P-2**	**CSA/P-3**	**CSA/P-4**	**P-1**	**P-2**	**P-3**	**Lake Level**
7/15/2005	65.0	50.8	52.9	34.1	82.5	55.9	46.5	88.5
8/10/2005	64.9	51.5	52.7	34.1	81.9	55.6	---	88.7
1/13/2006	61.6	57.2	52.6	34.2	---	56.2	46.1	78.0
11/9/2006	61.6	55.8	52.3	33.6	81.4	55.4	46.3	77.8
2/1/2007	57.6	56.2	52.2	33.0	80.2	55.2	---	---
3/14/2008	59.1	55.9	52.6	33.7	87.8	56.5	46.7	78.2
3/12/2009	62.2	57.4	51.9	33.7	90.5	55.0	---	78.8
3/18/2010	59.6	56.1	53.2	33.6	88.1	55.5	46.8	78.3
2/10/2011	58.7	57.2	51.8	33.1	80.8	54.7	44.7	78.2
2/16/2012	58.3	56.2	52.0	33.1	80.4	55.0	43.9	78.1
2/15/2013	58.8	55.5	51.2	33.5	82.0	53.8	43.8	78.6
2/10/2014	58.3	54.6	50.9	33.7	77.6	53.4	---	78.8
2/19/2015	59.2	54.4	50.3	33.9	86.1	53.3	47.3	78.6
2/29/2016	59.5	54.1	50.2	33.7	78.3	53.2	42.5	78.6
3/20/2017	64.3	57.1	54.5	34.9	85.5	57.6	46.8	78.1

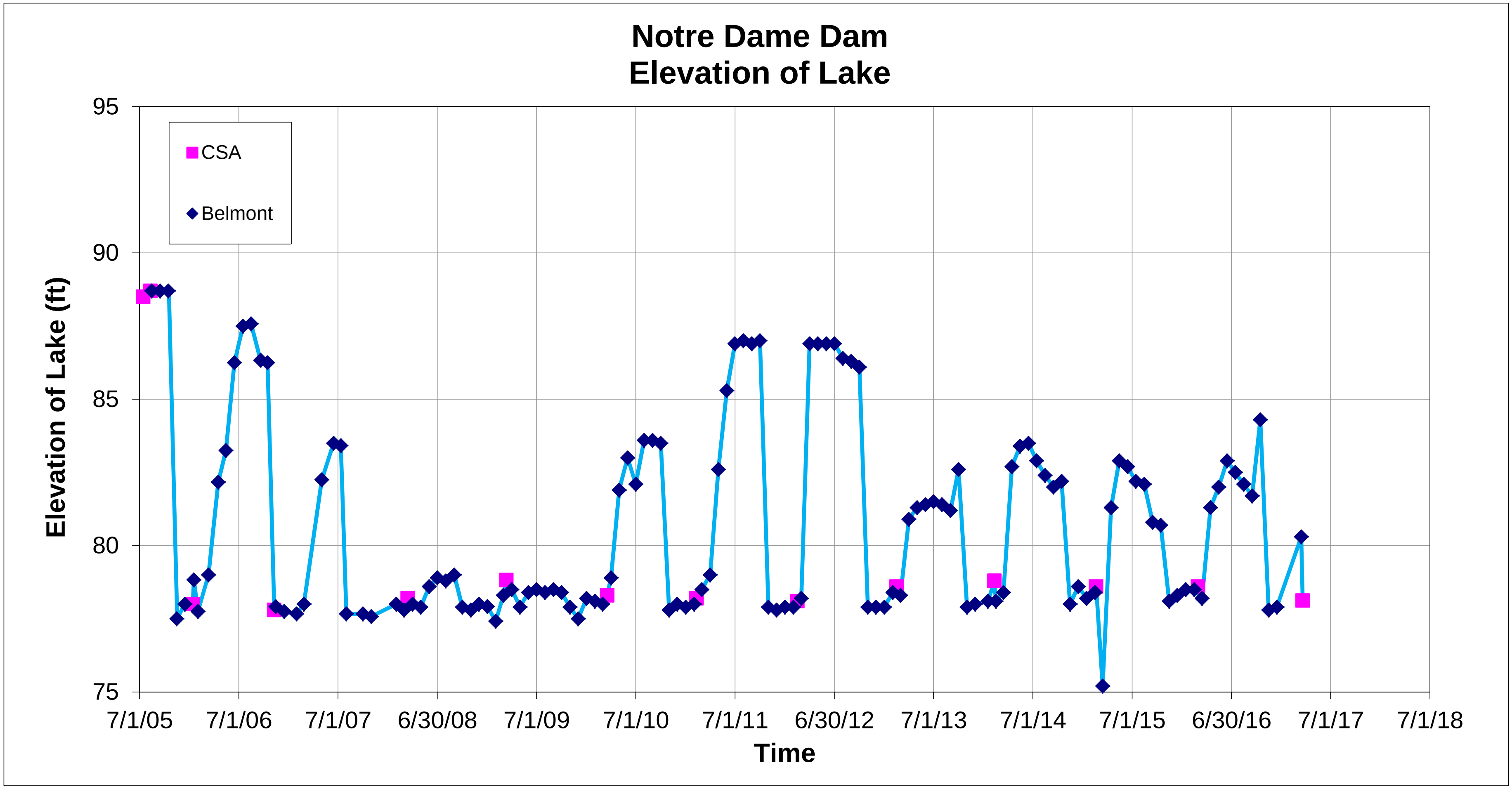
City of Belmont

PIEZOMETER MONITORING - Depth to Water Level (Feet, Inches or Decimal Feet)

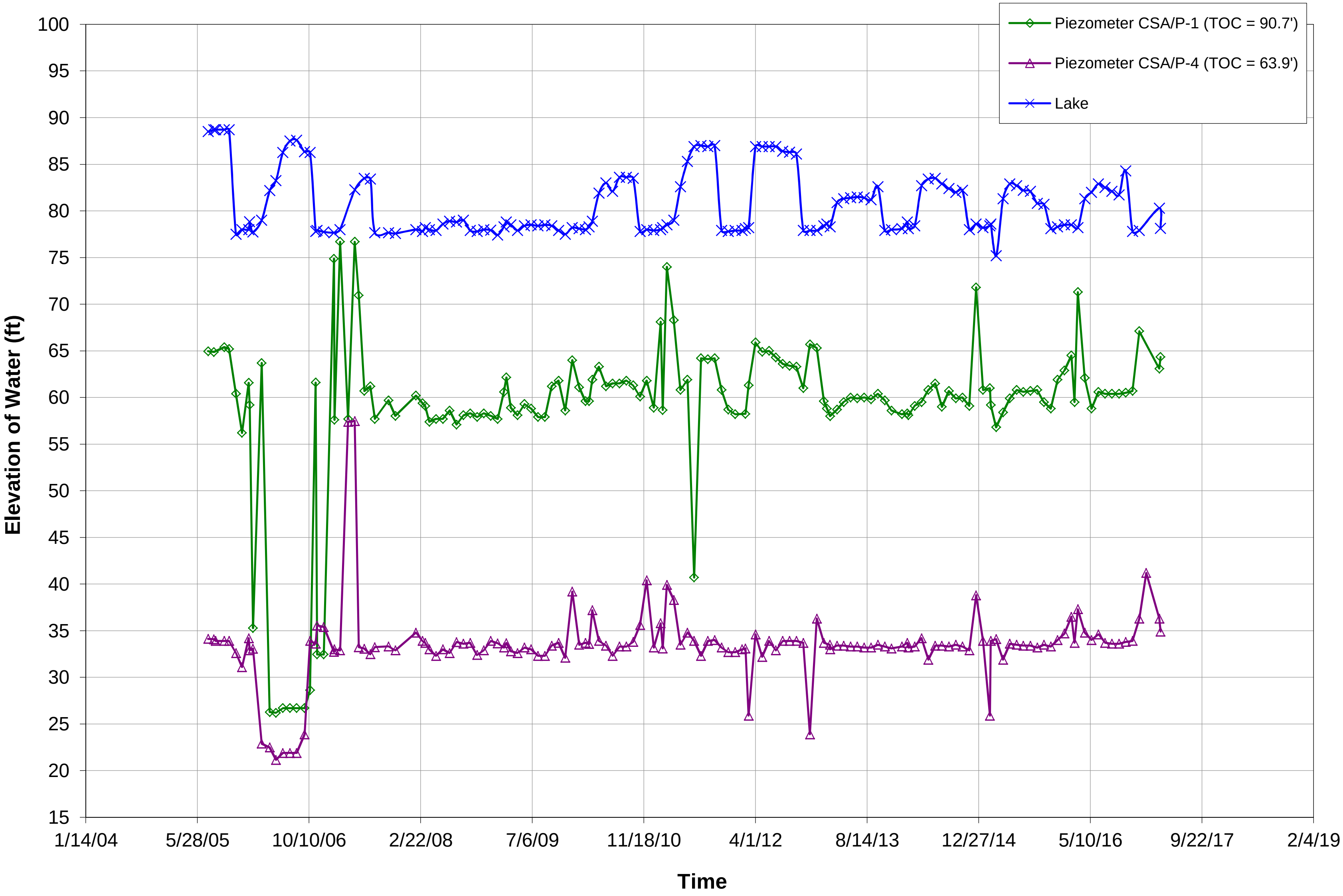
Date	**Month**	**Old Piezometers**			**New Piezometers**				**Lake Level (From Dock)**
		P-1	**P-2**	**P-3**	**CSA-P1**	**CSA-P2**	**CSA-P3**	**CSA-P4**	
6/14/2005	June	17'6"	29'	22'					
7/24/2005	July	19.6'	29.6'	22'					
8/18/2005	August	18'10"	29'4"	22'		50'	30'4"	30'	2'4"
9/26/2005	September	20'	31'8"	29'	25'4"	45'6"	36'6"	30'	2'4"
10/17/2005	October	18'8"	29'4"	22'	25'6"	54'6"	34'6"	30'	2'4"
11/17/2005	November	20'	30'1"	23'2"	30'4"	45'	30'2"	31'4"	13'6"
12/14/2005	December	20'5"	11'	19'6"	34'6"	34'8"	36'	32'10"	13'
1/17/2006	January	9'2"	29.5'	27'3"	31'6"	55'	33'	31'	12'2"
2/1/2006	February	29'4"	32'3"	No Data	55'5"	32'7"	36'10"	30'10"	13'3"
3/12/2006	March	29'	32'	No Data	27'	50'	37'	41'	12'
4/17/2006	April	33'	33'	No Data	64'5"	55'6"	36'10"	41'5"	8'10"
5/15/2006	May	29'7"	32'7"	No Data	64'6"	55'2"	36'11"	42'9"	7'9"
6/15/2006	June	33'	33'	No Data	64'	55'	37'	42'	4'9"
7/17/2006	July	33'	30'	No Data	64'	55'	37'	42'	3'6"
8/16/2006	August	33'	33'	No Data	64'	55'	37'	42'	3'5"
9/20/2006	September	33'	31'	No Data	64'	54'	38'	40'	4'8"
10/15/2006	October	18'-9"	29'-6"	22'-2"	62'-1"	55'-6"	30'-4"	30'	4'-9"
11/15/2006	November	11'	26'-6"	21'-10"	58'-3"	51'-6"	30'	28'-4"	13'-1"
12/15/2006	December	11'	27'-2"	22'-1"	58'-3"	51'-9"	30'	28'-6"	13'-3"
1/30/2007	January	20'-4"	30'	22'	15'-10"	54'-7"	15'-3"	31'-2"	13'-4"
2/1/2007	February	20'-6"	30'	22'-3"	33'-1"	43'-10"	30'	30'-11"	
2/26/2007	February	20'-3"	30'-3"	22'-7"	14'-0"	55'-0"	36'-6"	31'-0"	13'-0"
4/3/2007	April	17'-0"	30'-3"	14'-0"	33'-0"	54'-9"	14'-0"	6'-6"	
5/3/2007	May	19'-4"	30'-6"	23'-9"	14'-0"	55'-0"	16'-7"	6'-5"	8'-9"
5/21/2007	May	31'-3"	31'-0"	24'-1"	19'-9"	46'-0"	30'-9"	30'-8"	
6/15/2007	June	20'-5"	32'-6"	24'-6"	30'-0"	55'-2"	36'-6"	30'-10"	7'-6"
7/12/2007	July	20'-6"	30'-6"	24'-6"	29'-6"	44'-1"	30'-0"	31'-5"	7'-7"
8/1/2007	August	22'-5"	31'-2"	26'-2"	33'-0"	44'-10"	31'-0"	30'-8"	13'-4"
10/1/2007	October	22'-0"	31'-0"	26'-0"	31'-0"	44'-0"	30'-4"	30'-7"	13'-4"
11/1/2007	November	22'-1"	30'-6"	26'-0"	32'-8"	44'-5"	30'-8"	31'-0"	13'-5"
2/1/2008	February	10.1	29.9	21.9	30.5	43.3	30.3	29.1	13
3/1/2008	March	11	28.1	21.7	31.3	44.2	30	30	13.2
4/1/2008	April	16.7	29.7	22	33.3	44	29.7	30.9	13
5/1/2008	May	17.1	*43.8*	29.1	33	43.8	29.1	31.6	13.1
6/1/2008	June	18.6	30	22.2	33	43.6	29.9	30.9	12.4
7/1/2008	July	19.7	30.2	23.2	32.1	43.9	30.1	31.3	12.1
8/1/2008	August	18.9	30.1	22.7	33.6	43.6	30.6	30.11	12.2
9/1/2008	September	19.8	33	24.6	32.6	38	30	30.3	12
10/1/2008	October	21.3	30.3	25.1	32.4	44.1	30.3	30.2	13.1
11/1/2008	November	21.6	30.3	25.5	32.8	44.2	30.2	31.5	13.2
12/1/2008	December	21.7	30.4	25.6	32.4	44.2	30.3	31	13
1/1/2009	January	22.25	30.08	25.25	32.67	44.25	30.17	30	13.08
2/1/2009	February	22.42	31	25.25	33	44.17	31	30.25	13.58
3/1/2009	March	22.8	30.3	22	30.1	43.6	30.3	30.7	12.7
4/1/2009	April	17.1	30.3	22.1	31.8	44.3	30	31.1	12.5
5/1/2009	May	18.4	30.3	22.2	32.6	44.3	30	31.3	13.1
6/1/2009	June	17.9	30	21.9	31.4	43.9	30	30.7	12.6
7/1/2009	July	18.1	30.2	21.5	31.9	43.9	30.6	30.9	12.5
8/1/2009	August	20.8	30.5	23.9	32.8	44.4	30.3	31.6	12.6
9/1/2009	September	21.3	30.5	24.9	32.8	44.4	30.3	31.6	12.5
10/1/2009	October	22.5	29.9	24.7	29.5	44.7	30.4	30.5	12.6
11/1/2009	November	22	30.7	25.3	28.9	44.6	30.5	30.2	13.1
12/1/2009	December	21.5	30.5	25.7	32.1	45	29.1	31.8	13.5
1/1/2010	January	15.5	30.4	22	26.7	43.11	30.2	24.7	12.8
2/1/2010	February	16.6	30.5	22	29.6	44	30.4	30.4	12.9
3/1/2010	March	12.8	29.8	21.7	31.1	43.9	29.9	30.2	13
4/1/2010	April	11	28.7	21.4	28.8	44	29.6	26.7	12.1
5/1/2010	May	17.3	29.5	22	27.4	43.3	29.5	30	9.1
6/1/2010	June	18.7	29.9	22.1	29.5	43.4	23.7	30.5	8
7/1/2010	July	19.5	30	22.2	29.2	43.4	29.8	31.6	8.9
8/1/2010	August	20.4	30.1	22.5	29.2	43.6	30	30.6	7.4
9/1/2010	September	20.8	30.1	22.6	28.9	43.6	30.1	30.6	7.4
10/1/2010	October	21.5	30.2	23.7	29.4	43.8	30.1	30.1	7.5
11/1/2010	November	21.8	30.3	23.8	30.6	44	30.3	28.3	13.2
12/1/2010	December	19.2	30.7	23.6	28.9	43.5	30.5	23.5	13
1/1/2011	January	19.6	30.5	23.7	31.8	43.7	30.3	30.7	13.1
2/1/2011	February	17.8	29.8	21.6	22.6	43.9	30.3	28.1	13
3/1/2011	March	14.8	24	21	16.7	40	29.4	24	12.5
4/1/2011	April	17.2	27.7	22	22.4	44.2	28.4	25.6	12
5/1/2011	May	18.3	28.8	22	29.9	42.6	29	30.4	8.4
6/1/2011	June	19.2	29.1	22.2	28.8	42.9	29.3	29.1	5.7
7/1/2011	July	20	29.6	22.3	50	43.1	29.6	30	4.1
8/1/2011	August	20.9	29.7	22.5	26.5	43.3	29.7	31.6	4
9/1/2011	September	21.1	29.8	22.8	26.6	43.5	29.8	30	4.1
10/1/2011	October	21.5	30.1	24.3	26.5	43.7	30	29.9	4
11/1/2011	November	21.8	30	24.5	29.9	43.8	30.1	30.7	13.1
12/1/2011	December	22.2	30.3	24.6	32	44	30.4	31.2	13.2

Date	**Month**	**Old Piezometers**			**New Piezometers**				**Lake Level (From Dock)**
		P-1	**P-2**	**P-3**	**CSA-P1**	**CSA-P2**	**CSA-P3**	**CSA-P4**	
1/1/2012	January	22.3	30	24.7	32.5	43.9	30.2	31.2	13.1
2/1/2012	February	20.4	30.4	24.9	32.6	44	30.4	30.9	13.1
3/1/2012	March	17.3	30.3	25	29.4	38	30.6	38	12.8
4/1/2012	April	13	30.2	24.8	24.8	43.8	30.2	29.3	4.1
5/1/2012	May	16.8	30.4	24.9	25.8	43.6	30.4	31.7	4.1
6/1/2012	June	17.6	30.5	24.9	25.7	43.7	30.2	30	4.1
7/1/2012	July	18.4	30.6	25.2	26.4	44	30.5	31	4.1
8/1/2012	August	19.3	30.7	25.6	27.1	44.2	30.6	30	4.6
9/1/2012	September	19.7	30.9	25.8	27.3	44.4	30.7	30	4.7
10/1/2012	October	20.2	31	25.9	27.4	44.4	30.7	30	4.9
11/1/2012	November	20.5	30.4	26.4	29.7	43.7	30.8	30.2	13.1
12/1/2012	December	17.5	30.9	26.2	25	44.6	30.9	40	13.1
1/1/2013	January	17	31.3	22	25.4	44.4	31.6	27.6	13.1
2/1/2013	February	18.7	31.3	24.6	31.1	44.4	31	30.2	12.6
3/1/2013	March	19.2	31.3	24.9	32.7	44.9	31.5	30.9	12.7
4/1/2013	April	20	31.6	25	32	44.7	30.7	30.5	10.1
5/1/2013	May	20.5	31.5	25.4	31.2	44.8	31	30.5	9.7
6/1/2013	June	21	31.7	25.4	30.7	44.8	30.8	30.6	9.6
7/1/2013	July	21.4	31.7	25.5	30.8	44.9	30.8	30.6	9.5
8/1/2013	August	21.9	31.8	25.8	30.7	42.2	31.1	30.7	9.6
9/1/2013	September	22.1	31.8	26.1	30.9	45	31.2	30.7	9.8
10/1/2013	October	22.3	32.1	26.2	30.3	45	31.4	30.4	8.4
11/1/2013	November	22.5	32.1	26.3	31	45.5	31.4	30.6	13.1
12/1/2013	December	22.7	32.1	26.4	32.1	43.6	31.7	30.8	13
1/17/2014	January	22.9	32.1	26.5	32.5	45.6	31.7	30.6	12.9
2/15/2014	February	23.2	32.1	26.8	32.6	45.6	31.5	30.7	12.9
3/15/2014	March	23.5	32.3	27	31.6	45.7	31.8	30.6	12.6
4/15/2014	April	24.8	32.1	26.6	31.2	45.5	31.7	29.7	8.3
5/15/2014	May	23.1	32.1	26.7	29.9	45.6	32	32	7.6
6/15/2014	June	23.5	32.1	26.7	29.2	45.6	31.7	30.5	7.5
7/15/2014	July	23.9	32.1	26.7	31.7	45.7	31.9	30.5	8.1
8/15/2014	August	24	32.3	26.8	30	45.2	31.9	30.6	8.6
9/15/2014	September	24.3	32.1	26.8	30.8	45.8	31.9	30.4	9
10/15/2014	October	24.4	32.1	26.8	30.7	45	32	30.6	8.8
11/15/2014	November	24.5	32	26.8	31.6	46.1	32.2	31	13
12/15/2014	December	9.4	32.1	21.2	18.9	45.4	32.1	25.1	12.4
1/15/2015	January	15.9	32.1	22	29.9	45.4	32.1	30	12.8
2/15/2015	February	14.3	32.2	21.7	29.7	45.6	32.1	38	12.6
3/15/2015	March	16.9	32.2	21.8	33.9	46.4	29.9	29.8	15.8
4/15/2015	April	18.7	32.7	22.3	32.3	45.8	31.6	32	9.7
5/15/2015	May	19.6	31.5	22.3	30.8	45.8	32.1	30.3	8.1
6/15/2015	June	20.4	32.1	22.6	29.9	45.9	31.5	30.4	8.3
7/15/2015	July	21.3	32.2	24.1	30.1	46	31.5	30.5	8.8
8/15/2015	August	21.8	32.4	24.8	30	46	31.6	30.5	8.9
9/15/2015	September	22.5	32.7	25.5	29.9	46	31.6	30.7	10.2
10/15/2015	October	22.9	32.1	25.6	31.2	46.1	31.7	30.4	10.6
11/15/2015	November	23.2	32.2	25.8	31.9	46.3	31.7	30.6	12.9
12/15/2015	December	22.8	32.1	25.8	28.8	46.2	31.8	29.9	12.7
1/15/2016	January	22.6	32.1	25.9	27.8	46.3	31.8	29.2	12.5
2/15/2016	February	22.3	32.2	26.2	26.2	45.8	31.9	27.4	12.5
3/15/2016	March	20.1	32.2	21.7	19.4	44.7	31.8	26.6	12.8
4/15/2016	April	20.8	32.2	22	28.6	45.3	31.4	29.1	9.7
5/15/2016	May	20.5	31.8	22.8	31.9	46.3	31	29.9	9
6/15/2016	June	22.6	32.1	22.6	30.1	45.7	31.1	29.3	8.1
7/15/2016	July	23.1	32.1	22.6	30.3	44.9	31.2	30.2	8.5
8/15/2016	August	23.5	32	23.9	30.3	45.9	31.2	30.3	8.9
9/15/2016	September	23.2	32.1	24.9	30.3	45	31.2	30.3	9.3
10/15/2016	October	24.2	32.1	25.2	30.2	45.3	31.3	30.1	6.7
11/15/2016	November	24.4	32.2	25.3	30	46.1	31.3	30	13.2
12/15/2016	December	24.5	32.2	25.5	23.6	46.2	31.3	27.6	13.1
1/15/2017	January	24.6	32.1	21.5	Under water	44.7	31	22.7	Under water-flooded by storm
2/15/2017	February	16.8	21.6	20.6	Under water	42.3	26.3	22.3	Under water-flooded by storm
3/15/2017	March	15.7	28.1	21.9	27.6	43	27.8	29.3	10.7

***Dates in Italics are Assumed**

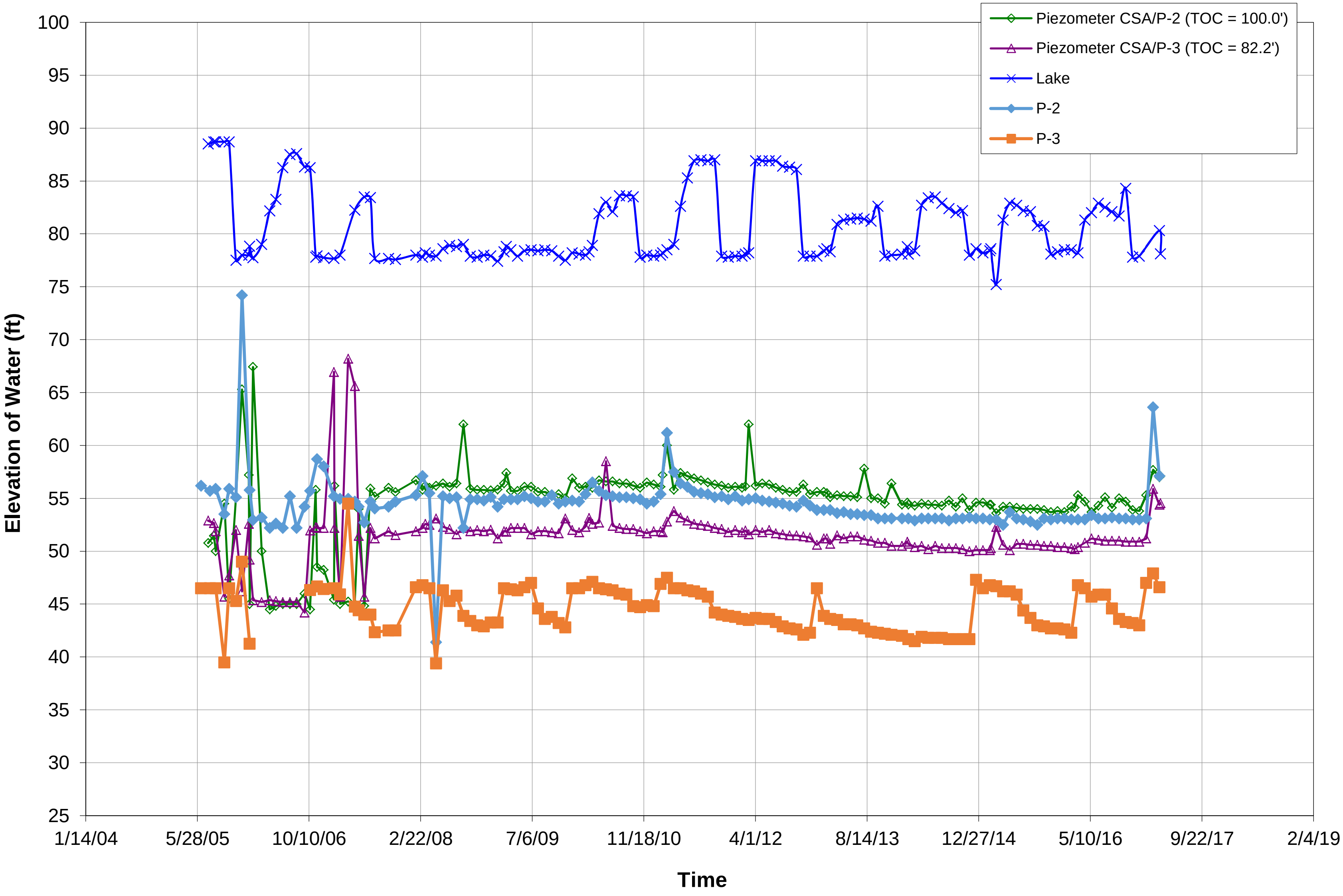

Notre Dame Dam
Elevation of Lake
Elevation of Lake (ft)
95
90
85
80
75
■ CSA
◆ Belmont
7/1/05
7/1/06
7/1/07
6/30/08
7/1/09
7/1/10
7/1/11
6/30/12
7/1/13
7/1/14
7/1/15
6/30/16
7/1/17
7/1/18
Time

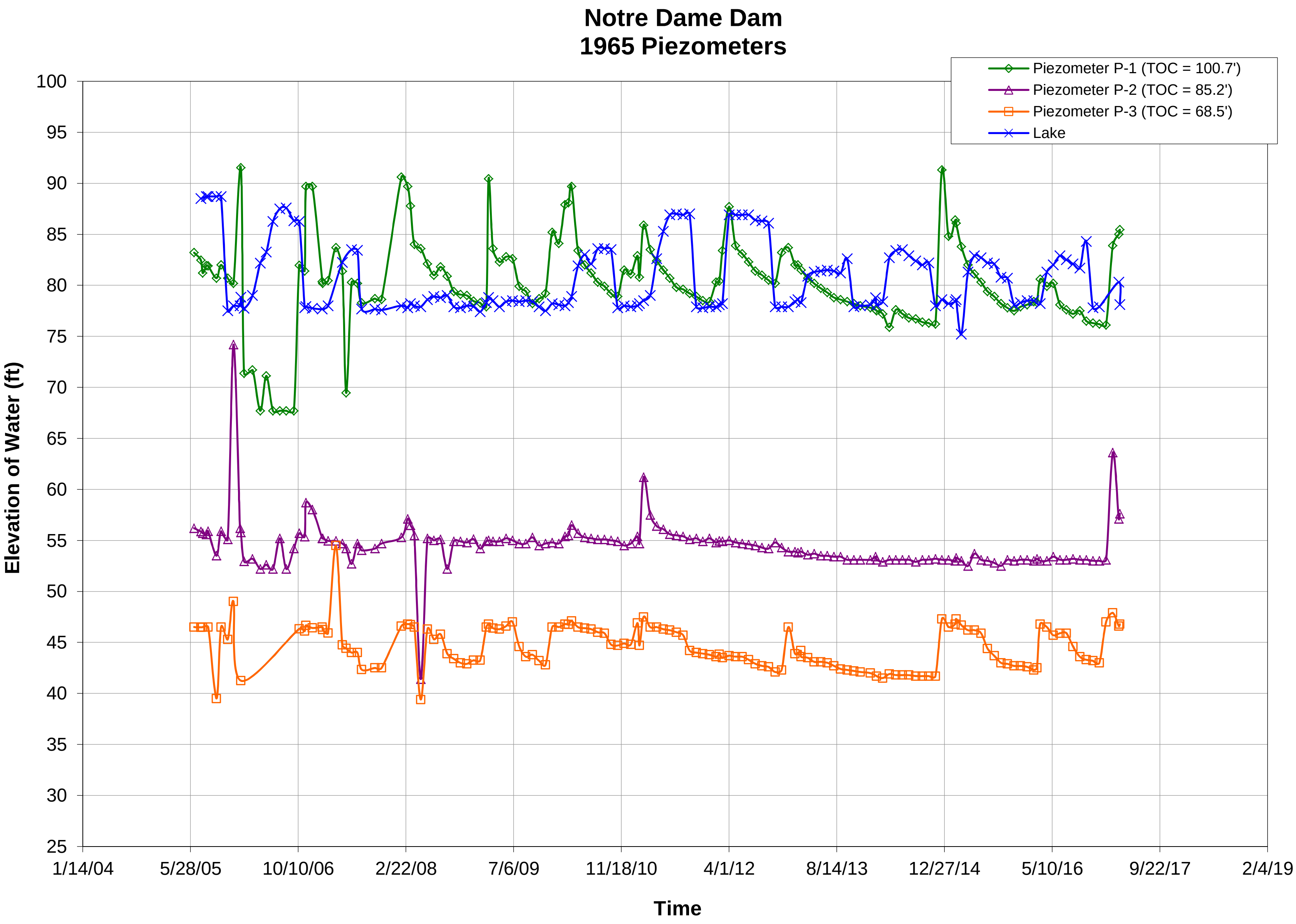
Notre Dame Dam
Foundation Piezometers



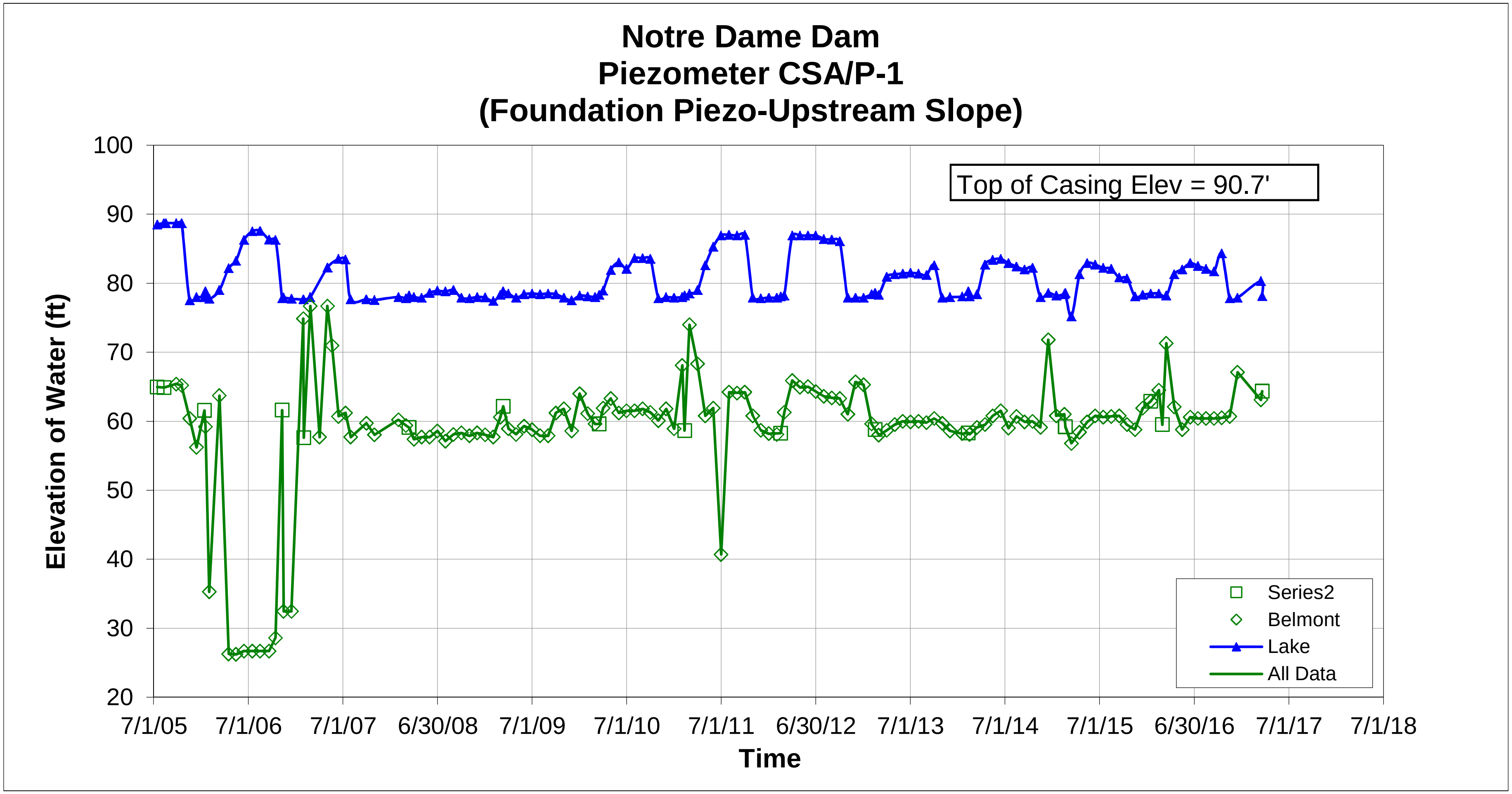
Appendix F

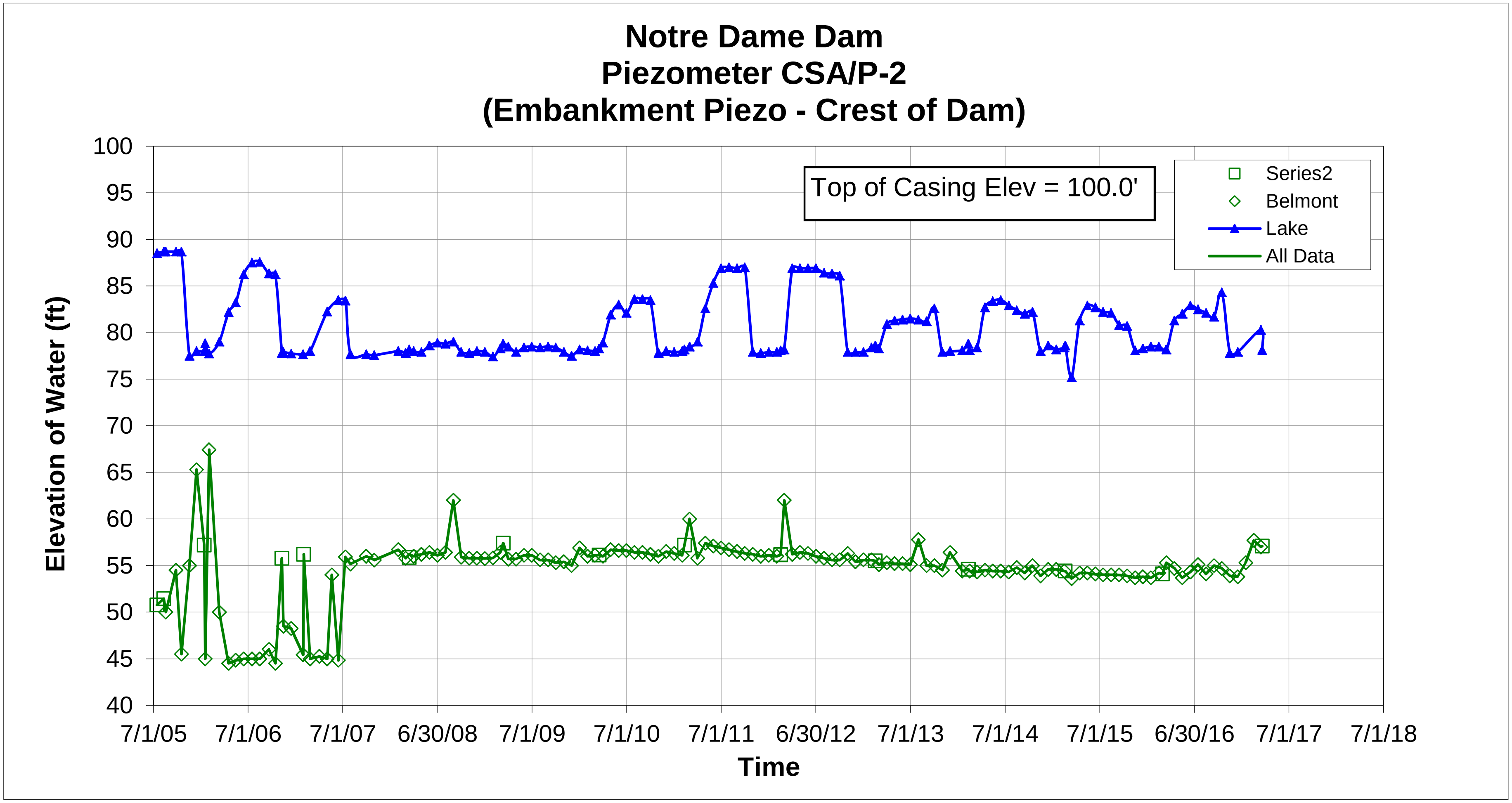
Notre Dame Dam
Embankment Piezometers




Notre Dame Dam
1965 Piezometers
Piezometer P-1 (TOC = 100.7')
Piezometer P-2 (TOC = 85.2')
Piezometer P-3 (TOC = 68.5')
Lake
Elevation of Water (ft)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
25
1/14/04
5/28/05
10/10/06
2/22/08
7/6/09
11/18/10
4/1/12
8/14/13
12/27/14
5/10/16
9/22/17
2/4/19
Time

Appendix F


Notre Dame Dam
Piezometer CSA/P-1
(Foundation Piezo-Upstream Slope)
Top of Casing Elev = 90.7'
Elevation of Water (ft)
100
90
80
70
60
50
40
30
20
7/1/05
7/1/06
7/1/07
6/30/08
7/1/09
7/1/10
7/1/11
6/30/12
7/1/13
7/1/14
7/1/15
6/30/16
7/1/17
7/1/18
Time
Series2
Belmont
Lake
All Data


Notre Dame Dam
Piezometer CSA/P-2
(Embankment Piezo - Crest of Dam)
Top of Casing Elev = 100.0'
Series2
Belmont
Lake
All Data
Elevation of Water (ft)
100
95
90
85
80
75
70
65
60
55
50
45
40
7/1/05
7/1/06
7/1/07
6/30/08
7/1/09
7/1/10
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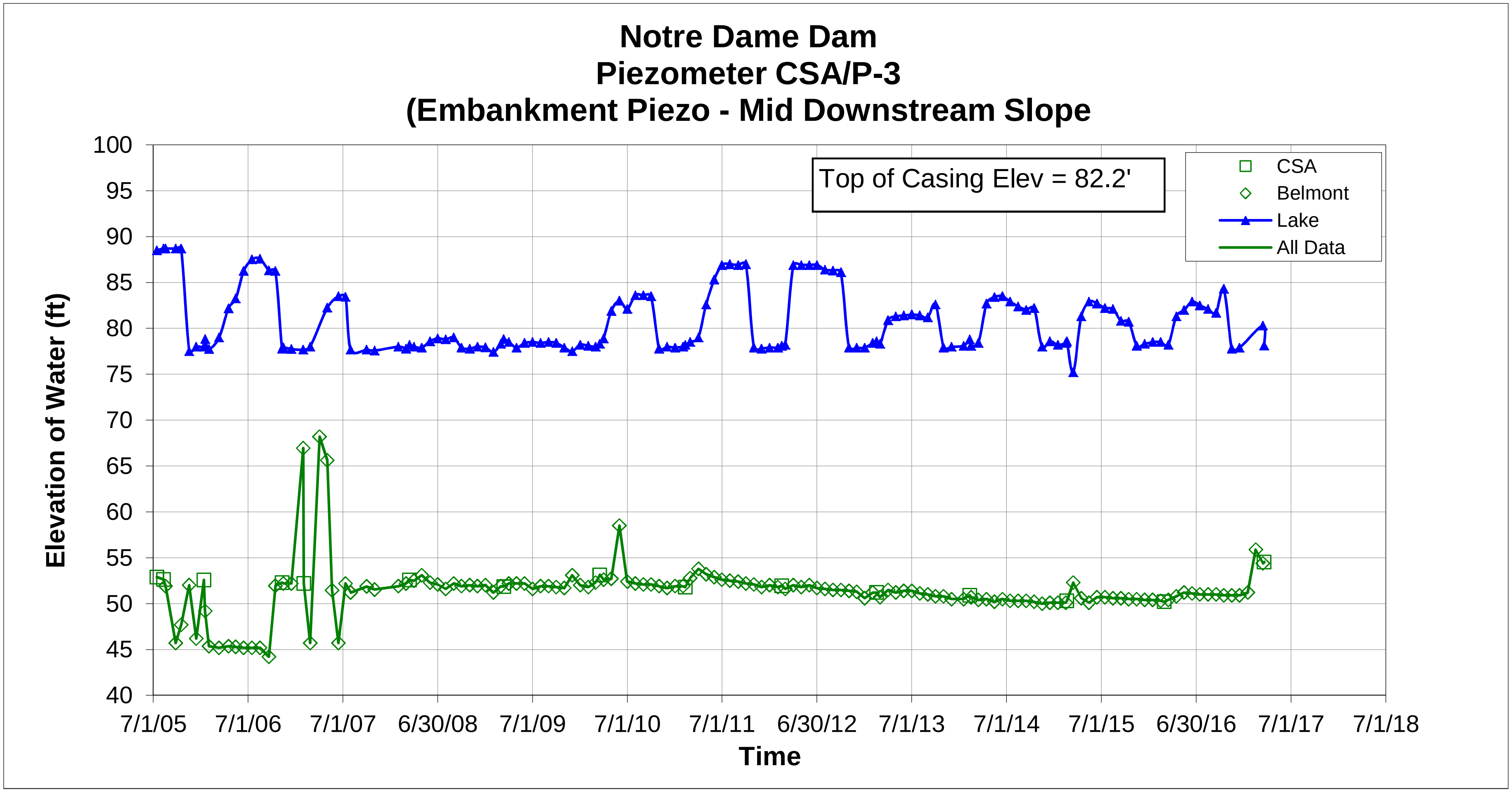
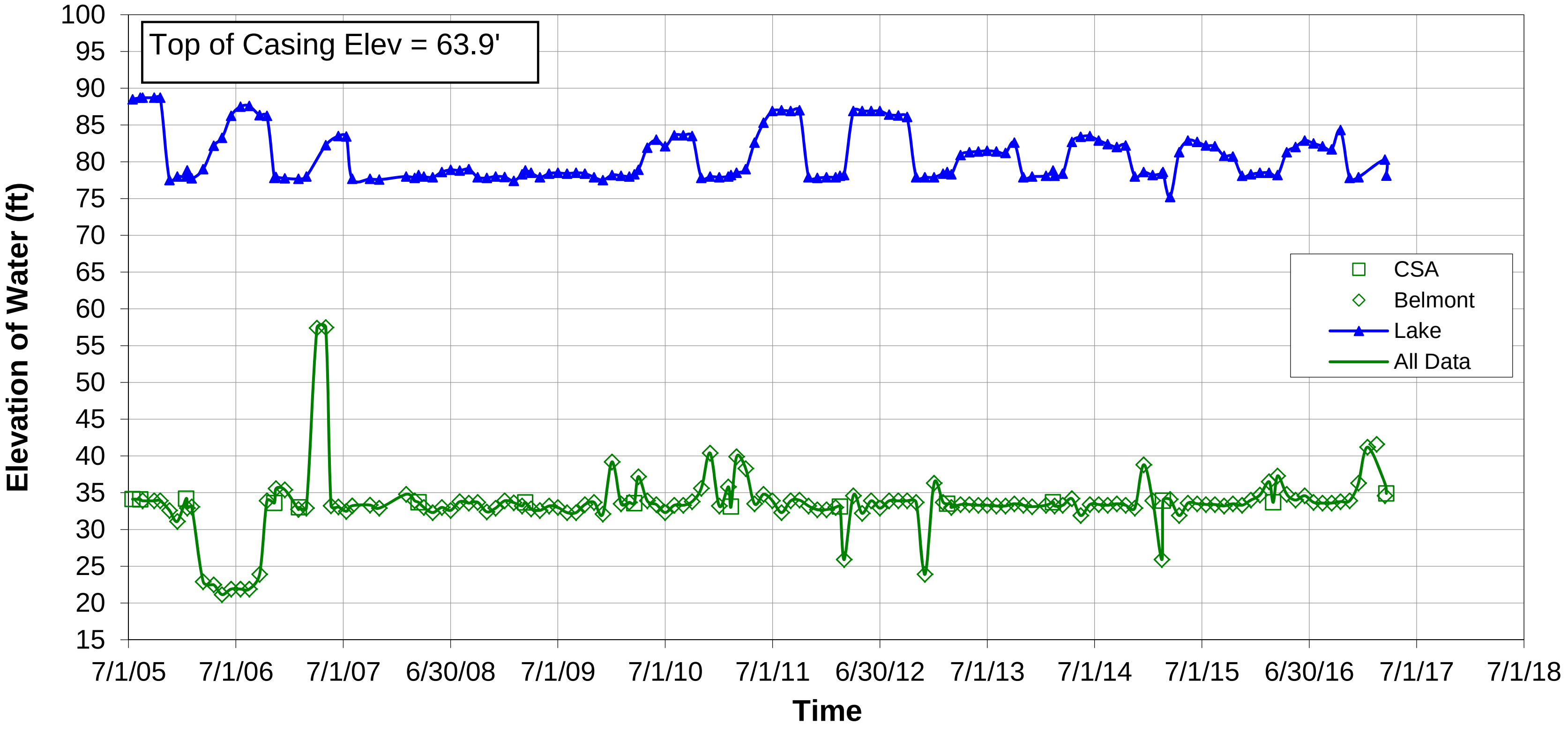
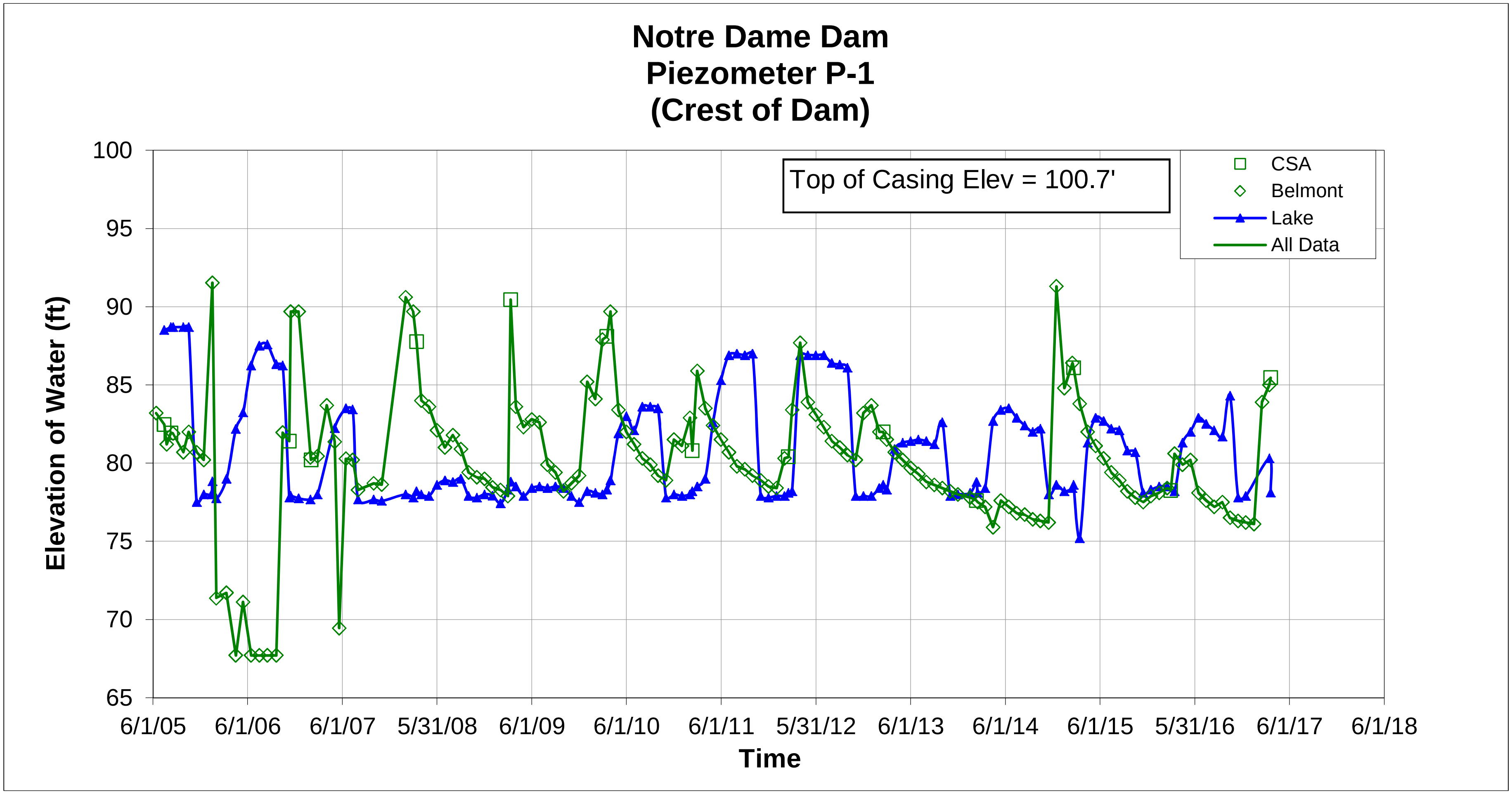
7/1/15
6/30/16
7/1/17
7/1/18
Time


Notre Dame Dam
Piezometer CSA/P-3
(Embankment Piezo - Mid Downstream Slope
Top of Casing Elev = 82.2'
□ CSA
◇ Belmont
Lake
All Data
Elevation of Water (ft)
100
95
90
85
80
75
70
65
60
55
50
45
40
7/1/05
7/1/06
7/1/07
6/30/08
7/1/09
7/1/10
7/1/11
6/30/12
7/1/13
7/1/14
7/1/15
6/30/16
7/1/17
7/1/18
Time

Notre Dame Dam
Piezometer CSA/P-4
(Foundation Piezo - Lower Downstream Slope)




Notre Dame Dam
Piezometer P-1
(Crest of Dam)
Top of Casing Elev = 100.7'
CSA
Belmont
Lake
All Data
Elevation of Water (ft)
100
95
90
85
80
75
70
65
6/1/05
6/1/06
6/1/07
5/31/08
6/1/09
6/1/10
6/1/11
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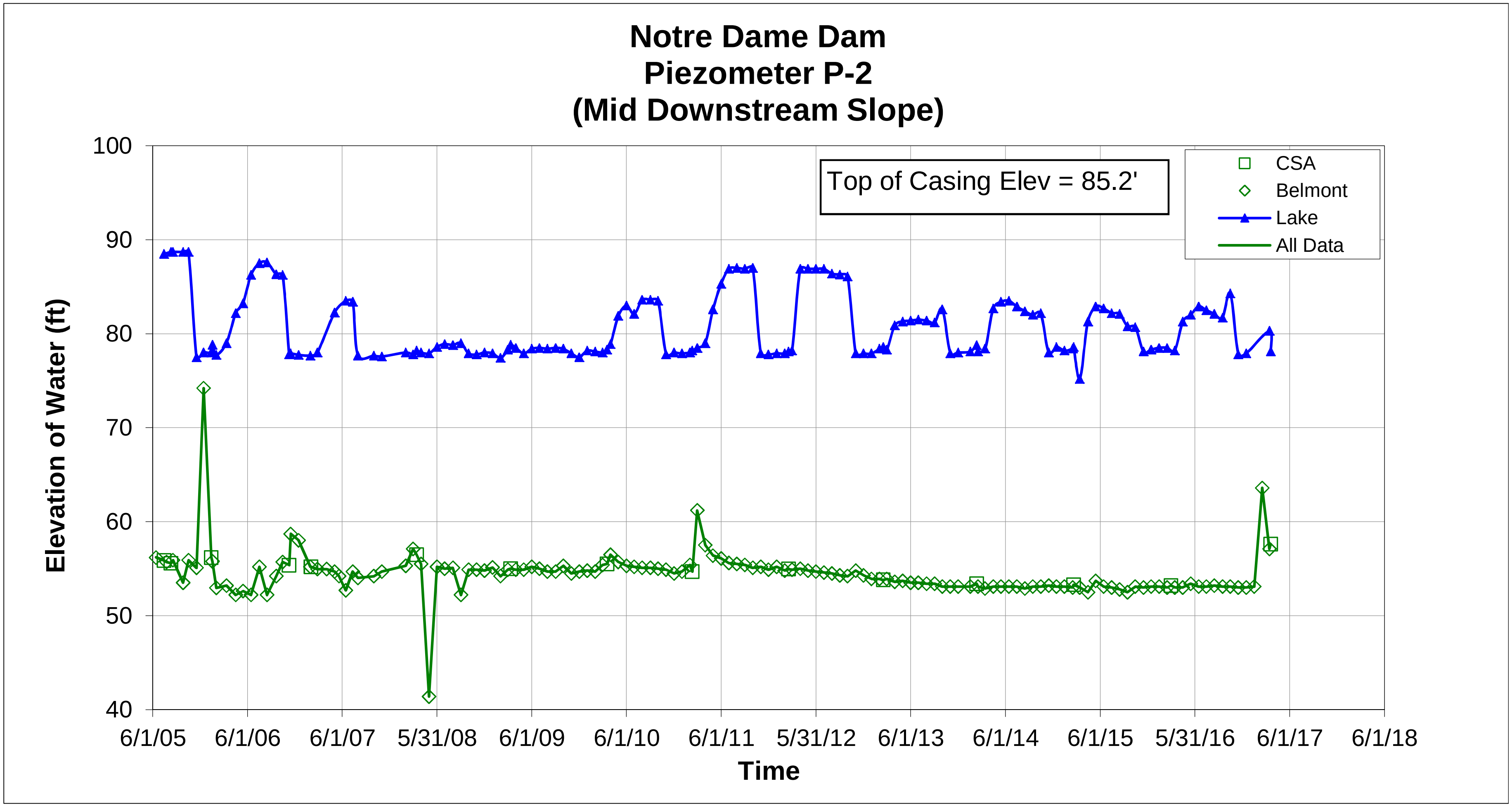
6/1/13
6/1/14
6/1/15
5/31/16
6/1/17
6/1/18
Time


Notre Dame Dam
Piezometer P-2
(Mid Downstream Slope)
Top of Casing Elev = 85.2'
CSA
Belmont
Lake
All Data
Elevation of Water (ft)
100
90
80
70
60
50
40
6/1/05
6/1/06
6/1/07
5/31/08
6/1/09
6/1/10
6/1/11
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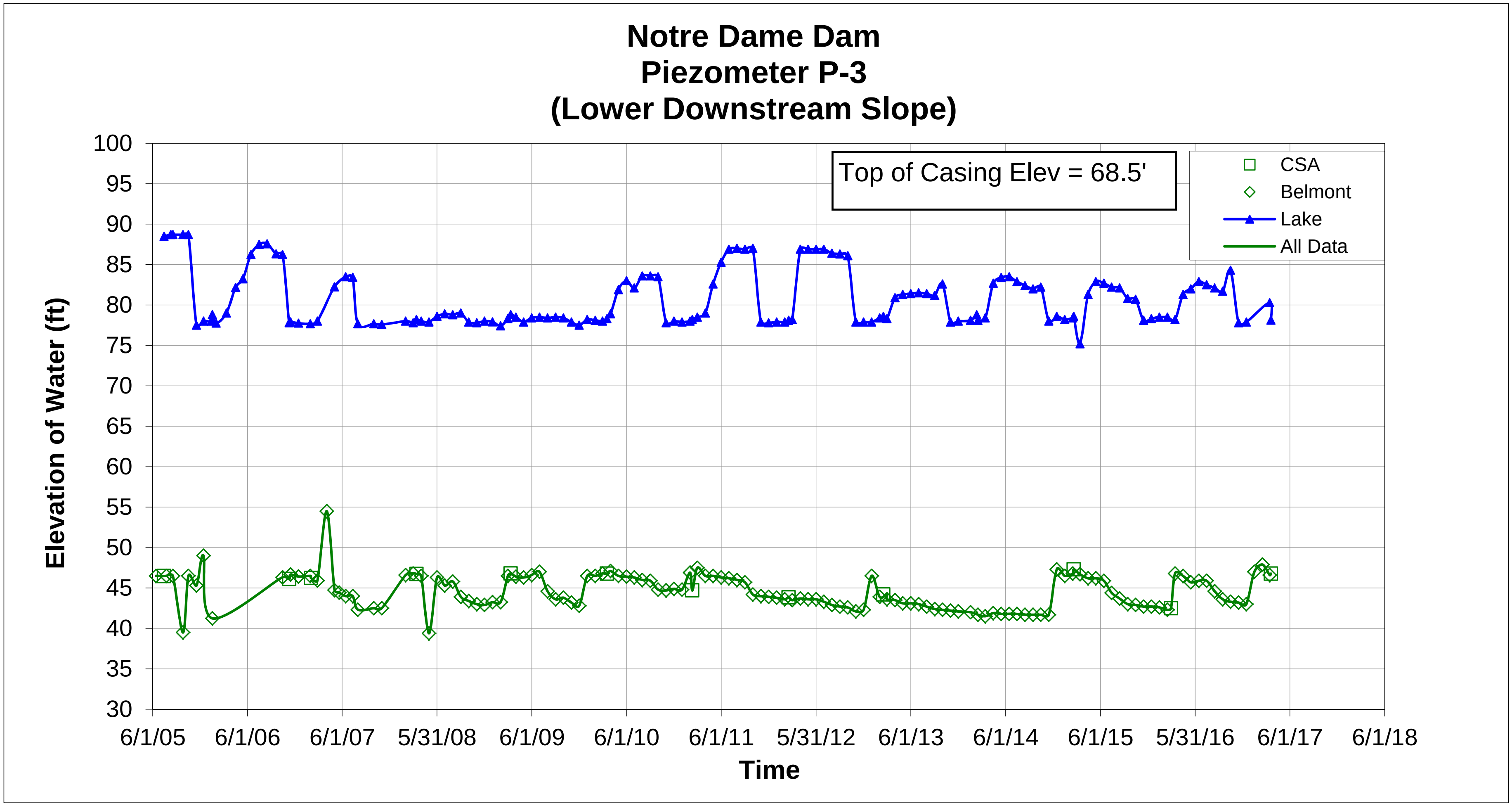
6/1/13
6/1/14
6/1/15
5/31/16
6/1/17
6/1/18
Time


Notre Dame Dam
Piezometer P-3
(Lower Downstream Slope)
Top of Casing Elev = 68.5'
CSA
Belmont
Lake
All Data
Elevation of Water (ft)
100
95
90
85
80
75
70
65
60
55
50
45
40
35
30
6/1/05
6/1/06
6/1/07
5/31/08
6/1/09
6/1/10
6/1/11
5/31/12
6/1/13
6/1/14
6/1/15
5/31/16
6/1/17
6/1/18
Time

12/19/2017

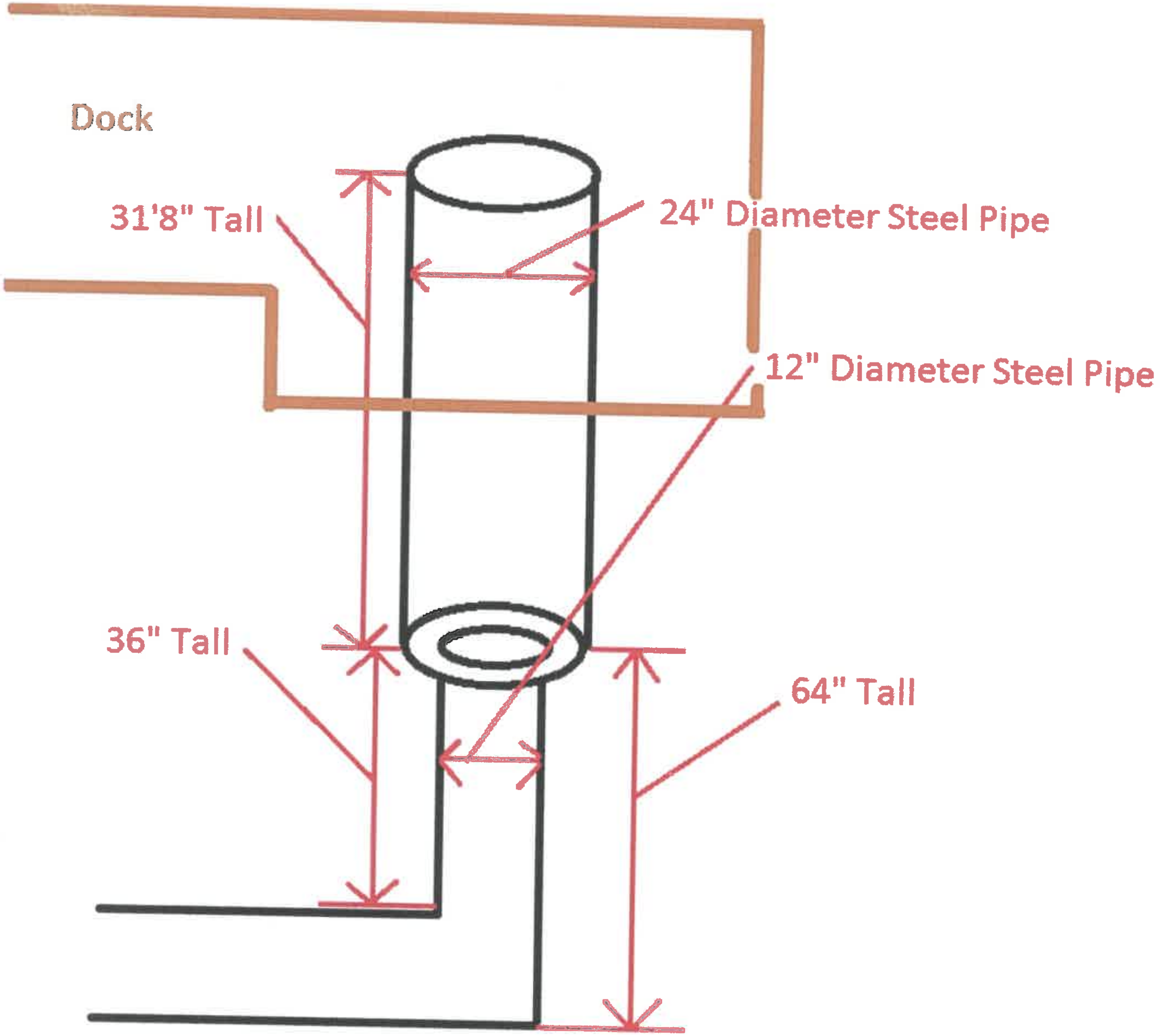
CALIFORNIA
CITY OF BELMONT

2017 Notre Dame Dam Monitoring
Piezometers and Survey Monuments Data

Month	Date Surveyed	Old Piezometers			New Piezometers				Lake Level (from Dock)
		P-1	P-2	P-3	CSA-P1	CSA-P2	CSA-P3	CSA-P4	
January	Jan ,2017	24.6	32.1	21.5	Under water	44.7	31	22.7	Under water-flooded by storm
February	Feb ,2017	16.8	21.6	20.6	Under water	42.3	26.3	22.3	Under water-flooded by storm
March	March ,2017	15.7	28.1	21.9	27.6	43	27.8	29.3	10.7
April	April ,2017	16.8	29.2	21.9	23.5	41.6	28.7	26.8	3.4
May	May ,2017	18.5	29.8	22	27	42.6	29.4	29.3	3.9
June	June ,2017	19	29.9	22.2	27.3	42.6	29.6	29.4	4
July	July ,2017	19.9	30.1	22.4	27.8	42.9	29.9	29.5	4.3
August	Aug ,2017	19.4	30	22.2	27.8	42.7	29.8	29.5	4
September	Sept ,2017	20.9	30.2	23.5	28	43.2	30	29.4	5
October	Oct ,2017	21.3	30.4	25	28.4	43.6	30.3	29.5	5.3
November	Nov ,2017	21.6	30.5	25.2	30.8	43.7	30.3	29.6	12.9
December	Dec ,2017	21.8	30.6	25.4	32	44	30.4	30	13

#N/A

WATER DOG LAKE DAM OUTLET
STRUCTURE SCHEMATIC
SEWER AND STORM DIVISION
CITY OF BELMONT



Christopher Bronny, M.S.

BIOLOGICAL RESOURCES SERVICES
1131 Burwick Ln. Folsom, California 95630
925.330.7202 chrisbronny@gmail.com

Memorandum

To: Kathryn Hart (Site No. 02-41-C0737)
From: Christopher Bronny, Biological Resources Services
Date: September 23, 2013
Re: Belmont Creek Sediment Removal Project – Project Completion: 72 Hour Post-Construction Notification

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The purpose of this memorandum (memo) is to notify the San Francisco Bay Regional Water Quality Control Board (SFBRWQCB) that the construction phase of the Belmont Creek Sediment Removal Project (Project Area) was completed on Monday, September 23, 2013. The purpose of this notification complies with Item 4 under *General Conditions* of the 401 Water Quality Certification issued for this project. Representative pre-, active, and post-construction photographs of the Project Area are provided at the end of this memo.

Pre-Construction Summary

Prior to construction start-up, a series of permanent photopoints were established along the right and left banks of the Project Area documenting existing conditions. A tree survey documenting the location of all native and non-native extant trees within the Project Area was conducted and included saplings and seedlings. Information regarding diameter at breast height (dbh) on any tree having at least one trunk greater than six inches (>6"), critical root zone (crz; dbh x 12), number of trunks, and general health was recorded and mapped with GPS technology using a Trimble GEO XT unit.

Project Construction Summary

A total of 11 days were required to complete the excavation and removal of channel bed sediments from the open gravel bars along the approximate 724 foot section of Belmont Creek. Project construction officially began on Monday, September 9, 2013. A worker environmental training program was presented by the Environmental Monitor (EM) for the Hanford ARC construction crew. Coffer dams were placed in the channel at the upstream and downstream limits of the Project Area; upstream flows from Belmont Creek were diverted into a by-pass pipe and discharged into the box culvert underneath Industrial Road. Existing scour pools were delineated with bright orange ESA silt fencing and avoided. From the original thalweg of the channel, approximately three to four feet of sediments were excavated from each of the identified gravel bars, resulting in the removal of 540 cubic yards (cy) of sediments from the Project Area. Final upstream and downstream turbidity testing and demobilization of the site occurred on Monday, September 23, 2013.

Post-Construction Implementation of the Mitigation and Monitoring Plan (MMP)
Implementation of the post-construction mitigation plantings was initiated by the EM following the completion of final excavation of sediments from the channel and after installation of double-weave Coir netting on all exposed banks within the Project Area. Approximately 12 pounds of blue wild-rye (*Elymus glaucus*) and meadow barley (*Hordeum brachyantherum*) was seeded on the banks armored with Coir netting. Green willow stakes of extant red willow (*Salix laevigata*) and arroyo willow (*Salix lasiolepis*) were prepared and driven approximately two feet into the bank along the saturation zone of the new channel. The entire 724 foot Project Area was mapped with the Trimble GPS showing the new bankfull width of the excavated areas, along with the avoided scour pools.

Central Coast Wilds Nursery in Santa Cruz, California will provide the regional ecotypes of container nursery stock for the MMP portion of the project. A total of two white alder (*Alnus rhombifolia*), four Fremont's cottonwood (*Populus fremontii*), two Oregon ash (*Fraxinus latifolia*), and three western sycamore (*Platanus racemosa*) were specified in the as-built drawings. Based on existing conditions following excavation, the total number of 11 transplants will be increased to 28. Installation of container stock will occur within the next two to three weeks. The final location of all installed trees (including green willow stakes) will be recorded with the Trimble GPS and flagged with blue and orange tape.

Summary
The Applicant (Novartis Pharmaceuticals) has thus far complied with all terms and conditions identified in the 401 Water Quality Certification, as well as the Army Corps of Engineers' Clean Water Act Section 404 permit (ACOE File No. 2011-00399S) and the California Department of Fish and Wildlife's Streambed Alteration Agreement (CDFW File No. 1600-2013-0007-R3) issued on June 11, 2013.

Mitigation and monitoring shall proceed according to the *Mitigation and Monitoring Plan for the Belmont Creek Sedimentation Removal Project, San Mateo County*, as prepared by Olberding Environmental (July 2013). Additional details of the post-construction mitigation plantings will be presented in the 60-day as-built report, and annually thereafter in letter reports submitted to the Water Board by December 31 during each year of the 5-year monitoring period.

_____________*Christopher Bronny, M.S.*_____________

BIOLOGICAL RESOURCES SERVICES
1131 Burwick Ln. Folsom, California 95630
925.330.7202 chrisbronny@gmail.com

PHOTOGRAPHS

1. Representative photograph of ESA/silt fencing around one of the protected/avoided scour pool features within the Project Area.

2. Photograph shows upstream coffer dam and by-pass pump configuration.

3. Photograph shows downstream coffer dam and by-pass pipe outfall underneath Industrial Road.

4. Upper reach of Project Area showing post-excavation pool area armored with Coir netting. Red pin flag on the right shows the location for white alder container planting; left pin flag is for western sycamore.

5. Upper reach showing Coir netting and placement of pin flags to mark container planting locations. Blue and orange-flagged green willow stake can be seen in the foreground.

6. Mid reach of Project Area showing Coir netting and placement of pin flags to mark container planting locations. Green willow stakes can be seen in the foreground and on left bank.

7. New excavated pool located between two protected scour pools.

8. Facing downstream, photograph shows lower reach of Project Area showing bank armoring and container planting pin flag locations.

9. Same area, facing upstream.

10. Downstream terminus of Project Area showing newly excavated pool that is approximately four feet in depth. This portion of the Project Area is tidally-influenced. A green red willow stake can be seen in the left-center portion of the photograph; the donor tree is located approximately 40 feet upstream. While salinity is a major abiotic stress and limiting factor on the extent of native willow species in brackish water habitats, the presence of red willow and arroyo willow (right side of the photograph) at the high tide limit indicate that these species appear to be acclimated to existing site conditions.

TABLE 13: Projected Sea-Level Rise (in feet) for San Francisco

Probabilistic projections for the height of sea-level rise shown below, along with the H++ scenario (depicted in blue in the far right column), as seen in the Rising Seas Report. The H++ projection is a single scenario and does not have an associated likelihood of occurrence as do the probabilistic projections. Probabilistic projections are with respect to a baseline of the year 2000, or more specifically the average relative sea level over 1991 - 2009. High emissions represents RCP 8.5; low emissions represents RCP 2.6. ***Recommended projections for use in low, medium-high and extreme risk aversion decisions are outlined in blue boxes below.***

		Probabilistic Projections (in feet) (based on Kopp et al. 2014)						*H++ scenario (Sweet et al. 2017) *Single scenario*
		MEDIAN	LIKELY RANGE			1-IN-20 CHANCE	1-IN-200 CHANCE	
		50% probability sea-level rise meets or exceeds…	*66% probability sea-level rise is between…*			*5% probability sea-level rise meets or exceeds…*	*0.5% probability sea-level rise meets or exceeds…*	
					Low Risk Aversion		**Medium - High Risk Aversion**	**Extreme Risk Aversion**
High emissions	2030	0.4	0.3	-	0.5	0.6	0.8	1.0
	2040	0.6	0.5	-	0.8	1.0	1.3	1.8
	2050	0.9	0.6	-	1.1	1.4	1.9	2.7
Low emissions	2060	1.0	0.6	-	1.3	1.6	2.4	
High emissions	2060	1.1	0.8	-	1.5	1.8	2.6	3.9
Low emissions	2070	1.1	0.8	-	1.5	1.9	3.1	
High emissions	2070	1.4	1.0	-	1.9	2.4	3.5	5.2
Low emissions	2080	1.3	0.9	-	1.8	2.3	3.9	
High emissions	2080	1.7	1.2	-	2.4	3.0	4.5	6.6
Low emissions	2090	1.4	1.0	-	2.1	2.8	4.7	
High emissions	2090	2.1	1.4	-	2.9	3.6	5.6	8.3
Low emissions	2100	1.6	1.0	-	2.4	3.2	5.7	
High emissions	2100	2.5	1.6	-	3.4	4.4	6.9	10.2
Low emissions	2110*	1.7	1.2	-	2.5	3.4	6.3	
High emissions	2110*	2.6	1.9	-	3.5	4.5	7.3	11.9
Low emissions	2120	1.9	1.2	-	2.8	3.9	7.4	
High emissions	2120	3	2.2	-	4.1	5.2	8.6	14.2
Low emissions	2130	2.1	1.3	-	3.1	4.4	8.5	
High emissions	2130	3.3	2.4	-	4.6	6.0	10.0	16.6
Low emissions	2140	2.2	1.3	-	3.4	4.9	9.7	
High emissions	2140	3.7	2.6	-	5.2	6.8	11.4	19.1
Low emissions	2150	2.4	1.3	-	3.8	5.5	11.0	
High emissions	2150	4.1	2.8	-	5.8	7.7	13.0	21.9

**Most of the available climate model experiments do not extend beyond 2100. The resulting reduction in model availability causes a small dip in projections between 2100 and 2110, as well as a shift in uncertainty estimates (see Kopp et al. 2014). Use of 2110 projections should be done with caution and with acknowledgement of increased uncertainty around these projections.*

Balance
Hydrologics, Inc.

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March 21, 2011

Mr. Steve Johnson
ICS – Insurance Claim Services, Inc.
1006 Pebble Beach Drive
Clayton, California 94517

RE: Inundation Source Investigation at 120 and 150 Industrial Road, City of San Carlos

Dear Mr. Johnson:

The following summarizes our investigation into the source of inundation at 120 and 150 Industrial Road in the City of San Carlos on January 20, 2010. A number of tasks were completed to assess the source of inundation including a review of photographic documentation of the event, a review of the drainage conditions surrounding the site, collection and processing of rainfall and historical radar data, and a review of other locally reported occurrences of inundation on that same day.

Review of Photographic Documentation

Photographic documentation of the January 20, 2010 inundation event was provided by Novartis Pharmaceutical Corporation. The photographs of the event were taken both in and outside of the structure located at 120 and 150 Industrial Road and captured the progression of inundation.

The set of photographs compiled on the attached Figure 1 indicate that the source of inundation at the northwest portion of the site and structure was an overtopping of the channel along the northwest boundary of the site. The floodwall separating the channel from the adjacent parking lot can be seen overtopping at multiple locations on the photographs numbered 1 and 2. Flooding of the adjacent parking lot up to the structure can be seen on the photographs numbered 3 through 6.

The set of photographs compiled on the attached Figure 2 indicate that a second source of inundation resulted from flooding along Quarry Road located adjacent to the southeast end of the site. The photographs numbered 1 through 4 illustrate the extent of flooding along Quarry Road and into the adjacent parking lots at the southwest and southeast portions of the site. Flooding of the adjacent parking lots up to the structure can be seen on the photographs numbered 5 and 6.

Siltation resulting from the inundation event can be seen on the photographs compiled on the attached Figure 3. Siltation outside and adjacent to the structure is shown on the photographs labeled 1 through 3 while siltation inside of the structure is shown on the photographs labeled 4 through 6. The presence of silt and mud is an additional indicator that the source of inundation at 120 and 140 Industrial Road was the turbid flow seen overtopping the creek channel.

Drainage Conditions Surrounding the Site

The channel seen in the photos running along the northwest end of the site is Belmont Creek, a west to east flowing drainage with headwaters reaching to Pulgas Ridge located at the western limits of the City of Belmont. Upstream from the site Belmont Creek drains approximately 3.1 square miles (2000 acres) of the City of Belmont, City of San Carlos, and unincorporated areas of San Mateo County. A map delineating the watershed is attached as Figure 4.

Belmont Creek as it runs adjacent to the site is a straightened reach of open channel confined by floodwalls along the south bank and portions of the north bank. The channel is roughly trapezoidal in shape with a top width ranging between 30 and 40 feet. The channel contains a number of established trees and an understory of grasses and brush. Immediately downstream from the site the creek passes through a pair of 10-foot wide by roughly 4-foot tall rectangular culverts beneath Industrial Road. Further upstream from the site the creek passes through a smaller 12-foot long by roughly 6-foot tall arch culvert beneath Old County Road.

The flow constriction at Old Country Road is likely one of the first locations where the lower reach of Belmont Creek would spill its banks during a flood event. A review of topographic mapping, along with observations made in the field indicate that flow spilling from the creek could travel southeast along Old Country Road and then northeast on Quarry Road past the site at 120 and 140 Industrial Road.

Rain Gage Data

Rain gage data was collected from the California Data Exchange Center's Crystal Springs Cottage gage located roughly ¾ miles to the west of the Belmont Creek watershed. This hourly data, graphed on the attached Figure 5, indicates a storm event occurred on January 20, 2010 that produced 1.6 inches of rainfall over a 10-hour period. The graphed data illustrates how the storm event began around midnight (Pacific Standard Time) producing increasingly heavier rainfall with peak intensities occurring roughly between the hours of 8 and 10 am on January 20.

A review of the extended rainfall record indicates that the Belmont Creek watershed was saturated prior to the January 20 storm event resulting in higher runoff rates than if the storm followed a dry period. The rainfall record at the Crystal Springs Cottage gage graphed through the middle part of January is attached as Figure 6 and indicates that 11.9 inches of rainfall had fallen after October 1, 2009 with 2.8 inches of that coming in the 8 days preceding the January 20 storm event. Altogether, 4.4 inches of rainfall was recorded over a 9-day period culminating with the end of the January 20 storm event.

Historical Radar Data

Historical Next-Generation Radar, or Nexrad, data was collected to support the rain gage data and to qualitatively correlate this data spatially to the nearby Belmont Creek watershed. A progression of Nexrad images at 30 minute intervals across the January 20 storm event are included on the attached Figures 7 through 9.

The Nexrad data supports the rain gage record and provides additional verification that a significant storm event occurred on January 20, 2010. The attached figures indicate that the storm tracked in a southwest to northeast direction with locally heavy rainfall focused over the Belmont Creek watershed. This storm track was ideal for producing higher rates of runoff given the predominate slope in the watershed to the northeast. The Nexrad imagery also supports the use of the Crystal Springs Cottage rain gage as the storm pattern generally appears consistent between the gage location and the watershed.

Reports of Flooding in Surrounding Areas

The National Oceanic and Atmospheric Administration's (NOAA) *Storm Data and Unusual Weather Phenomena with Late Reports and Corrections, January 2010, Volume 52, Number 1* document reports additional flooding events occurred within the Belmont Creek watershed and the neighboring Pulgas Creek and Atherton Creek watersheds to the south. As noted on pages 39 through 41 of the document, attached here as Appendix A, nearby flooding was reported on January 20 along Belmont Creek at Harbor Boulevard and State Route 82, along Pulgas Creek at Central Middle School in San Carlos, and along Atherton Creek at Marsh Road.

Conclusion

A review of photographic documentation of the event, a review of the drainage conditions surrounding the site, collection and processing of rainfall and historical radar data, and a review of other locally reported occurrences of flooding on that same day all strongly indicate that it was a flood event that was the source of inundation of the property at 120 and 150 Industrial Road on January 20, 2010. Additionally it can be concluded that the primary contributor of flood flows to the site was Belmont Creek both from overtopping of the floodwalls to the northwest of the site and from upstream overflows that routed down Quarry Road to the southeast of the site.

Sincerely,

BALANCE HYDROLOGICS, Inc.

Eric Riedner, P.E. 69728
Civil Engineer/Hydrologist

Figures

1

2

3

4

5

6

Figure 1. Photographs of inundation along the northwest portion of the site at 120 and 150 Industrial Road on January 20, 2010


1


2


3


4


5


6

Figure 2. Photographs of inundation along the southeast and southwest portion of the site at 120 and 150 Industrial Road on January 20, 2010


1


2

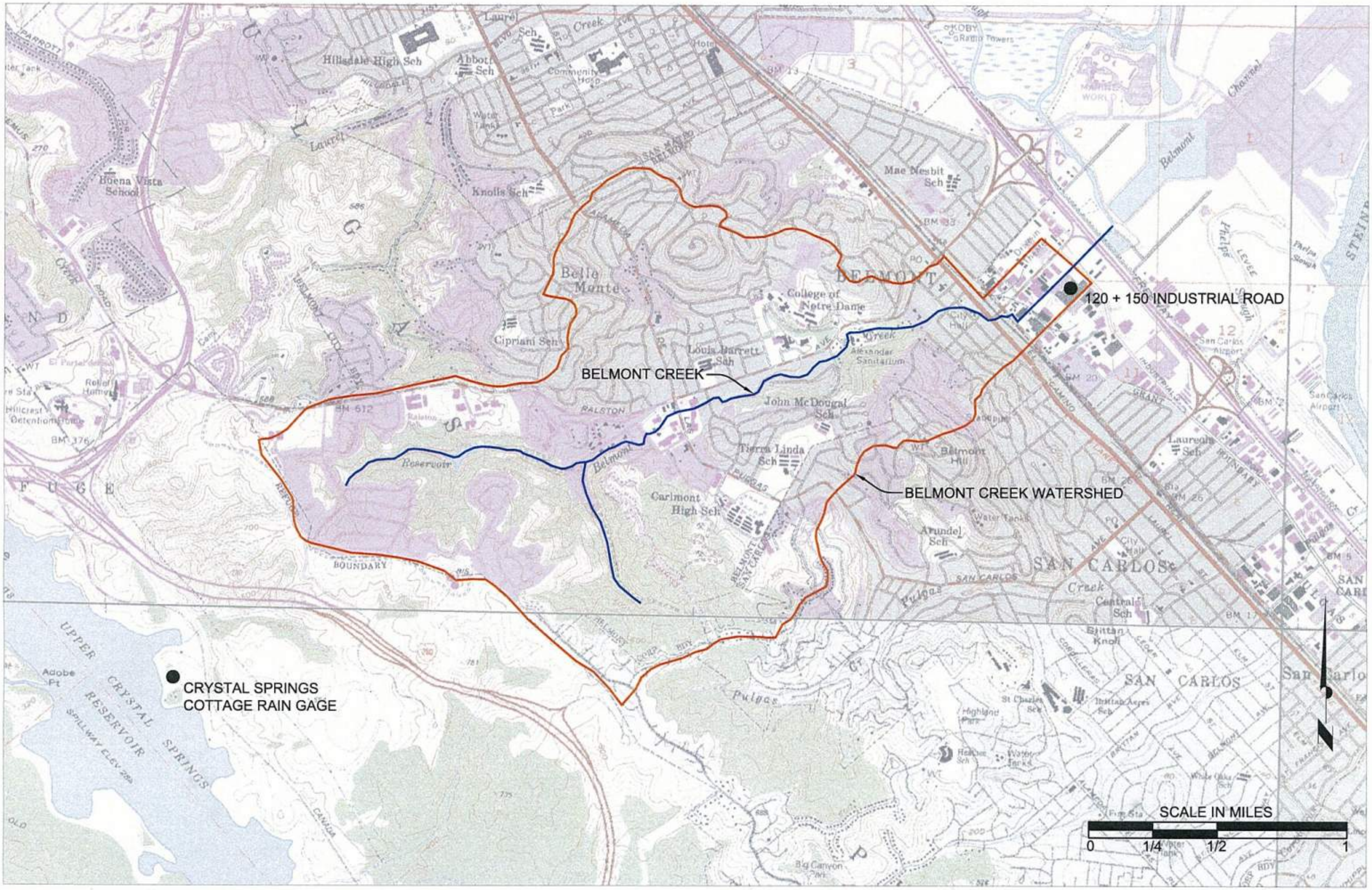

3


4


5

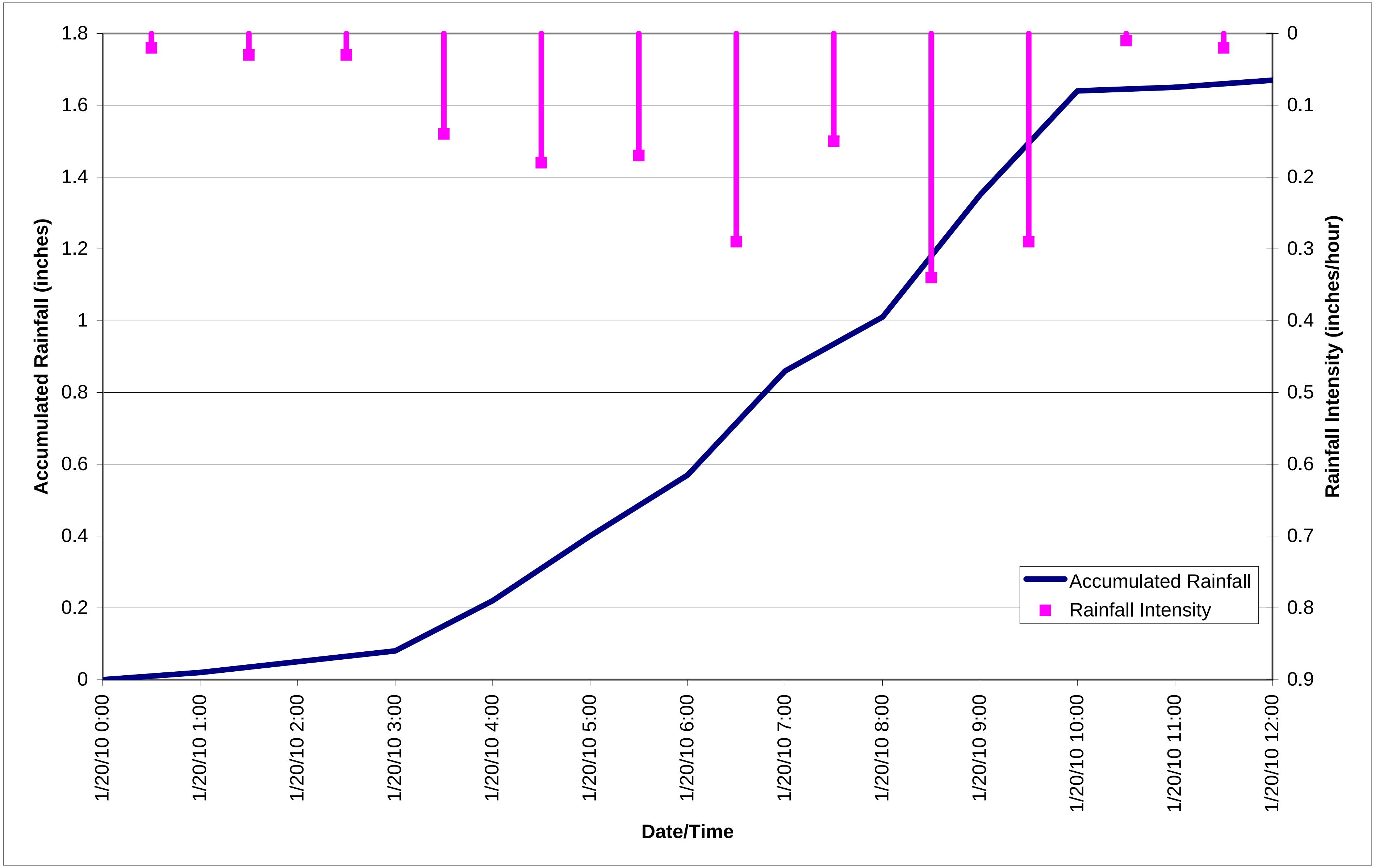

6

Figure 3. Photographs of siltation inside and outside of the structure located at 120 and 150 Industrial Road



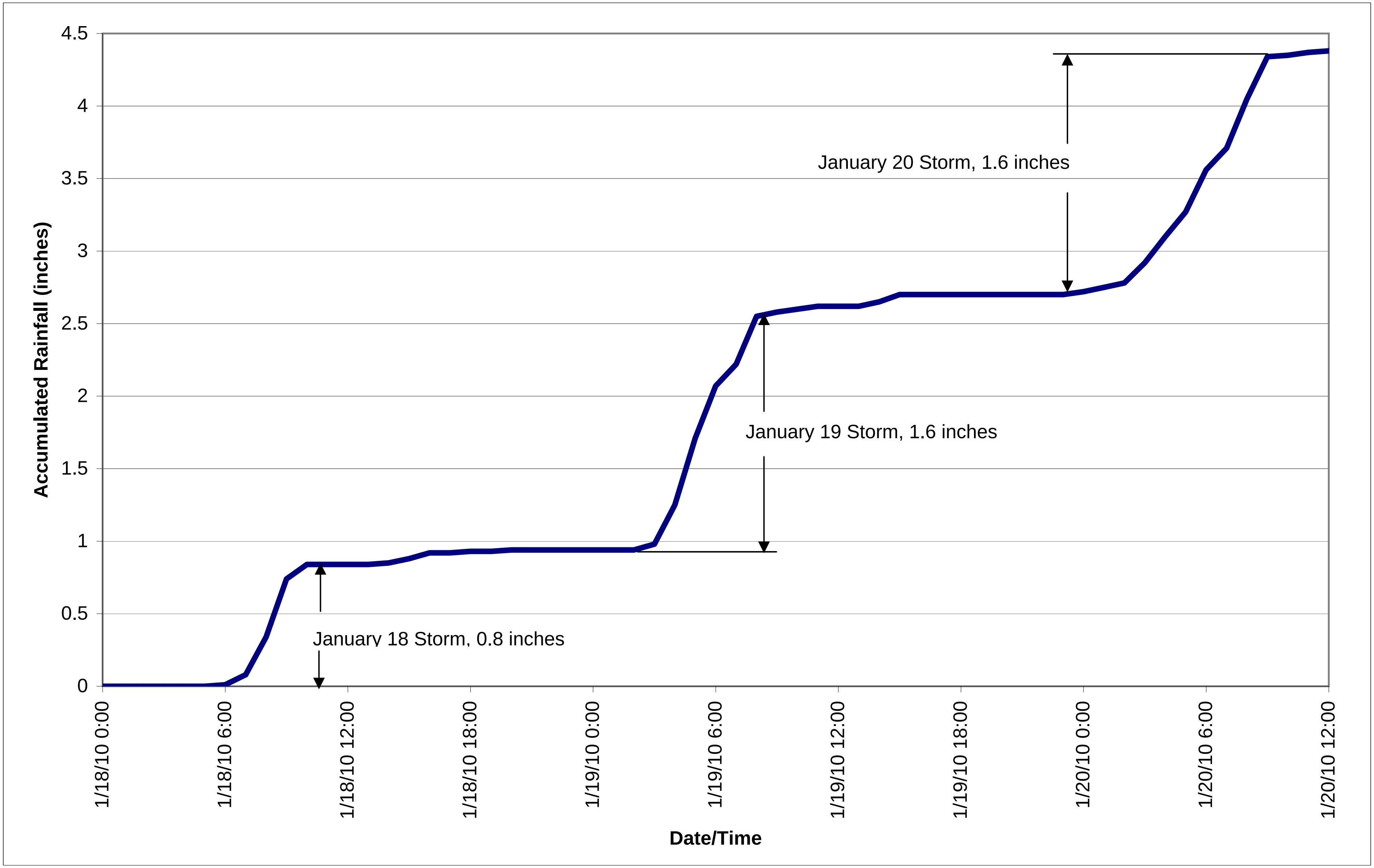
Balance Hydrologics, Inc.

Figure 4. Belmont Creek Watershed map



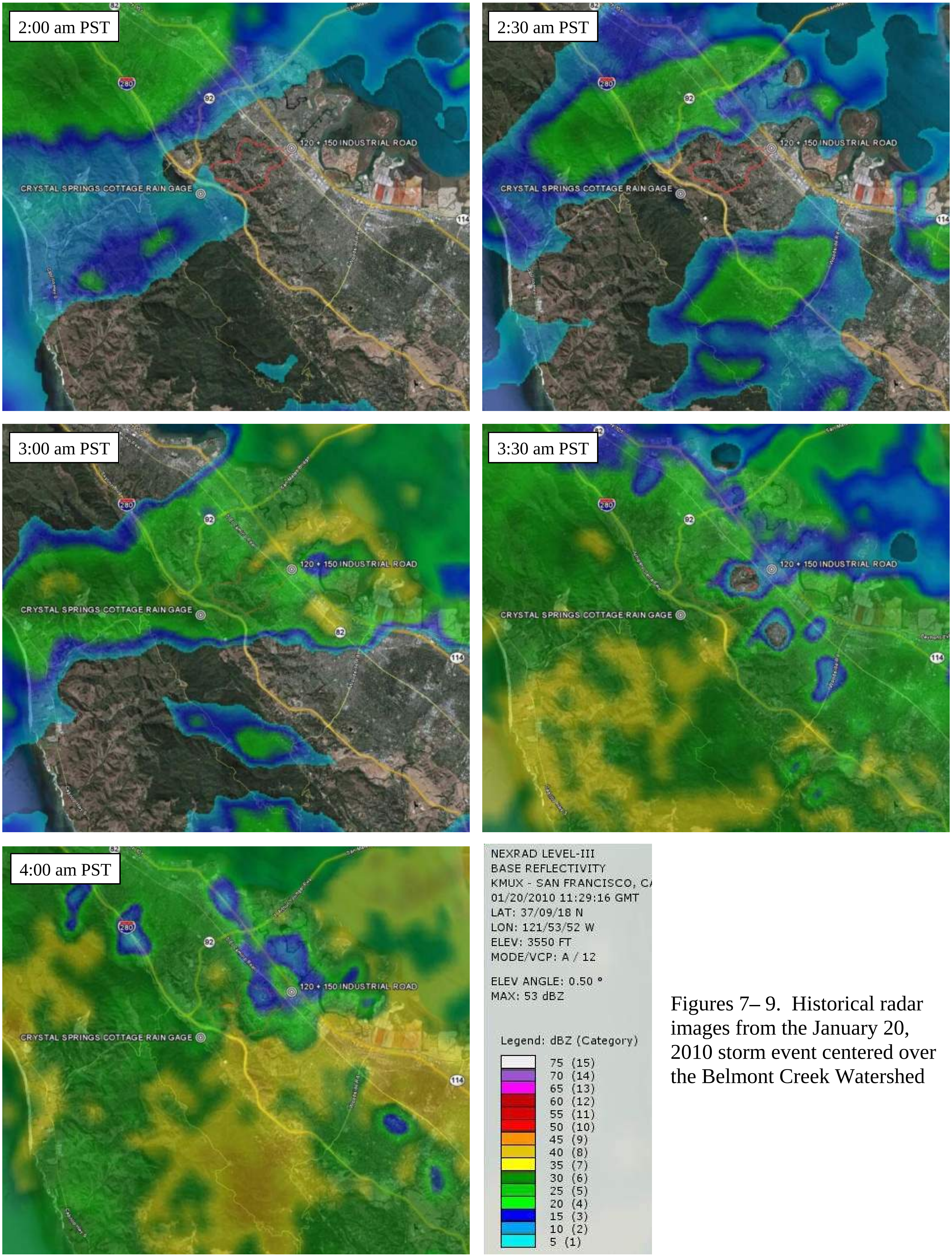
Balance Hydrologics, Inc.

Figure 5. January 20, 2010 hourly rainfall record from the Crystal Springs Cottage rain gage

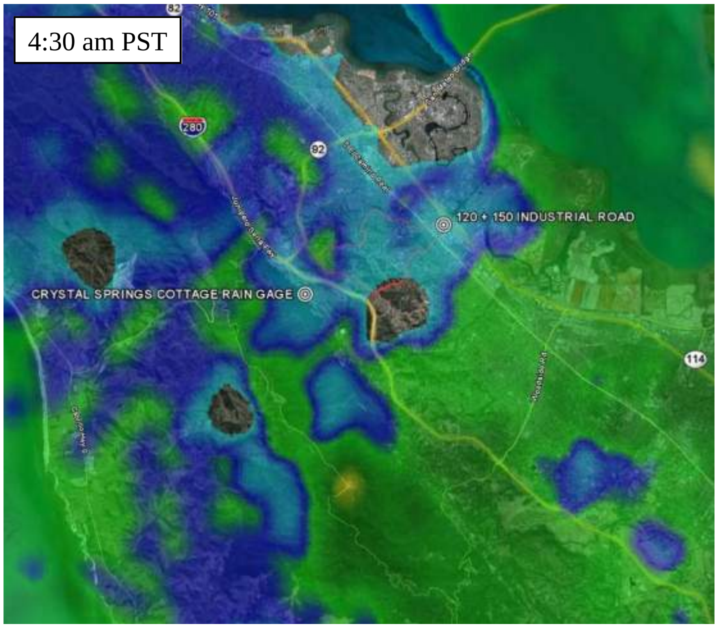


Balance Hydrologics, Inc.

Figure 6. **Mid-January 2010 hourly rainfall record from the Crystal Springs Cottage rain gage**



Figures 7– 9. Historical radar images from the January 20, 2010 storm event centered over the Belmont Creek Watershed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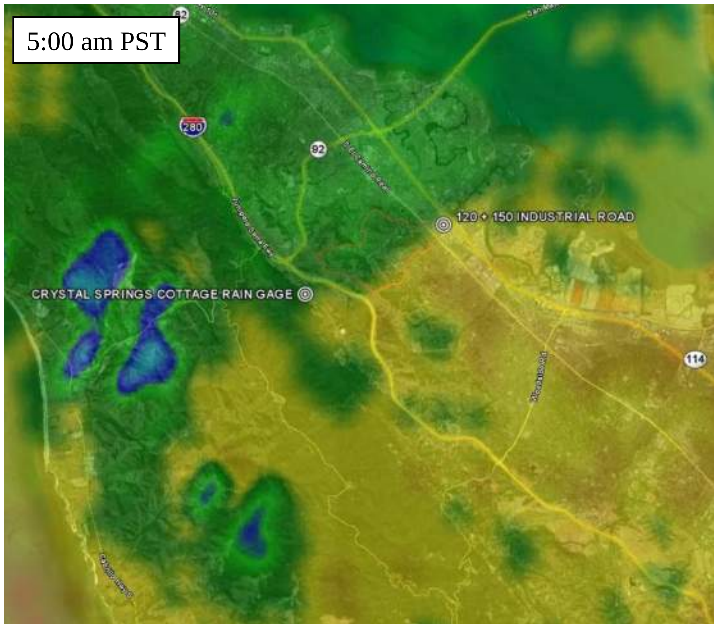
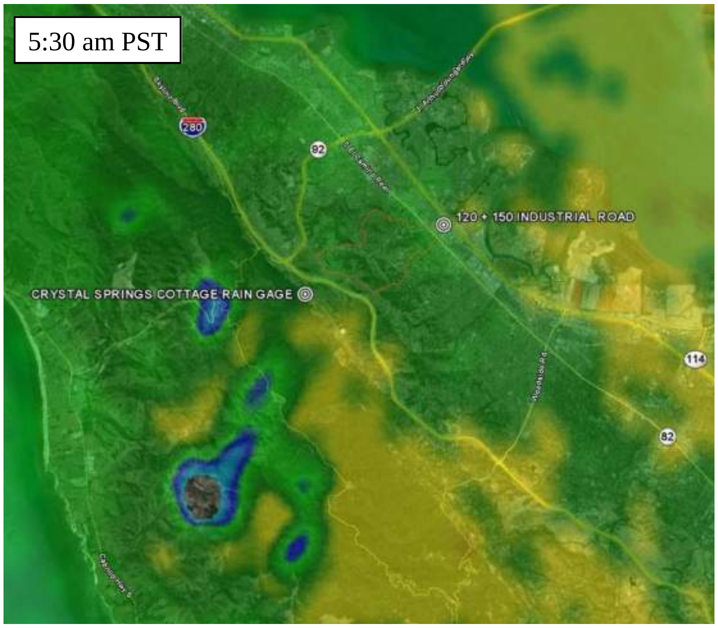

5:00 am PST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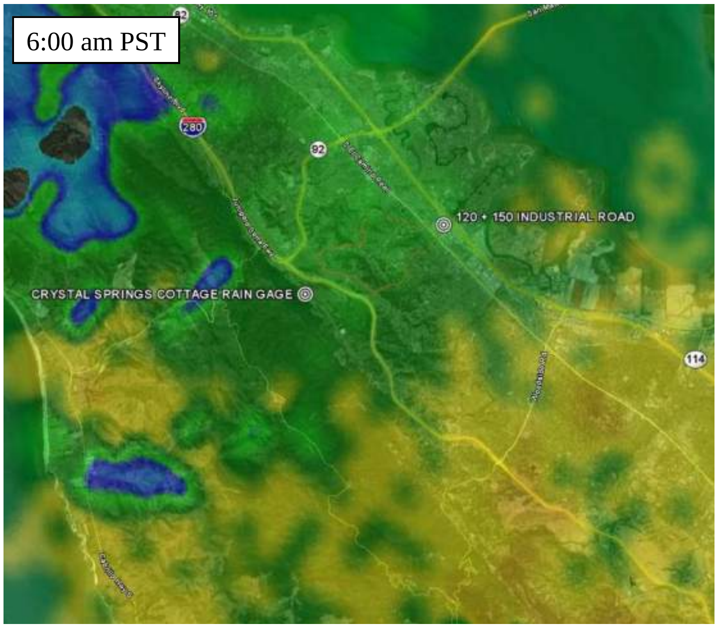
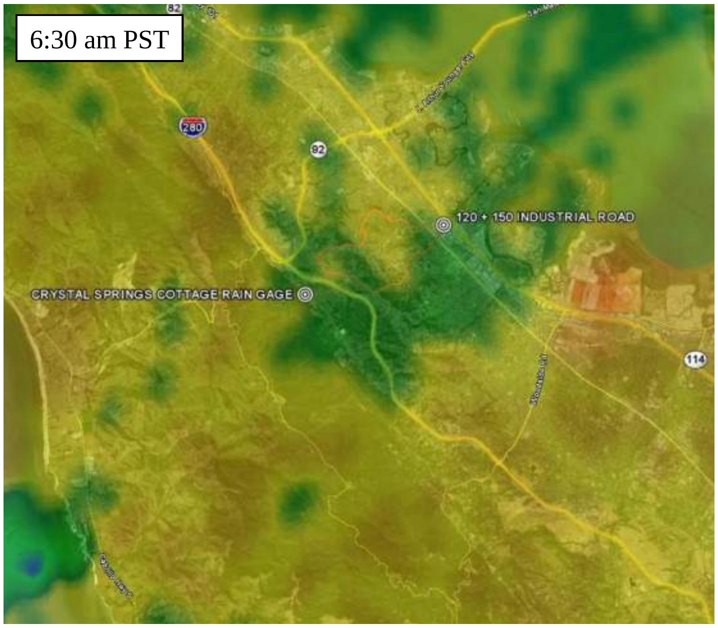

6:00 am PST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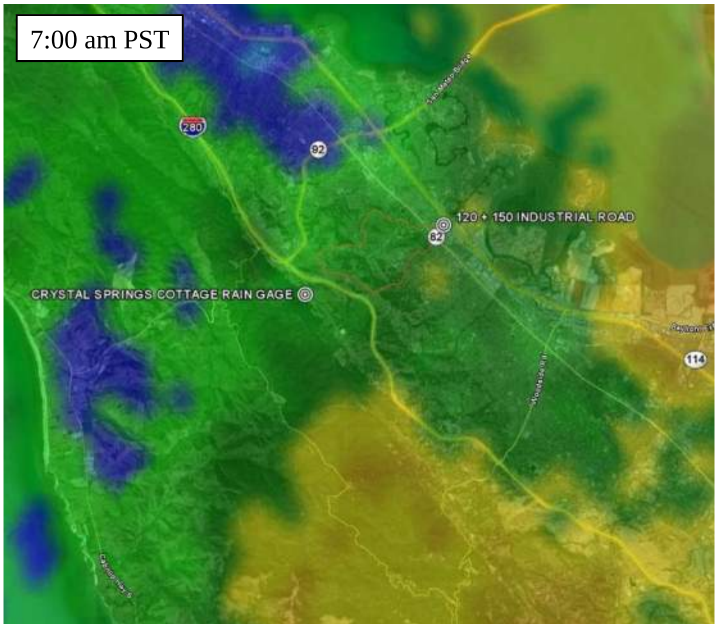
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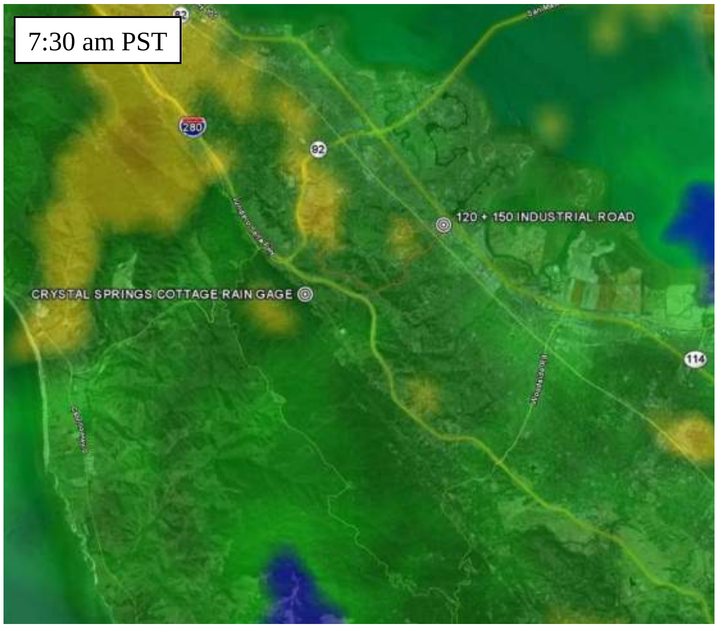
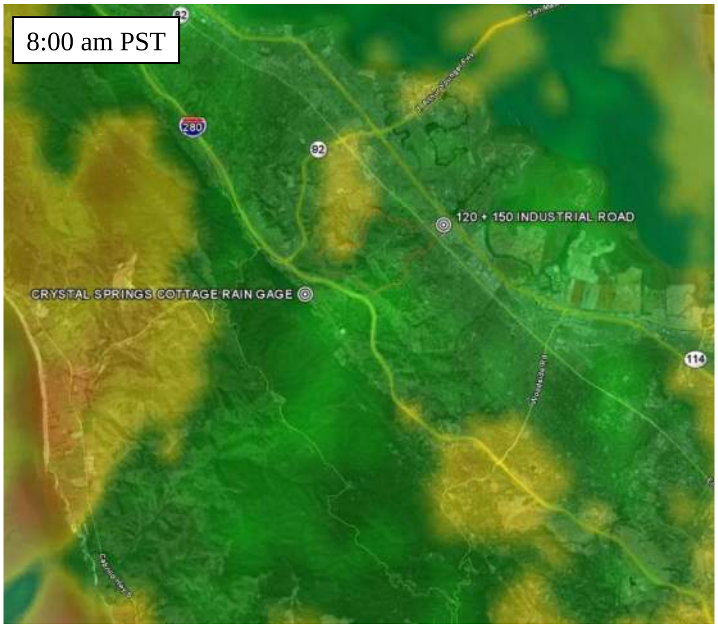
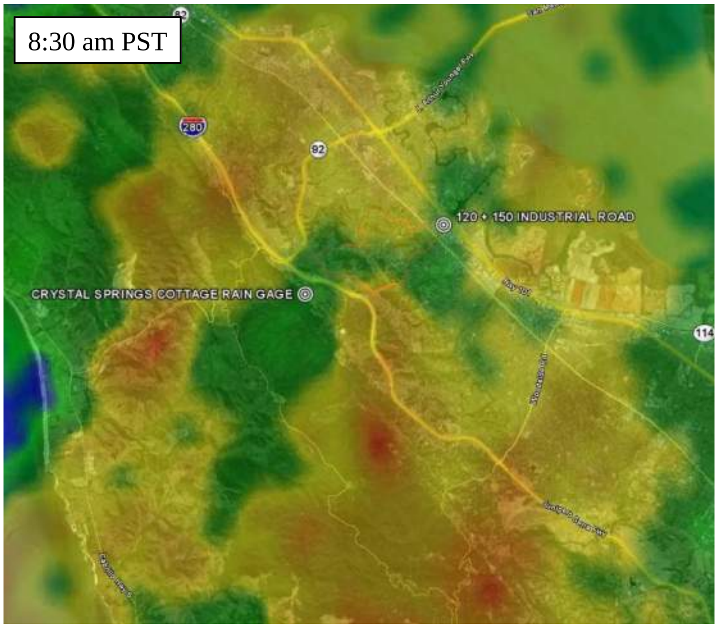

7:30 am PST


8:00 am PST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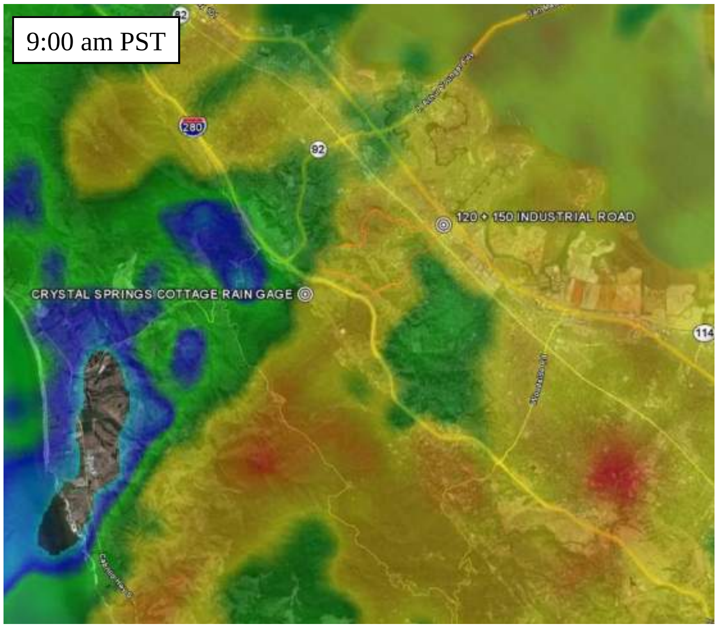
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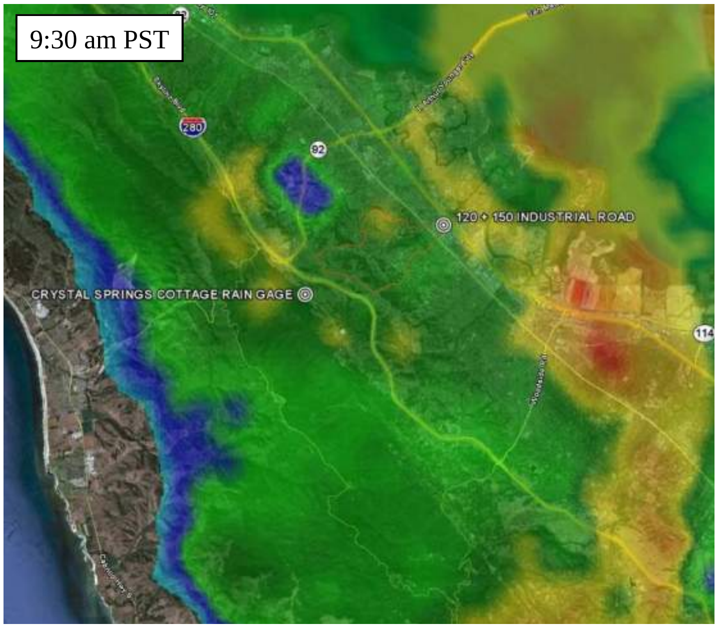
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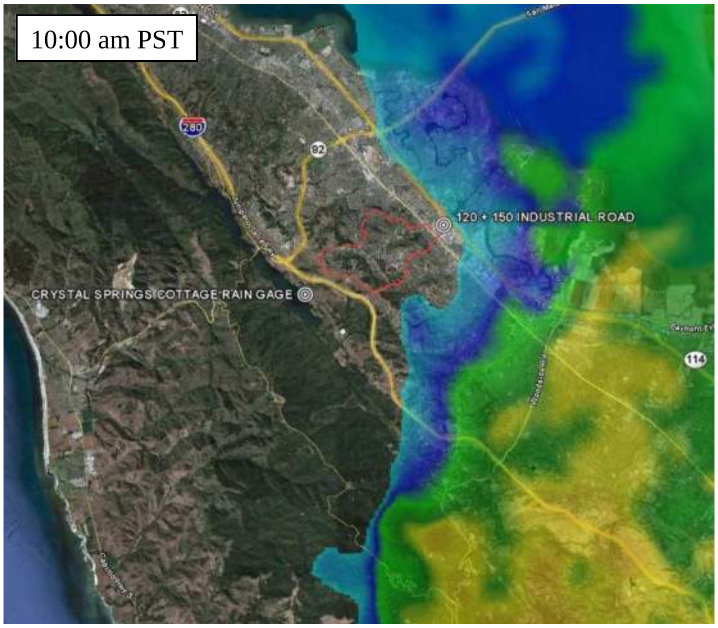
10:00 am PST

Appendix A

The National Oceanic and Atmospheric Administration's (NOAA) Storm Data and Unusual Weather Phenomena with Late Reports and Corrections, January 2010, Volume 52, Number 1, pages 39-41

CALIFORNIA, Western

Location	Date	Time Local/ Standard	Path Length (Miles)	Path Width (Yards)	Number of Persons		Estimated Damage		Character of Storm
					Killed	Injured	Property	Crops	
CAZ511 **East Bay Hills and the Diablo Range**	19	0700PST 0720PST			0	0	15.0K	0.00K	Landslide
	19	1845PST 1915PST			0	0	25.0K	0.00K	Strong Wind

The second in a series of significant storms brought strong winds and heavy rain to the San Francisco and Monterey Bay area. This storm developed over the Pacific Ocean with a strong parent low pressure based in the Gulf of Alaska. Around 137,000 customers lost power across the San Francisco Bay area. Numerous power lines and trees were knocked down when strong wind combined with saturated soil.

Location	Date	Time Local/ Standard	Path Length (Miles)	Path Width (Yards)	Number of Persons		Estimated Damage		Character of Storm
					Killed	Injured	Property	Crops	
CAZ006 **San Francisco**	20 21	0500PST 1000PST			0	0	18.168M	0.00K	High Surf
CAZ530 **Southern Monterey Bay and Big Sur Coast**	20	0500PST 1000PST			0	0	220.0K	0.00K	High Wind
CAZ509-530 **San Francisco Peninsula Coast - Southern Monterey Bay and Big Sur Coast**	20 21	0600PST 1600PST			0	0	1.53M	0.00K	High Surf
CAZ506-513 **North Bay Interior Valleys - Santa Clara Valley Including San Jose**	20	0600PST 1000PST			0	0	480.0K	0.00K	Strong Wind
Santa Clara County **1 NW (SJC)San Jose Intl A**	20	0645PST 1000PST			0	0	0.00K	0.00K	Flood

Heavy rain flooded the southbound lanes of US Highway 101 causing traffic to divert for over six hours.

Location	Date	Time Local/ Standard	Path Length (Miles)	Path Width (Yards)	Number of Persons		Estimated Damage		Character of Storm
					Killed	Injured	Property	Crops	
Alameda County **2 SW Albany**	20	0700PST 1200PST			0	0	0.00K	0.00K	Flood

Heavy rain caused knee-deep flooding at the intersections of Second and Harrison Streets in Berkeley.

Location	Date	Time Local/ Standard	Path Length (Miles)	Path Width (Yards)	Number of Persons		Estimated Damage		Character of Storm
					Killed	Injured	Property	Crops	
San Mateo County **1 N Pescadero**	20	0700PST 1000PST			0	0	20.00K	0.00K	Flood

Rescuers pulled six people out of cars that stalled in 3-foot water in Pescadero.

Location	Date	Time Local/ Standard	Path Length (Miles)	Path Width (Yards)	Number of Persons		Estimated Damage		Character of Storm
					Killed	Injured	Property	Crops	
CAZ508 **San Francisco Bay Shoreline**	20	0700PST 1000PST			0	1	245.0K	0.00K	High Wind
CAZ510-529 **East Bay Interior Valleys - Northern Monterey Bay**	20	0700PST 1000PST			0	0	380.0K	0.00K	Strong Wind

CALIFORNIA, Western

Location	Date	Time Local/ Standard	Path Length (Miles)	Path Width (Yards)	Number of Persons		Estimated Damage		Character of Storm
					Killed	Injured	Property	Crops	
Marin County **1 NW Ignacio**	20	0800PST 1100PST			0	0	0.00K	0.00K	Flood

Officials closed the southbound US Highway 101 off ramp to State Highway 37 and South Novato Boulevard due to flooding in Novato. Minor flooding occurred throughout Marin County and caused schools to close because of flooding concerns.

Monterey County **1 N Greenfield**	20	0800PST 1200PST			0	0	0.00K	0.00K	Flood

Heavy rain caused flooding in Greenfield.

Monterey County **1 NW Chualar**	20	0800PST 1000PST			0	0	0.00K	0.00K	Flood

Heavy rain caused flooding along State Highway 101 just north of Chualar. California Highway Patrol slowed traffic on Highway 101 because of the flooding.

San Mateo County **1 E San Carlos**	20	0800PST 1000PST			0	0	15.00K	0.00K	Flood

Heavy rain caused Pulgas Creek to overflow its banks and flood some classrooms at Central Middle School in San Carlos. Also, several streets were blocked off in low-lying areas just west of US Highway 101, including Taylor Avenue in San Carlos and parts of Rolison Road in Redwood City. In Atherton, officials closed March Road from Middlefield Road to Fair Oaks Avenue because a creek had begun to flood.

Sonoma County **Schellville**	20	0800PST 1100PST			0	0	10.00K	0.00K	Flood

Heavy rain led to flooding of Sonoma Creek along State Route 121 near Schellville. Numerous roads were blocked throughout the region because of standing water. Daywalt, Green Valley, Mark West Station, Todd, Portal, Piner and Valley Ford-Freestone Roads were among the areas closed roads due to flooding. The heavy rains also infiltrated the sewer pipes in five places in Boyes Hot Springs and in Sonoma causing overflows into streets and creeks.

CAZ509	**San Francisco Peninsula Coast** 20	0800PST 1000PST			0	0	15.0K	0.00K	High Wind
San Mateo County **1 W (SQL)San Carlos Arpt**	20	0830PST 1000PST			0	0	30.00K	0.00K	Flood

Heavy rain caused Harbor Boulevard at the underpass of State Route 82 to flood submerging a car to the base of its windows. The road was barricaded to stop anyone else from driving into the water. Also in Belmont, a car repair business evacuated its building as 3 inches of water covered the floor. Belmont Creek was to blame.

CAZ516	**Southern Salinas Valley/Arroyo Seco /Lake San Antonio** 20	0900PST 1100PST			0	0	50.0K	0.00K	Strong Wind
San Mateo County **3 ESE Pedro Vly**	20	0919PST 0920PST			0	0	0.00K	0.00K	Thunderstorm Wind (56MG)

A RAWS site at Spring Valley reported a wind gust to 64 mph at 9:19 a.m. PST.

Note: The measured wind gust of 56 knots is equivalent to 64 mph.

Location	Date	Time Local/ Standard	Path Length (Miles)	Path Width (Yards)	Number of Persons Killed	Number of Persons Injured	Estimated Damage Property	Estimated Damage Crops	Character of Storm

CALIFORNIA, Western

Santa Clara County

1 SW Los Gatos	20	1030PST							
		1330PST			0	0	0.00K	0.00K	Flood

State Highway 17 was closed for about three hours due to flooding.

Santa Cruz County

Mt Hermon	20	1100PST							
		1545PST			0	0	0.00K	0.00K	Flood

Heavy rain caused the San Lorenzo River in Felton to rise over its banks and flood the Felton Grove community. Two hundred residents were called to evacuate before the river rose to 18 feet and overflowed into the streets, including River Road and Sylvan Way.

Santa Clara County

1 NNE Campbell	20	1400PST							
		1600PST			1	0	0.00K	0.00K	Flood

As an arrest warrant was being served at a home in Campbell, a man ran into his backyard and hopped over a fence, where a cement drainage ditch was running at full capacity. The man tried to jump over the ditch but got caught in the water and dragged downstream. The Police Officers saw him try to keep his head above water, but he went under and drowned. M?IW

Santa Cruz County

3 N Corralitos	20	1410PST							
		1411PST			0	0	0.00K	0.00K	Hail (1.00)

A hail storm occurred in the mountains of Santa Cruz County. A report of one inch diameter hail came from a motorist traveling along Eureka canyon Road north of Corralitos.

Monterey County

1 S Del Rey Oaks	20	1430PST							
		1445PST			0	0	0.00K	0.00K	Hail (1.00)

An intense hail storm occurred near Ryan Ranch just south-southeast of Del Rey Oaks.

The third in a series of significant storms brought strong winds and heavy rain to the San Francisco and Monterey Bay areas. This storm, the strongest of the week, developed over the Pacific Ocean with a strong parent low pressure based in the Gulf of Alaska. Around 159,000 customers lost power across the San Francisco Bay area with nearly 22,000 customers without power in the Monterey Bay area. Numerous power lines and trees were knocked down when strong wind combined with saturated soil. Also, areas of flooding occurred causing mainly problems for vehicles.

CAZ508-510-513 — East Bay Interior Valleys - San Francisco Bay Shoreline - Santa Clara Valley Including San Jose

	22	0900PST							
		1830PST			1	0	42.0K	0.00K	Strong Wind

A cold front moved across the San Francisco and Monterey Bay area causing isolated strong winds, snow flurries at higher elevations and additional rain. Since the ground was saturated from the early week's storms many of the previously flooded areas remained closed.

Contra Costa County

4 WSW Brentwood	23	1254PST							
		1255PST	1.64	2	0	0	25.00K	0.00K	Tornado (EF1)

A low topped super cell produced an EF0 tornado near Brentwood. The tornado crossed power lines and destroyed a utility pole (DI24, DOD4). An eyewitness described the tornado as high winds from swirling white cloud. The pole was twisted to the ground and the top one-third of the 40-foot pole was splintered. Fifty-five customers lost power at 12:54 p.m. PST.

Lingering moisture combined with the cold air left behind a front that moved across the San Francisco Bay Area on Friday to produce a damaging thunderstorm on Saturday.

CAZ506 — North Bay Interior Valleys

	25	0300PST							
		1100PST			0	0	50.0K	0.00K	Strong Wind

Michael Baker
INTERNATIONAL

Appendix G

Funding Strategy

Belmont Creek Flood Management Plan – Funding Strategy

Introduction

This funding strategy supplements the Belmont Creek Flood Management Plan (project) by identifying funding identify funding opportunities for the project and evaluate the feasibility of obtaining funding for each design alternative. Potential partnerships among stakeholders are also identified.

The findings and recommendations are summarized in the matrices at the end of this Funding Strategy.

Descriptions of Funding Options

Grant Programs

State Water Resources Control Board.

The major SWRCB program for storm water is the **Storm Water Grant Program** The purpose of the SWGP is to fund storm water and dry weather runoff projects that best advance the SWRCB's policy goals of improving water quality and realizing multiple benefits from the use of storm water and dry weather runoff as a resource. Grant funding is primarily provided through Proposition 1: The Water Quality, Supply, and Infrastructure Improvement Act of 2014. The solicitation for Round 2 storm water management implementation grant applications for approximately $90 million in funding is expected to be issued in Summer 2019.

https://www.waterboards.ca.gov/water_issues/programs/grants_loans/swgp/docs/prop1/prop1_swgp_imp_r1_funding_list_approval.pdf

Other SWRCB Grant Programs

- **Groundwater Regional Sustainability Funding Program (Proposition 1).** Provides funds for projects to prevent or clean up the contamination of groundwater and groundwater recharge. Guidelines are in development and solicitation dates are to be determined.
- **Federal Clean Water Act 319(h) Non-point Source Grant Program.** Projects to reduce nonpoint source pollution consistent with Total Maximum Daily Loads (TMDLs) that address impaired water. Funding and award limits: $4.5 million total, with $75K to $125 K per planning project, and $250K to $750K per implementation project. Maximum grant project period is three years. Requires 25% match unless waiver of match is approved. Annual solicitation, late summer or early fall, with applications submitted through Financial Assistance Application Submittal Tool (FAAST).

https://www.waterboards.ca.gov/water_issues/programs/grants_loans/

Online SWRCB financial assistance website: https://faast.waterboards.ca.gov/

State Coastal Conservancy.

SCC also awards Prop. 1 grants. Approximately $30 million of Prop. 1 funds are remaining available for SCC grant programs, including money that will be awarded for Round 10 applications, which have not yet been selected. The Round 11 for Prop.1 has been issued, applications for grant proposals are due April 30, 2019.

Proposition 68. The recently passed $4.1 billion bond measure (California Drought, Water, Parks, Climate, Coastal Protection, and Outdoor Access for All Act of 2018) will provide up to $550 million for flood protection; $443 for climate preparedness and habitat resiliency; $370 million for groundwater recharge and cleanup; and $162 million for river and waterway improvements. Much of this funding is designated for specific projects or locations. For example, of the $550 million for flood protection, $350 million is designated for the Central Valley and $50 million for the Sacramento-San Joaquin Delta. $100 million is available for competitive grants for the purposes of multi-benefit projects in urbanized areas to address flooding. Eligible projects for this section include storm water capture and reuse, planning and implementation of low-impact development, restoration of urban streams and watersheds, and increasing permeable surfaces to help reduce flooding.

It is expected that grants for Prop. 68 funds will follow a generally similar process as Prop. 1. SCC is in the process of developing the grant guidelines for Prop. 68. A local match of at least 25 percent of the awarded amount will be required unless the project is identified as serving a disadvantaged community.

Climate Ready Grants

These grants, funded by the Greenhouse Gas Reduction Fund, encourage action to prepare for a changing climate by advancing planning and implementation of on-the-ground actions that reduce greenhouse gas emissions and lessen the impacts of climate change on communities and natural resources. The Conservancy seeks to support multi-benefit projects that use natural systems to enhance climate resilience. Grant solicitation announcement in Spring 2019.

http://scc.ca.gov/grants/proposition-1-grants/

California Department of Water Resources

Urban Streams Restoration Proposition 68 grant funds for local communities for projects to reduce flooding and erosion and associated property damages; restore, enhance, or protect the natural ecological values of streams; and promote community involvement, education, and stewardship. Funded projects have included:

- Stream cleanups
- Bank stabilization projects
- Revegetation efforts
- Recontouring of channels to improve floodplain function

Tentative release of the proposal solicitation package in Spring 2019 and applications for proposals anticipated in Summer 2019.

https://water.ca.gov/Programs/Integrated-Regional-Water-Management/Urban-Streams-Restoration-Program

CALTRANS

Cooperative Implementation Agreement (CIA)

The CIA program provides funding for local storm water projects that help Caltrans meet its storm water quality objectives in a given watershed or stream reach. The source of funding for the CIA is the Caltrans storm water management operating budget and depends on availability of funds after Caltrans' own programs are funded. Funding availability is generally determined in March or April of each year. Caltrans establishes priorities for funded projects in each watershed. For example, in the mid-Bay area, trash removal is a current priority. Other pollutant categories include: sediment nutrients, turbidity, metals, bacteria, temperature, chloride and others. Reach priorities (for TMDL's) are posted on the State Water Resources Control Board website:

http://www.waterboards.ca.gov/water_issues/programs/stormwater/caltrans.shtml

Funding for each agreement is subject to the appropriation of resources by the Legislature, the State Budget Act authority. It is mutually agreed that if the State Legislature does not appropriate sufficient funds for the program, this Agreement shall be amended if possible to reflect any reduction in funds, but nothing herein obligates parties to provide additional funding or proceed if sufficient funding is unavailable

http://www.dot.ca.gov/hq/tpp/grants.html

California Natural Resources Agency

Urban Storm Water and Waterways Improvement Program (Prop. 68)

Funds multi-benefit projects in urbanized areas to address flooding. Projects include storm water capture and reuse, planning and implementation of low-impact development, restoration of urban streams and watersheds and increasing permeable surfaces to help reduce flooding. Up to $92.5 million to be awarded in 2019, pending final Prop. 68 guidelines.

Environmental Enhancement and Mitigation Program

The EEM is grant opportunity that requires a partnership with an agency proposing a transportation facility (a "Related Transportation Facility" public street, highway, mass transit guideway, trains, ports, light rail lines, city streets, airports, etc. or their appurtenant features e.g. park and ride facilities, high-occupancy vehicle lanes, transit stations, etc.) which has documented environmental impacts that would be mitigated by the grant-funded mitigation project. The mitigation project must either be in the immediate vicinity of the RTF, or in general area of the RTF. Grant applicants can identify eligible RTF's by contacting the Regional Transit Authority, the Council of Governments, or the Caltrans District Office. The EEM project must satisfy one of the following categories:

- Urban Forestry project designed to offset vehicular emissions of carbon dioxide.
- Resource Lands project for the acquisition or enhancement of resource lands to mitigate the loss of, or the detriment to, resource lands lying within or near the right-of-way acquired for transportation improvements.
- Mitigation Project beyond the scope of the Lead Agency responsible which is responsible for assessing the environmental impacts of the proposed RTF.

The next EEM solicitation is expected in April 2019

http://resources.ca.gov/grants/environmental-enhancement-and-mitigation-eem/

Urban Greening Program (GGRF) and Urban Green Infrastructure (Prop. 68)

SB 859 was signed into law on September 14, 2016, (Chapter 368, Statutes of 2016) creating the California Natural Resources Agency's Urban Green Infrastructure, funded by the Greenhouse Gas Reduction Fund (GGRF "cap & trade") to support the development of projects that reduce GHG emissions and provide multiple benefits. In 2017, AB 109 (Chapter 249, Statutes of 2017) allocated $26 million from the GGRF to the Cal NRA for its Urban Greening Program. In October 2018, eligible projects were awarded $24.7 million in Round 2 of the program. A request for concept proposals (Round 3) has recently been issued for approximately $19 million in funding. Proposals are due February 28, 2019.

California Natural Resources Agency is also developing guidelines for Prop. 68 grants including an $18.5 million Urban Green Infrastructure program, which may be targeted to benefits for disadvantaged communities. Guidelines are expected to be issued in 2019.

http://resources.ca.gov/grants/urban-greening/

California Trails and Greenway Investments

Funded by Prop. 68 these grants promote new or alternate access to parks, waterways, outdoor recreation, or other natural environments, to encourage active transportation.

California Department of Water Resources

Urban Streams Restoration Program

The Prop. 68 Urban Streams Restoration Program provides grants to local communities for projects to reduce flooding and erosion and associated property damages; restore, enhance, or protect the natural ecological values of streams; and promote community involvement, education, and stewardship. Tentative solicitation is Spring 2019 for $10 million in funding.

https://water.ca.gov/Work-With-Us/Grants-And-Loans/Urban-Streams

Federal Emergency Management Agency

FEMA (Department of Homeland Security) administers three programs that provide funding for eligible mitigation planning and implementation projects that reduces disaster losses and protect life and property from future disaster damages. The three programs are the Flood Mitigation Assistance (FMA) Program, the Pre-Disaster Mitigation (PDM) Program, and the Hazard Mitigation Grant Program (HMGP):

Flood Mitigation Assistance

As appropriated by the Consolidated Appropriations Act, 2018 (Public Law 115-141); the Fiscal Year (FY) 2018 Flood Mitigation Assistance (FMA) Grant Program provides resources to assist states and local communities in their efforts to reduce or eliminate the risk of repetitive flood damage to buildings and structures insurable under the National Flood Insurance Program (NFIP) as authorized by the National Flood Insurance Act of 1968, as amended. Local governments are considered sub-applicants and must apply to their applicant state.

The 2018 FMA application submission deadline is January 31, 2019 at 3 PM Eastern Standard Time and the anticipated award date is December 30, 2019. To be considered timely, a FMA grant application must be submitted by the application deadline via the Mitigation eGrants system, and the Applicant must have received a confirmation message in eGrants that indicates successful FMA grant submission to FEMA.

The FMA Grant Program is a nationally competitive program that was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 with the goal of reducing or eliminating claims under the NFIP and is focused on mitigating repetitive loss (RL) properties and severe repetitive loss (SRL) properties. The total amount of funds distributed under the FY 2018 FMA will be $160,000,000. Of this, a total $70,000,000 has been prioritized for community flood mitigation projects and advance flood mitigation assistance leaving an estimated $90,000,000 available for other FMA priorities that include technical assistance, flood mitigation planning, and mitigation of RL and SRL properties.

Eligible Community Flood Mitigation Projects include

- Infrastructure protective measures
- Floodwater storage and diversion
- Utility protective measures
- Storm water management
- Wetlands restoration/creation
- Aquifer storage and recovery
- Localized flood control to protect a critical facility
- Floodplain and stream restoration
- Water and sanitary sewer system protective measures

Applicants (states) and sub-applicants (local governments) must have a FEMA approved mitigation plan as of the application deadline in order to apply for mitigation projects in accordance with Title 44 CFR Part 201.

The maximum federal share for FMA planning sub-applications is as follows:

- Up to $100,000 for community flood mitigation advance assistance
- Up to $10,000,000 for community flood mitigation projects
- $50,000 for Technical Assistance for states/territories who were awarded FMA Grant Program funds totaling at least $1,000,000 in FY 2017.
- $100,000 per Applicant for mitigation planning with a maximum of $50,000 for state plans and $25,000 for local plans.

A maximum of 10 percent of grant funds awarded can be used by the recipient for management costs, and a maximum of 5 percent of grant funds awarded can be used by the subrecipient for management costs, per HMA Guidance.

Federal funding is available for up to 75 percent of the eligible FMA activity costs. FEMA may contribute up to 90 percent for RL properties and up to 100 percent Federal cost share for SRL properties.

For more information on FEMA's Flood Mitigation Assistance program visit:

https://www.fema.gov/flood-mitigation-assistance-grant-program;

and the California Office of Emergency Services:

http://www.caloes.ca.gov/for-governments-tribal/plan-prepare/hazard-mitigation-planning/state-hazard-mitigation-plan

Pre-Disaster Mitigation Program

The PDM Program, authorized by Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, is designed to assist States and local communities in implementing a sustained pre-disaster natural hazard mitigation program. Local governments are eligible sub-applicants and can sponsor applications on behalf of homeowners.

The goal of the PDM program is to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on Federal funding in future disasters. This program awards planning and project grants and provides opportunities for raising public awareness about reducing future losses before disaster strikes. Mitigation planning is a key process used to break the cycle of disaster damage, reconstruction, and repeated damage.

The 2018 PDM application submission deadline is January 31, 2019 at 3 PM Eastern Standard Time and the anticipated award date is December 30, 2019. To be considered timely, a FMA grant application must be submitted by the application deadline via the Mitigation eGrants system, and the Applicant must have received a confirmation message in eGrants that indicates successful FMA grant submission to FEMA.

PDM grants are funded annually by Congressional appropriations and are awarded on a nationally competitive basis. The total amount of funds that will be distributed under the FY 2018 PDM Grant Program will be $235,200,000 of which all states are eligible to receive an allocation of 1% of the appropriation, or $575,000, in accordance with Section 203(f)(1) of the Stafford Act. This is referred to as a state set aside amount. The balance of PDM Grant Program funds will be distributed on a competitive basis to all eligible applicants. No applicant may receive more than 15 percent, or $37,380,000, of the appropriated PDM funding per Section 203(f)(2) of the Stafford Act.

FEMA requires that recipients adopt hazard mitigation plans as a condition for receiving certain types of non-emergency disaster assistance, including funding for PDM mitigation projects. All mitigation projects submitted as part of a PDM grant application must be consistent with the goals and objectives identified in a) the current, FEMA-approved State or Tribal (Standard or Enhanced) Mitigation Plan and b) the local mitigation plan for the jurisdiction in which the project is located.

For more information on the mitigation plan requirement:

https://www.fema.gov/hazard-mitigation-plan-requirement

The maximum federal share for PDM sub-applications is as follows:

- $4,000,000 for mitigation projects;
- Up to $200,000 per Applicant for Advance Assistance;
- $10,000,000 for Resilient Infrastructure projects;
- $400,000 for new mitigation plans consistent with 44 CFR Part 201;
- $300,000 for State/territorial and multi-jurisdictional local or tribal mitigation plan updates consistent with 44 CFR Part 201;
- $150,000 for single jurisdiction local or tribal mitigation plan updates consistent with 44 CFR Part 201;

A maximum of 10 percent of grant funds awarded can be used by the recipient for management costs, and a maximum of 5 percent of grant funds awarded can be used by the subrecipient for management costs, per HMA Guidance. In addition, 10 percent of plan and project sub-applications for information dissemination activities, including public awareness and education (brochures, workshops, videos, etc.) related to a proposed planning or project activity

Federal funding is available for up to 75 percent of the eligible FMA activity costs. Small, impoverished communities may be eligible for up to a 90 percent Federal cost share in accordance with the Stafford Act. The remaining eligible activity costs must be derived from non-Federal sources.

For more information on FEMA’s Pre Disaster Mitigation Program visit: https://www.fema.gov/pre-disaster-mitigation-grant-program

Hazard Mitigation Grant Program

The purpose of HMGP is to help communities implement hazard mitigation measures following a Presidential Major Disaster Declaration in the areas of the state requested by the Governor. The HMGP supports mitigation measures that reduce the risk of loss of life and property from future disasters. HMGP funding is determined upon the Presidential Major Disaster Declaration at the Governor's request.

The amount of HMGP funding available to the Applicant is based on the estimated total Federal assistance, subject to the sliding scale formula outlined in Title 44 C.F.R. Section 206.432(b) that FEMA provides for disaster recovery under Presidential major disaster declarations. The formula provides for up to 15 percent of the first $2 billion of estimated aggregate amounts of disaster assistance, up to 10 percent for amounts between $2 billion and $10 billion, and up to 7.5 percent for amounts between $10 billion and $35.333 billion. For States with enhanced plans, the eligible assistance is up to 20 percent for estimated aggregate amounts of disaster assistance not to exceed $35.333 billion. The Period of Performance (POP) for HMGP begins with the opening of the application period and ends no later than 36 months from the close of the application period.

Regulations require the state, tribe, or territory to provide a Letter of Intent within 30 days after a disaster declaration that notifies FEMA whether or not the state will participate in HMGP.

The HMGP amount of grant funds available in a particular year depends entirely on the number and size of the declared major disasters in the recent past and HMGP funds are flexible in that HMGP monies can be used to mitigate risks that have no relation to the disaster declaration that provides them.

If Advance Assistance is authorized under a declaration, it gives FEMA the authority to provide up to 25% of the amount of estimated HMGP funds to a state in advance of incurring eligible costs. The purpose of Advance Assistance is to provide states resources to develop mitigation strategies and obtain data to prioritize, select, and develop complete HMGP applications in a timely manner. In this case, the States would use Advance Assistance to allow subrecipients to obtain additional needed staff or resources. Advance Assistance, if approved, is given as a lump sum to cover pre-award costs (e.g., conduct studies, develop an application, and submit the application on time or within an extension of an application period). Examples of how it can be used include:

- Develop cost-share strategy and identify potential match;
- Evaluate or determine appropriate mitigation actions;
- Collect data, including developing hazard mitigation projects (e.g., feasibility actions) and conducting benefit cost analyses; and
- Incorporate environmental considerations early into program decisions.

For more information on FEMA's Hazard Mitigation Grant Program visit:

https://www.fema.gov/hazard-mitigation-grant-program

HMA Application Review and Selection Process

FEMA has specified minimum project criteria via regulation (44 CFR Part 79 and 44 CFR Section 206.434), including that Applicants must demonstrate mitigation projects are cost effective. Benefit-Cost Analysis (BCA) is the method by which the future benefits of a hazard mitigation project are determined and compared to its costs. The end result is a Benefit-Cost Ratio (BCR), which is calculated by a project's total benefits divided by its total costs. The BCR is a numerical expression of the "cost-effectiveness" of a project. A project is considered to be cost effective when the BCR is 1.0 or greater, indicating the benefits of a prospective hazard mitigation project are sufficient to justify the costs. Projects that are not cost-effective will not be eligible.

FEMA will review sub-applications submitted by each Applicant to ensure compliance with the HMA Guidance, including eligibility of the Applicant and sub-applicant, eligibility of proposed activities and costs, completeness of the sub-application, cost-effectiveness and engineering feasibility of mitigation projects, and eligibility and availability of non-Federal cost share. For more detailed information, see Part V, Application Review Information, of the HMA Guidance, available on the FEMA website at:

http://www.fema.gov/medialibrary/assets/documents/103279.

FEMA will provide the Federal award package to the Applicant electronically via the MT eGrants system. Award packages include an award letter, Obligating Document for Awards/Amendments, and Articles of Agreement, including EHP review and/or other conditions. An email notification of the award package will be sent through the eGrants system to the Applicant POC(s) designated in the Contact Information section of their PDM grant application. See 2 CFR 200.210, Information contained in a Federal award at:

http://www.gpo.gov/fdsys/granule/CFR-2014-title2-vol1/CFR-2014-title2-vol1-sec200-210.

Cooperating Technical Partners Program

The purpose of the CTP Program is to provide, through a Cooperative Agreement, funds to ensure that state and local government partners, through training and technical assistance, can perform program management and technical mapping-related activities. The CTP program supports the establishment, or the update of flood-risk zone data, via Risk MAP (mapping, assessment and planning) projects. The CTP program assists partners in making estimates of the probable flood caused loss for the various flood risk zones for these assessment and planning projects. Through Risk MAP FEMA develops and updates flood hazard data and maps for NFIP participating communities.

FEMA collaborates with a variety of stakeholders to achieve the following goals under Risk MAP:

- Flood Hazard Data: Address gaps in flood hazard data to form a solid foundation for risk assessment, floodplain management, and actuarial soundness of the NFIP.
- Public Awareness/Outreach: Ensure that a measurable increase in the public’s awareness and understanding of flood risk results in a measurable reduction of current and future vulnerability. CTP Program includes a separate scope of work specifically for community engagement and risk communication tasks. The scope of these tasks is identified through the (Community Outreach Mitigation Strategies Statement of Work) or COMS-SOW. As with all projects funded through the CTP Program, entities who wish to undertake community engagement and risk communication tasks as a CTP must meet eligibility and program requirements outlined in the CTP Program Guidance. Tasks funded under the COMS SOW cannot result in the production of a FIRM.
- Hazard Mitigation Planning: Lead and support States, localities, and Tribes to effectively engage in risk-based mitigation planning resulting in sustainable actions that reduce or eliminate risks to life and property from natural hazards.
- Enhanced Digital Platform: Provide an enhanced digital platform that improves management of Risk MAP, stewardship of information produced by Risk MAP, and communication and sharing of risk data and related products to all levels of government and the public.

- Alignment and Synergies: Align risk analysis programs and develop synergies to enhance decision-making capabilities through effective risk communication and management.

Each fiscal year, FEMA issues a Notice of Funding Opportunity (NOFO) document to announce the availability of the CTP cooperative agreement funding opportunity. The NOFO describes the available funding, priorities, requirements and process for eligible applicants to request funding for program activities. FEMA has developed a PowerPoint presentation that provides general information on the CTP Program at this link: CTP Program.

Basic agreements required:

- Partnership Agreement - Required for program participation
- Mapping Activity Statement- Required for undertaking activities
- Cooperative Agreement - Required when FEMA provides funding

None of the members of the Belmont Creek Collaborative have an active CTP agreement. An agreement is necessary to apply to FEMA for a grant. The Association of Bay Area Governments does have an active CTP agreement, the Collaborative might inquire about ABAG applying to FEMA on its behalf.

CTP NOFO link:

https://www.fema.gov/media-library/assets/documents/21123

https://www.fema.gov/cooperating-technical-partners-program

Note: the CTP program will not fund mitigation-related activity that is already funded by HMGP and PDM such as updates to HMPs, projects such as elevations and acquisitions.

Community Rating System

FEMA’s CRS isn’t a grant program, but a way for communities to buy down the cost of flood insurance premiums. Communities that participate is qualifying activities go through an application process and provide documentation of their efforts. The CRS program is available to communities within designated Special Flood Hazard Zone (SFHA). Currently, the Belmont Creek watershed is not within a SFHA.

Other Grant Programs

Pacific Gas and Electric: “Better Together Resilient Communities” is a grant program designed to support local climate resilience initiatives.

Competitiveness for funding is demonstrated by the extent to which the proposal reflects a collaborative effort among multiple organizations and the following priorities: Replicability: the extent to which the proposal identifies how others will be able to learn from and adopt resulting strategies and solutions; show how the proposal addresses the identified needs of disadvantaged communities; and Measure of Effectiveness: the extent to which the proposal includes practical, measurable and innovative ways to address community needs and climate risks.

https://www.pge.com/en_US/residential/in-your-community/local-environment/resilient-communities/resilient-communities-grant-program.page

National Fish and Wildlife Foundation: "Five Star and Urban Waters Restoration Grant Program”. $1.7 million in funding nationwide for projects that include one or more of the following: wetland, riparian, forest and coastal habitat restoration; wildlife conservation, community tree canopy enhancement, water quality monitoring and green infrastructure best management practices for managing run-off. Grant proposals are due January 28, 2019.

https://www.nfwf.org/fivestar/Pages/2019rfp.aspx

Storm Water Fees and Assessments

Benefit Assessment Districts

Assessment districts are formed for a variety of purposes to fund the maintenance and construction of public improvements. All assessment districts require a majority approval of the district's property owners with votes weighted in proportion to the proposed assessment amounts on each parcel. The district formation and voting procedures are specified in California Government Code Sec 53750 et. seq. Assessments districts may issue bonds to finance public improvements pursuant to the Improvement Bond Act of 1915 (Streets and Highways Code Sec. 8500). The bonds are repaid from the annual assessment installments. Financing of improvements using assessment revenue may also be obtained through the California Infrastructure and Economic Development Bank (see below). The improvements financed with assessments must provide a special benefit to the properties in the district and the assessment on each parcel must be proportional to the benefit received by that parcel.

Storm water Management (Enterprise) Fees.

Senate Bill 231 was recently signed into law. The new law is significant for local government storm water management activities because it includes storm drainage in the definition of sewer systems in Article XIII D of the California Constitution. The intent of the legislation is to allow new fees and fee increases for the purpose of funding storm water management activities subject to majority protest only—not Prop. 218 ballot procedures as was previously the case for only non-exempt property-related charges (water, sewer, solid waste, etc.). Many jurisdictions charge storm water or drainage fees. However, these fees typically cover only a small fraction of the costs related to storm water management, including compliance with the Clean Water Act as well as maintaining and constructing new flood control improvements. Under the old law the fees could not be raised to even a justifiable level without passage of a ballot measure in a special or general election. Rate-based revenues could be the source of bonded debt service to fund improvements.

Groundwater Extraction Fees

The groundwater extraction fee is a unit charge for pumping groundwater from the basin to offset the cost of groundwater management activities. A recent court decision, City of San Buenaventura vs. United Water Conservation District validates a more general application of groundwater extraction charges. This decision may have positive implications for funding of a storm water program outside of Prop. 218, if groundwater is, or could be, a significant resource in a community's water supply. The groundwater extraction fee would be a component of customers' water utility bills and used to fund maintenance of groundwater quality, enhance groundwater recharge and develop the groundwater resource.

Local Groundwater Management Authority

A Groundwater Extraction Charge may be imposed, or increased, if a Groundwater Sustainability Plan pursuant to Water Code 10730.2 is adopted. A portion of Belmont Creek watershed is within the San

Mateo Plain Sub-basin, for which no entity is actively managing. However, a basin assessment is in progress to be completed in next month.

http://www.smcsustainability.org/energy-water/groundwater/

Impact Fees

Development impact mitigation fees pursuant to Government Code Section 66000, may be imposed on new development projects to mitigate the impact on the drainage system. Land development typically increases runoff and the potential for downstream flooding. The impact fee may be used to construct storm water management facilities (including conduits, culverts, detention basins, pump stations, and structural best management practices) or purchase equipment that will mitigate the impact caused by new development. Impact fees may not be used for operations or maintenance of facilities and may not fund improvements needed to correct existing deficiencies in the storm water system. Adoption of impact fees require a majority vote of the City Council or Board of Supervisors.

Direct Loans and Bonded Debt Programs

Clean Water/Infrastructure State Revolving Funds

Both the California State Water Resources Control Board (funds originate with the EPA, pursuant to the Clean Water Act) and the California Infrastructure and Economic Development Bank (IBank, State "IBank Act" CA Gov't Code Sec 63000) have SRF programs that offer direct loans at below market interest rates with proceeds from bundled bond issues. Both the SWRCB and I-Bank SRF programs fund a wide range of infrastructure including drainage, water supply and conservation, watershed protection, flood control, parks and recreation and environmental mitigation.

Funding sources for debt service must be identified and may include: water, sewer and other enterprise revenues, general fund revenues, property assessments, Mello-Roos special taxes, lease revenues and other recurring revenues acceptable to the SWRCB and IBank. IBank SRF funding amounts range between $50,000 and $25 million, no maximum for Clean Water SRF, but dependent on available funds. Prevailing wage requirements and 1 percent origination fee for IBank loans. Loan applications are accepted continuously.

Loan Terms:

- Maximum term 30 years
- The interest rate benchmark is Thompson's Municipal Market Data Index
- Staff may adjust the interest rate based on upon factors that include:
- ▪ Area unemployment rates
- ▪ Medium Household Income
- ▪ Recent bond credit rating (if any)

https://faast.waterboards.ca.gov http://www.waterboards.ca.gov/cwsrf

http://ec2-52-39-222-77.us-west-2.compute.amazonaws.com/ibank/programs/isrf

Enhanced Infrastructure Financing District/Tax Increment.

California Government Code §§53398.5 et seq. provides for local agencies to establish enhanced infrastructure financing districts (EIFD) that capture the incremental property taxes after establishment of the EIFD. Except for school districts, a local agency in the EIFD receiving property tax may allocate its share of the property tax increment to finance eligible improvements within the EIFD. School districts are prohibited from relinquishing any share of their tax increment. This revenue source is then leveraged as debt service for a bond issue for capital improvements that benefit the EIFD. An advantage of forming an EIFD is that the improvement bonds may be issued with 55 percent approval of the voters within the EIFD vs. two-thirds approval required to issue bonds without an EIFD.

Public-Private Partnership—Industrial Development Bonds (aka Private Activity Bonds)

The State's Industrial Development Bond (IDB) program provide low-interest tax exempt bonds through the California Industrial Development Financing Advisory Commission (CIDFAC). The bond proceeds must be spent on capital expenditures such as land, buildings and equipment. The program is intended to assist manufacturing facilities to finance capital expansion that generate employment in the production of tangible products. No more than 25 percent of the bond proceeds can be applied to land acquisition, ancillary office, warehouse or other space. The City or County (as local issuing authority) can enter to an agreement wherein an eligible business, through the local issuing authority, applies to the CIDFAC for the bond issue. In exchange for the local authorization of the bonds, a property-owner would deed the land to the City or County and after flood control or other public improvements have been are completed, lease it back from the City or County (using the 25 percent of the bond proceeds allowable for land acquisition). The local authority would finance the improvements with the lease payments.

http://ec2-52-39-222-77.us-west-2.compute.amazonaws.com/ibank/Programs/What-are-Industrial-Development-Bonds

The California Debt Limit Allocation Committee (CDIAC) administers tax-exempt private activity bond programs (IDB are a type of PAB).

Local Watershed Enhancement Bond

With the approval of the electorate, local governments in California have the authority to issue bonds for many governmental purposes. There are several types of bonds (general obligation, limited tax obligation, revenue, tax allocation and special assessment bonds). Depending on the type, up to a two-thirds majority is required of proposed bonded indebtedness and any associated tax measure (property, sales, transient occupancy, etc.) that is needed for debt service.

Funding Options for Management Plan Alternatives

Alternative Descriptions

Belmont Creek Flood Management Plan preliminary alternatives are identified in the 2014 WRECO Study[1]

Alternatives 1, 5, 6, 7 and 8 of WRECO Study were selected by the Stakeholders for further assessment. Alternatives 1, 2, 5, 6 and 7 of the WRECO study were refined in the "Technical Memorandum of Additional Detention Basins for the Belmont Creek Flood Management Plan (May 1 memo)", memorandum dated May 1, 2018. Alternative 1 of the WRECO study was not recommended for project development due to its

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[1] "Belmont Creek Watershed Study, Creek Assessment, and Recommendations for Sustainable Improvements", developed conceptual alternatives for mitigating the flooding conditions along Belmont Creek, particularly in the area between Industrial Road and Old Country Road.

low contribution to the watershed. Alternatives 2, 5, 6 and 7 of the WRECO study were reconfigured in the May 1 memo into two basic alternatives:

Alternative 1: New culvert in Harbor Boulevard from Old Country Road to Belmont Creek

3,200 linear feet of a 10-foot by 4-foot RCB culvert in Harbor Boulevard, targeted operation and maintenance (O&M) of the existing Belmont Creek culverts under US 101 and Industrial Road, and a 3’-5’ high floodwall on the left (northerly) of Belmont Creek, approximately 80 feet upstream of Industrial Road. This alternative is based on Alternatives 6 and 7 of the WRECO Study. Project would feature green infrastructure on Harbor Blvd. for storm water quality and greenhouse gas reduction benefits

Alternative 2: Detention Basins
Detention basins and regional storm water capture projects as presented in the San Mateo County Storm Water Resource Plan website, locations within the Belmont Creek watershed as follows:

- 2A: Hidden Canyon Park Detention
- 2B: Notre Dame De Namur Softball Field
- 2C: Notre Dame De Namur Soccer Field
- 2E: Carlmont High School
- 2F: Twin Pines Park

Alternative 2 –Detention Basins--above represents WRECO Study alternatives #2 and #5 voted on by the Stakeholders, with added locations 2B, and 2C.

Alternative 3: Detention Basins plus Floodwall and Operations and Maintenance At the November 29, 2018 Community Meeting Alternative 3 was identified. This alternative includes the detention basins in Alternative 2 plus construction of a floodwall along the northerly bank of Belmont Creek within the Harbor District, between Old Country Road and Industrial Road, with localized maintenance of culverts along Belmont Creek.

Alternative 4: All the Above Also presented at the November 2018 Community Meeting was Alternative 4, which includes the bypass culvert, the detention basins, floodwall and localized maintenance. The resource agencies (SWRCB, SCC, CADWR) tend to favor grant applications for projects that benefit water quality protection and watershed enhancement in addition to, or even as a higher priority over projects that provide solely flood control improvements. This is particularly true of Caltrans CIA, Prop. 1, and likely Prop 68 as well. Urban greening, watershed restoration, groundwater recharge, watershed storage capacity and reducing pollution of streams and coastal waters are among the specific objectives of Prop. 1.

The above Belmont Creek management alternatives are matched with those sources and mechanisms that would provide the greatest potential for funding of the given project (e.g. including green street improvements in a project to increase funding potential). Only funding options for Alternatives 1 and 2 are included they comprise Alternatives 3 and 4:

Alternative 1

Direct Loans and Bond Financing

The construction of a new culvert and floodwall expands the capacity of the downstream reaches of Belmont Creek and reduces the risk of flooding structures in the Harbor Industrial District and other areas. Financing of these improvements through direct loans and issuance of bonded debt is the most likely option available if a source of revenue could be identified. Potential revenue sources are tax increment through an EIFD, an assessment district or a combination of both. The downside with loans and bond financing is that a plan for repayment with a dedicated revenue stream is required by the lending agencies such as the I-Bank SRF and bond underwriters.

The potential for bond financing is greatest where real estate values are increasing, and a value-capture mechanism is established. An EIFD is a tax increment mechanism that may be used to capture property values that are increasing in an area due to redevelopment and/or general appreciation in real estate. The legislative body (the City Council or Board or Supervisors) acting as District Board of Directors may form an EIFD and create an Infrastructure Financing Plan. However, 55 percent voter approval is required to issue improvement bonds in an EIFD. Furthermore, for a successful bond issue, the available tax increment must be demonstrated, that is, the development growth in the district is underway and is at the level necessary to support the bond repayment. Alternatively, the tax increment may be used for pay-as-you-go improvements, or to fund an I-Bank direct loan.

Benefit Assessment District

A benefit assessment district is another type of value-capture mechanism. The construction of the flood control improvements would confer a direct benefit on the properties protected by the improvements. The cost of the improvements, or some portion thereof, would be apportioned to the property based on the proportionate benefit received. Assessments must be approved by the owners of parcels representing a simple majority of the proposed total assessment amount.

Public/Private Partnerships (PPP)

In the context of the Belmont Creek FMP, a PPP would be a possibility for very specific private development that would benefit directly from the flood control and/or other improvements. The PPP concept as described above would take advantage of the local jurisdictions’ (City or County) ability to secure low interest Industrial Development Bonds from I-Bank to finance the improvements. The potential for redevelopment of the Harbor Industrial District presents a range of financing opportunities for improvements that support the redevelopment of the area. PPP’s generally do not require voter approval, since they create an enterprise separate from general governmental operations. However, PPP agreements are complex and require a high level of sophistication on the part of both the agency and the private party.

Grant funding for Alternative 1 is not completely out of the realm of possibility. The FEMA Flood Mitigation Assistance and the Hazard Mitigation grant programs may provide funding if the subject area is in a flood hazard zone and a mitigation plan is in place. Currently, only a few acres of the Belmont Creek watershed are located within a qualifying flood hazard area. Although that could change over time with sea-level rise and if the area is remapped. The FEMA CTP program is designed to assist local agencies in developing hazard mitigation plans and with updating Flood Insurance Rate Maps (FIRM) to reflect current conditions.

As indicated above, the California Department of Water Resources’ Urban Streams Restoration Program lists flood reduction as an eligible purpose. However, 90 percent of the awards over the past two cycles have gone to stream restoration projects.

Alternative 2

Several grant funding opportunities exist for the Alternative 2 projects. This is due to the wider range of benefits associated with the detention basin projects that, depending on specific design, could include water quality improvement, groundwater recharge, watershed enhancement, stream restoration and educational and recreational benefits.

*Each sub-alternative has the potential to be eligible for future Prop. 1 cycles announced by either SWRCB or SCC and Prop. 68 when those funds are made available.

Whereas the Alternative 2 projects provide real benefits to the wider community, these benefits may not be specific or directly apportionable to any particular property in the watershed. For that reason, the debt-based financing options applicable to Alternative 1 may not be available for Alternative 2 projects, except in the narrowest of circumstances where flood mitigation benefits to downstream properties can be quantified.

Low Impact Development Measures/Green Street Improvements

Low Impact Development (LID) for New Development and Redevelopment. Through the future redevelopment of currently underutilized parcels in the Belmont Creek watershed, the opportunity exists for privately-funded LID to be a viable alternative for the Belmont Creek FMP. LID is required by the San Mateo County Municipal Regional Storm Water Permit (MRP) as a mitigation measure to reduce the impacts of storm runoff from land development project's. LID measures are designed to improve storm water quality and reduce runoff quantity and peak flow using on-site capture and detention, infiltration and biological treatment methods. LID measures are applicable to new development, or as a retrofit to existing land use. LID measures are planned and installed as implementation of a project's conditions of approval and design review. Therefore, LID features are integrated into the project's site improvements, which are directly funded by the project developer.

Publicly Funded LID Projects: In conjunction with privately-funded LID, LID retrofit on public parking lots, within street rights-of-way (Green Streets), and public parks may also benefit the Belmont FMP. Potential Green Street project locations in Belmont and San Carlos are identified in the San Mateo County Storm Water Resource Plan. Alternative #6 of the WRECO Study identified Harbor Boulevard as a potential Green Street location within the Belmont Creek watershed. Other high potential Green Street/Public LID locations may also be identified.

Funding LID Measures

Green Street projects in particular and, more generally, public LID, are listed as eligible uses in several grant programs offered by State agencies (SWRCB, SCC, CALTRANS). These grant programs described above are funded by Prop. 1, Prop. 68 and SB 1. The storm water quality benefits of LID accomplish the objectives of Props 1 and 68, more so than traditional flood control improvements.

Funding Matrix by Alternative

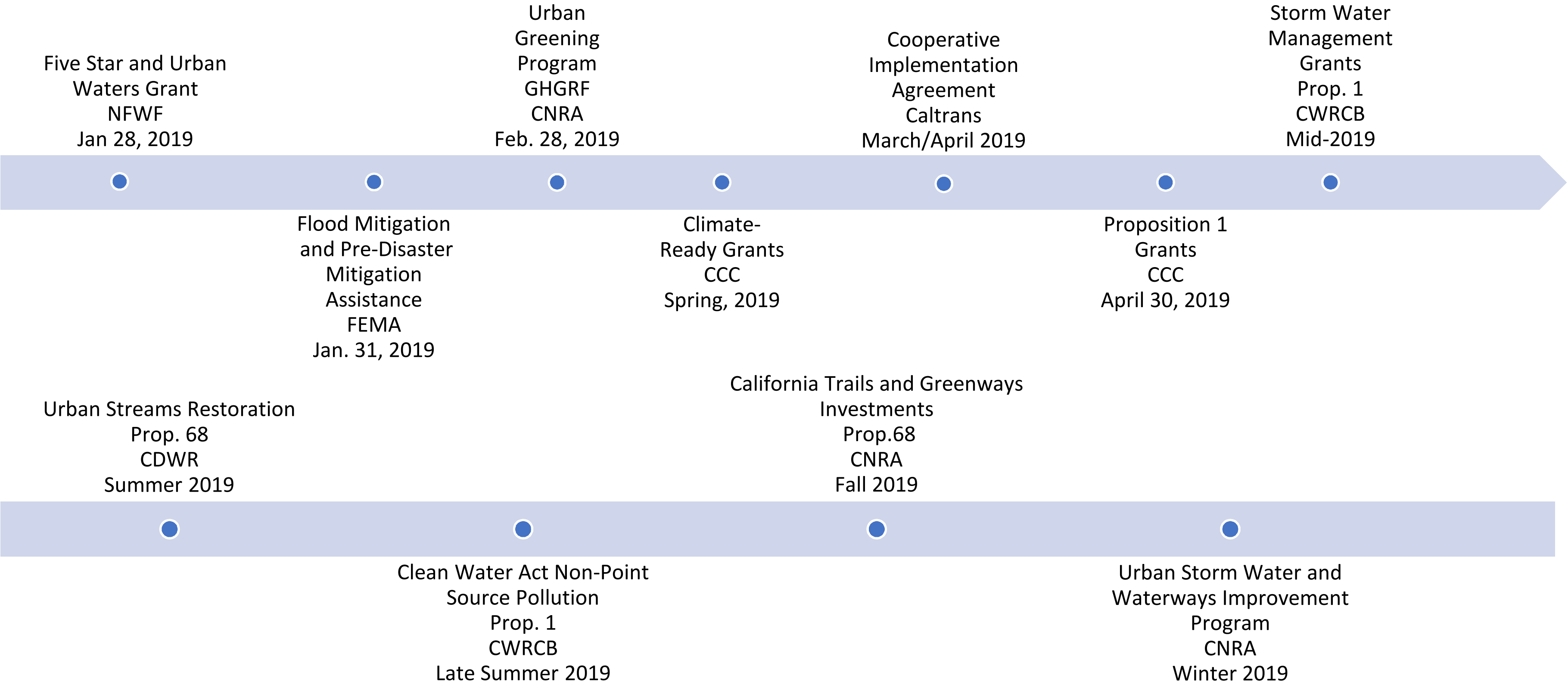
Applicable Belmont Creek FMP Alternatives	Program	Agency	Fund Source/Funding Cycle	Criteria/Notes
Grants				
Detention basins: 2A: Hidden Canyon Park Detention 2B: Notre Dame De Namur Softball Field 2C: Notre Dame De Namur Soccer Field 2E: Carlmont High School 2F: Twin Pines Park General application: – Green Infrastructure – Storm Water Capture – Storm Water Quality	Storm Water Management, Water Code Sec 79747(a)	State Water Resources Control Board	Proposition 1 originally $200 million, about $100 million remaining as of July 2018 Max. award $10 million Round 2 solicitation is anticipated in Mid 2019	https://www.waterboards.ca.gov/water_issues/programs/grants_loans/swgp/prop1/ Contact: Daman Badyal Damanvir.Badyal@waterboards.
	Sec. 80146(a) Groundwater Regional Sustainability		Proposition 68, $16.2 million Final guidelines/solicitation: TBD	Contact: Robert Reeves Robert.Reeves@waterboards.ca.gov (916) 319-8254
	Clean Water Act Non-Point Source Pollution		Clean Water Act 319(h) $4.5 million annually. Annual solicitation late summer or early fall 2019	http://www.waterboards.ca.gov/water_issues/programs/grants_loans/319h/index.shtml Contact: Jeanie Mascia Jeanie.Mascia@waterboards.ca.gov 916-323-2871
2A and 2F	Urban Streams Restoration	California Department of Water Resources	Prop.68, $10 million/$1 million award cap per project; proposal solicitation package in Spring 2019, applications submittal anticipated in Summer 2019	

Applicable Belmont Creek FMP Alternatives	Program	Agency	Fund Source/Funding Cycle	Criteria/Notes
Alternatives 1 and 2	Urban Storm Water and Waterways Improvement Program	California Natural Resources Agency	Prop. 68, $92.5 million Pending final guidelines solicitation anticipated Winter 2019	Multi-benefit projects in urbanized areas to address flooding. Projects shall include but are not limited to storm water capture and reuse, planning and implementation of low impact development, restoration of urban streams and watersheds, and increasing permeable surfaces to help reduce flooding. bondsandgrants@resources.ca.gov (916) 653-2812+J11
1, 2A and 2F	Urban Greening Program		Greenhouse Gas Reduction Fund $19 million, concept proposals for Round 3 accepted until Feb. 28, 2019	
	Urban Green Infrastructure Program		Prop. 68, $18.5 million, solicitation anticipated 2019 pending final guidelines	
2A and 2F	California Trails and Greenways Investments		Prop. 68, $27.5 million, solicitation anticipated Fall 2019 Pending final guidelines	
Alternative 2	Climate Ready Grants	State Coastal Conservancy	Greenhouse Gas Reduction Fund $2.85 million, announcement in Spring 2019	Implement watershed adaptation projects that reduce the impacts of climate change on communities and ecosystems. Mary Small mary.small@scc.ca.gov 510-286-4181
	Proposition 1 Grants		Round 11 funds remaining after award of Round 10, applications for Round 11 due April 30, 2019	

Applicable Belmont Creek FMP Alternatives	**Program**	**Agency**	**Fund Source/Funding Cycle**	**Criteria/Notes**
Alternatives 1, 2 Including eligible features: Urban infrastructure, storm water treatment, best management practices,	Cooperative Implementation Agreement Storm water quality management	Caltrans	Caltrans storm water management operating budget. Funding, depending on availability, in March/April of each year.	Prioritized by reach according to benefit to Caltrans facilities/ROW in meeting named TMDL thresholds. Belmont Creek is not listed in the current reach priority list.
Alternative 4	Flood Mitigation Assistance (FMA) grants	FEMA	2018 FMA application submission deadline is January 31, 2019; $70 million for community flood mitigation projects	Objective is to reduce or eliminate claims under the NFIP and is focused on mitigating repetitive loss (RL) properties and severe repetitive loss (SRL) properties.
	Pre-Disaster Mitigation		PDM application submission deadline is January 31, 2019; $275.2 million	Objective is to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on Federal funding in future disasters.
	Hazard Mitigation Grant		Funding is based on the estimated total Federal assistance, subject to the sliding scale formula	Implements hazard mitigation measures following Presidential Major Disaster Declaration in areas of the state requested by the Governor
Funding to develop flood hazard mapping, mitigation planning and public awareness/outreach	Cooperative Technical Partners Program		Notice of Funding Opportunity (NOFO) document issued each year announcing availability of CTP cooperative agreement funding opportunities	Provide training and technical assistance; Use data from local permitting, planning and other efforts to facilitate floodplain management Partnership Agreement - Required for program participation

Applicable Belmont Creek FMP Alternatives	**Program**	**Agency**	**Fund Source/Funding Cycle**	**Criteria/Notes**
Alternatives 1 and 2	Five Star and Urban Waters Restoration Grant Program	National Fish and Wildlife Foundation	Proposals due January 28, 2019. $1.7 million in funding nationwide for	Projects would include one or more of the following: wetland, riparian, wildlife conservation, community tree canopy enhancement, water quality monitoring and green infrastructure best management practices for managing run-off

Grant Application Timeline--2019



Five Star and Urban
Waters Grant
NFWF
Jan 28, 2019

Flood Mitigation
and Pre-Disaster
Mitigation
Assistance
FEMA
Jan. 31, 2019

Urban
Greening
Program
GHGRF
CNRA
Feb. 28, 2019

Climate-Ready Grants
CCC
Spring, 2019

Cooperative
Implementation
Agreement
Caltrans
March/April 2019

Proposition 1
Grants
CCC
April 30, 2019

Storm Water
Management
Grants
Prop. 1
CWRCB
Mid-2019

Urban Streams Restoration
Prop. 68
CDWR
Summer 2019

Clean Water Act Non-Point
Source Pollution
Prop. 1
CWRCB
Late Summer 2019

California Trails and Greenways
Investments
Prop.68
CNRA
Fall 2019

Urban Storm Water and
Waterways Improvement
Program
CNRA
Winter 2019

Dates to be Determined or Indeterminate:

Urban Green Infrastructure Program, CNRA—2019, continue to monitor CNRA website
Groundwater Regional Sustainability, CWRCB, continue to monitor CWRCB website
Hazard Mitigation Grant, FEMA, requires disaster declaration
Cooperative Technical Partners Program, FEMA, requires agreement, contact ABAG for possibility of applying under its agreement

All other funding mechanisms: storm water fees and assessments, direct loans, bonded debt, public-private partnerships, infrastructure districts, low impact development, etc. are pursued on a case-by-case basis, independently of grant programs and at the County's and City's discretion.

Abbreviations:

NFWF – National Fish and Wildlife Foundation
FEMA – Federal Emergency Management Agency
GHGRF – Greenhouse Gas Reduction Fund
CWRCB – California Water Resources Control Board
CDWR – California Department of Water Resources
CNRA – California Natural Resources Agency
CCC – California Coastal Conservancy

Michael Baker
INTERNATIONAL

Appendix H

Public Outreach

Belmont Creek Flood Management Plan
Community Engagement Plan

Introduction

The community engagement process for the Belmont Creek Flood Management Plan will provide the local communities with information about flood management strategies, funding, implementation schedule, and identify valued co-benefits that could be included in projects.

The purpose of this plan is to ensure that balanced and effective communication occurs through an inclusive community-wide outreach and engagement campaign. This document outlines the community involvement objectives of the project and describes engagement strategies the Collaborative will use to reach key target audiences and stakeholders.

The outreach plan is divided into two key phases: Review of the Preliminary Conceptual Alternatives and Belmont Creek Flood Management Plan Preferred Alternative(s). Each phase includes a daytime meeting with the business community and an evening meeting for residents of the upstream project area.

Prior to Phase 1: Stakeholder Meetings

Purpose

These introductory stakeholder meetings will introduce the project and alternatives to key stakeholders most affected by the project.

Target Audience

Residential community along Carlmont Drive (Hidden Canyon Park users)
Notre Dame de Namur University and High School
Church of the Immaculate Heart of Mary
Carlmont High School

Desired Outcome

To provide an introduction of the project and seek input on the alternatives and construction scheduling prior to the community workshop.

Technique

Meetings would take place at a location convenient to the stakeholders. Michael Baker, County of San Mateo, and/or City of Belmont and San Carlos staff would introduce the project using the fact sheet and exhibits of the alternatives. The meetings will be used to seek input and preliminary thoughts on the alternatives and understand how each alternative would specifically affect each stakeholder. Specific reactions will be sought on the following:

- Residential community along Carlmont Drive (Hidden Canyon Park users): The community's access and use of Hidden Canyon Park may be limited during construction of Alternative 2A. An above ground storage is proposed which would fill with water after it rains and slowly drained to prevent vector (mosquito) issues. The maintenance will be determined.
- Notre Dame de Namur University: The university is downstream along the creek. Two proposed underground storage systems provide the most flood reduction out of all the alternatives (Alternatives 2B and 2C). Construction may cause some disruption for the University's softball and soccer fields. However, it would also provide an opportunity for the

University to resurface playing fields with better turf, upgrade their on-site storm drain, and use water in underground detention basins for irrigation.

- Church of the Immaculate Heart of Mary: An underground detention system (Alternative 2D) would involve excavating church parking lot and play courts. However, disturbed surface would be replace/resurface after construction and construction could be done in phases to minimize disruptions to Church activities.
- Carlmont High School: An underground detention system (Alternative 2E) would involve a proposed underground storage system off Alameda de las Pulgas. Construction may cause some disruption for the baseball fields and adjacent parking. However, it would also provide an opportunity for the school to resurface playing fields with better turf, upgrade their on-site storm drain, and use water in detention basins for irrigation.

Deliverable/ Task	Michael Baker	County
Stakeholder Meeting Coordination and Materials	• Exhibits and materials to facilitate discussion	• Schedule meetings with stakeholders
Meeting Attendance	• One outreach staff and one engineer to attend meeting	• City and/or County representatives to attend meeting
Meeting Summary	• Meeting notes in electronic memorandum format	• Update stakeholder's list to include emails from participants

Phase 1: Review the Preliminary Conceptual Alternatives

Community Meeting #1

Purpose

The first community meeting will introduce the Belmont Creek Flood Management Plan to the communities and provide an overview of the background, purpose of the project, and present the preliminary conceptual alternatives.

Target Audience

Residents and community members impacted by the project within the Cities and County

Belmont Parks and Recreation Commission

Desired Outcome

To engage community members in the process, allow them to learn about the Collaborative and project, and receive input about the preliminary conceptual alternatives.

Technique

The first community meeting will take place in the evening at a venue close to the project area. The meeting will begin with a welcome from County staff and an introduction to the Collaborative. The Michael Baker project team will present an overview of the project including objectives, preliminary conceptual alternatives, flood management plan process, and schedule. Following the presentation, the lead facilitator will guide participants through an exercise to garner feedback on the preliminary conceptual alternatives. Participants will be broken into groups of 5 to 8 people with one Michael Baker or Collaborative staff member acting as a facilitator at each table. Each group under the guidance of the facilitator will be asked to work together to review the preliminary conceptual alternatives and identify potential issues based on their local knowledge and valued co-benefits that could be included in project. Each group will then present their finding to everyone in the room. The Michael Baker team will provide closing remarks and next steps in the process before adjourning the meeting. Children's coloring sheets and markers will be available for young participants as needed.

Deliverable/ Task	Michael Baker	County
Workshop Promotion	• Prepare workshop flyer • Prepare website and social media content	• Post flyer on County's website • Send flyer to stakeholders list • Mail flyer to residents • Send email and social media blast to County's distribution list • Promotion with local community organizations • Provide promotional materials to Collaborative members for distribution
Workshop Coordination and Materials	• Prepare sign-in sheet, nametags, and comment cards • Presentation • Exhibits and materials to facilitate exercise • Kid's activity (optional) • Other event supplies (including tape, markers, sticky notes, pens, etc.)	• Select and coordinate venue • Coordinate audiovisual equipment, if available • Provide refreshments, tables, and chairs
Workshop Attendance	• Two outreach staff and one engineer to attend workshop	• City and/or County representatives to attend workshop
Workshop Summary	• Meeting notes that highlight key actions and decisions and a summary table of key comments in electronic memorandum format	• Post summary on County's website • Post PDF of workshop materials on County's website • Update stakeholder's list to include emails from participants

Business Meeting #1

Purpose

The first business meeting will be to introduce the Belmont Creek Flood Management Plan to the local business community and provide an overview of the background, objectives, preliminary conceptual alternatives, schedule, and scope of the project.

Target Audience

Harbor Industrial Area business group

Desired Outcome

To engage local businesses in the process and receive input about the preliminary conceptual alternatives.

Technique

The meeting would be a held during a regularly scheduled luncheon of the Harbor Industrial Area business community. The meeting will begin with a welcome from County staff and an introduction to the Collaborative. The Michael Baker project team will present an overview of the project including objectives, preliminary conceptual alternatives, flood management plan process, and schedule. A short question and answer session will follow the presentation. Michael Baker will provide closing remarks and next steps in the process and invite participants to review the exhibits on the preliminary conceptual alternatives to provide the team will additional comments. Exhibits will be on display following the presentation for participants to review the preliminary conceptual alternatives and provide comments. Michael Baker and Collaborative staff will be available to answer questions following the presentation. Comment cards will be provided to participants to provide written comments.

Deliverable/ Task	Michael Baker	County
Meeting Promotion		• Coordinate with Harbor Area Industrial group to promote meeting
Meeting Coordination and Materials	• Prepare sign-in sheet, nametags, and comment cards • Presentation • Exhibits of preliminary conceptual alternatives • Other event supplies (including tape, markers, sticky notes, pens, etc.)	• Schedule luncheon meeting with Harbor Industrial Area business group • Coordinate audiovisual equipment, if available
Meeting Attendance	• Two outreach staff and one engineer to attend meeting	• City and/or County representatives to provide welcome and introduction
Meeting Summary	• Meeting notes that highlight key actions and decisions and a summary table of key comments in electronic memorandum format •	• Post summary on County's website • Post PDF of meeting materials on County's website • Update stakeholder's list to include emails from participants

Phase 2: Review of the Belmont Creek Flood Management Plan Preferred Alternative(s)

Community Meeting #2

Purpose

The second community meeting will provide an opportunity for the communities to review the Belmont Creek Flood Management Plan preferred alternative(s), including funding strategy and implementation schedule.

Target Audience

Residents and community members impacted by the project within the Cities and County
Belmont Parks and Recreation Commission

Desired Outcome

To receive input from community members on the Belmont Creek Flood Management Plan preferred alternative(s).

Technique

The second community meeting will take place in the evening at a venue close to the project area. The meeting will begin with a welcome from County staff. The Michael Baker project team will present the findings of the Belmont Creek Flood Management Plan preferred alternative(s) and how community feedback from the first meeting was used in the plan. Following the presentation, the lead facilitator will introduce the "open house" activity for participants to review the components on the final plan. Stations will be set up around the room with exhibits displaying the final plan components including preliminary design, implementation plan, and funding strategy. Participants will have an opportunity to review and provide comments at each station. Michael Baker and Collaborative staff will be available to answer questions. Children's coloring sheets and markers will be available for young participants as needed.

Deliverable/ Task	Michael Baker	County
Meeting Promotion	• Prepare workshop flyer • Prepare website and social media content	• Post flyer on County's website • Send flyer to stakeholders list • Mail flyer to residents • Send email and social media blast to County's distribution list • Promotion with local community organizations • Provide promotional materials to Collaborative members for distribution
Workshop Coordination and Materials	• Prepare sign-in sheet, nametags, and comment cards • Exhibits and materials to facilitate feedback • Kid's activity (optional)	• Select and coordinate venue • Coordinate audiovisual equipment, if available • Provide refreshments, tables, and chairs

	- Other event supplies (including tape, markers, sticky notes, pens, etc.)	
Workshop Attendance	- Two outreach staff and one engineer to attend workshop	- County representatives to attend workshop
Workshop Summary	- Meeting notes that highlight key actions and decisions and a summary table of key comments in electronic memorandum format -	- Post summary on County's website - Post PDF of workshop materials on County's website - Update stakeholder's list to include emails from participants

Business Meeting #2

Purpose

The second business meeting will provide local businesses with an opportunity to review the findings of the final plan.

Target Audience

Harbor Industrial Area business group

Desired Outcome

To share the final plan with the business community and receive comments.

Technique

The meeting would be held during a regularly scheduled luncheon of the Harbor Industrial Area business community. The meeting will begin with a welcome from County staff. The Michael Baker project team will present the findings of the Belmont Creek Flood Management Plan preferred alternative(s) and how community feedback from was used in the plan. A short question and answer session will follow the presentation. Michael Baker will provide closing remarks and next steps in the process and invite participants to review the exhibits on the final plan and provide the team will additional comments. Exhibits will be on display following the presentation for participants to review the components of the final plan and provide comments. Michael Baker and Collaborative staff will be available to answer questions following the presentation. Comment cards will be provided to participants to provide written comments.

Deliverable/ Task	Michael Baker	County
Meeting Promotion		- Schedule luncheon meeting with Harbor Industrial Area business group
Meeting Coordination and Materials	- Prepare sign-in sheet, nametags, and comment cards - Presentation and materials	- Select and coordinate venue - Coordinate audiovisual equipment, if available - Coordinate community event activities, if desired

	• Other event supplies (including tape, markers, sticky notes, pens, etc.)	• Provide refreshments, tables, and chairs
Meeting Attendance	• Two outreach staff and one engineer to attend workshop	• County representatives to attend workshop
Meeting Summary	• Meeting notes that highlight key actions and decisions and a summary table of key comments in electronic memorandum format •	• Post summary on County's website • Post PDF of meeting materials on County's website • Update stakeholder's list to include emails from participants

Belmont Creek Flood Management Plan

WHAT IS THE FLOOD MANAGEMENT PLAN?

San Mateo County and the Cities of Belmont and San Carlos are collaborating on the Belmont Creek Flood Management Plan. The plan will provide a framework to restore the natural function of the watershed and protect people and places from flooding. The plan will also identify and discuss flood-resilient solutions, funding, and additional public benefits such as:

- **Water Quality Enhancements**
- **Green Infrastructure**
- **Potential for Groundwater Recharge**

WHY CREATE A FLOOD MANAGEMENT PLAN FOR BELMONT CREEK?

Flooding occurs between Old County Road and Industrial Road and continually impacts residents and businesses. The creek has been studied and analyzed for capacity deficits, erosion, and bank stability.

Today's system has capacity for the 10 year storm, which has a 10% probability of occurring any year. With community input, the Flood Management Plan is looking to protect for larger storm events.

> **"Each $1 spent on mitigation saves an average of $6 in future disaster costs"**

– Natural Hazard Mitigation Saves: 2017 Interim Report, http://www.nibs.org/page/mitigationsaves

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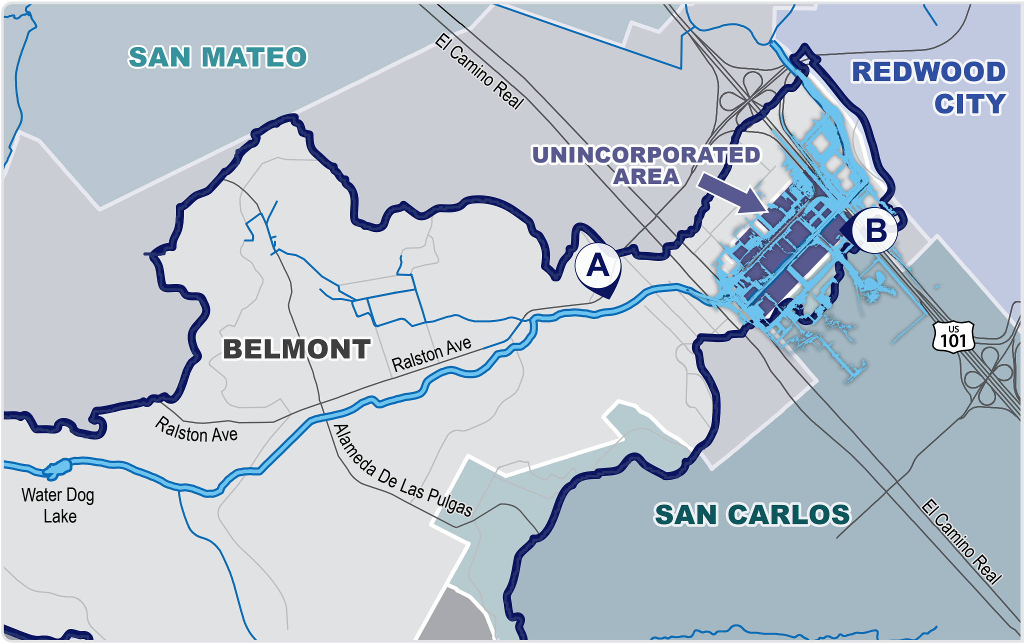
Implementing multi-beneficial flood resilient solutions for larger flood events will save community millions in future storm recovery costs.

PROJECT SCHEDULE

Fall 2017	Winter 2017–2018	Summer 2018	Fall/Winter 2018
• Review previous studies • Site reconnaissance	• Develop project alternatives	• Stakeholder Meetings • Business Meeting #1 • Preliminary design	• Develop implementation plan and funding strategy • Community Meeting • Business Meeting #2 • Finalize Flood Management Plan

WATERSHED AND WHERE WE FLOOD



Belmont Creek

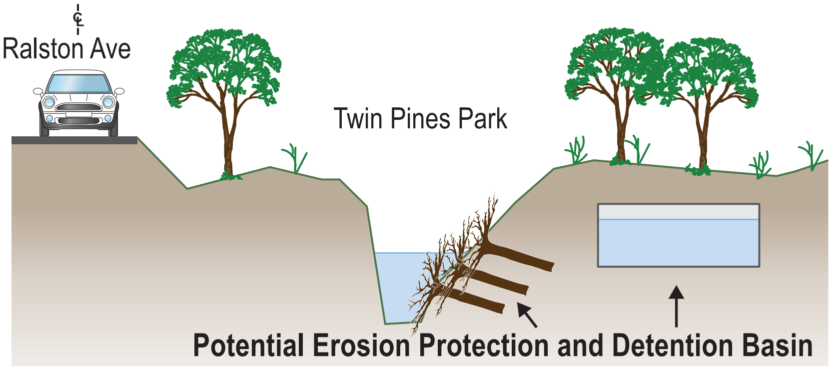
☐ **Belmont Creek Watershed Boundary**

🟦 **100-year flood flood limits**
(1% probability of occurring any year)

WHAT ARE POTENTIAL IMPROVEMENTS?

A

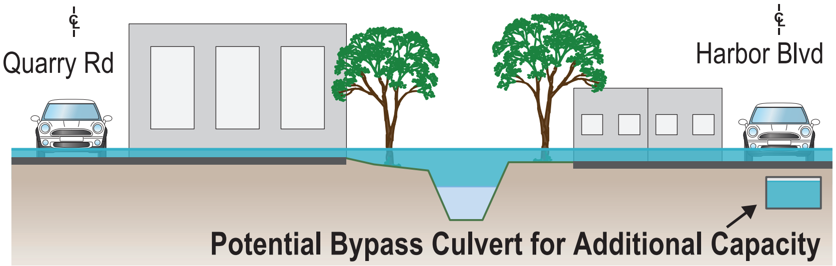
Upper creek cross-section example



B

Lower creek cross-section example

🟦 100-year storm, which has a 1% probability of occurring any year



PROJECT PARTNERS:

- County of San Mateo
- City of Belmont
- City of San Carlos

GET INVOLVED:

- Attend a community meeting
- Participate in a business meeting
- Send comments or questions to:
  epowell@smcgov.org or (650) 599-1488

For more information visit: https://publicworks.smcgov.org/belmont-creek-watershed-management-plan

AGENDA

Belmont Creek Flood Management Plan

COMMUNITY WORKSHOP

November 29, 2018, 6pm
Belmont City Hall, EOC Room 2nd Floor
1 Twin Pines Lane
Belmont, CA 94002

1. SIGN-IN
2. WELCOME AND INTRODUCTIONS
3. PRESENTATION
4. GROUP ACTIVITY
5. GROUP FEEDBACK
6. WRAP-UP AND NEXT STEPS

Please leave us your feedback on the back of this sheet or send it via email by 12/6/18 to cmartorana@smcgov.org

AGENDA

Belmont Creek Flood Management Plan

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Please leave us your feedback on the back of this sheet or send it via email by 12/6/18 to cmartorana@smcgov.org

COMMENT CARD

Belmont Creek Flood Management Plan
COMMUNITY WORKSHOP

**What did you think of today's meeting?
Is there anything else you would like to share with the County of San Mateo for the Belmont Creek Flood Management Plan?**

How did you hear about this meeting?

☐ I would like to be contacted personally to discuss my comments further.

Name:

Phone:

Email:

COMMENT CARD

Belmont Creek Flood Management Plan
COMMUNITY WORKSHOP

What did you think of today's meeting?
Is there anything else you would like to share with the County of San Mateo for the Belmont Creek Flood Management Plan?

How did you hear about this meeting?

☐ I would like to be contacted personally to discuss my comments further.

Name:

Phone:

Email:

CITY OF SAN CARLOS
CALIFORNIA

CALIFORNIA
BELMONT

Belmont Creek
Flood Management Plan

COMMUNITY WORKSHOP

Erika Powell

Flood Resilience Program Manager
County of San Mateo

November 29, 2018

Agenda

1. Welcome and Introductions
2. Presentation
3. Group Activity
4. Group Feedback
5. Wrap-Up and Next Steps

Project Overview

Why We Are Here

Identify Problem

- Frequent flooding
- Erosion and bank stability issues
- Impacted riparian ecosystem

Review

- Fixes have been studied in the past but no specific projects selected

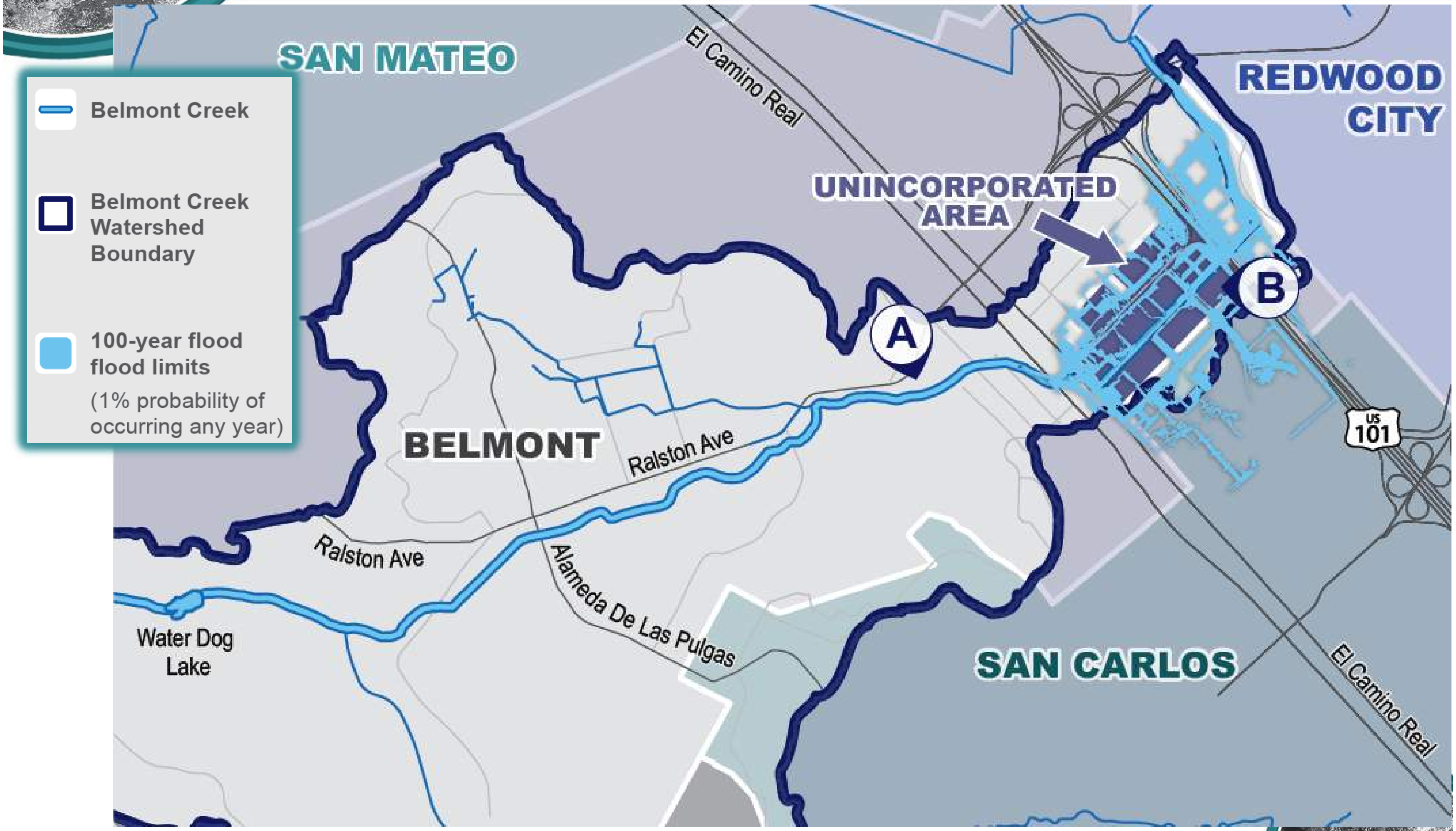
Make a Plan

- In 2018, the County and Cities determine the need to develop a unified approach

Identify Projects

- Identify specific project alternatives to implement for the plan

The Why *(challenges in the watershed)*



▬ Belmont Creek

☐ Belmont Creek Watershed Boundary

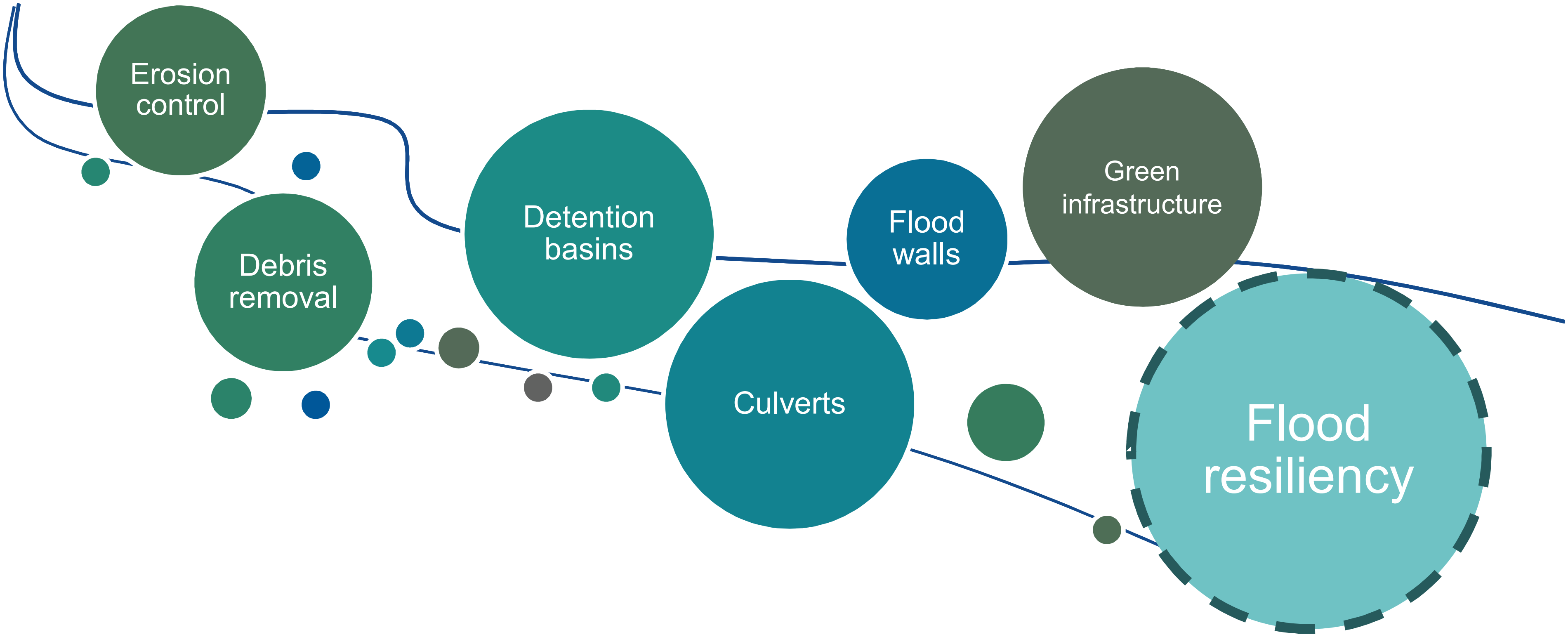
🟦 100-year flood flood limits (1% probability of occurring any year)

Project Objectives

- Flood protection
- Water quality
- Green Infrastructure
- Groundwater Recharge
- Permitting requirements
- Resilience to climate change
- Construction/ maintenance costs
- Grants/Funding Partnerships

The How *(upcoming process)*

Identified flood resiliency measures



Flood Resiliency Measures

● **High Effectiveness for Flood Resiliency and Protection**

◒ **Moderate Effectiveness for Flood Resiliency and Protection**

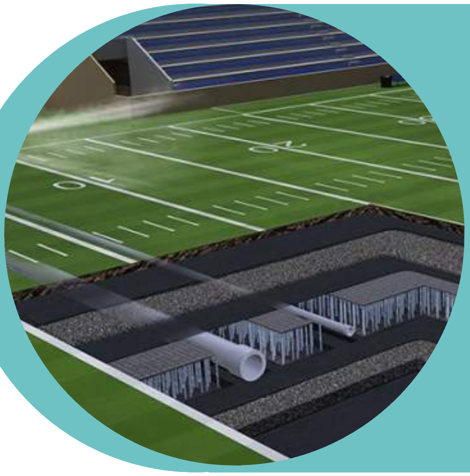
Flood Resiliency Measures

Erosion control ●

Debris removal ◒

Flood Resiliency Measures

Surface detention basins ●



Underground detention basins ●

Flood Resiliency Measures

Culverts ●

Flood walls ◒

Flood Resiliency Measures

Green Infrastructure

Flood Protection

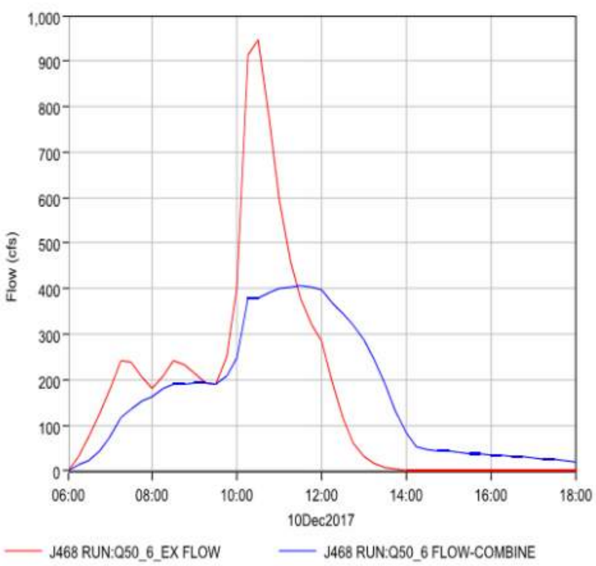
Before

After

🟦 50-year storm flood limits

🟩 100-year storm flood limits

ALTERNATIVE 2 HYDROGRAPH (ALL DETENTION BASINS)
50 YEAR, 6 HOUR STORM



Implement:

- Conveyance improvements
  or
- Multiple detention basins
  or
- A combination

Effects on Community

Long-term Benefits:

- ✓ Ensuring creekside properties are not subject to erosion
- ✓ Decreased flood risk to businesses and roadways in the Harbor Industrial Business Area (e.g. no flooding in a 50-year storm)
- ✓ Saving local taxpayer dollars by avoiding costly flood-related damage
- ✓ Improved natural habitat along Belmont Creek
- ✓ Resilience to a changing environment

Potential Short-term Compromises:

- ✓ Detention basins built into parking lots or recreational fields of local schools and parks requiring construction work
- ✓ Construction on roadways in the Harbor Industrial Business Area

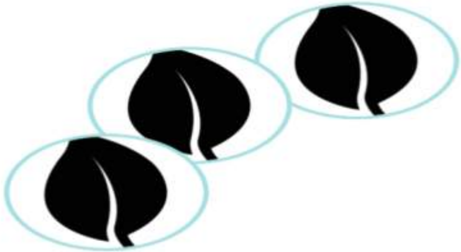
Group Activity

Ground Rules

- Respect opinions you may not share
- Show common conversational courtesy
- Speak up, but share the time we have together with other voices
- Have fun!

Direction

- In groups, discuss and decide how much you value each of the Project Objectives.
- When it's your group's turn, place stickers in the boxes to indicate your top preferences for a Project Objective
- Use the post-its to write:
  - What you *like* about Belmont Creek amenities
  - C*oncerns* or *questions* about the objectives
- Place post-it note in the appropriate objective column when it's your group's turn



Group Activity

Project Objectives								
Environmental Investments (Opportunities)					Capital Investments (Costs)			
1. Flood Protection	2. Groundwater Recharge	3. Protect and Enhance Water Quality	4. Green Infrastructure	5. Resiliency to Climate Change	6. Construction Cost	7. Operation and Maintenance	8. Grants/Funding Partnerships	9. Constructability

Directions:

When your group is called:

1. Place stickers (any color) in box that you value/prioritize
2. Write comments, questions, and concerns on post-it and place in box

Group Activity

Environmental Investments

1. Flood Protection

Protecting properties from flooding

2. Groundwater Recharge

Restoring/recharging groundwater supply

3. Protect and Enhance Water Quality

Preventing pollutants (heavy metals, oils, chemicals, trash) from entering streams, lakes, ocean

4. Green Infrastructure

Landscaping, porous pavement, and other features that provide sustainable, environmental, and aesthetic benefits (shade, drought tolerant, trash capture, water quality)

5. Resiliency to Climate Change

Ability to withstand sea level rise, tidal changes, drought, and increasingly intense rain events

Capital Investments

6. Construction Cost

Willingness to support construction costs for Environmental Investments

7. Operation and Maintenance (O&M)

Willingness to support projects that reduce Belmont Creek O&M, freeing up resources for other priorities

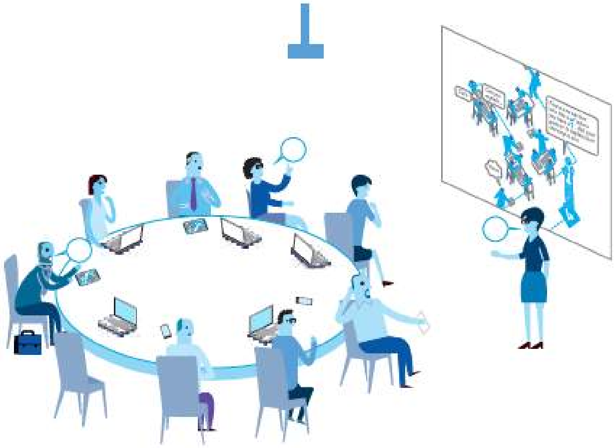
8. Grants/Funding Partnerships

Willingness to support multi-benefit projects that have a higher likelihood of grant/funding awards

9. Constructability

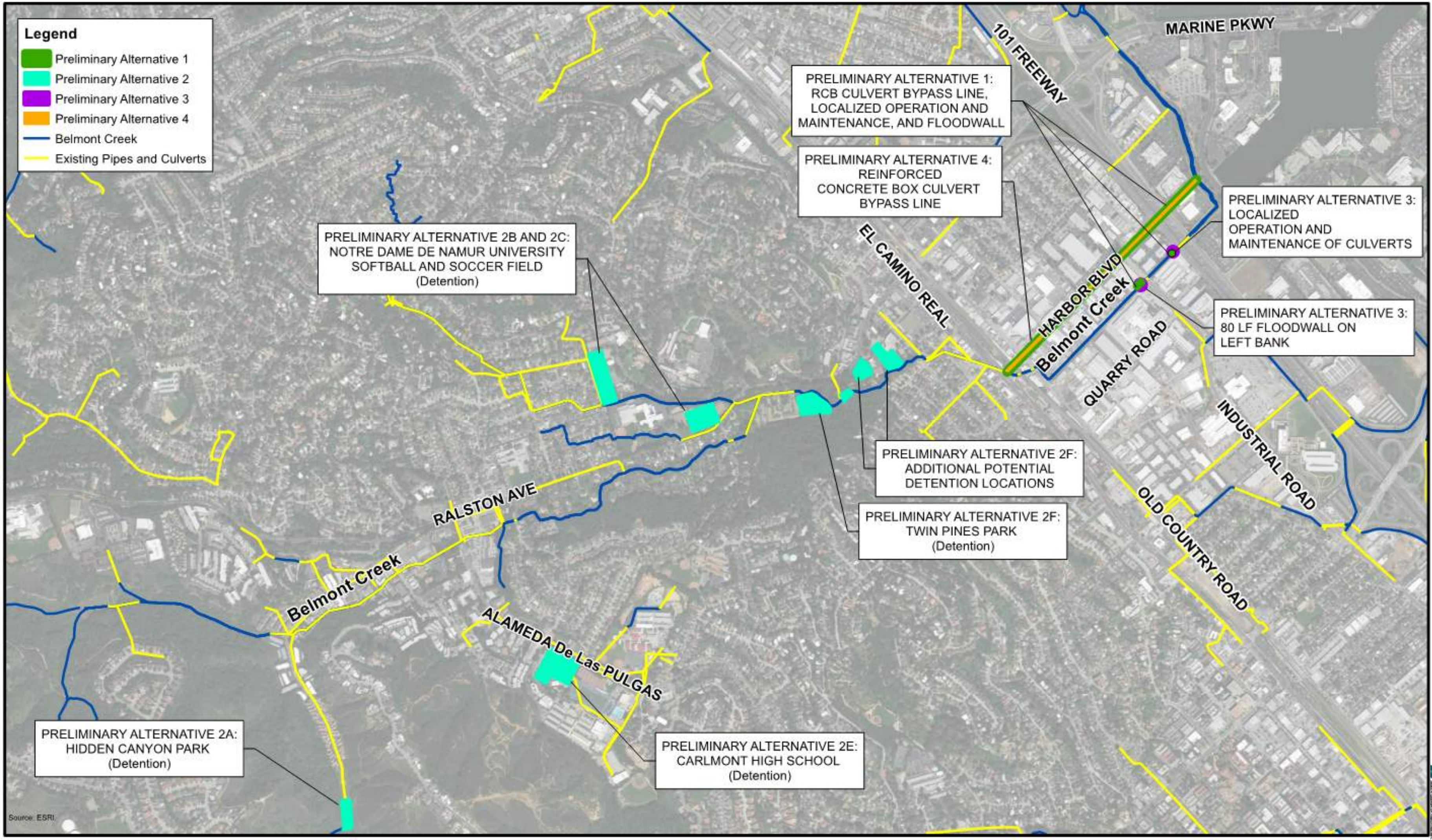
Willingness to accommodate disruptions due to construction for lower project costs

Sticker (any color) = This is a priority for me



Group Report Out

Potential Project Alternatives



Legend
🟩 Preliminary Alternative 1
🟦 Preliminary Alternative 2
🟪 Preliminary Alternative 3
🟧 Preliminary Alternative 4
— Belmont Creek
— Existing Pipes and Culverts

PRELIMINARY ALTERNATIVE 1: RCB CULVERT BYPASS LINE, LOCALIZED OPERATION AND MAINTENANCE, AND FLOODWALL

PRELIMINARY ALTERNATIVE 4: REINFORCED CONCRETE BOX CULVERT BYPASS LINE

PRELIMINARY ALTERNATIVE 3: LOCALIZED OPERATION AND MAINTENANCE OF CULVERTS

PRELIMINARY ALTERNATIVE 3: 80 LF FLOODWALL ON LEFT BANK

PRELIMINARY ALTERNATIVE 2B AND 2C: NOTRE DAME DE NAMUR UNIVERSITY SOFTBALL AND SOCCER FIELD (Detention)

PRELIMINARY ALTERNATIVE 2F: ADDITIONAL POTENTIAL DETENTION LOCATIONS

PRELIMINARY ALTERNATIVE 2F: TWIN PINES PARK (Detention)

PRELIMINARY ALTERNATIVE 2A: HIDDEN CANYON PARK (Detention)

PRELIMINARY ALTERNATIVE 2E: CARLMONT HIGH SCHOOL (Detention)

Source: ESRI

Project Alternatives

Potential Alternatives	Project Objectives									Local Impacts
	Environmental Investments (Opportunities)					Capital Investments (Costs)				
	1. Flood Protection	2. Groundwater Recharge	3. Protect and Enhance Water Quality	4. Green Infrastructure	5. Resiliency to Climate Change	6. Construction Cost	7. Operation and Maintenance	8. Grants/Funding Partnerships	9. Constructability	
Alternative 1: Bypass RCB + Floodwalls + O&M	💧			💧		$	$$$	$	🚜 🚜 🚜	Close portions of Harbor Blvd and construction nuisance for extended period of time.
Alternative 2: Detention Basins	💧	💧	💧	💧	💧	$$	$	$$$$	🚜	Unable to use portions of facility for a few months
Alternative 3: Detention Basins + Floodwalls + O&M	💧💧	💧	💧	💧	💧	$$$	$$	$$$$	🚜	Unable to use portions of facility for a few months
Alternative 4: Detention Basins + Floodwalls + O&M + Bypass RCB	💧💧💧💧	💧	💧	💧	💧	$$$$	$$	$$$$	🚜 🚜 🚜 🚜	All of the above
Legend	💧 = least properties protected 💧💧💧💧 = most properties protected	[ ] = does not recharge groundwater 💧 = does recharge groundwater	[ ] = does not enhance water quality 💧 = does enhance water quality	[ ] = does not include green infrastructure 💧 = does include green infrastructure	[ ] = not resilient to climate change 💧 = resilient to climate change	$ = least expensive $$$$ = most expensive	$ = least expensive $$$$ = most expensive	$ = least available funding/grant awards $$$$ = most available funding/grant awards	🚜 = less disruptions from construction 🚜 X4 = more disruptions from construction	

Discussion

Next Steps

Schedule

PROJECT SCHEDULE

Fall 2017
- Review previous studies
- Site reconnaissance

Winter 2017–2018
- Develop project alternatives

Summer 2018
- Stakeholder Meetings
- Business Meeting #1
- Preliminary design

Fall/Winter 2018
- Develop implementation plan and funding strategy
- Community Meeting
- Business Meeting #2
- Finalize Flood Management Plan

Next Steps

- Additional meetings with Parks Commission and City Council → share additional feedback
- Selection of a final alternative—a combination of flood resiliency measures—based on community input and performance on selected criteria
- Development of preliminary and final designs

THANK YOU!

Contact:

Erika Powell:
epowell@smcgov.org
Afshin Oskoui:
aoskoui@Belmont.org
Steve Machida:
smachida@cityofsancarlos.org

Meeting Minutes

Subject: Belmont Creek Flood Management Plan – Community Meeting

Date: November 29, 2018

Time: 6:00pm – 8:00pm

Location: Belmont City Hall, EOC Room 2nd Floor, 1 Twin Pines Lane, Belmont, CA 94002

Attendees:
Erika Powell, County of San Mateo
Colin Martorana, County of San Mateo
Brigitte Shearer, City of Belmont
Afshin Oskoui, City of Belmont
Steve Machida, City of San Carlos
Darren Choy, Michael Baker Intl.
Lisa Messano, Michael Baker Intl.
Nicole West, Michael Baker Intl.
15 Members of the public (sign-in optional)

Purpose: Discuss the Belmont Creek Flood Management Plan and Proposed Project Alternatives with Community Members

---

Members of the Collaborative from the San Mateo County Flood Resilience Program, and the cities of Belmont and San Carlos introduced themselves and the purpose Belmont Creek Flood Management Plan, noting that more benefits are achievable working as a Collaborative than would be possible by any single entity.

The Collaborative looked holistically throughout the watershed to identify the source of the flooding issues and develop a unified approach that will help to remedy the issues upon implementation. The Novartis study, conducted previously, was peer reviewed to build on those findings, and erosion issues and flooding issues along Harbor Boulevard were reviewed.

The Collaborative established eight Project Objectives to help achieve a multi-objective/multi-benefit solution that benefits everyone and builds resilience for the future, as follows:

- Flood protection
- Water quality
- Green infrastructure
- Groundwater recharge
- Permitting requirements
- Resilience to climate change
- Construction/maintenance costs
- Grants/Funding Partnerships

Flood risk is dynamic and resilience within the watershed will be more achievable by mitigating, managing, and preparing for future floods. The Collaborative established flood resiliency and protection measures, and worked with the consultant, Michael Baker International, to develop project alternatives based on these measures. No single measure will work in isolation, it will take a combination of measures to achieve long-term resilience.

For instance, a lot of sediment is an indication of water quality issues. Dredging sediment on an annual basis requires a permit, which is an annual maintenance cost and a drain on community resources. Upon implementation of new, proposed project alternatives, less dredging will be necessary because sediment issues will be reduced. Additionally, implementing a multi-benefit solution with the Belmont Creek Flood Management Plan will better position the Collaborative to apply for grant opportunities and allay local costs through other funding mechanisms.

Leading up to the community meeting, proposed project site stakeholders were consulted in meetings to explore the potential alternatives, and collected feedback was used to continue to refine feasible alternatives.

Flood resilience measures were presented during the community meeting in terms of their ability to achieve moderate to high effectiveness if implemented. The ultimate goal is to implement one or more resiliency measures that bring the 12-hour flow into the Belmont Creek channel while providing additional environmental and resilient benefits.

Erika Powell, San Mateo County Flood Resilience Program Manager, presented long-term community benefits, as follows:

- Ensuring creek side properties are not subject to erosion
- Decreased flood risk to businesses and roadways in the Harbor Industrial Business Area (e.g. no flooding in a 50-year storm)
- Saving local taxpayer dollars by avoiding costly flood-related damage
- Improved natural habitat along Belmont Creek
- Resilience to a changing environment

Potential short-term community compromises include managing around detention basins being built into parking lots or recreational fields of local schools and parks requiring construction work, and phased construction on roadways in the Harbor Industrial business area.

Meeting attendees broke into small groups to discuss and vote on their preferred project alternatives and provide comments on a matrix with sticker dots and post-it notes. Before the exercise started, the following questions were asked (answers in *italics*):

Where does erosion fit within the voting matrix? *#3, protect and enhance water quality since sediment is a water quality impairment*

What is the source of the groundwater for groundwater recharge? *Additional testing for groundwater locations and depths will likely be a part of the next steps after the Collaborative chooses a project(s) to implement. While Belmont gets its drinking water from a purveyor, recharging the groundwater in Belmont could provide a water quality benefit to the Bay.*

How are green infrastructure and habitat connected? *Green infrastructure treats runoff for pollutant, thereby improving water quality that discharges to Belmont Creek and the Bay (ecological habitats).*

Aren’t additional measures above and beyond what is required these days anyways? *San Mateo County is required to make an effort to improve the water quality in it watershed, as outline by its Stormwater Resource Plan. Improving stormwater quality continues to be a more stringent requirement by the State Water Resources Control Board every year.*

Is an EIR required for green infrastructure? *Depends on what is triggered by the alternatives chosen; potential alternatives have to be selected before determining whether an EIR would be needed.*

As part of this project, did you determine the source of flooding in the first place? *It is a combination of a lot of things, including:*

- *The size of watershed and its overall sediment contributions to Belmont Creek (all storm drains discharge to Belmont Creek)*
- *90-degree turns which reduce energy, causing sediment to accumulate*
- *undersized storm drains (currently handle the10-year storm if properly maintained and the 4-year storm if blocked, e.g. sediment clogging)*
- *high tide/king tide*
- *this really a watershed problem which is why the Collaborative looked watershed wide starting upstream for a holistic solution*

The outcomes of the group exercise that demonstrate community support will be considered in concert with the Collaborative to help decide which alternatives are chosen.

In response to a question about the City of Belmont helping to make improvements on private property related to erosion caused by upstream issues, the City's Public Works Director said that the City does not own the creek and that public entities can't manage issues on private lands due to liability. Depending on the alternatives chosen, some of these projects would mitigate those impacts and result in enhancing private property. The goal is to capture water and sediment at the *source* to mitigate the way it gets concentrated in the channel. Once the alternatives are chosen, the owning agency would take on the environmental impact (i.e. CEQA or NEPA assessment) on its own or through a partnership.

Project alternatives (listed below) were presented based stakeholder willingness to allow these alternatives on their property.

Alternative #1 – 10' wide x 4' high bypass culvert; some flood walls on other side of creek near Novartis; additional O&M requirements (meaning increased removal of sediment). This alternative would provide some trash capture on the surface, but heavy metals, oils, and other pollutants would pass through as they do today. Diverting flow where it naturally goes. The challenge with this alternative was the significant amount of utilities that are under Harbor Blvd that would need to get relocated. Significant Caltrans coordination is also needed to cross 101.

Alternative #2 – detention basins above and below ground for project sites at Twin Pines Park, Hidden Canyon Park, and recreational fields at Carlmont High School and Notre Dame de Namur University; the basins would take storm water from Belmont Creek and slowly release it back into the creek during storm events and overall reduce flooding impact. The detention basins could also provide water quality benefits. This alternative is being closely coordinated with the Belmont Parks Master Plan.

Alternative #3 – All detention basins previously mentioned in Alternative #2, plus flood wall, plus O&M activity

Alternative #4 – All previously mentioned alternatives to provide all benefits

In response to a question about capturing the water for reuse, the detention basin choice could include underground storage that could be open-bottom or closed. Reuse of the stored water might require treatment for use in the facilities in Twin Pines Park, but the community would need to choose that expense for the environmental benefits.

Alternatives chosen should carefully consider O&M requirements because flooding caused by insufficient maintenance is not worthwhile. If you build something but don't keep it up or dredge it isn't worthwhile. Detention basins would provide the best benefit to the community in regards to overall reduced maintenance compared to existing conditions.

Estimated projects costs have been identified and the Collaborative wants to implement the options that will reduce the most flow. The next phase of the Plan will be to develop a funding strategy and look at sustainable funding for project maintenance. The Collaborative is talking with the Cities of Belmont and San Carlos and will take the results to the City/County Association of Governments of San Mateo County.

This comprehensive approach to flood management and resilience for Belmont Creek is ahead of the other two projects in the watershed and cutting edge for the County.

Next steps include meeting with City Council and Parks Commission to share feedback from the community meeting, select ing the final alternative based on community feedback and performance on selected criteria, and developing preliminary and final designs.

Summary of Questions/Answers from Group Activity

Q: Upsize existing culverts

A: upsizing existing culverts to improve capacity doesn't prevent the existing sediment issue from clogging them. Upsizing the existing culverts would require setting up bypass culverts and/or pumps during construction to allow Belmont Creek to continue to flow. The existing culverts are constrained vertically (due to tide and existing roadway elevations) therefore upsizing would be in a lateral direction, which might require Right-of-Way/property acquisition.

Q: Private property and public business benefits?

A: Our models show that both businesses and residential properties are impacted by the flooding. This project is intended to eliminate flooding from Belmont Creek, thereby benefiting public and private properties.

Q: Can the City fix Erosion on private properties along Belmont Creek?

A: The City of Belmont, City of San Carlos, and County of San Mateo do not have the jurisdiction to do these repairs, as they do not own Belmont Creek. Implementing detention basins upstream in the watershed to reduce flows in Belmont Creek could eliminate erosion-inducing flows in Belmont Creek.

Q: Are there any assessments for the environmental impacts to local fauna and preserving their habitats?

A: No – these types of assessments and studies will occur at the next step after projects/alternatives have been selected for implementation.

Q: Recommend detention basin under Carlmont High School

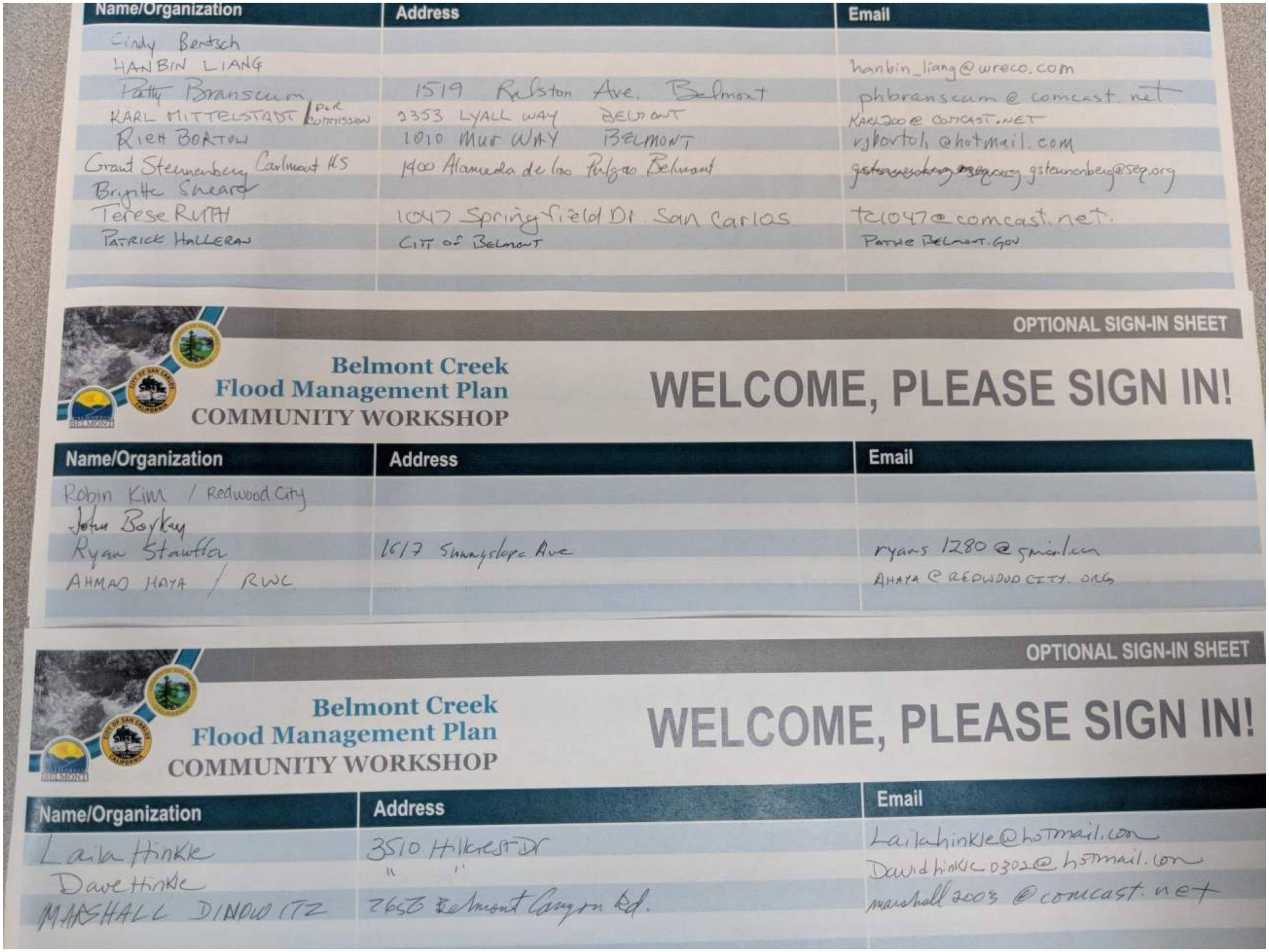
A: A detention basin is currently included as an alternative.

Q: Would a detention basin fall be eligible for the Caltrans CIA grant?

A: It could be – Caltrans funds similar projects. The applicant would need to prove that the detention basin would somehow benefit Caltrans (e.g. building a basin upstream would provide downstream water quality benefits in Caltrans right-of-way).

Summary of Comment Cards Submitted at End of Meeting

- Streets are already full of existing utilities including recent PG&E infrastructure in Harbor/Old County Rd. Not sure Alternative 1 is feasible. Also need to consider separation of utilities from sewer and potable water.
- Concern about soils and ability to infiltrate, as well as groundwater depth and springs. These would impact design of detention basins.
- Request to enforce C.3 water quality requirements for development as other cities hold more stringent requirements
- Prioritize habitat protection
- Information on website is minimal, request more detail on this project
- Implement additional restrictions on development to gradually reduce peak flows for no major development (similar to Atherton stormwater detention requirements for non development)
- Provide further clarification about erosion and animal habitat



Name/Organization	Address	Email
Cindy Bentsch		
HANBIN LIANG		hanbin_liang@wreco.com
Patty Branscum	1519 Ralston Ave. Belmont	phbranscum@comcast.net
KARL MITTELSTADT / P&R COMMISSION	2353 LYALL WAY BELMONT	KARL200@COMCAST.NET
RICH BORTON	1010 MUIR WAY BELMONT	rjborton@hotmail.com
Grant Steunenberg Carlmont HS	1400 Alameda de las Pulgas Belmont	~~[illegible]~~ gsteunenberg@seq.org
Brigitte Sheard		
Terese RUTH	1047 Springfield Dr. San Carlos	tc1047@comcast.net
PATRICK HALLERAN	CITY of BELMONT	PATH@BELMONT.GOV

OPTIONAL SIGN-IN SHEET

Belmont Creek
Flood Management Plan
COMMUNITY WORKSHOP

WELCOME, PLEASE SIGN IN!

Name/Organization	Address	Email
Robin Kim / Redwood City		
John Boykay		
Ryan Stauffer	1617 Sunnyslope Ave	ryans1280@gmail.com
AHMAD HAYA / RWC		AHAYA@REDWOODCITY.ORG

OPTIONAL SIGN-IN SHEET

Belmont Creek
Flood Management Plan
COMMUNITY WORKSHOP

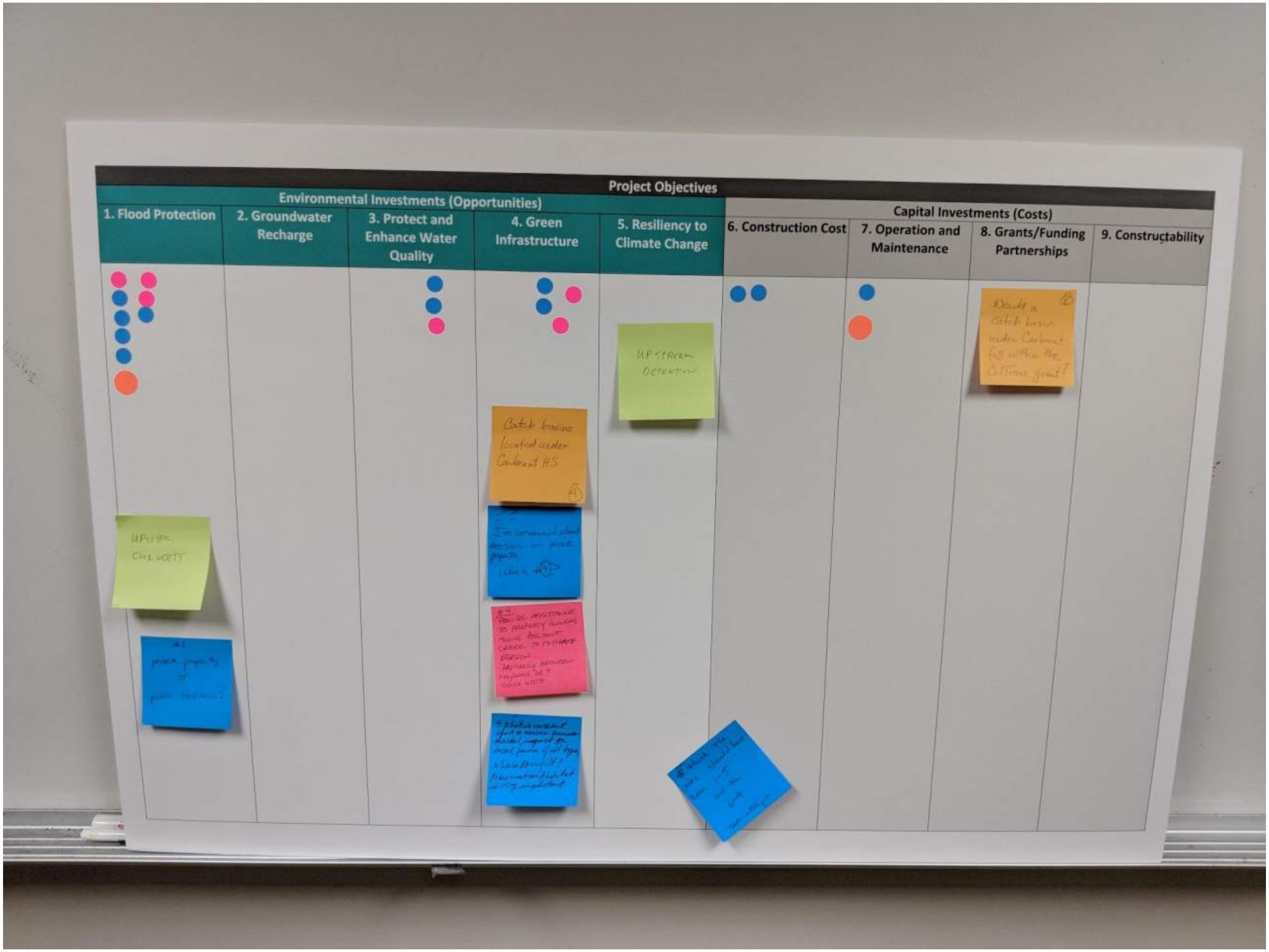
WELCOME, PLEASE SIGN IN!

Name/Organization	Address	Email
Laila Hinkle	3510 Hillcrest Dr	Lailahinkle@hotmail.com
Dave Hinkle	" "	Davidhinkle0302@hotmail.com
MARSHALL DINOWITZ	2656 Belmont Canyon Rd.	marshall2003@comcast.net

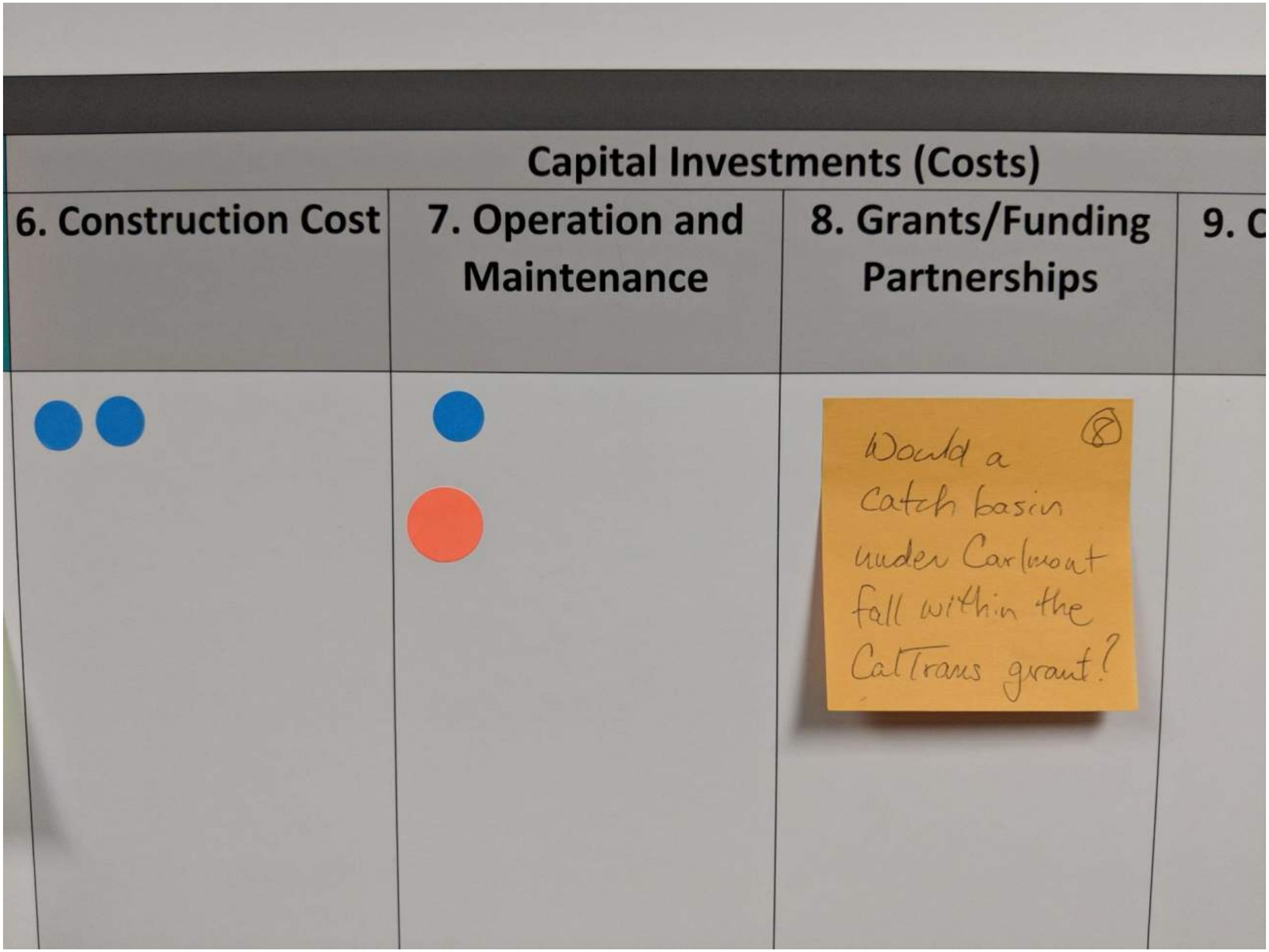

OPERATIONS
COMMUNITY WORKSHOP


OPERATIONS
COMMUNITY WORKSHOP

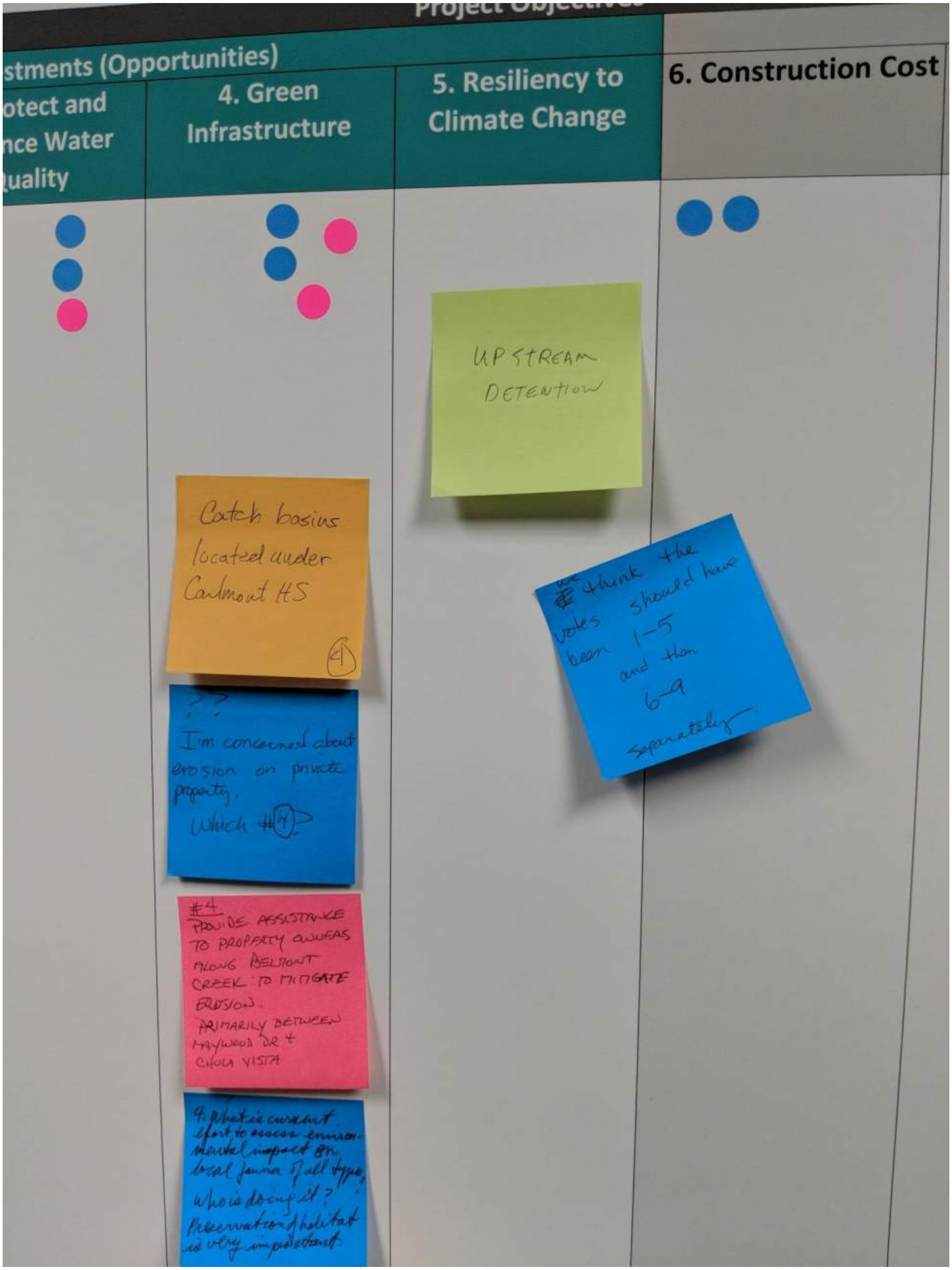

EXIT



Project Objectives								
Environmental Investments (Opportunities)					Capital Investments (Costs)			
1. Flood Protection	2. Groundwater Recharge	3. Protect and Enhance Water Quality	4. Green Infrastructure	5. Resiliency to Climate Change	6. Construction Cost	7. Operation and Maintenance	8. Grants/Funding Partnerships	9. Constructability
UPSIZE CULVERTS #1 private property or public business?			Catch basins located under Culvert #5 I'm concerned about erosion on private property (which #?)	UPSTREAM DETENTION			Would a catch basin under Culvert fall within the Caltrans grant?	



Capital Investments (Costs)			
6. Construction Cost	7. Operation and Maintenance	8. Grants/Funding Partnerships	9. C
● ●	● ●	⑧ Would a catch basin under Carlmont fall within the CalTrans grant?	



UPSTREAM DETENTION

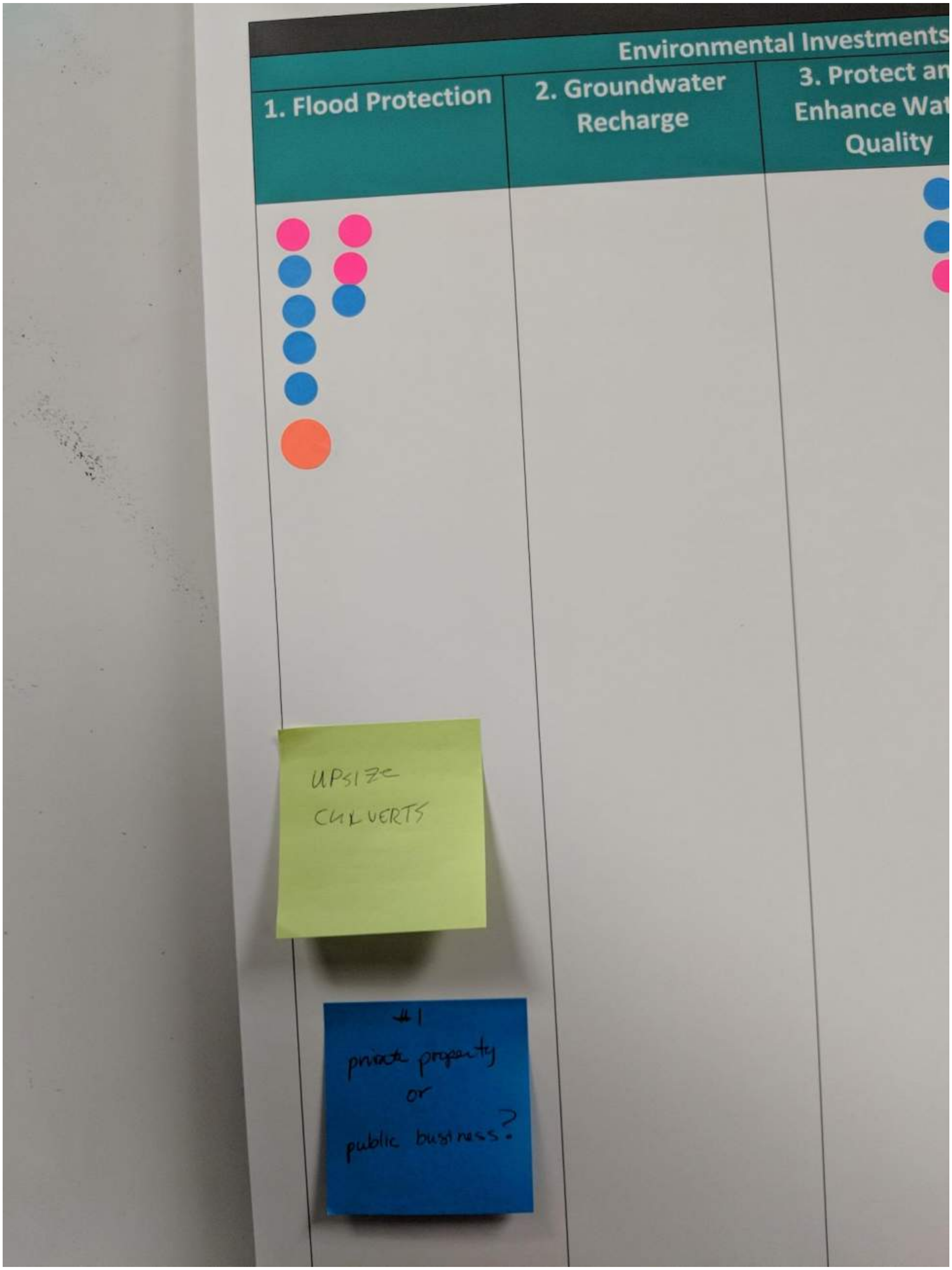
Catch basins located under Carlmont HS ④

??
I'm concerned about erosion on private property.
Which #④?

#4
PROVIDE ASSISTANCE TO PROPERTY OWNERS ALONG BELMONT CREEK TO MITIGATE EROSION.
PRIMARILY BETWEEN MAYWOOD DR + CHULA VISTA

4. What is current effort to assess environmental impact on local fauna of all types, who is doing it?
Preservation of habitat is very important.

~~I~~ we think the votes should have been 1–5 and then 6–9 separately

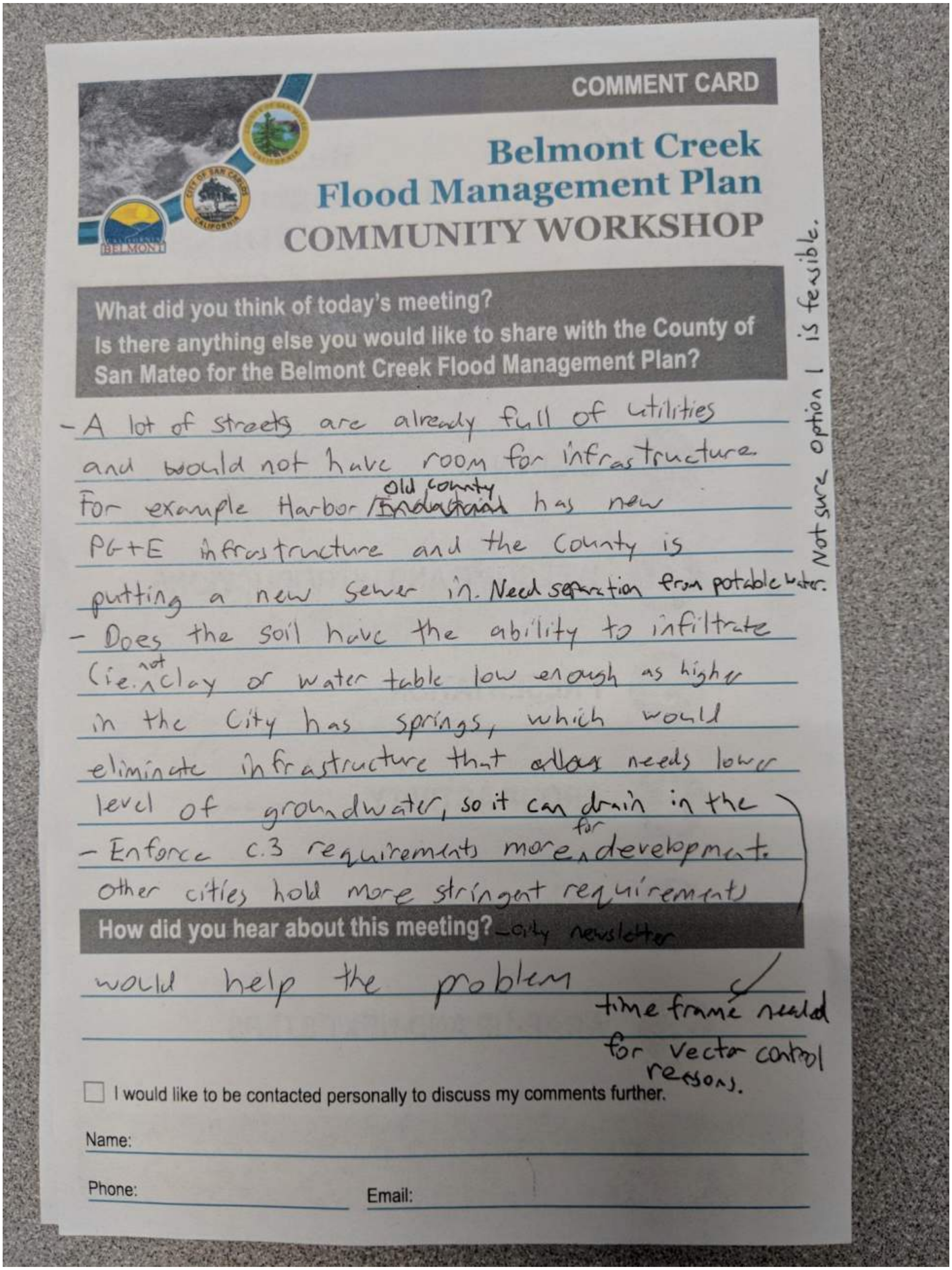


Environmental Investments

1. Flood Protection	2. Groundwater Recharge	3. Protect an Enhance Wat Quality

UPSIZE CULVERTS

#1 private property or public business?



COMMENT CARD

Belmont Creek Flood Management Plan
COMMUNITY WORKSHOP

What did you think of today's meeting?
Is there anything else you would like to share with the County of San Mateo for the Belmont Creek Flood Management Plan?

- A lot of streets are already full of utilities and would not have room for infrastructure. For example Harbor / old county ~~Industrial~~ has new PG+E infrastructure and the County is putting a new sewer in. Need separation from potable water.
- Does the soil have the ability to infiltrate (i.e. not clay or water table low enough as higher in the City has springs, which would eliminate infrastructure that ~~allows~~ needs lower level of groundwater, so it can drain in the
- Enforce c.3 requirements more for development. other cities hold more stringent requirements would help the problem

Not sure option / is feasible.

time frame needed for vector control reasons.

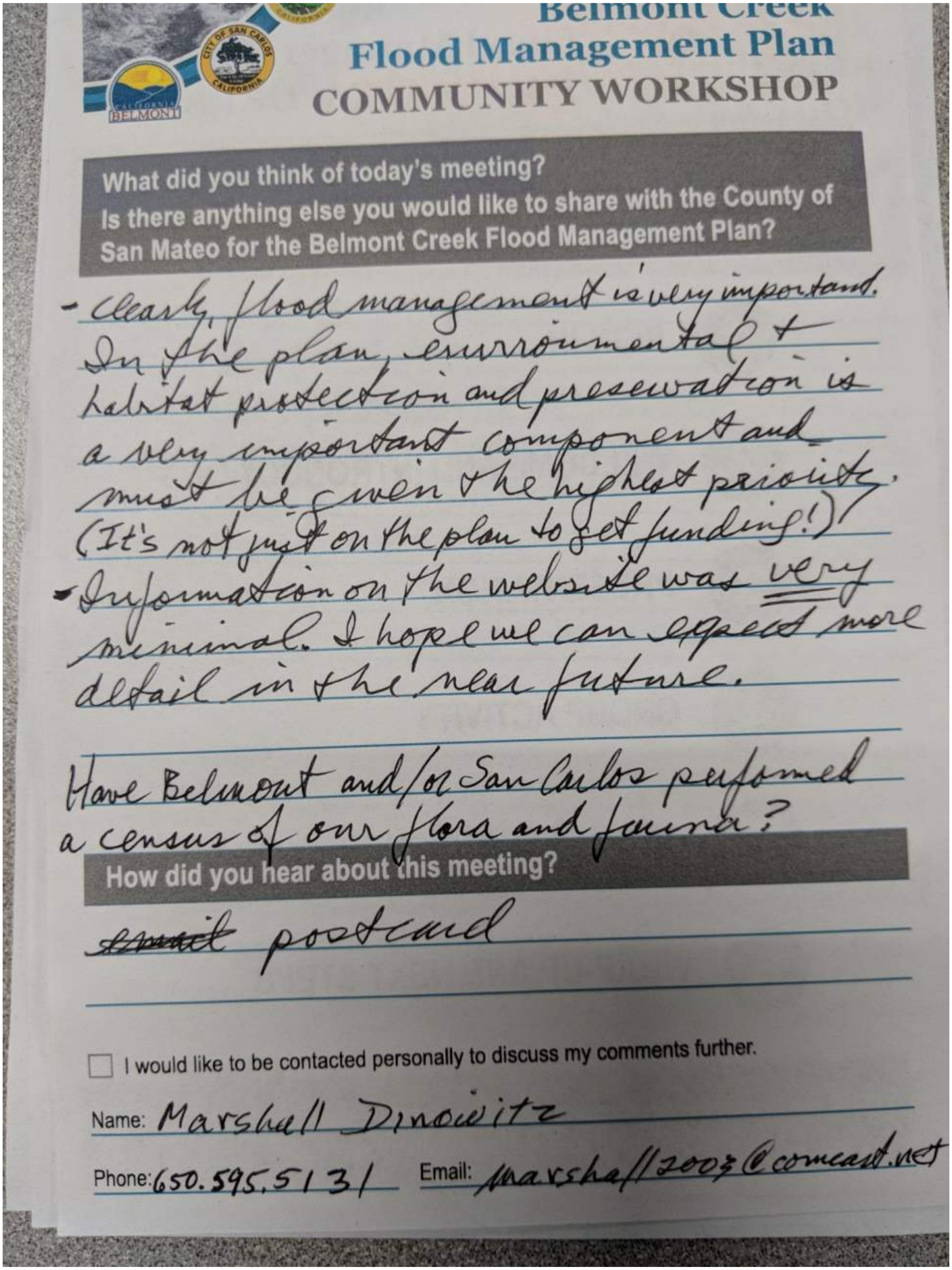
How did you hear about this meeting? - city newsletter

☐ I would like to be contacted personally to discuss my comments further.

Name:

Phone:

Email:



Belmont Creek
Flood Management Plan
COMMUNITY WORKSHOP

What did you think of today's meeting?
Is there anything else you would like to share with the County of San Mateo for the Belmont Creek Flood Management Plan?

- Clearly, flood management is very important. In the plan, environmental + habitat protection and preservation is a very important component and must be given the highest priority. (It's not just on the plan to get funding!)
- Information on the website was <u>very</u> minimal. I hope we can expect more detail in the near future.

Have Belmont and/or San Carlos perfomed a census of our flora and fauna?

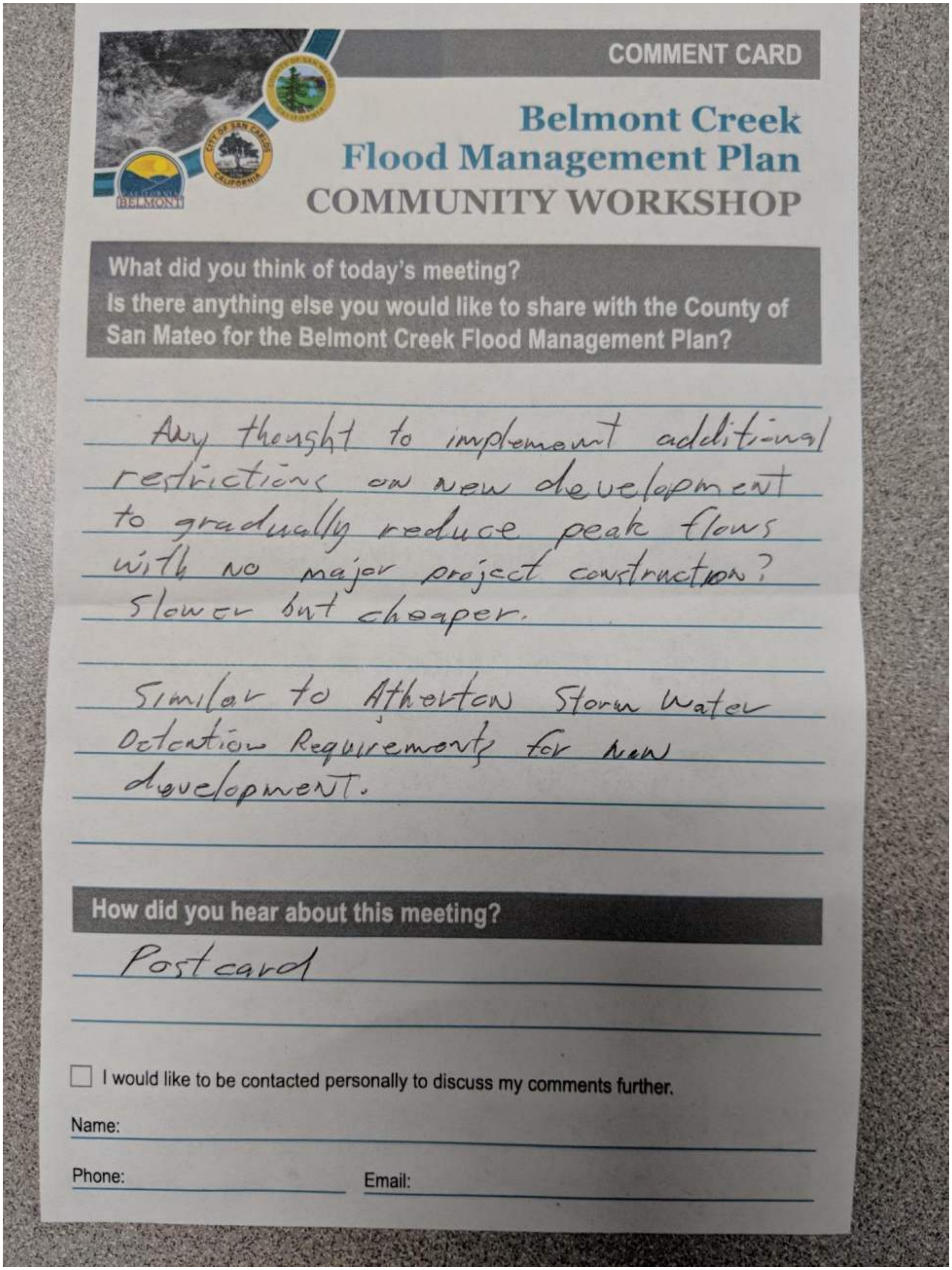
How did you hear about this meeting?

~~email~~ postcard

☐ I would like to be contacted personally to discuss my comments further.

Name: Marshall Dinowitz

Phone: 650.595.5131 Email: marshall2003@comcast.net



COMMENT CARD

Belmont Creek Flood Management Plan
COMMUNITY WORKSHOP

What did you think of today's meeting?
Is there anything else you would like to share with the County of San Mateo for the Belmont Creek Flood Management Plan?

Any thought to implement additional restrictions on new development to gradually reduce peak flows with no major project construction? Slower but cheaper.

Similar to Atherton Storm Water Detention Requirements for new development.

How did you hear about this meeting?

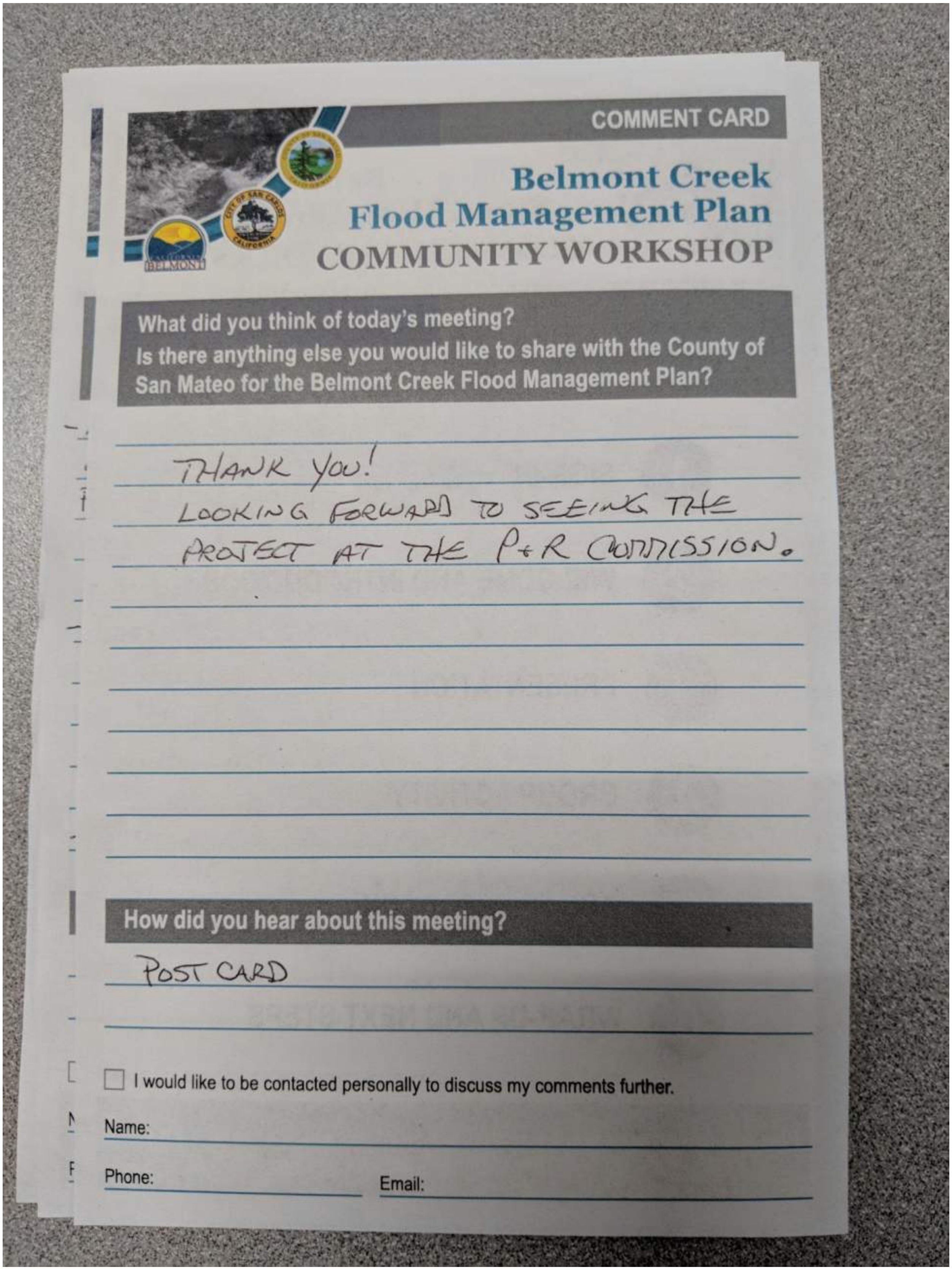
Postcard

☐ I would like to be contacted personally to discuss my comments further.

Name:

Phone:

Email:



COMMENT CARD

Belmont Creek Flood Management Plan

COMMUNITY WORKSHOP

What did you think of today's meeting?
Is there anything else you would like to share with the County of San Mateo for the Belmont Creek Flood Management Plan?

THANK YOU!
LOOKING FORWARD TO SEEING THE PROJECT AT THE P+R COMMISSION.

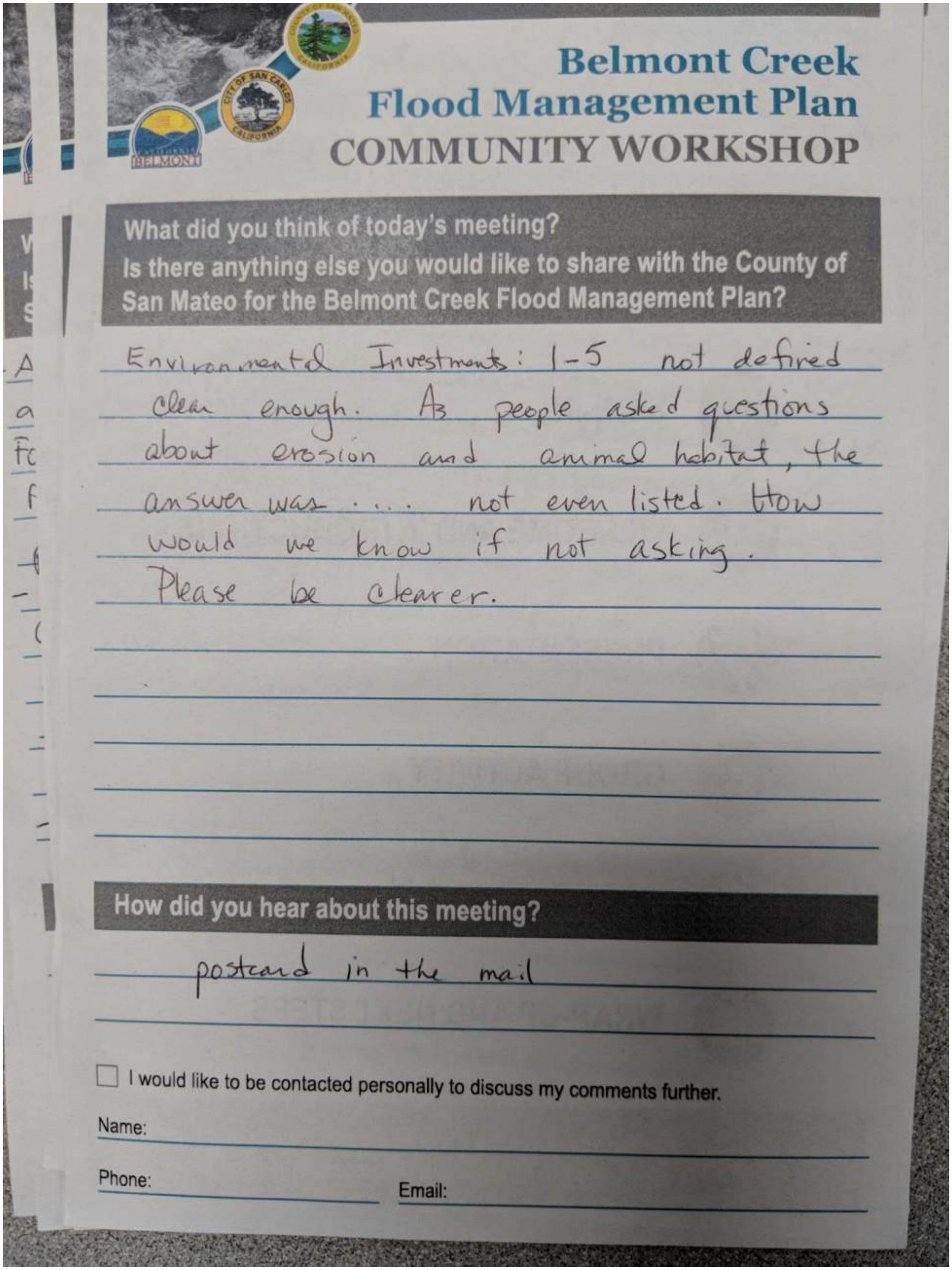
How did you hear about this meeting?

POST CARD

☐ I would like to be contacted personally to discuss my comments further.

Name:

Phone: Email:



Belmont Creek Flood Management Plan

COMMUNITY WORKSHOP

What did you think of today's meeting?
Is there anything else you would like to share with the County of San Mateo for the Belmont Creek Flood Management Plan?

Environmental Investments: 1-5 not defined
clear enough. As people asked questions
about erosion and animal habitat, the
answer was . . . not even listed. How
would we know if not asking.
Please be clearer.

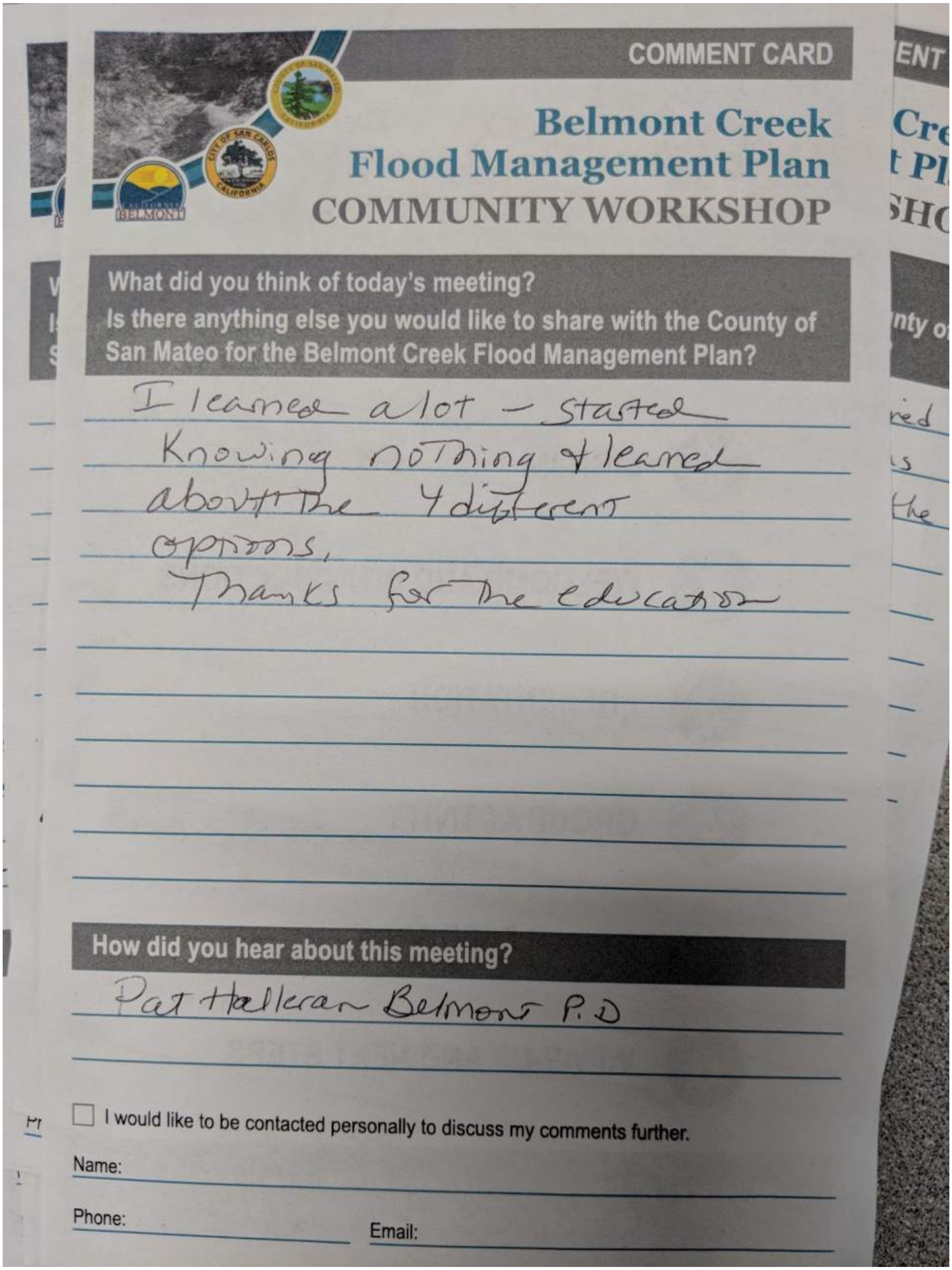
How did you hear about this meeting?

postcard in the mail

☐ I would like to be contacted personally to discuss my comments further.

Name:

Phone:
Email:



COMMENT CARD

Belmont Creek Flood Management Plan
COMMUNITY WORKSHOP

What did you think of today's meeting?
Is there anything else you would like to share with the County of San Mateo for the Belmont Creek Flood Management Plan?

I learned alot - started
Knowing nothing & learned
about the 4 different
options,
Thanks for the education

How did you hear about this meeting?

Pat Halleran Belmont P.D

☐ I would like to be contacted personally to discuss my comments further.

Name:

Phone:

Email:

Michael Baker
INTERNATIONAL

Appendix I

Underground Detention Sample Product

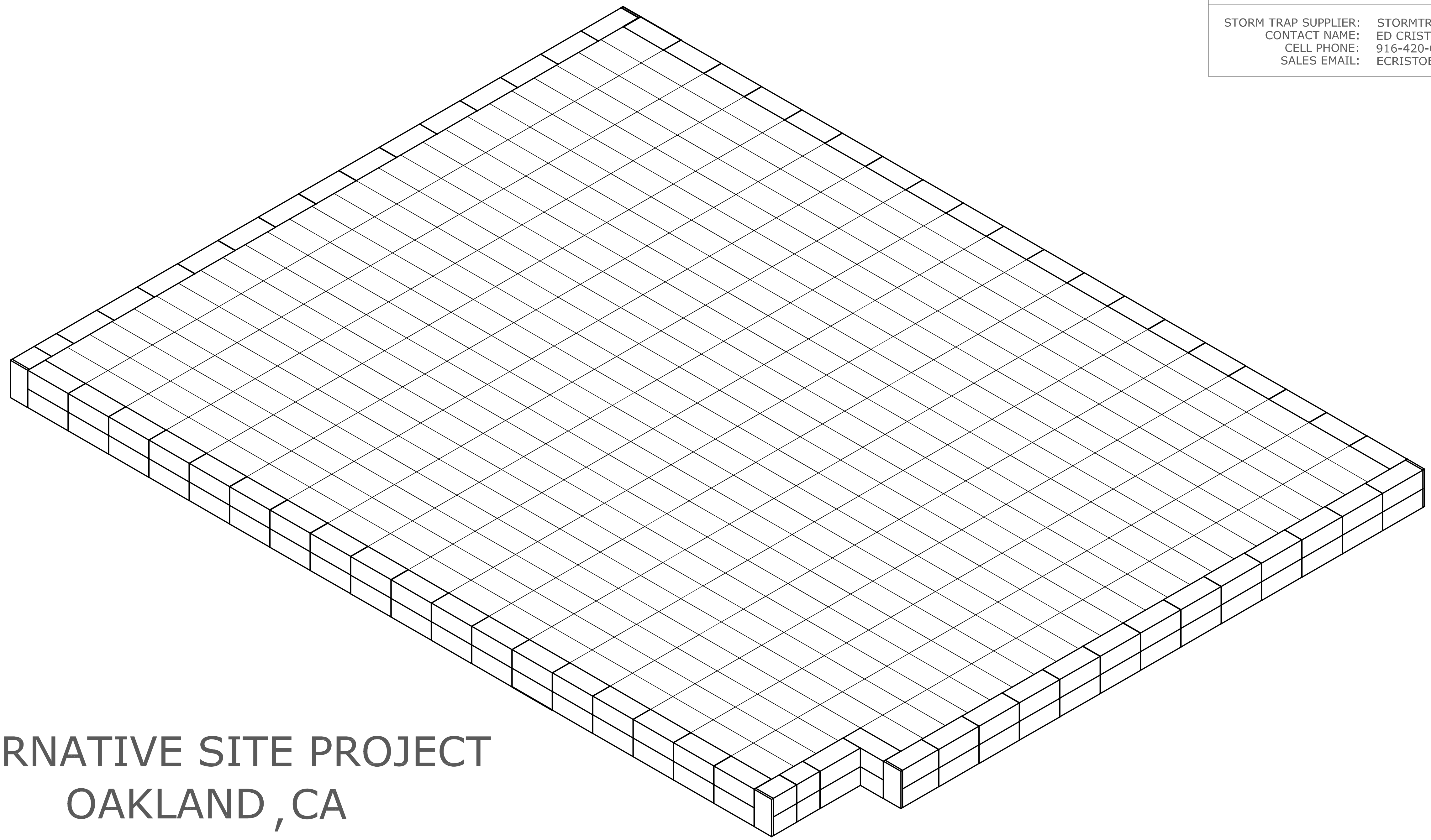
StormTrap®

MODULAR CONCRETE
STORMWATER MANAGEMENT

SHEET INDEX	
PAGE	DESCRIPTION
0.0	COVER SHEET
1.0	DOUBLETRAP DESIGN CRITERIA
2.0	DOUBLETRAP SYSTEM LAYOUT
3.0	DOUBLETRAP INSTALLATION SPECIFICATIONS
3.1	DOUBLETRAP INSTALLATION SPECIFICATIONS
4.0	DOUBLETRAP BACKFILL SPECIFICATIONS
5.0	RECOMMENDED PIPE / ACCESS OPENING SPECIFICATIONS
6.0	DOUBLETRAP MODULE TYPES

STORMTRAP CONTACT INFORMATION

STORM TRAP SUPPLIER:	STORMTRAP
CONTACT NAME:	ED CRISTOBAL
CELL PHONE:	916-420-0005
SALES EMAIL:	ECRISTOBAL@STORMTRAP.COM



ALTERNATIVE SITE PROJECT
OAKLAND , CA

StormTrap®

PATENTS LISTED AT: [HTTP://STORMTRAP.COM/PATENT]

1287 WINDHAM PARKWAY
ROMEOVILLE, IL 60446
P:815-941-4549 / F:331-318-5347

ENGINEER INFORMATION:

MICHAEL BAKER
INTERNATIONAL

PROJECT INFORMATION:

ALTERNATIVE SITE
PROJECT

OAKLAND, CA

CURRENT ISSUE DATE:

2/20/2018

ISSUED FOR:

PRELIMINARY

REV.	DATE:	ISSUED FOR:	DWN BY:
△1	2/20/2018	PRELIMINARY	ADF

SCALE:

NTS

SHEET TITLE:

COVER SHEET

SHEET NUMBER:

0.0

STRUCTURAL DESIGN LOADING CRITERIA

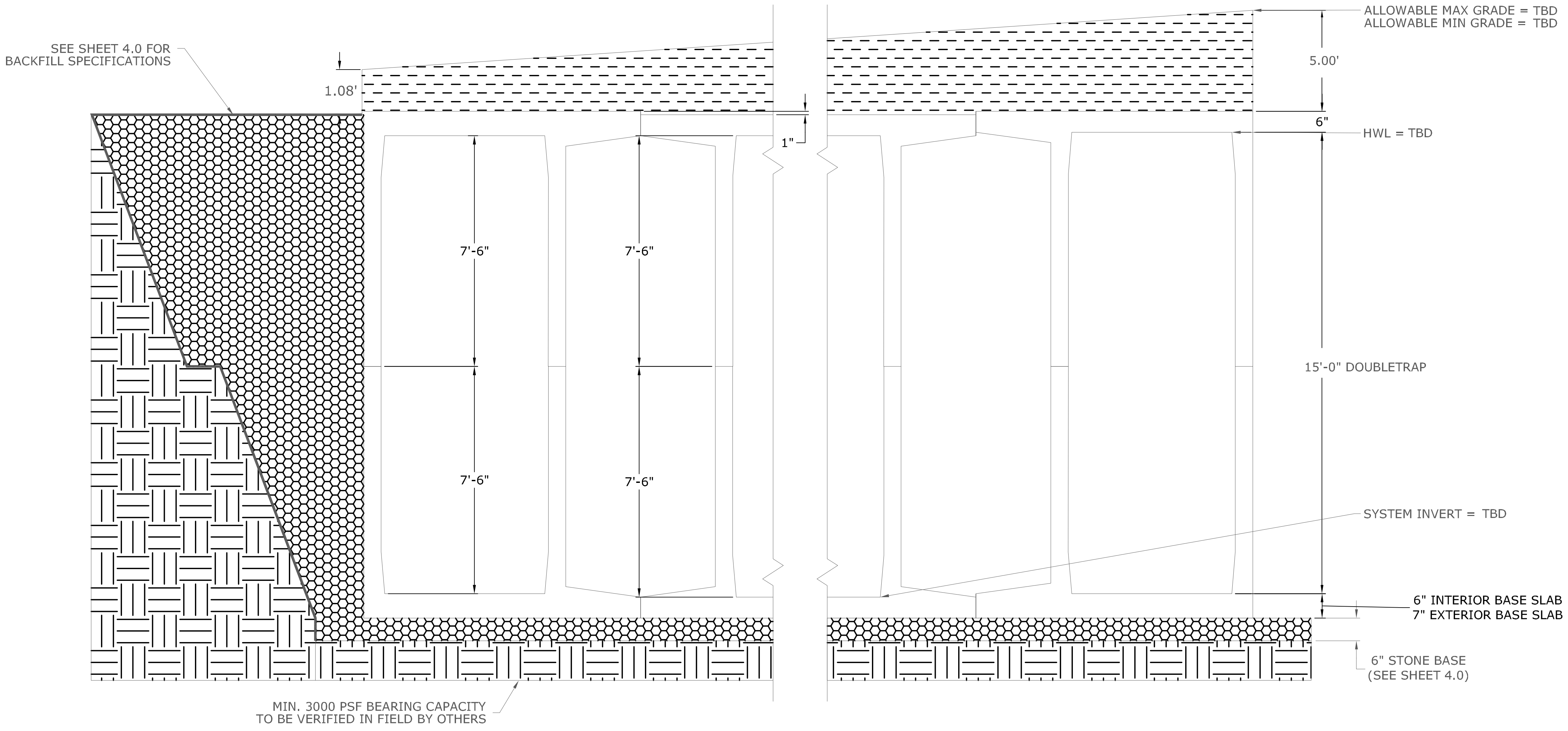
LIVE LOADING:	AASHTO HS-20 HIGHWAY LOADING
GROUND WATER TABLE:	BELOW INVERT OF SYSTEM
SOIL BEARING PRESSURE:	3000 PSF
SOIL DENSITY:	120 PCF
EQUIVALENT UNSATURATED LATERAL ACTIVE EARTH PRESSURE:	35 PSF / FT.
EQUIVALENT SATURATED LATERAL ACTIVE EARTH PRESSURE:	80 PSF/FT. (IF WATER TABLE PRESENT)
APPLICABLE CODES:	AASHTO ACI-318
BACKFILL TYPE:	$\frac{3}{4}$" STONE AGGREGATE

STORMTRAP SYSTEM INFORMATION

WATER STORAGE REQ'D:	980,000.00 CUBIC FEET
WATER STORAGE PROV:	980,188.66 CUBIC FEET
UNIT HEADROOM:	15'-0" DOUBLETRAP
UNIT QUANTITY:	1120 TOTAL UNITS

SITE SPECIFIC DESIGN CRITERIA

1. STORMTRAP UNITS SHALL BE MANUFACTURED AND INSTALLED ACCORDING TO SHOP DRAWINGS APPROVED BY THE INSTALLING CONTRACTOR AND ENGINEER OF RECORD. THE SHOP DRAWINGS SHALL INDICATE SIZE AND LOCATION OF ROOF OPENINGS AND INLET/ OUTLET PIPE TYPES, SIZES, INVERT ELEVATIONS AND SIZE OF OPENINGS.
2. COVER RANGE: MIN. 1.00' MAX. 5.00' CONSULT STORMTRAP FOR ADDITIONAL COVER OPTIONS.
3. ALL DIMENSIONS AND SOIL CONDITIONS, INCLUDING BUT NOT LIMITED TO GROUNDWATER AND SOIL BEARING CAPACITY ARE REQUIRED TO BE VERIFIED IN THE FIELD BY OTHERS PRIOR TO STORMTRAP INSTALLATION.
4. FOR STRUCTURAL CALCULATIONS THE GROUND WATER TABLE IS ASSUMED TO BEBELOW INVERT OF SYSTEM . IF WATER TABLE IS DIFFERENT THAN ASSUMED, CONTACT STORMTRAP.



15'-0" DOUBLETRAP

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PATENTS LISTED AT: [HTTP://STORMTRAP.COM/PATENT]

1287 WINDHAM PARKWAY
ROMEOVILLE, IL 60446
P:815-941-4549 / F:331-318-5347

ENGINEER INFORMATION:

MICHAEL BAKER
INTERNATIONAL

PROJECT INFORMATION:

ALTERNATIVE SITE
PROJECT

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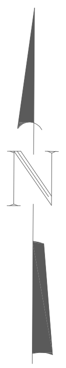
DOUBLETRAP
DESIGN
CRITERIA

SHEET NUMBER:

1.0

BILL OF MATERIALS

QTY.	UNIT TYPE	DESCRIPTION	TOP WEIGHT	BASE WEIGHT
490	I	15'-0" DOUBLETRAP	18998	19008
0	II	15'-0" DOUBLETRAP	23711	23721
63	III	15'-0" DOUBLETRAP	20873	22151
2	IV	15'-0" DOUBLETRAP	23229	24507
0	VII	15'-0" DOUBLETRAP	22747	24026
5	SPIV	15'-0" DOUBLETRAP	VARIES	VARIES
5	PANEL	8" THICK PANELS	10655	
103	JOINTWRAP	150' PER ROLL		
488	JOINTTAPE	14.5' PER ROLL		

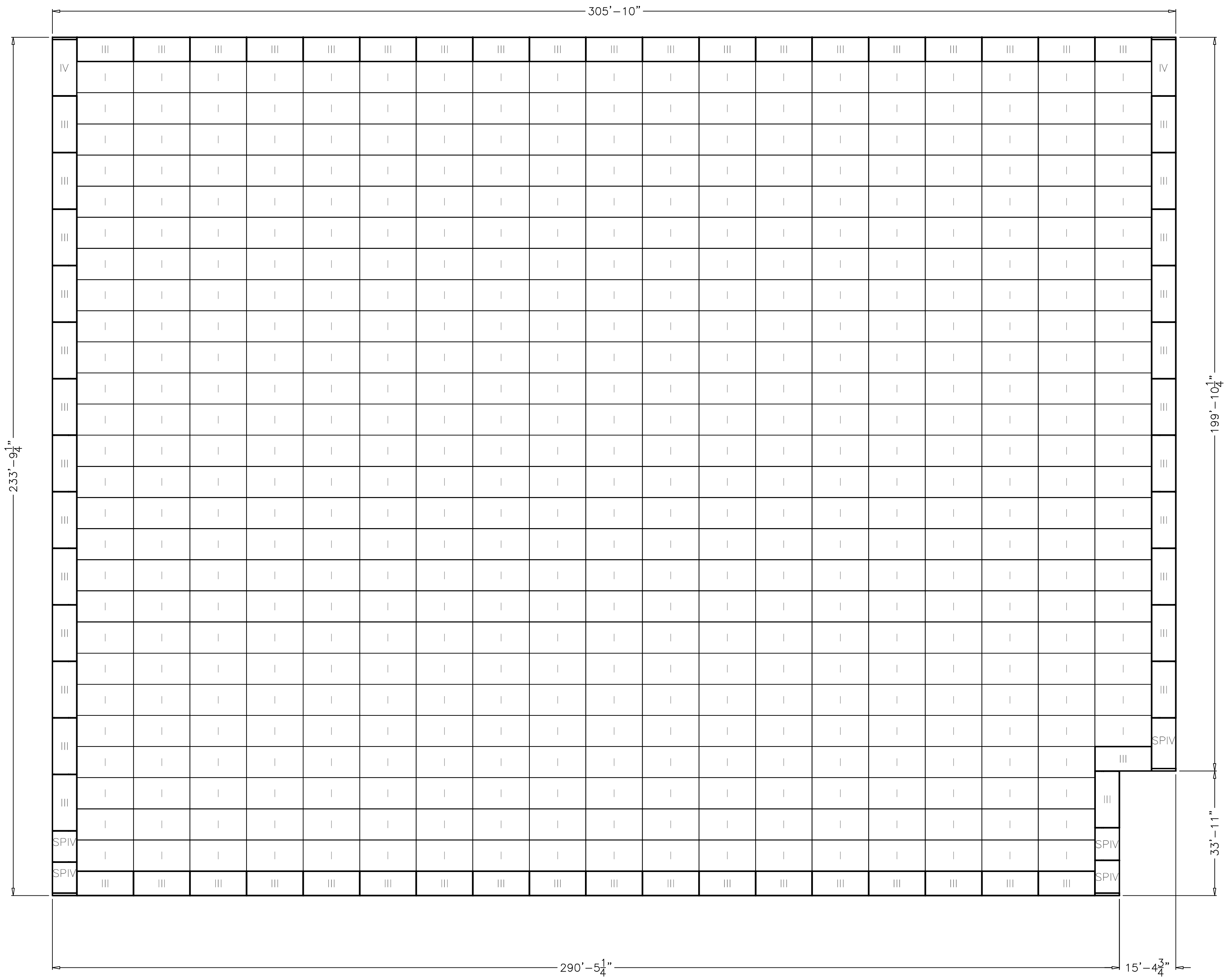


DESIGN CRITERIA

ALLOWABLE MAX GRADE = TBD
ALLOWABLE MIN GRADE = TBD
INSIDE HEIGHT ELEVATION = TBD
SYSTEM INVERT = TBD
STORMTRAP VOLUME =980,188.66C.F.

NOTES:

1. DIMENSIONING OF STORMTRAP SYSTEM SHOWN BELOW ALLOW FOR A 3/4" GAP BETWEEN EACH MODULE.
2. ALL DIMENSIONS TO BE VERIFIED IN THE FIELD BY OTHERS.
3. SEE SHEET 3.0 FOR INSTALLATION SPECIFICATIONS.
4. SP - INDICATES A MODULE WITH MODIFICATIONS.
5. P - INDICATES A MODULE WITH A PANEL ATTACHMENT.
6. CONTRACTORS RESPONSIBILITY TO ENSURE CONSISTENCY/ACCURACY TO FINAL ENGINEER OF RECORD PLAN SET.



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DOUBLETRAP
SYSTEM LAYOUT

SHEET NUMBER:

2.0

STORMTRAP INSTALLATION SPECIFICATIONS

1. STORMTRAP SHALL BE INSTALLED IN ACCORDANCE WITH ASTM C891, STANDARD FOR INSTALLATION OF UNDERGROUND PRECAST CONCRETE UTILITY STRUCTURES, THE FOLLOWING ADDITIONS AND/OR EXCEPTIONS SHALL APPLY:

2. IT IS THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO ENSURE THAT PROPER/ADEQUATE EQUIPMENT IS USED TO SET/INSTALL THE MODULES.

3. STORMTRAP MODULES CAN BE PLACED ON A LEVEL, 6" FOUNDATION OF ¾" AGGREGATE EXTENDING 2'-0" PAST THE OUTSIDE OF THE SYSTEM (SEE DETAIL 1) AND SHALL BE PLACED ON PROPERLY COMPACTED SOILS (SEE SHEET 1.0 FOR SOIL BEARING CAPACITY REQUIREMENTS), AND IN ACCORDANCE WITH ASTM C891 STANDARD PRACTICE FOR INSTALLATION OF UNDERGROUND PRECAST UTILITY STRUCTURES.

4. THE STORMTRAP MODULES SHALL BE PLACED SUCH THAT THE MAXIMUM SPACE BETWEEN ADJACENT MODULES DOES NOT EXCEED ¾" (SEE DETAIL 2). IF THE SPACE EXCEEDS ¾", THE MODULES SHALL BE RESET WITH APPROPRIATE ADJUSTMENT MADE TO LINE AND GRADE TO BRING THE SPACE INTO SPECIFICATION.

5. STORMTRAP MODULES ARE NOT WATERTIGHT. IF A WATERTIGHT SOLUTION IS REQUIRED, CONTACT STORMTRAP FOR RECOMMENDATIONS. THE WATERTIGHT APPLICATION IS TO BE PROVIDED AND IMPLEMENTED BY THE CONTRACTOR. THE CONTRACTOR IS RESPONSIBLE TO ENSURE THAT THE SELECTED WATERTIGHT SOLUTION PERFORMS AS SPECIFIED BY THE MANUFACTURER.

6. THE PERIMETER HORIZONTAL JOINT BETWEEN THE TOP AND BASE LEG CONNECTION OF THE STORMTRAP MODULES SHALL BE SEALED WITH PREFORMED MASTIC JOINT TAPE ACCORDING TO ASTM C891, 8.8 AND 8.12. (SEE DETAIL 3). THE MASTIC JOINT TAPE DOES NOT PROVIDE A WATERTIGHT SEAL. THE SOLE PURPOSE OF THE JOINT TAPE IS TO PROVIDE A SILT AND SOIL TIGHT SYSTEM.

7. ALL EXTERIOR JOINTS BETWEEN ADJACENT STORMTRAP MODULES SHALL BE SEALED WITH 8" WIDE PRE-FORMED, COLD-APPLIED, SELF-ADHERING ELASTOMERIC RESIN, BONDED TO A WOVEN , HIGHLY PUNCTURE RESISTANT POLYMER WRAP, CONFORMING TO ASTM C891 AND SHALL BE INTEGRATED WITH PRIMER SEALANT AS APPROVED BY STORMTRAP (SEE DETAILS 3 & 4). THE JOINT WRAP DOES NOT PROVIDE A WATERTIGHT SEAL. THE SOLE PURPOSE OF THE JOINT WRAP IS TO PROVIDE A SILT AND SOIL TIGHT SYSTEM. THE ADHESIVE EXTERIOR JOINT WRAP SHALL BE INSTALLED ACCORDING TO THE FOLLOWING INSTALLATION INSTRUCTIONS:

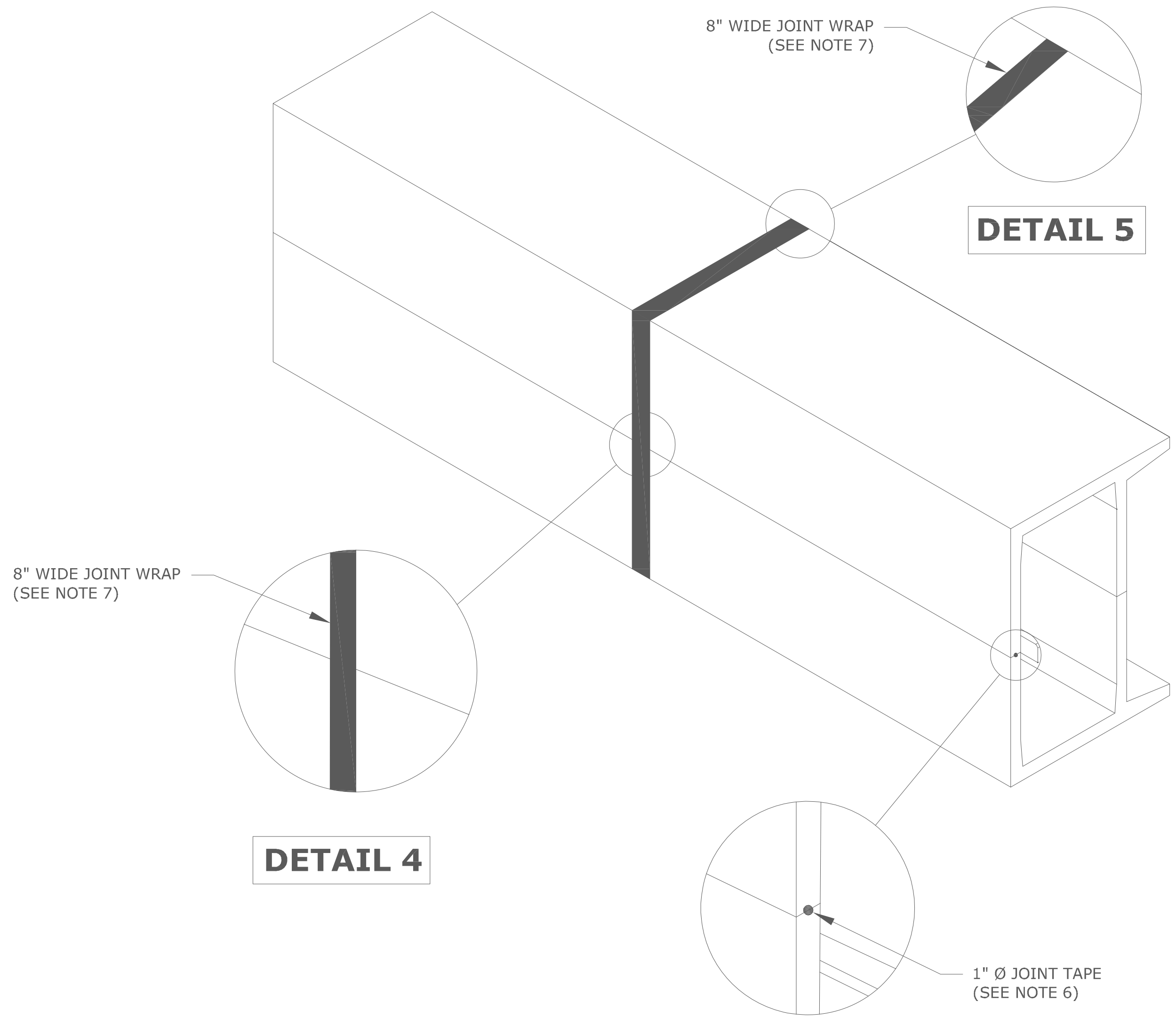
   7.1. USE A BRUSH OR WET CLOTH TO THOROUGHLY CLEAN THE OUTSIDE SURFACE AT THE POINT WHERE JOINT WRAP IS TO BE APPLIED.

   7.2. A RELEASE PAPER PROTECTS THE ADHESIVE SIDE OF THE JOINT WRAP. PLACE THE ADHESIVE TAPE (ADHESIVE SIDE DOWN) AROUND THE STRUCTURE, REMOVING THE RELEASE PAPER AS YOU GO. PRESS THE JOINT WRAP FIRMLY AGAINST THE STORMTRAP MODULE SURFACE WHEN APPLYING.

8. IF THE CONTRACTOR NEEDS TO CANCEL ANY SHIPMENTS, THEY MUST DO SO 48 HOURS PRIOR TO THEIR SCHEDULED ARRIVAL AT THE JOB SITE. IF CANCELED AFTER THAT TIME, PLEASE CONTACT THE PROJECT MANAGER.

9. IF THE STORMTRAP MODULE(S) IS DAMAGED IN ANY WAY PRIOR, DURING, OR AFTER INSTALL, STORMTRAP MUST BE CONTACTED IMMEDIATELY TO ASSESS THE DAMAGE AND TO DETERMINE WHETHER OR NOT THE MODULE(S) WILL NEED TO BE REPLACED. IF ANY MODULE ARRIVES AT THE JOBSITE DAMAGED DO NOT UNLOAD IT; CONTACT STORMTRAP IMMEDIATELY. ANY DAMAGE NOT REPORTED BEFORE THE TRUCK IS UNLOADED WILL BE THE CONTRACTOR'S RESPONSIBILITY.

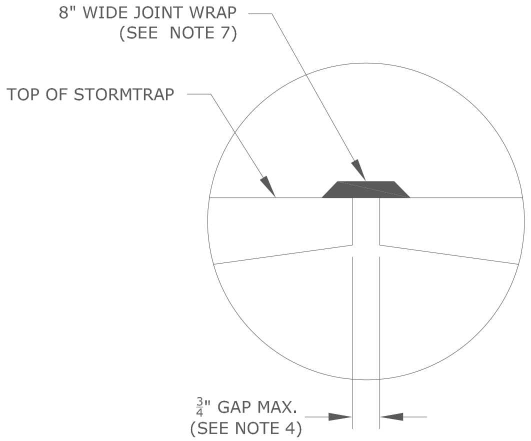
10. STORMTRAP MODULES CANNOT BE ALTERED IN ANY WAY AFTER MANUFACTURING WITHOUT WRITTEN CONSENT FROM STORMTRAP.



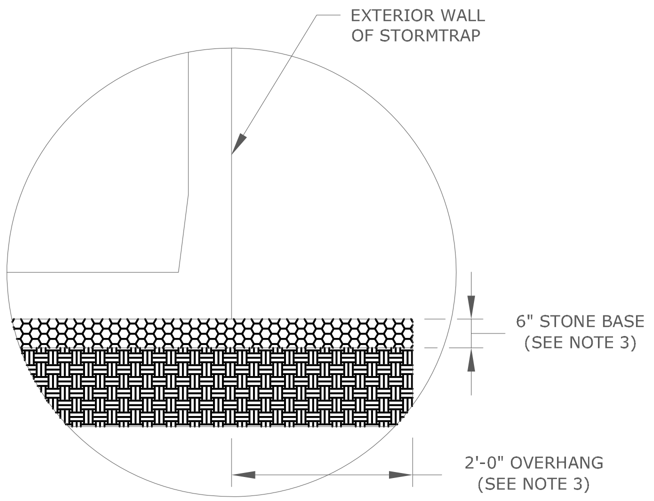
DETAIL 5

DETAIL 4

DETAIL 3



DETAIL 2



DETAIL 1

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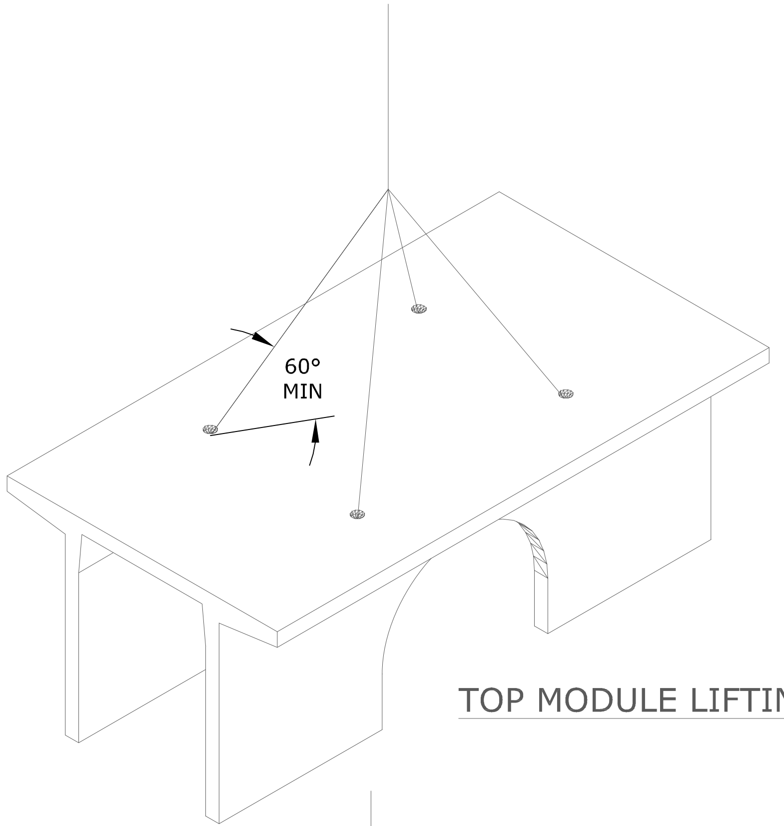
DOUBLETRAP INSTALLATION SPECIFICATIONS

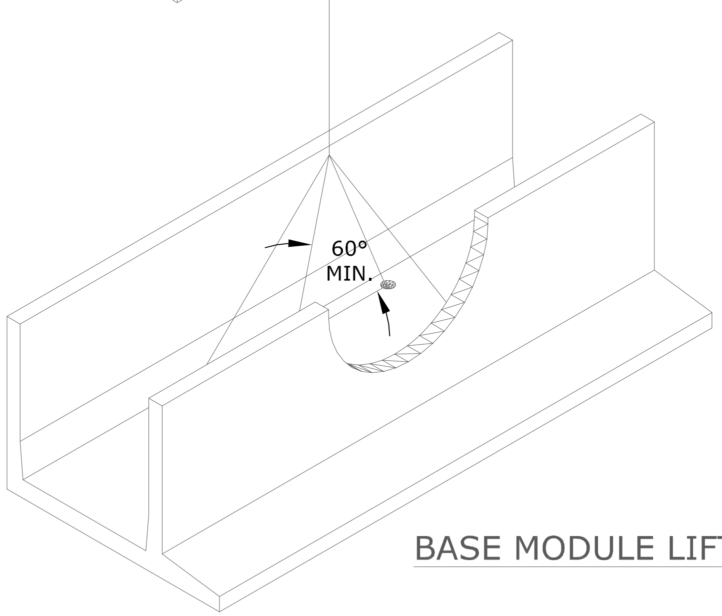
SHEET NUMBER:
3.0

END PANEL ERECTION/INSTALLATION NOTES

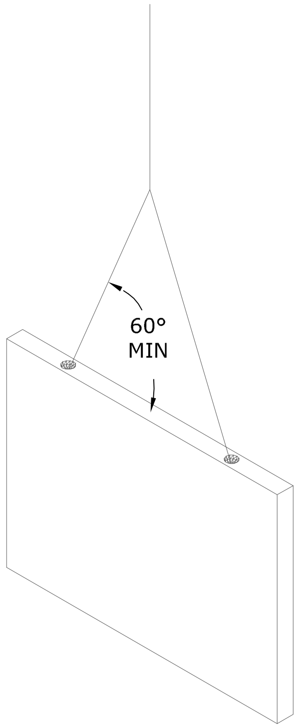
1. END PANELS WILL BE SUPPLIED TO CLOSE OFF OPEN ENDS OF ROWS.
2. PANELS SHALL BE INSTALLED IN A TILT UP FASHION DIRECTLY ADJACENT TO OPEN END OF MODULE (REFER TO SHEET 2.0 FOR END PANEL LOCATIONS).
3. CONNECTION HOOKS WILL BE SUPPLIED WITH END PANELS TO SECURELY CONNECT PANEL TO ADJACENT STORMTRAP MODULE (SEE PANEL CONNECTION ELEVATION VIEW).
4. ONCE CONNECTION HOOK IS ATTACHED, LIFTING CLUTCHES MAY BE REMOVED.
5. JOINT WRAP SHALL BE PLACED AROUND PERIMETER JOINT PANEL (SEE SHEET 3.0).



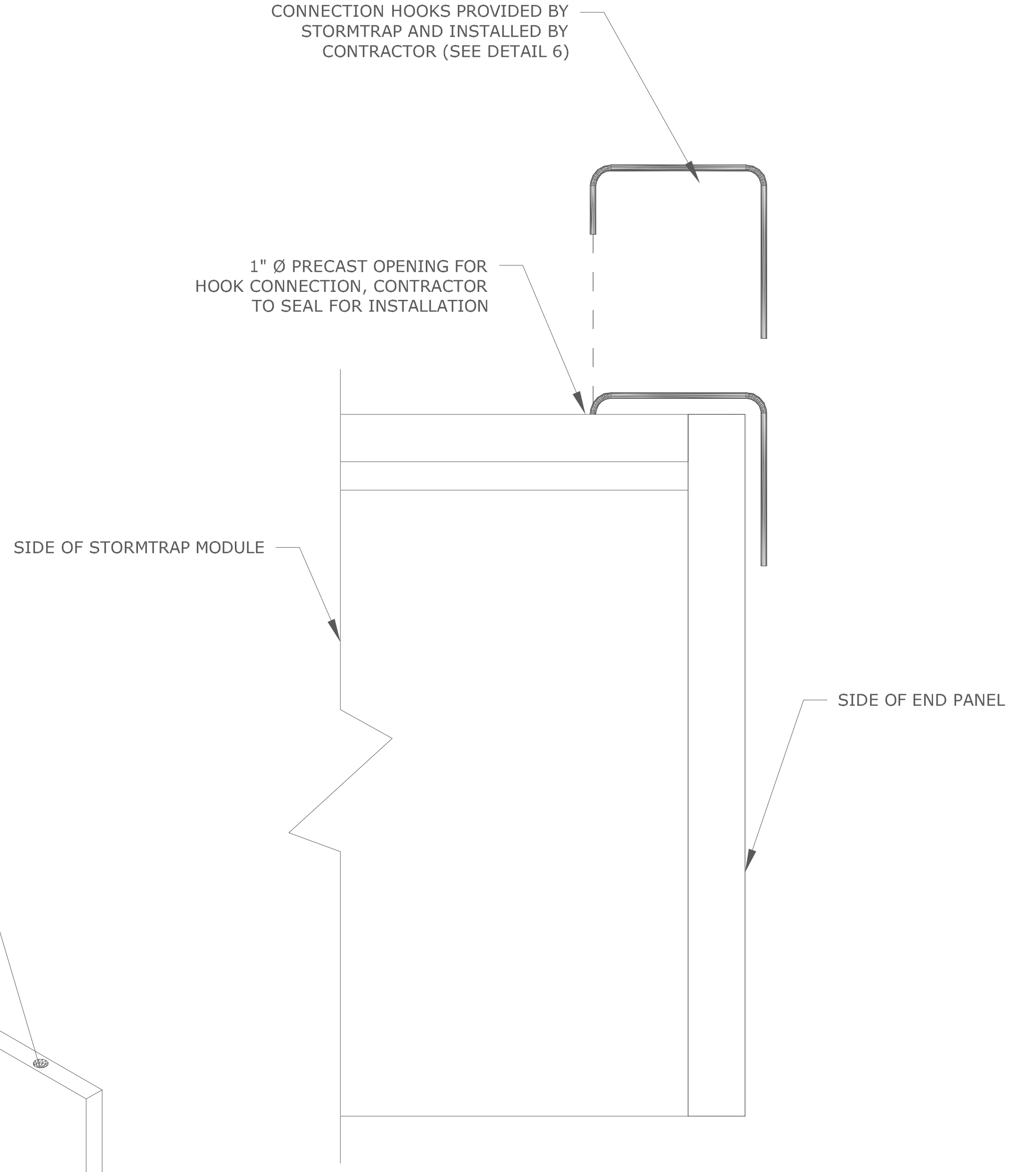
TOP MODULE LIFTING DETAIL



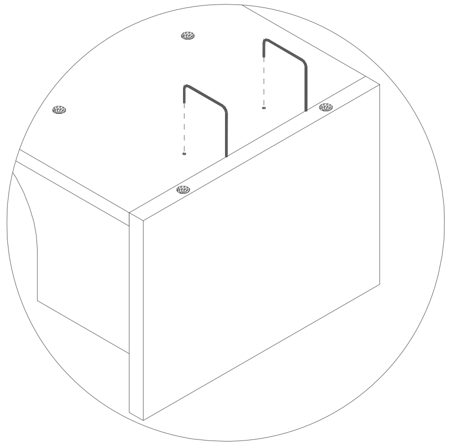
BASE MODULE LIFTING DETAIL



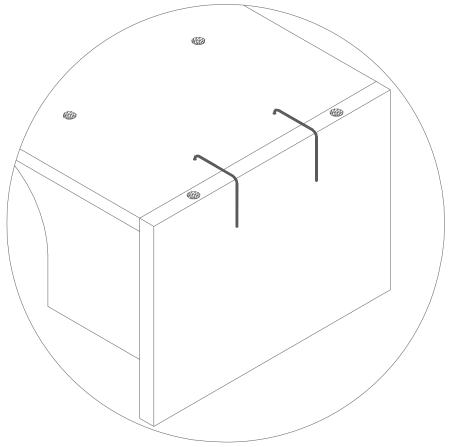
END PANEL LIFTING DETAIL



PANEL CONNECTION ELEVATION VIEW



STEP 1



STEP 2

DETAIL 6

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DOUBLETRAP
INSTALLATION
SPECIFICATIONS

SHEET NUMBER:

3.1

ZONE CHART		
ZONES	ZONE DESCRIPTIONS	REMARKS
ZONE 1 (SEE NOTE 5)	FOUNDATION AGGREGATE	#5 (¾") AGGREGATE (SEE NOTE 4 FOR DESCRIPTION)
ZONE 2	BACKFILL	#5 (¾") AGGREGATE (SEE NOTE 4 FOR DESCRIPTION)
ZONE 3	FINAL COVER OVERTOP	MATERIALS NOT TO EXCEED 120 PCF

FILL DEPTH	TRACK WIDTH	MAX GROUND PRESSURE
12"	12"	1690 psf
	18"	1219 psf
	24"	1111 psf
	30"	1000 psf
	36"	924 psf

STORMTRAP ZONE INSTALLATION SPECIFICATIONS/PROCEDURES

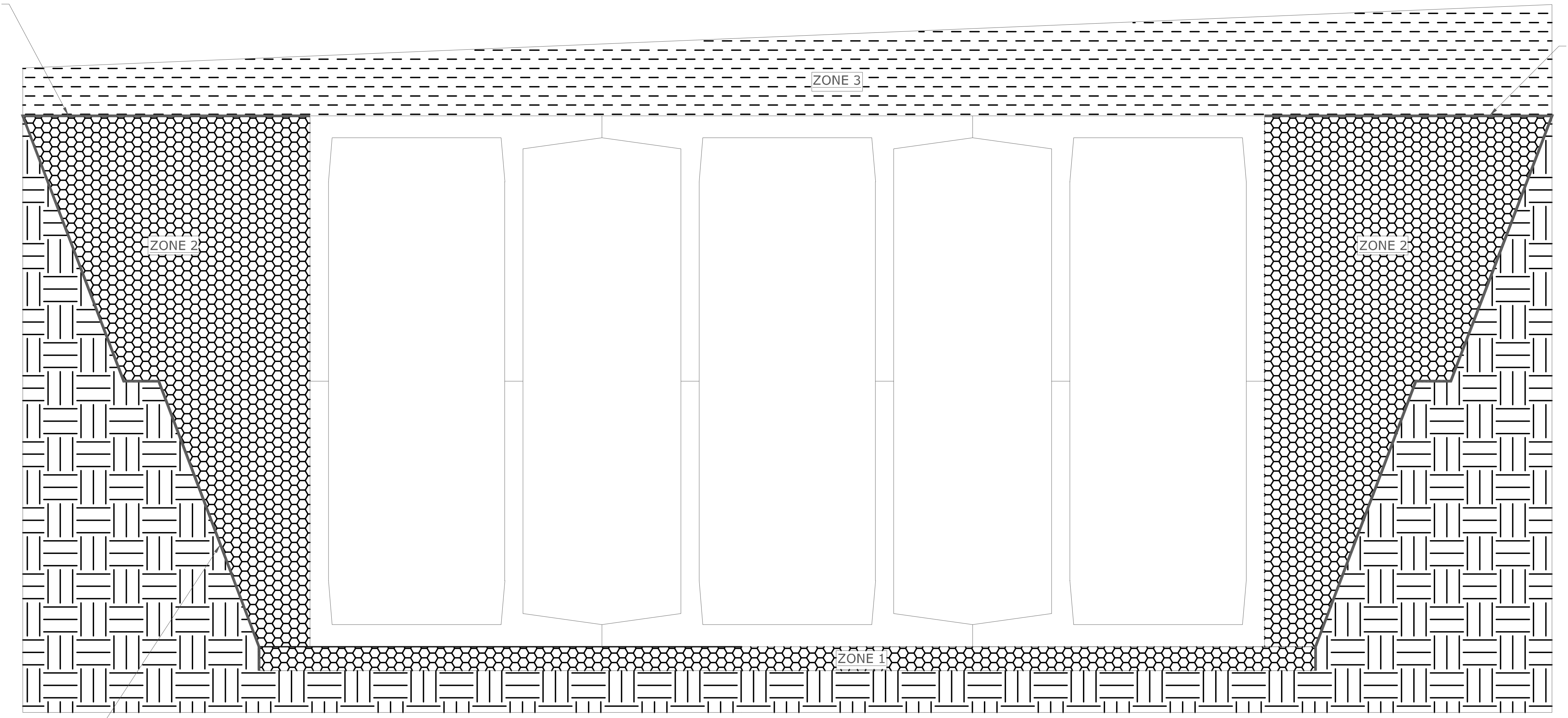
1. THE FILL PLACED AROUND THE STORMTRAP MODULES MUST DEPOSITED ON BOTH SIDES AT THE SAME TIME AND TO APPROXIMATELY THE SAME ELEVATION. AT NO TIME SHALL THE FILL BEHIND ONE SIDE WALL BE MORE THAN 2'-0" HIGHER THAN THE FILL ON THE OPPOSITE SIDE. BACKFILL SHALL EITHER BE COMPACTED AND/OR VIBRATED TO ENSURE THAT BACKFILL AGGREGATE/STONE MATERIAL IS WELL SEATED AND PROPERLY INTER LOCKED. CARE SHALL BE TAKEN TO PREVENT ANY WEDGING ACTION AGAINST THE STRUCTURE, AND ALL SLOPES WITHIN THE AREA TO BE BACKFILLED MUST BE STEPPED OR SERRATED TO PREVENT WEDGING ACTION. CARE SHALL ALSO BE TAKEN AS NOT TO DISRUPT THE JOINT WRAP FROM THE JOINT DURING THE BACKFILL PROCESS. BACKFILL MATERIAL SHALL BE CLEAN, CRUSHED, ANGULAR No. 5 (AASHTO M43) AGGREGATE. IF NATIVE EARTH IS SUSCEPTIBLE TO MIGRATION, CONFIRM WITH GEOTECHNICAL ENGINEER AND PROVIDE PROTECTION AS REQUIRED (PROVIDED BY OTHERS).

2. DURING PLACEMENT OF MATERIAL OVERTOP THE SYSTEM, AT NO TIME SHALL MACHINERY BE USED OVERTOP THAT EXCEEDS THE DESIGN LIMITATIONS OF THE SYSTEM. WHEN PLACEMENT OF MATERIAL OVERTOP, MATERIAL SHALL BE PLACED SUCH THAT THE DIRECTION OF PLACEMENT IS PARALLEL WITH THE OVERALL LONGITUDINAL DIRECTION OF THE SYSTEM WHENEVER POSSIBLE.

3. THE FILL PLACED OVERTOP THE SYSTEM SHALL BE PLACED AT A MINIMUM OF 6" LIFTS. AT NO TIME SHALL MACHINERY OR VEHICLES GREATER THAN THE DESIGN HS-20 LOADING CRITERIA TRAVEL OVERTOP THE SYSTEM WITHOUT THE MINIMUM DESIGN COVERAGE. IF TRAVEL IS NECESSARY OVERTOP THE SYSTEM PRIOR TO ACHIEVING THE MINIMUM DESIGN COVER, IT MAY BE NECESSARY TO REDUCE THE ULTIMATE LOAD/BURDEN OF THE OPERATING MACHINERY SO AS TO NOT EXCEED THE DESIGN CAPACITY OF THE SYSTEM. IN SOME CASES, IN ORDER TO ACHIEVE REQUIRED COMPACTION, HAND COMPACTION MAY BE NECESSARY IN ORDER NOT TO EXCEED THE ALLOTTED DESIGN LOADING. SEE CHART FOR TRACKED VEHICLE WIDTH AND ALLOWABLE MAXIMUM PRESSURE PER TRACK.

4. FREE DRAINING AGGREGATE - 80% AGGREGATE RETAINED ON ½" SIEVE MAJORITY OF AGGREGATE SIZE BETWEEN ½" AND 1" ONLY 5% OF MATERIAL PASSING #200 SIEVE NO FINES.

5. STORMTRAP RECOMMENDS STONE SUBBASE FOR LEVELING PURPOSES ONLY (OPTIONAL). IF STONE SUBBASE IS REQUIRED FOR INFILTRATION, THE DEPTH OF STONE SHALL BE DETERMINED BY THE EOR.



BACKFILL DETAIL

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DOUBLETRAP BACKFILL SPECIFICATIONS

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4.0

RECOMMENDED
ACCESS OPENING SPECIFICATION

1. A TYPICAL ACCESS OPENING FOR THE STORMTRAP SYSTEM ARE 2'-0" IN DIAMETER. ACCESS OPENINGS LARGER THAN 3'-0" IN DIAMETER NEED TO BE APPROVED BY STORMTRAP. ALL OPENINGS MUST RETAIN AT LEAST 1'-0" OF CLEARANCE FROM THE END OF THE STORMTRAP MODULE UNLESS NOTED OTHERWISE. ALL ACCESS OPENINGS TO BE LOCATED ON INSIDE LEG UNLESS OTHERWISE SPECIFIED.
2. PLASTIC COATED STEEL STEPS PRODUCED BY M.A. INDUSTRIES PART #PS3-PFC OR APPROVED EQUAL (SEE STEP DETAIL) ARE PROVIDED INSIDE ANY MODULE WHERE DEEMED NECESSARY. THE HIGHEST STEP IN THE MODULE IS TO BE PLACED A DISTANCE OF 1'-0" FROM THE INSIDE EDGE OF THE STORMTRAP MODULES. ALL ENSUING STEPS SHALL BE PLACED WITH A MAXIMUM DISTANCE OF 1'-4" BETWEEN THEM. STEPS MAY BE MOVED OR ALTERED TO AVOID OPENINGS OR OTHER IRREGULARITIES IN THE MODULE.
3. STORMTRAP LIFTING INSERTS MAY BE RELOCATED TO AVOID INTERFERENCE WITH ACCESS OPENINGS OR THE CENTER OF GRAVITY OF THE MODULE AS NEEDED.
4. STORMTRAP ACCESS OPENINGS MAY BE RELOCATED TO AVOID INTERFERENCE WITH INLET AND/OR OUTLET PIPE OPENINGS SO PLACEMENT OF STEPS IS ATTAINABLE.
5. ACCESS OPENINGS SHOULD BE LOCATED IN ORDER TO MEET THE APPROPRIATE MUNICIPAL REQUIREMENTS. STORMTRAP RECOMMENDS AT LEAST TWO ACCESS OPENINGS PER SYSTEM FOR ACCESS AND INSPECTION.
6. USE PRECAST ADJUSTING RINGS AS NEEDED TO MEET GRADE. STORMTRAP RECOMMENDS FOR COVER OVER 2' TO USE PRECAST BARREL OR CONE INSPECTIONS. (PROVIDED BY OTHERS)

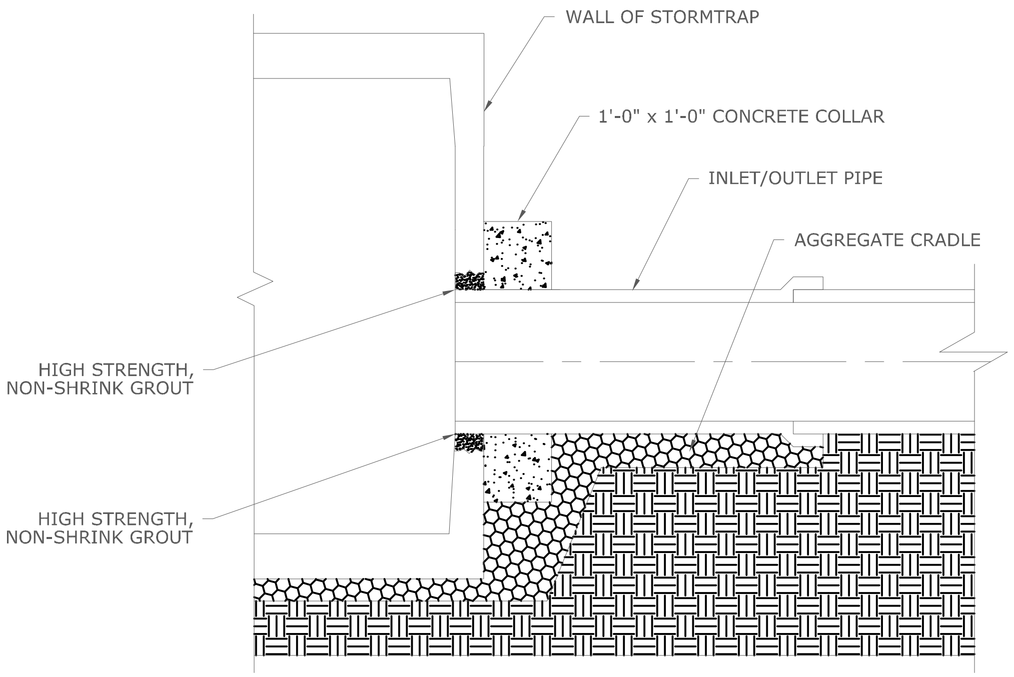
RECOMMENDED
PIPE OPENING SPECIFICATION

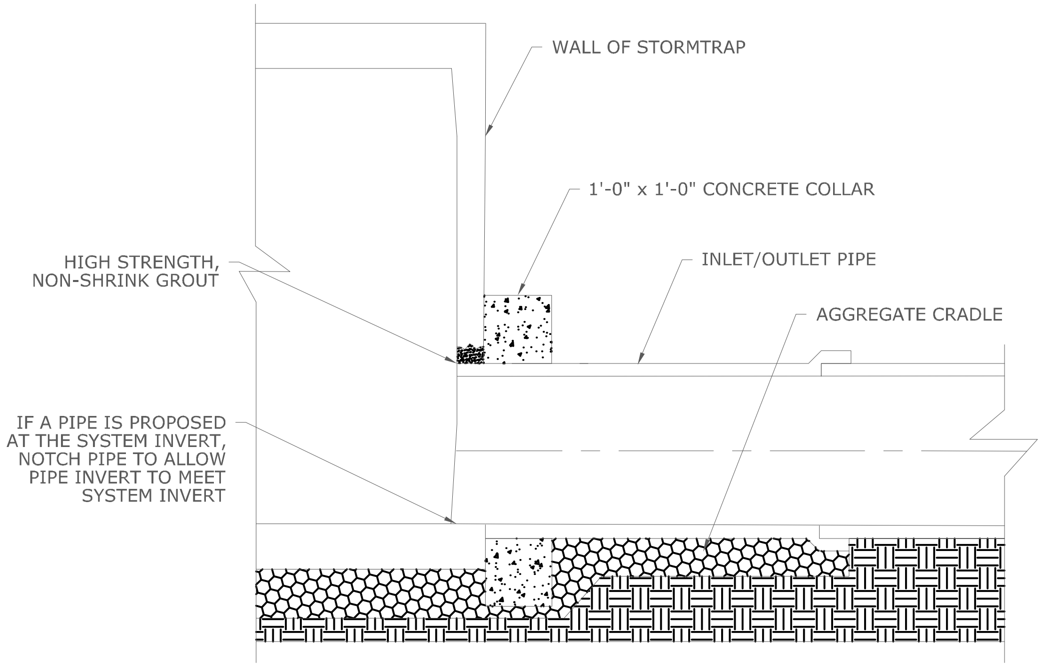
1. MINIMUM EDGE DISTANCE FOR AN OPENING ON THE OUTSIDE WALL SHALL BE NO LESS THAN 1'-0".
2. MAXIMUM OPENING SIZE TO BE DETERMINED BY THE MODULE HEIGHT. PREFERRED OPENING SIZE Ø 36" OR LESS. ANY OPENING NEEDED THAT DOES NOT FIT THIS CRITERIA SHALL BE BROUGHT TO THE ATTENTION OF STORMTRAP FOR REVIEW.
3. CONNECTING PIPES SHALL BE INSTALLED WITH A 1'-0" CONCRETE COLLAR, AND AN AGGREGATE CRADLE FOR AT LEAST ONE PIPE LENGTH (SEE PIPE CONNECTION DETAIL). A STRUCTURAL GRADE CONCRETE OR HIGH STRENGTH, NON-SHRINK GROUT WITH A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3000 PSI SHALL BE USED.
4. THE ANNULAR SPACE BETWEEN THE PIPE AND THE HOLE SHALL BE FILLED WITH HIGH STRENGTH NON-SHRINK GROUT.

RECOMMENDED PIPE
INSTALLATION INSTRUCTIONS

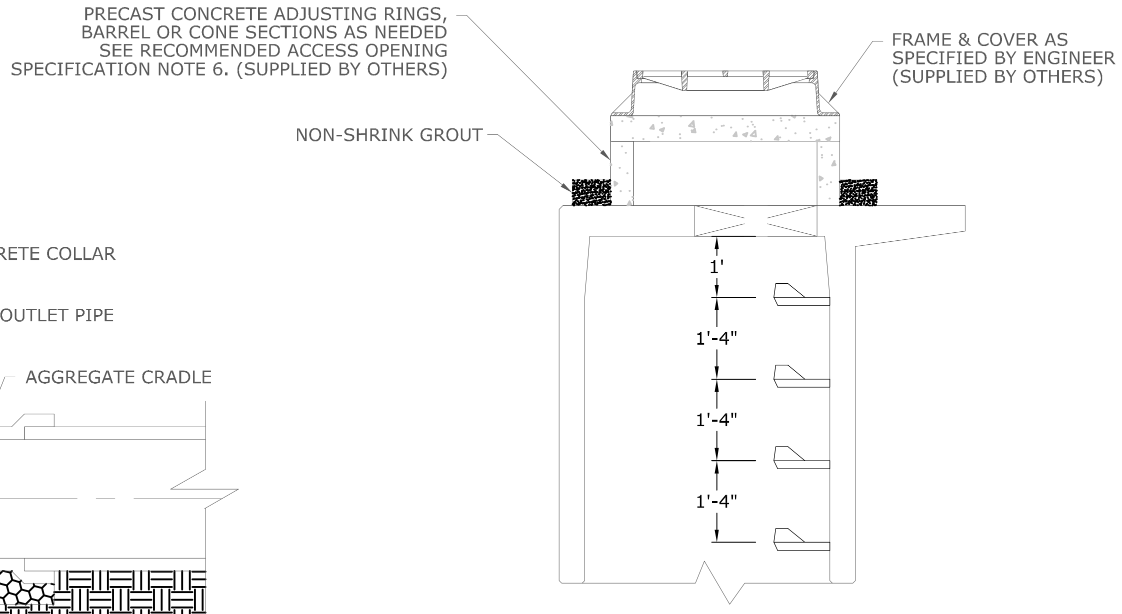
1. CLEAN AND LIGHTLY LUBRICATE ALL OF THE PIPE TO BE INSERTED INTO STORMTRAP.
2. IF PIPE IS CUT, CARE SHOULD BE TAKEN TO ALLOW NO SHARP EDGES. BEVEL AND LUBRICATE LEAD END OF PIPE.
3. ALIGN CENTER OF PIPE TO CORRECT ELEVATION AND INSERT INTO OPENING.

NOTE: ALL ANCILLARY PRODUCTS/SPECIFICATIONS RECOMMENDED AND SHOWN ON THIS SHEET ARE RECOMMENDATIONS ONLY AND SUBJECT TO CHANGE PER THE INSTALLING CONTRACTOR AND/OR PER LOCAL MUNICIPAL CODE/REQUIREMENTS.

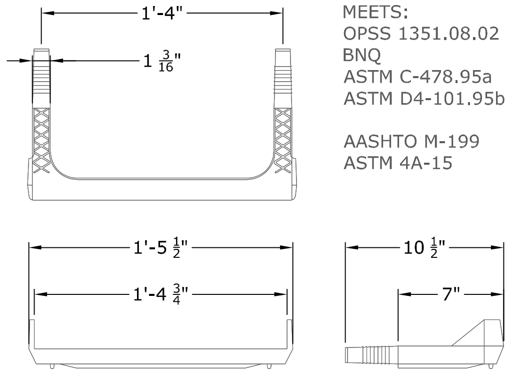




PIPE CONNECTION DETAIL



RISER / STAIR DETAIL



MEETS:
OPSS 1351.08.02
BNQ
ASTM C-478.95a
ASTM D4-101.95b

AASHTO M-199
ASTM 4A-15

STEP DETAIL

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RECOMMENDED
PIPE / ACCESS
OPENING
SPECIFICATIONS

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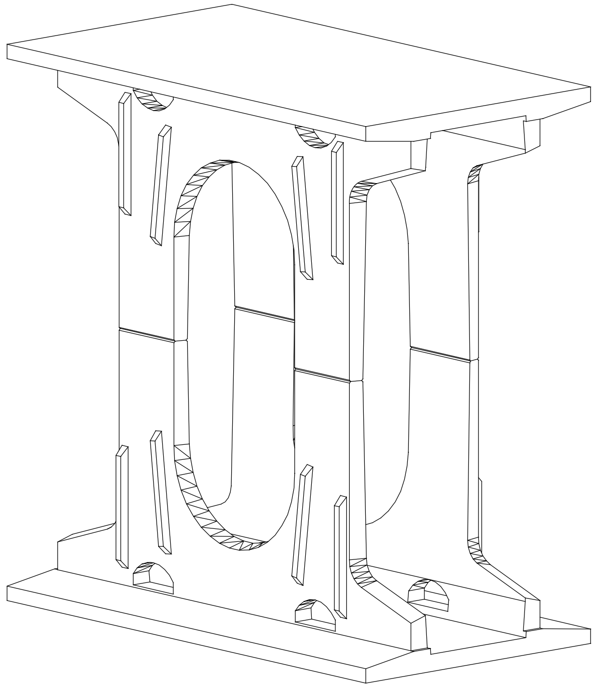

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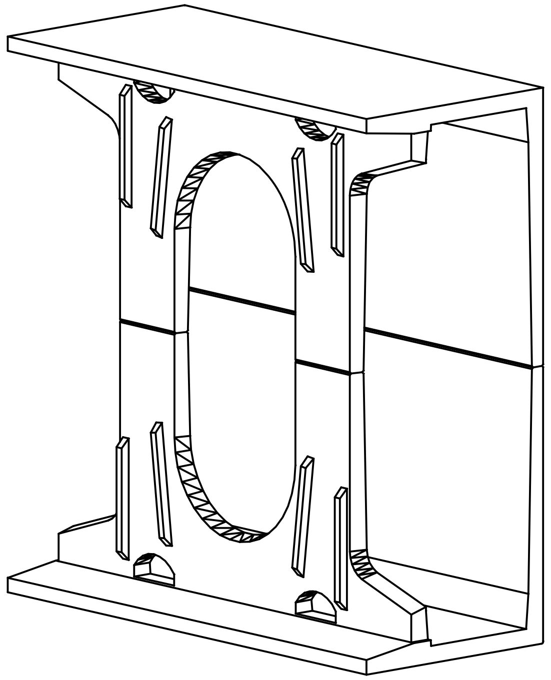

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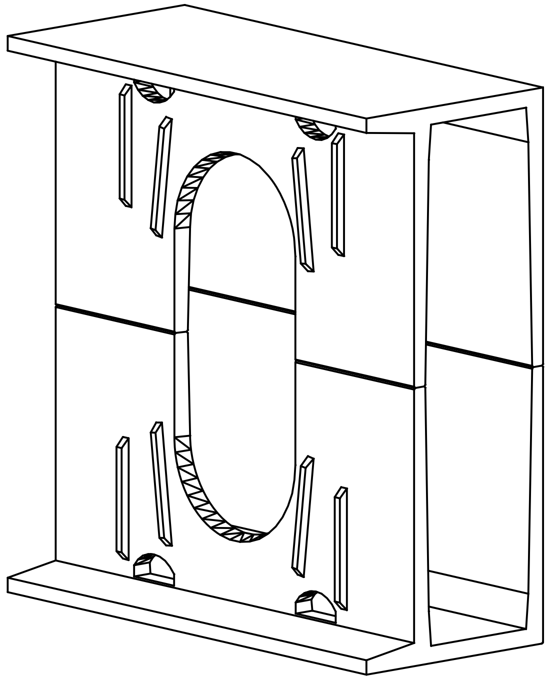

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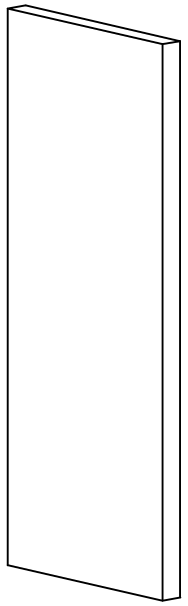

TYPE IV
END PANEL

NOTES:

1. OPENING LOCATIONS AND SHAPES MAY VARY.
2. SP - INDICATES A MODULE WITH MODIFICATIONS.
3. P - INDICATES A MODULE WITH A PANEL ATTACHMENT.
4. POCKET WINDOW OPENINGS ARE OPTIONAL.

StormTrap®

PATENTS LISTED AT: [HTTP://STORMTRAP.COM/PATENT]

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PROJECT INFORMATION:

ALTERNATIVE SITE
PROJECT

OAKLAND, CA

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NTS

SHEET TITLE:

DOUBLETRAP
MODULE TYPES

SHEET NUMBER:

6.0

StormTrap Guide Specification

StormTrap 2
DoubleTrap on Stone
Groundwater BELOW Invert

Revised 12/14/17

This product guide specification is written according to the Construction Specifications Institute (CSI) 3-Part Format, including *MasterFormat, SectionFormat,* and *PageFormat,* contained in the CSI *Manual of Practice.*

The section must be carefully reviewed and edited by the Engineer to meet the requirements of the project and local building code. Coordinate this section with other specification sections and the Drawings. Delete all “Specifier Notes” when editing this section.

Section numbers are from *MasterFormat 2016 Edition*. Update section numbers to versions if required.

Specifier Notes: This section covers “StormTrap®” precast concrete, modular, storm water detention. StormTrap is custom designed to meet the specific requirements of the project.

Consult StormTrap for assistance in editing this section for the specific application.

SECTION 33 46 23 – MODULAR BURIED STORMWATER STORAGE UNITS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. StormTrap Precast concrete, modular stormwater detention.

1.02 RELATED SECTIONS

A. Section 31 00 00 – Earthwork

B. Section 03 40 00 – Precast Concrete

1.03 REFERENCE STANDARDS

A. AASHTO – Standard Specifications for Highway Bridges – Seventh (7th) Edition

B. ACI 318 - Building Code Requirements for Structural Concrete.

C. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

D. ASTM C 857 - Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.

E. ASTM C 858 - Standard Specification for Underground Precast Concrete Utility Structures.

F. ASTM C 891 - Standard Practice for Installation of Underground Precast Concrete Utility Structures.

G. ASTM C 990 - Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.

H. ASTM A 1064 – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

1.04 DESIGN REQUIREMENTS

A. Precast Concrete Modular Stormwater Detention shall comply with ASTM C858.

B. Underground precast concrete stormwater management system shall be sized in accordance with the design requirements provided by the Engineer of Record (EOR) and approved by the reviewing agency.

C. The system shall be designed so modules are aligned and have channels that extend to the bottom of the modules allowing for relatively unrestricted fluid flow in both directions.

D. Minimum Structural Design Loading: ASTM C 857.

1. Total Cover:
    - a. Minimum: As indicated on the drawings.
    - b. Maximum: As indicated on the drawings.
2. Concrete chamber shall be designed for AASHTO HS-20 wheel load.

3. Minimum Soil Pressure:
    a. DoubleTrap Modules: As indicated on the drawings.
4. Vertical and lateral soil pressures shall be determined using:
    a. Groundwater: At or below invert of system.
    b. Lateral soil pressures to be based on Active earth pressure
        1) Lateral soil pressure = 35 pcf for 120 pcf backfill unit weight
    c. Vertical soil pressures
        1) Live load = HS-20-44 and Dead load = 120 pcf cover fill unit weight
    d. Engineer to verify geotechnical requirements

1.05 QUALITY ASSURANCE

A. The manufacture of the concrete modules shall be performed at a precast production facility certified by the NPCA or PCI.

1.06 SUBMITTALS

A. Comply with Section 01 33 00 - Submittal Procedures, except shop drawings shall be eleven inches (11”) by seventeen inches (17”).

B. Product Data: Submit manufacturer’s product data and installation instructions.

C. Record Documents:

1. Shop Drawings:
    a. Submit manufacturer’s shop drawings, including plans, elevations, sections, and details indicating layout, dimensions, foundation, cover, and joints.
    b. Indicate size and location of roof openings and inlet and outlet pipe openings.
    c. Indicate sealing of joints.

D. Operation and Maintenance Data: Submit manufacturer’s operation and maintenance instructions

1.07 DELIVERY, STORAGE AND HANDLING

A. Delivery of Accessories: Deliver to site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage of Accessories:

1. Store in accordance with manufacturer’s instructions.
2. Store in clean, dry area, out of direct sunlight.

C. Handling: Protect materials during handling and installation to prevent damage.

1.08 WARRANTY

A. The Manufacturer shall provide a minimum five (5) year limited warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. StormTrap, LLC, 1287 Windham Parkway, Romeoville, Illinois 60446. Phone (877) 867-6872. Fax (331) 318-5347. Website www.stormtrap.com.

2.02 STORMWATER DETENTION

A. All material shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

B. Stormwater Detention Modules:

1. Description: Engineered, precast concrete, modular stormwater detention.
2. Module Type: StormTrap DoubleTrap
3. Size: As indicated on the drawings.
4. Concrete: Manufacturer's Approved Mix design providing a minimum compressive strength of 6,000 psi at 28 days.
5. Reinforcing Bars: ASTM A 615, Grade 60.
6. Reinforcing Mesh: ASTM A 1064, Grade 80.
7. Cover for Reinforcing Bars: ACI 318

2.03 ACCESSORIES

A. Joint Tape:

1. ASTM C 990.
2. Seven eights inch (7/8") diameter, preformed butyl mastic joint sealer.
3. Approved by manufacturer.

B. Joint Wrap:

1. Eight inch (8") wide self-adhesive elastomeric resin bonded woven puncture resistant polymer wrap.
2. Approved by manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine area to receive stormwater detention modules. Notify Engineer if area is not acceptable. Do not begin installation until unacceptable conditions have been corrected.

B. Verify in field before installation, dimensions and soils conditions, including groundwater and soil bearing capacity.

3.02 INSTALLATION

A. Install stormwater detention modules in accordance with manufacturer's instructions and ASTM C 891.

B. Install modules plumb, on line, and to proper elevation.

C. Install modules with a maximum space of three quarters inch (3/4") between adjacent modules. If the space exceeds three quarters inch (3/4"), the modules shall be reset with appropriate adjustment made to line and grade to bring the space into compliance.

D. DoubleTrap:

   1. Place modules on level, six-inch (6") pad of three quarters inch (3/4") stone that extends two feet (2'-0") past the outside of the system as indication on the drawings.

E. Joint Tape:

   1. Seal perimeter horizontal joint between modules with joint tape in accordance with ASTM C 891, 8.8 and 8.12.

   2. Prepare surfaces and install joint tape in accordance with manufacturer's instructions.

F. Joint Wrap:

   1. Seal exterior joints between adjacent modules with joint wrap in accordance with ASTM C 891.

   2. Prepare surfaces and install joint wrap in accordance with manufacturer's instructions.

G. Field Modifications to the modules is strictly prohibited without prior written consent of StormTrap.

H. Excavation and fill shall be as specified in Sections 31 00 00.

I. Fill:

   1. Backfill material shall be three quarter inch (3/4") free draining crushed aggregate with the following properties:

      a. 100% passing one inch (1") sieve

      b. Minimum of 80% aggregate retained on one half inch (1/2") sieve.

      c. Maximum of 5% fines passing #200 sieve.

   2. Deposit fill on both sides of modules at same time and to approximate same elevation.

   3. Prevent wedging action against structure by stepping or serrating slopes bounding or within area to be backfilled.

   4. Do not disrupt or damage joint wrap during backfilling.

J. Do not use stormwater detention modules that are damaged, as determined by manufacturer.

K. Contractor is responsible for installation in accordance with project plans, specifications, and all federal, state, and local regulations.

END OF SECTION 33 46 23