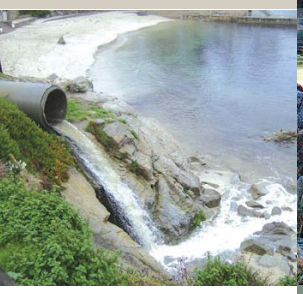

40% Design Engineering Report
Stormwater Management Project

Pacific Grove Area of Special Biological Significance
Cities of Monterey and Pacific Grove, California

Fall Creek Engineering, Inc

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Point Pinos: http://creagrus.home.montereybay.com/MTYsitesPtPinos.html

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Storm Drain and PG Outfall: http://www.cedarstreettimes.com/2009/03/09/stormwater-outfall-at-lovers-point/

TABLE OF CONTENTS

EXECUTIVE SUMMARY…….. ...ES-1
1. Introduction 1
1.1 Background 1
1.2 Project Goals 1
1.3 Study Objective and Approach 2
1.4 Project Description 4
2. Stormwater Management Improvements 6
2.1 David Avenue Reservoir Improvements....6
2.1.1 Design Alternatives....9
2.1.2 Engineering Elements....9
2.2 Pine Avenue Conveyance 10
2.2.1 Design Alternatives....11
2.2.2 Engineering Elements....11
2.3 Ocean View Boulevard Conveyance....12
2.3.1 Design Alternatives....14
2.3.2 Engineering Elements....14
2.4 Point Pinos Stormwater Treatment Facility and Crespi Pond....15
2.4.1 Design Alternatives....19
2.4.2 Engineering Elements....20
2.4.3 Treatment System Regulatory Requirements 21
2.5 Diversions to MRWPCA....23
2.5.1 Engineering Elements....25
3. Hydrology Analysis....26
3.1 Methodology and Assumptions....26
3.2 Results....32
4. Project Construction....34
5. Preliminary Project Cost Estimates....38
5.1 Preliminary Capital Cost Estimates....38
5.2 Preliminary Operation and Maintenance Cost Estimates 39
5.3 Equivalent Annual Cost & Life Cycle Cost Analysis....39
5.3.1 Life Cycle Costs (LCC)....39
5.3.2 Equivalent Annual Cost 40
5.4 Cost Benefit Analysis 42
5.5 Market Value Comparison 44
6. Project Implementation Plan 48
6.1 Project Phasing 48
6.2 Institutional Agreements 48
6.3 Permitting....50
6.3.1 Construction Permits....50
6.3.2 Operational Permits....50
6.4 Next Steps....51
6.4.1 Master Planning Studies 51
6.4.2 Geotechnical Investigations and Surveying 51
6.4.3 Engineering Design and Permitting....52
6.4.4 Project Construction 52
6.4.5 Project Monitoring and Evaluation....52

6.4.6 Proposed Project Timeline 53
6.5 Funding Strategy 53

TABLES

Table 1. Urban Diversion Pump Station Estimated Peak Flows 24
Table 2. Land Use Category and Percent Impervious Assumption 27
Table 3. Curve Number Designation by Land Use and Hydrologic Soil Group 28
Table 4. Summary of Sub-Basin Hydrology Characteristics 30
Table 5. Peak, Average Annual and Dry Weather Runoff Rates by Sub-basin and Sub-Project 33
Table 6. Summary of Sub-Project Construction Details 34
Table 7. Project Cost Estimate Summary by Sub-Project 38
Table 8. Summary of Estimated O&M Cost for Each Sub-Project 39
Table 9. Summary of Life Cycle and Equivalent Annual Cost Estimate 41
Table 10. Estimated TSS (lb/yr) load from Pacific Grove ASBS watershed as a result of stormwater runoff. 42
Table 11. Estimated CER for the proposed project based on pounds of TSS prevented from discharge into the Monterey Bay 43
Table 12. Summary of Proposed Project Cost and CER Compared to Similar Project Options Identified in MACTEC, 2006 Study 44
Table 13. Summary of Potential Reuse Opportunities and Cost for Proposed Project 45
Table 14. Planning Level Cost Estimate for Distributed Stormwater Treatment at Three Locations for Irrigation 46
Table 15. Funding Programs for Stormwater Related Projects 54

FIGURES

Figure 1. Pacific Grove Area of Special Biological Significance (ASBS) 56
Figure 2. Project ASBS Watershed Management Areas 57
Figure 3. Sub-Project Areas 58
Figure 4. Precipitation Measured at the Monterey Bay Aquarium from 1/20/2012 to 1/21/2012 59
Figure 5. Comparison of Modeled and Measured Discharge at Greenwood Park 59
Figure 6. Sub-basin Boundaries 60

ATTACHMENTS

Attachment A: Project Alternatives Screening Analysis
Attachment B: David Avenue Reservoir Alternatives Screening Analysis
Attachment C: Geotechnical Findings at David Avenue Reservoir
Attachment D: Geotechnical Investigation Report
Attachment E: Storm and Sanitary Sewer Analysis (SSA) Model Example
Attachment F: Preliminary Cost Estimates

EXECUTIVE SUMMARY

This project addresses stormwater discharges into the Pacific Grove Area of Special Biological Significance (ASBS), which receives urban runoff from the New Monterey District in the City of Monterey and from the City of Pacific Grove. Over the past several years, the Cities of Monterey and Pacific Grove have been evaluating alternative stormwater management projects to address regulatory requirements imposed by the State Water Resources Control Board (SWRCB) for stormwater discharges to the ASBS.

In 2013, the Cities also initiated the multi-year Central Coast Regional ASBS Water Quality Monitoring Program to assess potential water quality impacts from stormwater runoff in to the Pacific Grove ASBS. This proposed stormwater management project, as presented in this report and accompanied plans, outlines the steps that can be implemented for structural measures to effectively manage stormwater discharges to comply with the SWRCB's water quality requirements and to protect the ASBS.

E.S.1 Project Approach

In 2006 the City of Monterey completed an evaluation of a suite of options to address SWRCB restrictions for stormwater discharges into the ASBS. The analysis, prepared by MACTEC Engineering and Consulting, Inc. (MACTEC), compared twenty two (22) alternative projects including local projects that collect and treat runoff in Pacific Grove before it is discharged to the Monterey Bay, regional projects that pump runoff to the MRWPCA, a publicly owned treatment plant in Monterey, and other projects.

In January 2013, Fall Creek Engineering, Inc. (FCE) was retained by the City of Monterey to complete the *City of Monterey and Pacific Grove ASBS Refined 2006 Feasibility Study of Alternatives Management Plan*. The scope of work in this study was to: (1) refine and select a preferred and alternate project from the broad list of projects identified by MACTEC, (2) select a preferred project alternative, (3) develop conceptual and preliminary plans for the preferred project, (4) prepare the CEQA environmental impact report (EIR) for the preferred project; and (5) prepare a project implementation work plan for the preferred project.

After review and screening of the twenty two (22) alternatives identified in the 2006 MACTEC Study, six (6) project alternatives were identified and refined with input from the Cities of Monterey and Pacific Grove. These alternatives were then screened by numerical ranking and weighting to select a preferred and alternative project.

The preferred project would divert both wet and dry weather flows from both Pacific Grove and New Monterey watershed areas into an upgraded stormwater collection and treatment system. As proposed, flows would be directed either to a new stormwater treatment facility adjacent to Pacific Grove Golf Links at the retired Point Pinos Wastewater Treatment Plant site and/or to the Monterey Regional Water Pollution Control Agency (MRWPCA) regional wastewater treatment plant in Marina. The objective of the project is to achieve up to a 90% reduction in pollutant loading during storm events to comply with the SWRCB's ASBS Special Protections.

As a result of urbanization in the ASBS watershed, impervious surfaces such as pavement and rooftops, speed the transition between when rainfall falls on the surface to when it runs off into drainage ways and into the Monterey Bay. Low Impact Development (LID) is a stormwater management strategy concerned with maintaining or restoring natural hydrologic functions to protect water quality, manage stormwater runoff, achieve natural resource protection objectives and fulfill environmental regulatory requirements. LID strategies and practices were considered throughout the project selection and design process and the proposed project would result in a multitude of benefits associated with typical LID applications, specifically a reduction in peak stormwater flows and a de-synchronization of rainfall and associated runoff that will more closely resemble pre-development conditions. Due to the magnitude of flows that need to be managed to protect the Pacific Grove ASBS, LID practices alone were not considered as a feasible management approach. Future project phases should continue to evaluate opportunities to retrofit existing sites to accommodate LID practices and integrate LID into the proposed project to further enhance compliance with the ASBS Special Protections.

By conveying stormwater to Point Pinos and the MRWPCA the discharge of stormwater into the ASBS will be eliminated during storms less than or equal to the design storm. Runoff to the ASBS would also be reduced during rainfall events in excess of the design storm because runoff would continue to be diverted into the proposed stormwater collection and treatment system. Runoff exceeding the system design capacity would continue to discharge through existing outfalls. Though treated freshwater runoff through Crespi Pond will be increased as a result of the proposed project, overall freshwater runoff into the ASBS from Pacific Grove will be significantly reduced.

Results of the Central Coast Regional ASBS Water Quality Monitoring Program will inform the decision about if the proposed project should be implemented to comply with the SWRCB's water quality requirements to protect the ASBS. The monitoring results will also indicate if the proposed project needs to be modified and will also inform the stormwater treatment plant design, specifically the refinement of the proposed treatment system. In addition the monitoring efforts will evaluate potential stormwater impacts in the mixing zone as related to freshwater and stormwater pollutants.

E.S.2 Project Description

The preferred ASBS stormwater management project is comprised of five associated sub-projects located primarily in the City of Pacific Grove, with a portion of two projects located in the City of Monterey. The five projects include (1) David Avenue Reservoir Improvements, (2) Pine Avenue Conveyance, (3) Ocean View Boulevard Conveyance, (4) Point Pinos Stormwater Treatment Facility, and (5) Diversions to the MRWPCA. Together each of these projects would divert and provide treatment for runoff up to the 85th percentile design storm; flows exceeding this design storm would continue to the existing outfall locations and flow to the Pacific Grove ASBS.

Sub-Project 1. ***Upgrading and restoring the retired David Avenue Reservoir, adjacent to the intersection of David Avenue, Terry Street, and Carmel Avenue***

This project would improve the David Avenue Reservoir (reservoir) so that it could be used to capture runoff from a portion of the ASBS watershed within the City of Monterey and release it into the existing City of Pacific Grove storm drain system for conveyance downhill (northward) to Pine Avenue and then eventually to either the urban runoff diversion system or to the stormwater treatment system at Point Pinos. Detaining stormwater within the reservoir provides flow

equalization and a potential water source for local landscape irrigation. The reservoir could be managed with stormwater storage proposed at the Robert Down Elementary School (Sub-Project 2) and at the intersection of Caledonia Street and Pacific Avenue (Sub-Project 3) to provide dry weather irrigation to areas within Pacific Grove. Additionally, restoring the reservoir as a water feature provides potential opportunities as a neighborhood park which has been identified as a goal of residents living in the neighborhood around the reservoir. Figure E.S.1 provides a rendering of what the reservoir could become if rehabilitated and if public access were permitted. The property is currently owned and operated by the California American Water Company (CalAm).

Figure E.S.1. David Avenue Reservoir Landscape Concept Plan

Sub-Project 2. ***Modifying the Pine Avenue drainage system between 7th Street and 18th Street***

The Pine Avenue Conveyance project creates a back-bone stormwater conveyance system to divert flows from the upper watershed to the Point Pinos Stormwater Treatment Facility (Sub-Project 4). Conveyance at this location reduces flows to the lower watershed and reduces the extent of upgrades needed in the existing urban diversion system to the MRWPCA (Sub-Project 5). Stormwater storage is proposed beneath the fields behind the Robert Down Elementary School and would provide a supply of water for irrigation of the school yard during dry weather. In addition to flow equalization this proposed storage site reduces peak flows and provides a desynchronization of rainfall and runoff.

Sub-Project 3. ***Modifying the Ocean View Boulevard drainage system from Forest Avenue west to the retired Pacific Grove Wastewater Treatment Plant at the Point Pinos***

The Ocean View Conveyance Improvements would convey stormwater from the existing storm drain along Ocean View Boulevard to the Point Pinos Stormwater Treatment Facility (Sub-Project 4), with underground storage proposed beneath the intersection of Caledonia Street and Pacific Avenue. This sub-project would divert urban runoff from the northeastern portion of Pacific Grove, which currently has unmanaged wet and dry weather discharges to the ASBS. Routing stormwater along Ocean View Boulevard makes collection of these unmanaged flow possible while re-using an existing pipeline. Alternative locations would have required new construction with potential impacts to archeological resources while reducing the amount of runoff to the ASBS that could be collected and treated.

Sub-Project 4. Installing a new stormwater treatment system at the retired Pacific Grove Wastewater Treatment Plant site, located on the Pacific Grove Golf Links

This sub-project would involve the installation of a stormwater treatment facility at the retired Pacific Grove Wastewater Treatment Plant at Point Pinos. Treated stormwater from the stormwater treatment plant would either be discharged to the Monterey Bay, outside the ASBS, through the existing Crespi Pond outfall or be available for reuse as irrigation water. The project would treat both wet and dry weather flows, so there is the potential to reuse treated stormwater during the dry season when irrigation demands are highest. A multi-stage treatment stormwater system is proposed which includes four stages of treatment: a rotary screen, a first stage disc filter, a second stage disc filter and a UV disinfection system. FCE recommends that pilot testing of stormwater treatment technologies should be completed prior to developing final engineering design plans and implementing the project. A wet-weather equalization basin at the site would provide additional reduction in peak runoff while metering flows into the treatment facility.

The retired Pacific Grove Wastewater Treatment Plant site is ideally suited as the stormwater treatment plant location. The existing site is cleared and graded with non-native plants and no sensitive natural habitat. The existing structures on the site include two tanks that have the potential to be re-used for water storage as part of this project. Collecting and treating stormwater at this site is more efficient and less environmentally disruptive than constructing distributed treatment facilities along the Pacific Grove coastline to collect runoff from the numerous outfalls that currently discharge to the ASBS.[1]

Sub-Project 5. Upgrading the stormwater drainage system along the Ocean View Boulevard right-of-way from Forest Avenue east to David Avenue to increase the diversion of wet weather flows to the MRWPCA Regional Wastewater Treatment Plant in Marina

This project would capture runoff from approximately 23% of the total 950 acre ASBS drainage area and convey it to the MRWPCA Regional Wastewater Treatment Plant in Marina through upgrades to Pacific Grove's existing dry weather urban diversion system. On average, approximately 150 acre-feet per year of urban runoff would be delivered to the MRWPCA as a potential supply to its recycled water project or the proposed groundwater replenishment project. Additionally, connections between the stormwater collection system and the MRWPCA are proposed at the existing MRWPCA Coral Street pump station.

Analysis conducted to support development of the proposed project included 15% Concept Design Plans, a David Avenue Reservoir Alternatives Screening Analysis, a review of Geotechnical Findings at David Avenue Reservoir, a Geotechnical Investigation Report, 40% Preliminary Design Plans, and an Environmental Impact Report. A hydrology analysis was also performed to appropriately size the new conveyance and treatment system to manage runoff resulting from the design storm (the 85th percentile annual rainfall event).

E.S.3 Preliminary Project Cost Estimates

FCE has prepared preliminary costs estimates for capital construction costs, engineering and construction management, administrative and legal fees and other related costs. FCE has also

[1] Twenty three outfalls over 12-inches in diameter were identified along the coastline that currently discharge into the Pacific Grove ASBS.

estimated the annual operation and maintenance costs for each subproject. The following sections present a summary of the capital and operational costs estimated for this project.

Capital Cost. Preliminary engineering capital cost estimates for the proposed improvements include material and labor costs, contingency (15%), project complexity factor (15%), engineering design (13%), construction management (8%), administrative and legal fees (2.5%) and inflation factor (4%). Please note that the capital costs summarized in Table ES-1 are preliminary and in some instances additional information and project analysis will be required to finalize and refine estimates.

Table ES-1. Project Cost Estimate Summary by Sub-Project

Project Description	Total Estimated Capital Cost	Annual Debt Payment on Capital (i = 3%, n = 20)
Sub-Project 1: David Avenue Reservoir	$3,575,939	$240,359
Sub-Project 2: Pine Avenue Stormwater System Improvements	$2,383,475	$160,207
Sub-Project 3: Ocean View Boulevard Conveyance	$6,813,338	$457,963
Sub-Project 4: Point Pinos Stormwater Treatment Facility	$4,973,686	$334,310
Sub-Project 5: Urban Diversion System Improvements	$3,997,157	$268,672
Total	$21,743,595	$1,461,511

Operation and Maintenance (O&M) Costs. O&M costs generally include the cost of labor, materials and energy for equipment, structural and landscape components. Annual operation costs would depend greatly upon the Cities' policies, specifically related to labor and maintenance schedules. At this stage in project development the O&M costs are assumed to be 3% of the preliminary capital cost estimate as shown in Table ES-2. Also shown in Table ES-2 is the average annual O&M over the 20-year loan period calculated as the average of 20-years of O&M costs increased annually by 1.5% inflation.

Table ES-2. Summary of Estimated O&M Cost for Each Sub-Project

Project Description	Total Estimated Capital Cost	O&M Cost (3% of Capital Cost)	Average Annual O&M[1]
Sub-Project 1: David Avenue Reservoir	$3,575,939	$107,000	$ 123,700
Sub-Project 2: Pine Avenue Stormwater System Improvements	$2,383,475	$72,000	$ 83,200
Sub-Project 3: Ocean View Boulevard Conveyance	$6,813,338	$204,000	$ 235,900
Sub-Project 4: Point Pinos Stormwater Treatment Facility	$4,973,686	$149,000	$ 172,300
Sub-Project 5: Urban Diversion System Improvements	$3,997,157	$120,000	$ 138,700
Total	$21,743,595	$652,000	$753,800

1. Average Annual O&M Cost is the average of the O&M cost adjusted annually for inflation over the 20 year period.

E.S.4 Cost Benefit Analysis

A cost benefit analysis was conducted to evaluate and compare stormwater management options. For this analysis, and for consistency with previous project evaluations in the Pacific Grove ASBS region, Total Suspended Sediment (TSS) was selected as a representative constituent to conduct pollutant load reductions. Table ES-3 presents the Cost Effective Ratio of the proposed project with an estimated cost of $4.81 per pound of TSS removed. After the initial Central Coast ASBS Regional Monitoring Program has been completed and additional pollutant load data is available, this analysis should be further developed as part of the final PG ASBS Compliance Plan, due to the SWRCB in 2018.

Table ES-3. Estimated CER for the proposed project based on pounds of TSS prevented from discharge into the Monterey Bay

Cost Effective Ratio (CER)		
TSS Load	lbs/yr	360,500
	lbs/ac-yr	370
Proposed Project		
Pollutant Removal Efficiency for 85th Percentile Storm Event[1]		93%
Pollutant Removal	lbs/yr	335,300
Life Cycle Cost (LCC)	$	$32,276,476
Equivalent Annual PW (LCC/n)	$/yr	$1,613,824
Cost Effective Ratio (CER)	**$/lbs of TSS Removed**	**$ 4.81**

1. As reported from MACTEC, 2006 as "Average Annual Capture" (i.e. the amount of annual runoff captured and treated) estimated using STORM modeling as a combined efficiency for similations of dry and wet weather storm management for systems designed to manage the 85% storm event.

The two project options identified in the MACTEC (2006) analysis that are most similar to the proposed project were Pacific Grove ASBS Options 3 and 9. Option 3 proposed treatment of wet and dry weather flows up to the 85% storm event at the Point Pinos Treatment site. Option 9 proposed delivery and treatment of all wet and dry weather flows up to the 85% storm event to the MRWPCA. The proposed project CER of $4.81/lb of TSS Removed is less than Option 9 ($4.97/lb TSS) and more than Option 3 ($1.43/lb TSS). It should be noted that neither Option 3 or 9 included rehabilitation of the David Avenue Reservoir. Option 3 also provided for a wet pond with impermeable liner, whereas, the proposed project includes a stormwater treatment facility designed to meet the 90% reduction requirements. It is unlikely that a wet pond would meet these requirements without additional treatment.

E.S.5 Market Value Comparison

The primary objective of the proposed project is to manage and treat stormwater discharges into the Pacific Grove ASBS. As a secondary benefit, the proposed project provides the opportunity to reuse collected stormwater for irrigation. Specifically, the proposed project would install three storage facilities located in the vicinity of where irrigation is currently occurring with potable water from Cal-Am; at the Robert Down Elementary School, Caledonia Park and Pacific Grove Golf Links. Potential reuse demands at these locations for recycled water or stormwater have been identified in two previous studies. In the vicinity of the Pacific Grove Golf Links, individual demands were identified for the El Carmelo Cemetery and for filling maintenance trucks.

The proposed Pacific Grove ASBS Stormwater Management project has also been designed so that water stored in the various reservoirs can be reused to meet local irrigation demands. It is anticipated that with additional releases from the rehabilitated David Avenue Reservoir, stormwater could be managed to meet 5 acre-feet per year (AFY) of irrigation demand at the Robert Down Elementary School, 1 AFY of irrigation demand at Caledonia Park and approximately 6.3 AFY of irrigation demand at Point Pinos (either at the Golf Links, El Carmelo Cemetery or truck filling), for a total of 12.3 AFY. Assuming an annual cost of treatment of $18,900, the cost to use stored stormwater for irrigation at these locations would cost approximately $1,500/AF.

E.S.6 Project Implementation

Project Phasing. It is unlikely that each of the five sub-projects would be constructed at the same time. The following is one potential approach to sequencing the construction:

1. Restore the David Ave Reservoir;
2. Install the Robert Down Elementary School Storage and CDS Unit
    a. Treatment system for stormwater reuse to meet irrigation demand
3. Install the Caledonia Storage and CDS Unit
    a. Treatment system for stormwater reuse to meet irrigation demand
4. Upgrade the MRWPCA Urban Diversion Improvements
5. Install the Ocean View conveyance and pump stations (three stations);
6. Install the Pine Avenue conveyance system; and
7. Install the Point Pinos Stormwater Treatment Facility

This implementation sequence maximizes the use of each facility without depending on the completion of a subsequent sub-project allowing for the immediate use of each facility once it has been constructed. Importantly, the conveyance along Pine Avenue and Ocean View Boulevard should be closely coordinated; Ocean View conveyance would need to be installed to adequately convey the additional flows delivered from Pine Avenue.

Institutional Agreements. The construction and continued O&M of the proposed project would depend upon agency coordination and institutional agreements between numerous entities. The following list describes institutional agreements likely required for the project.

City of Monterey and City of Pacific Grove – This project is a partnership between both Cities and numerous elements will need to be coordinated and agreed upon, including the following:

- Implementation
    - The project would provide a coordinated approach for the Cities to each achieve ASBS compliance, therefore proportional responsibility would need to be assigned as it pertains to each city's share of the project costs, including both capital and long term O&M.
    - Due to the range of benefits this project would accomplish if implemented, it is expected to be competitive for grant and other funding opportunities. The Cities will need to coordinate joint pursuit of funding opportunities, in terms of application preparation and management of funds received.
    - Similarly, the Cities will need to agree upon how permitting will be coordinated and led.

- Facility Management
    - The Cities would need to agree upon the coordinated management of the new stormwater treatment facility and the MRWPCA diversion system, which would receive flows from northeastern Pacific Grove and New Monterey.
    - If a facility transfer or sharing agreement is reached with CalAm for the use of the David Avenue site, the Cities will potentially need to agree upon joint ownership and/or management of the property and reservoir.
    - Additionally, if agreed upon, the Cities would need to coordinate the release of water from David Avenue Reservoir to meet irrigation demands and agreed upon locations in Pacific Grove and/or Monterey.

CalAm – CalAm is the current owner and operator of the David Avenue Reservoir site which includes one of their critical distribution facilities, the Eardley Pump Station. CalAm has expressed interest and support of the proposed project and is a necessary partner for successful rehabilitation of the David Avenue Reservoir. In the near term, CalAm will need to be a project permitting partner specifically as it relates to approval and coordination of the proposed reservoir design review with the Division of Safety of Dams (DSOD). With support from CalAm, the City of Monterey, either independently or jointly with the City of Pacific Grove, could coordinate an agreement for transferring the Reservoir to the City for rehabilitation and a return to service for stormwater management. The current use of the site as a maintenance and operations yard would likely require modifications or potentially need to be relocated depending upon the agreed upon final use of the property.

Pacific Grove Unified School District (PGUSD) – The proposed location for storage of stormwater between David Avenue and Pine Avenue is on PGUSD property, specifically the playing fields behind Robert Down Elementary School, near Junipero Avenue. The proposed storage location would need to be negotiated with PGUSD and could provide PGUSD with an irrigation supply source, offsetting the existing 5 AFY potable water demand at potential cost savings to the PGUSD.

MRWPCA – The proposed project would increase deliveries of wet weather flows to the MRWPCA in addition to the existing dry weather diversion system. The additional capacity of the MRWPCA system to receive and treat these flows would need to be confirmed and the cost of any additional improvements negotiated (e.g. capacity fees) if the MRWPCA would use them as a source of supply for recycled water demands.

MPWMD - With the MPWMD/MRWPCA's planned Groundwater Replenishment Project (GRP) it is also in the Cities' interest to clearly define with the MPWMD the amount of stormwater conveyed into the MRWPCA system for treatment in Marina, storage in the Seaside Groundwater Basin, and reuse in the CalAm potable water system. There is the potential that some of the stormwater conveyed to the MRWPCA, treated in Marina, and delivered to the GRP could become a part of each Cities' water supply portfolio or become new water allocation to the Cities. For this to occur, MPWMD must conduct further environmental review to establish new water allocations or credits.

E.S.7 Next Steps

Master Planning and Technical Studies. There are a three additional investigations, or special studies, that if completed could expedite project implementation. The proposed investigations are specifically related to continued use of the David Avenue Site, improvements on Pine Avenue and stormwater treatment and reuse. The recommended scope of each of these studies is described in more detail below.

David Avenue Reservoir Master Plan – In addition to the institutional agreement required for successful transfer of the Reservoir site (described in Section 6), the proposed rehabilitation of the Reservoir would benefit from a shared vision for how the site can balance competing community, water utility and stormwater management needs. The proposed Master Plan would incorporate representatives from each of these sectors and recommend a strategy for ownership, site use and landscape amenities to the site.

Pine Avenue Master Plan – The conveyance pipeline along Pine Avenue was strategically located to coincide with future improvements on Pine Avenue; a Safe Routes to Schools project and Green Street Low Impact Development (LID) retrofit. The Green Street improvements can be connected to the proposed stormwater conveyance pipeline on Pine Avenue, and would provide additional stormwater water quality benefits for the ASBS. A Pine Avenue Master Plan would provide a cohesive plan for how these three projects can not only be strategically phased but physically interwoven to maximize their individual impacts.

Stormwater Treatment and Reuse Pilot Study – There is currently very little available data documenting the successful treatment and reuse of stormwater. A pilot study treating stormwater runoff from the ASBS watershed could benefit the project by testing stormwater treatment

technologies and removal efficiencies. Such a study would not only benefit the ASBS, but other local utilities considering similar water supply projects.

Geotechnical Investigations and Surveying. Additional geotechnical studies and surveying work will need to be conducted in all project areas to support the final design and permitting for the projects. A comprehensive geotechnical investigation of the existing David Avenue Reservoir dam site would be needed to support the final designs and permitting of the project with the State Division of Safety of Dams.

Engineering Design and Permitting. The current preliminary engineering design is at the approximate 40% completion level. Subsequent design plans and construction documents will need to be completed to implement any or all of the projects.

Funding Strategy. Along with developing institutional agreements, identifying a funding strategy for the proposed project should be a near term objective for each of the Cities. The funding strategy should be for the proposed project as a whole and for each of the sub-projects because it is unlikely all the sub-projects would be implemented simultaneously. A successful funding strategy would consider local, state and federal sources and if implemented would greatly enhance each of the Cities' mandates of successfully managing stormwater runoff in the ASBS watershed.

E.S.8 Project Funding

This project is well suited to qualify for a variety of grant funding opportunities. Three potential opportunities are the (1) Integrated Regional Water Management (IRWM) grant program, (2) funding through Proposition 84 and (3) directly through the Ocean Protection Council (OPC). The OPC generally does not have an open solicitation process, but can be approached directly with funding requests. They have funds available for low impact development (LID) projects and have ASBS related strategic goals. Where match funds are required to receive grant awards, the Cities could potentially apply monitoring efforts and/or property contributions (e.g. at David Avenue Reservoir).

Table ES-4 outlines available programs for stormwater related projects remaining in Proposition 84 and Proposition 1E as well as Clean Water Act funding, including 319(h) and the State Revolving Loan Fund. A new water bond may be put on the ballot in 2014 and may provide future funding opportunities for the project as a whole or the various sub-projects. Stormwater is supported in all of the existing water bonds with sufficient funding for the costs associated with the ASBS Stormwater Management Project.

Additionally drought emergency legislation currently in effect will expedite an approximate $200 million dollar portion of the Proposition 84 IRWMP funds for a grant round in early spring 2014. These funds will be especially focused on multi-benefit water supply projects as focused by the drought emergency.

Table ES-4. Funding Programs for Stormwater Related Projects

Program	Agency	Website
Clean Beaches Initiative – Proposition 84	State Water Resources Control Board	http://www.waterboards.ca.gov/water_issues/programs/grants_loans/
Stormwater Program – Proposition 84	State Water Resources Control Board	http://www.waterboards.ca.gov/water_issues/programs/grants_loans/
Stormwater Flood Management – Proposition 1E	Department of Water Resources	http://www.water.ca.gov/irwm/grants/stormwaterflood.cfm
Integrated Regional Water Management Program – Proposition 84	Department of Water Resources	http://www.water.ca.gov/irwm/grants/index.cfm
Ocean Protection Council – Proposition 84	State Coastal Conservancy	http://www.opc.ca.gov/category/funding-opportunities/
Clean Water Act 319 h Grant Program	State Water Resources Control Board	http://www.waterboards.ca.gov/water_issues/programs/grants_loans/
State Revolving Loan Fund	State Water Resources Control Board	http://www.waterboards.ca.gov/water_issues/programs/grants_loans/

1. INTRODUCTION

1.1 Background

The primary goal of the Pacific Grove ASBS stormwater management project (project) is to improve stormwater quality discharged into the Area of Special Biological Significance (ASBS) located along the Pacific Grove coastline, as identified in Figure 1. The California Ocean Plan and the Marine Managed Areas Improvement Act convey special protections to ASBS areas in California. The Special Protections prohibit waste discharges into ASBS areas, and allow stormwater discharges under a General Exception adopted by the State Water Resources Control Board (SWRCB) if stormwater discharges are controlled to protect "natural water quality".

A multi-year water quality monitoring effort in the Central Coast region, beginning in winter 2013, has been undertaken to assess if stormwater discharges to the Pacific Grove ASBS are degrading natural water quality. If monitoring finds the Pacific Grove ASBS natural water quality is impacted, the proposed project could be implemented as a structural control to improve the quality of stormwater discharged to the Pacific Grove ASBS.

To protect natural water quality, the proposed project would divert both wet weather and dry weather flows from both Pacific Grove and New Monterey watershed areas into an upgraded stormwater collection and treatment system. As proposed, flows would be directed either to a new stormwater treatment facility adjacent to Pacific Grove Golf Links at the retired Point Pinos Wastewater Treatment Plant site and/or to the Monterey Regional Water Pollution Control Agency (MRWPCA) regional wastewater treatment plant in Marina. The objective of the project is to achieve up to a 90% reduction in pollutant loading during storm events to comply with the ASBS Special Protections. Data collected throughout the upcoming water quality monitoring effort is expected to inform pollution removal targets and associated stormwater treatment facility design.

1.2 Project Goals

If upcoming water quality monitoring results identify impacts to natural water quality in the Pacific Grove ASBS, anticipated in 2015, the cities would pursue the proposed project. The primary goal of the project is to improve stormwater quality discharged into the Pacific Grove ASBS. In addition, key objectives of the project are:

1. *To meet the ASBS Special Protection requirements to implement structural BMPs to achieve up to a 90 percent reduction in pollutant loading during storm events, if the wet weather discharges are impacting natural water quality to comply with the ASBS water quality standards set by the SWRCB;*
2. *To conserve potable water by developing dry and wet weather storm system flows as a source of non-potable water for irrigation to feasible non-potable water demands;*
3. *To restore the David Avenue Reservoir to a year-round continuous reservoir;*
4. *To install necessary stormwater infrastructure and structural BMPs to comply with the Special Protections and NPDES permit requirements, including: expansion of dry weather diversions, new storm drain pipelines, stormwater treatment units,*

equalization basins, and lift stations, so that runoff can be managed in an effective manner to protect water quality, and to allow the reuse of runoff either locally from David Avenue Reservoir, the proposed equalization systems, the planned Point Pinos Stormwater Treatment System and/or at MRWPCA future groundwater replenishment project;

5. *To expand the existing dry weather diversion system to collect runoff west of Lovers Point for discharge to the Point Pinos Stormwater Treatment Facility and/or to the MRWPA system for reuse in the Castroville Seawater Intrusion Project or the proposed groundwater replenishment project in Seaside.*
6. *To construct improvements in such a way as to allow the future addition of stormwater BMPs into the system to further enhance water quality and local reuse activities;*
7. *To reduce regulatory uncertainty by addressing the requirements of the ASBS Special Protections that may impact the cities of Monterey and/or Pacific Grove;*
8. *To construct a project that is technically feasible and financially realistic to fund through each of the City's capital improvement programs;*
9. *To construct a project that does not exceed MRWPCA Regional Wastewater Treatment Plant capacity; and*
10. *To construct a project that can be eligible for multiple funding opportunities.*

1.3 Study Objective and Approach

The following is a summary of work performed to support completion of the 40% Engineering Design Plans and Report.

Project Alternatives Screening Analysis. A screening analysis of project alternatives to manage stormwater flows into the Pacific Grove ASBS was completed by FCE in May 2013 and is included in Attachment A. The purpose of the screening analysis was to evaluate potential stormwater management projects within the Cities of Monterey and Pacific Grove, and to identify a preferred and alternate project capable of meeting the State Water Resources Control Board (SWRCB) ASBS requirements. The screening analysis compared six project alternatives based on 16 screening criteria and identified a preferred project. During this initial screening assessment work the preferred project would treat both dry and wet-weather flows from Pacific Grove and New Monterey at a new stormwater treatment facility located at the retired Pacific Grove Wastewater Treatment Plant at Point Pinos. The alternate project would treat both dry and wet-weather flows from Pacific Grove and New Monterey at the Monterey Regional Water Pollution Control Agency (MRWPCA), Regional Water Treatment Plant in Marina. Both proposed projects would utilize David Avenue reservoir for storage and flow equalization. The reservoir is currently owned and operated by the California American Water Company (CalAm).

As FCE further developed the preferred and alternate project concepts a hybrid project between the two was identified, considered to be environmentally superior, and more cost effective to either project individually. The hybrid project, as presented in this engineering report and accompanying plans, maximizes the use of existing infrastructure and planned projects within the Cities of Monterey and Pacific Grove. Among the benefits of the preferred and alternate project is the:

- **Expanded use of the City of Pacific Grove's existing urban runoff dry-weather diversion system,** which currently collects dry weather flows for delivery to the MRWPCA. The proposed hybrid project would upsize a portion of the existing dry weather diversion system to provide capacity for the current system to convey runoff up to the 85 percentile storm event. The system was expanded in 2013 to add approximately 66 acres of the watershed area in the Pacific Grove retreat and first addition neighborhood of Pacific Grove to the Monterey border. Maximizing the use of this infrastructure allows the City of Pacific Grove to effectively meet the ASBS requirements with minor costs incurred to upgrade the existing infrastructure.

- **Continued and increased conveyance and delivery of urban runoff to the MRWPCA**. As the Monterey Peninsula continues to develop water supply options, augmenting MRWPCA's capacity to produce additional recycled by supplying them with both dry weather and additional wet weather flows is beneficial to maintain reliable and abundant source or recycled water for both agricultural users and for groundwater replenishment.

- **Construction of a "backbone" stormwater conveyance pipeline along Pine Avenue in Pacific Grove**. Reconfiguring the existing collection system so that a portion of flows can be redirected to a Point Pinos stormwater facility along Pine Avenue achieves multiple objectives. It allows the City the flexibility to either direct runoff to Point Pinos stormwater facility or to the MRWPCA system.

- **Production of treated stormwater at a retrofitted Pacific Grove Water Treatment Plant (PGWTP).** The City of Pacific Grove's Golf Links and El Carmelo Cemetery is one of the City's best opportunity sites for re-using treated stormwater for irrigation, and by locating the stormwater treatment facility at the PGWTP, treated stormwater could connect directly to the golf course irrigation system and supplement non-potable supplies that are planned from the Pacific Grove Local Water Project. This potentially gives the City of Pacific Grove the ability to develop a local water supply and off-set some of the expensive potable water demand. Additionally, the PGWTP site is well situated for retrofit to include stormwater treatment facilities.

The hybrid project provides the Cities with a cost effective and environmentally superior project that incorporates elements from both the "local" preferred project alternative and the alternate or "regional" project alternative. The remainder of the engineering report provides additional details for the stormwater management and treatment improvements in the Pacific Grove ASBS watershed following this hybrid management approach.

15% Concept Plans. FCE prepared concept plans to portray the hybrid project supported by the project screening alternatives analysis. The Cities and Consultant Team reviewed and provided comments on the 15% plans, and revisions and additional details were incorporated into a 40% design plan set.

David Avenue Reservoir Alternatives Screening Analysis. The 15% Concept Plans identified four design options to restore service to the David Avenue Reservoir. To assist with selection of a preferred alternative, the Consultant Team led by Rincon Consultants,

prepared a memorandum comparing the environmental opportunities and constraints of each alternative. The memo is included as Attachment B of this report.

The memo considered the primary environmental categories required by the California Environmental Quality Act (CEQA) and found Alternative 3, which calls for lining the interior of the Reservoir and installing a leak detection system, to be the environmentally superior alternative. As compared to the other alternatives it requires less earthwork and soil disturbance, which by extension minimizes impacts to air quality, biological resources, cultural resources, greenhouse gas emissions, noise and traffic.

Geotechnical Findings at David Avenue Reservoir. To support the continued evaluation of improvements at David Avenue Reservoir, the Consultant Team led by Pacific Geotechnical Engineering, prepared a letter report summarizing geotechnical findings and next steps at the site. The letter report is included as Attachment C of this report. The letter summarizes what information is available about the existing dam, compares the four alternatives identified in the 15% Concept Design and recommends a series of geotechnical studies be undertaken as the project moves toward implementation.

Geotechnical Investigation. The Consultant Team, led by Pacific Geotechnical Engineering, prepared a Geotechnical Investigation Report (Attachment D) documenting findings from a review of local geology, liquefaction potential and tsunami hazards along with results from a series of exploratory drill holes taken from within the proposed project vicinity. Results from the investigation were incorporated into the 40% project design and planning for the Pacific Grove Local Water Project, a recycled water project currently under development by the City of Pacific Grove with assistance from Brezack and Associates Planning, which is also proposed for construction at Point Pinos.

Environmental Impact Report (EIR). The Consultant Team, led by Rincon Consultants, prepared a draft and final EIR according to state CEQA guidelines to review the potential environmental impacts from the proposed project as described in the 40% design plans. A draft EIR was made available for public comment until March 3, 2014.

1.4 Project Description

The project includes the diversion of both dry weather and portions of wet weather surface water runoff flows into an upgraded stormwater collection and treatment system from the ASBS watershed. For the purposes of this project, the ASBS drainage area was subdivided into four smaller water management areas as shown in Figure 2. A different management approach would be applied to each area, and flows from each would be directed to either a new Point Pinos stormwater treatment plant at the retired PGWTP site or to the MRWPCA Regional Wastewater Treatment Plant in the City of Marina, as follows:

- ***Area 1*** *includes the New Monterey drainage. Runoff from this area would be directed to a restored David Avenue Reservoir and ultimately to a new Point Pinos stormwater treatment plant located at the retired PGWTP.*

- ***Area 2*** *is north of David Avenue and southwest of Pine Avenue. Runoff from this area would drain to Pine Avenue for conveyance northwest towards the new Point Pinos stormwater treatment plant.*

- ***Area 3*** *includes a portion of Pacific Grove that is outside and northwest of the existing dry weather diversion system. Runoff from this area would be conveyed to the new Point Pinos Stormwater Treatment Facility at the retired PGWTP.*

- ***Area 4*** *includes the lower Pacific Grove drainage area below Pine Avenue. Runoff from this area drains to an existing urban diversion system, which directs dry-weather flows to the MRWPCA. The existing system would be upgraded to convey dry and wet weather flows to the MRWPA Regional Wastewater Treatment Plant for treatment and reuse.*

2. STORMWATER MANAGEMENT IMPROVEMENTS

The ASBS stormwater management project is comprised of five associated sub-projects located primarily in the City of Pacific Grove, with a portion of two projects located in the City of Monterey. The five projects include:

1) *Upgrading and restoring the former David Avenue Reservoir, adjacent to the intersection of David Avenue, Terry Street, and Carmel Avenue;*
2) *Modifying the Pine Avenue drainage system between 7th Street and 18th Street;*
3) *Modifying the Ocean View Boulevard drainage system from Forest Avenue west to the retired Pacific Grove Wastewater Treatment Plant at the Point Pinos;*
4) *Installing a new stormwater treatment system at the retired Pacific Grove Wastewater Treatment Plant site, located on the Pacific Grove Golf Links; and*
5) *Upgrading the stormwater drainage system along the Ocean View Boulevard right-of-way from Forest Avenue east to David Avenue to increase the diversion of wet weather flows to the Regional Wastewater Treatment Plant in Marina.*

Figure 3 presents a schematic plan of the overall improvements.

2.1 David Avenue Reservoir Improvements

This project would improve the former David Avenue Reservoir (reservoir) so that it could be used to capture runoff from the portion of the ASBS watershed within the City of Monterey and release it into the existing City of Pacific Grove storm drain system for conveyance downhill (northward) to Pine Avenue and then eventually to either the urban runoff diversion system or to the stormwater treatment system at Point Pinos.

The original dam for the reservoir was built in 1882, and an expansion to the downstream (north) side of the dam was added in 1920. According to a *Seismic Safety and Hydrologic Investigation* for the reservoir (Converse Consultants Northern California, March 1989), the existing dam is 750 feet long, 30 feet high, has a crest elevation of 240 feet and a crest width of 60 feet. The reservoir historically retained 87 acre feet (AF) of water with a surface water elevation of 235 feet. In 1989, the reservoir ceased operation as a component of the California American Water Company (CalAm) potable water system, and was drained in 1998. In January 2003, the Division of Safety and Dams designated the dam as inoperative and cannot be returned to service in its existing condition. The site is still owned by CalAm, and is currently used as a maintenance, operations, and materials storage area. The site is restricted with a gated entry. Vegetation has grown inside the previously inundated areas of the reservoir since the time the reservoir ceased operating as a water storage facility, and a small portion of the original reservoir bottom has filled with water and is a small non-jurisdictional wetland.

The dam is an old earthen embankment and to restore the dam would require major modifications and improvements. FCE, with Pacific Geotechnical, conducted an initial technical review of the dam and alternative improvements that would be required to use the dam for water storage. The analysis considered several options for restoration,

including full replacement of the earth embankment, installing a dual liner system and other potential options. The preferred project selected would involve installing a forebay and new dual liner system into the existing reservoir basin. To accommodate the liner system some grading within the reservoir would be required, as discussed below. A technical and environmental review of these options is presented in Attachments B and C.

The project would restore the use of this facility for stormwater equalization and storage purposes on the 10.25 acre site. The reservoir improvement project would encompass the entire reservoir area of approximately six acres with an additional approximate 0.8 acres for vegetation removal. The project would include grading, trenching, installing a new CDS system, installing new headworks (inlet and outlet structures) and new underdrain and dual liner system with a leak detection monitoring system. The majority of the construction would be on the David Avenue Reservoir site itself, with some trenching in Carmel Avenue/Terry Street, west of the reservoir. Improvements, which are depicted on Sheet 2.0 of the 40% Plan set, would include:

- *A new inlet connection to the Monterey storm drain collection system;*
- *Excavation of a new forebay, an inlet structure and related improvements within the reservoir impoundment;*
- *Installation of a multi-layer geomembrane liner and sub-drain system within the interior of the former Reservoir to enable water storage behind the existing dam; and*
- *A new outlet connection to the Pacific Grove storm drain collection system.*

<u>Inlet Connection.</u>

A new stormwater manhole/diversion box on Carmel Avenue would be installed to direct stormwater into the reservoir. The newly retrofitted manhole/diversion box would include a weir and gate system that would allow a variable quantity of stormwater to be directed to the reservoir. The gate would also allow the diversion to be closed completely, not allowing any stormwater into David Ave Reservoir.

The target flow is the 85th percentile stormwater runoff event from an approximately 87.3 acre drainage area in New Monterey, south (uphill) of the reservoir. Runoff above the 85th percentile event would bypass the reservoir and continue downstream within the existing City of Pacific Grove stormwater collection system as it currently does. A new pipe would be trenched from the new manhole at the David Avenue and Terry Street/Carmel Avenue intersection to a new Continuous Deflection Separation (CDS) unit located in the existing paved parking area. The CDS system would be installed to remove gross pollutants such as trash, vegetation debris, coarse solids, oil, and grease before runoff enters the reservoir. Stormwater exiting the CDS unit would be conveyed in a new 30" diameter pipe to the reservoir inlet.

<u>Reservoir Improvements</u>

Within the reservoir impoundment area, uncompacted fill in the northwest section would be excavated. This fill material is debris and rubble from a nearby construction project and was placed in its current location circa 2007. The content of the fill and its method of placement are unknown and the material would therefore need to be removed and screened. Fill material that is suitable for use in the reconstruction of the reservoir, based

on geotechnical observations during excavation, would be stockpiled on-site and covered, in the northwestern and southwestern portions of the sight until it is ready to be used. The remaining debris (determined to be unsuitable as fill) would be off-hauled to the Monterey Regional Waste Management District landfill in Marina.

A new forebay would be constructed in the southeast portion of the existing reservoir (refer to Sheet 2.0 of the 40% Design Plans). The function of the forebay would be to slow the speed of water entering the facility, dissipate the energy, and allow sediment to fall out of suspension within the forebay. The forebay would be vegetated with emergent vegetation to improve the removal of sediment in the runoff. The forebay would periodically be excavated and cleared to facilitate continued sediment deposition.

The interior slopes of the existing earthen embankments and new forebay would be filled and reshaped to a side slope of 2.5 horizontal to 1 vertical. All grading would occur on the interior slopes of the earthen embankments. The new slopes would be keyed into stable material, placed in lifts, and compacted to the desired compaction standards to be determined by the project geotechnical engineer. The bottom of the reservoir would be graded (both cut/fill) to create a smooth surface at an elevation of 220' above mean sea level (MSL). Two new planting benches would be formed within the existing reservoir footprint, one in the northwest corner and the other in the southern slope. These benches would add complexity and a natural aesthetic to the pond and allow for the planting of emergent vegetation. A new15% slope access ramp would also be constructed on the north slope of the reservoir to allow vehicles to drive to the bottom of the reservoir for periodic maintenance. Additionally, a new access road would be constructed around the southern half of the reservoir to allow for maintenance vehicles to have complete access to the reservoir.

The entire reservoir and forebay would be covered with a double layer of geosynthetic liner material with a leak detection system. The double layer geosynthetic liner is designed to prevent water impounded in the reservoir from infiltrating into the earthen embankment and soils underlying the site. The geosynthetic liner system would be covered with soil backfill. The height of the existing earthen embankments would remain at 20 feet and the overall shape of the restored reservoir would remain as in its historic footprint.

A piped underdrain collection system would be installed to collect groundwater seepage from below the liner and convey it to the existing Pacific Grove storm drain system on Hillcrest Avenue. A drain pipe would be installed above the liner to drain the reservoir in the event of emergency or for maintenance and would connect to the Hillcrest Avenue storm drain. The single new connection to the storm drain on Hillcrest Avenue would convey water via gravity from above the liner (for draining stored water) and below the liner (groundwater collection) and be installed using directional boring methods.

Stormwater runoff would enter the reservoir through a new inlet structure located in the Forebay. The inlet structure would consist of a concrete head and wing wall structure. Stormwater would flow via gravity from the Forebay to the main reservoir impoundment through a new concrete lined channel spillway. The new spillway would convey pre-treated stormwater into the reservoir in the southeast portion of the impoundment. Stormwater would remain impounded in the reservoir until the water surface levels reach the invert elevation of the outlets.

An existing concrete outlet structure located in the eastern portion of the site would remain in place for reuse if a final structural engineering analysis determines that it is sound condition. If the existing structure is determined to be in poor condition, a new outlet structure would be constructed in the same location. The existing outlet pipe (12 inch diameter) would be replaced with a new 36-inch diameter outlet pipe to allow for the conveyance of large storm events up to the 85% event. A secondary overflow pipe would be added to accommodate excess flow and/or in the event the primary outlet is not functioning or undergoing maintenance, the secondary outlet would be used as the primary outlet. Trash racks would be installed on the inlet or upstream end of each of the of the outlet pipes. Reservoir outflow would be conveyed to a new manhole located on Carmel Avenue near the entrance driveway to the site. Stormwater would then be conveyed within the existing City of Pacific Grove storm drain collection system north towards Pine Avenue.

The reservoir could be drained through a new 12" diameter drain that would be installed by horizontal drilling through the earthen embankment. This drain would provide for lowering the reservoir water level as may be required in case of emergency, for inspection and maintenance, and/or for releasing water in anticipation of storm events or to meet downstream demands.

2.1.1 Design Alternatives

<u>Water Storage Capacity.</u>

After construction, the newly restored reservoir would have an estimated water storage capacity of 49.15 acre-feet (AF), which includes storage provided by the new forebay.

2.1.2 Engineering Elements

Engineering elements proposed for David Avenue Reservoir include:

- Installing a stormwater diversion facility to redirect a portion of runoff to the Reservoir:
    - Diversion and Bypass Structure
    - CDS Unit
    - Inlet Piping (335 LF) and Manholes

- Reservoir Structure:
    - Grading and a new retaining wall (approximately 950 LF)
    - Reservoir Forebay
        - Inlet Structure
        - Spillway
        - Overflow
        - Energy Dissipater
    - Reservoir Liner
    - Access Road
    - Reservoir Drain (200 LF)

    - Reservoir Outlet
        - Concrete Sill
        - Outlet Structure and Secondary Spillway
        - Outlet Pipeline (300 LF)

- Leak Detection
    - Leak Detection System
    - Groundwater Collection Dry Well and Piping (approximately 910 LF)
    - Submersible Pump and Controls

- Revegetation

- Road Rehabilitation

2.2 Pine Avenue Conveyance

This sub-project would involve the installation of approximately 2,760 linear feet of new storm drain conveyance pipeline beneath Pine Avenue from 7th Street to 18th Street, as well as installation of a new underground stormwater equalization and storage facility in the vicinity of the Robert Down Elementary School. The underground storage facility would be located beneath the sports fields behind (south of) the school, adjacent to Junipero Avenue between 13th and 15th Streets (refer to Sheet 3.0 of the 40% plan set). This facility would be approximately 6,000 square feet and would have the capacity to store up to 240,000 gallons of stormwater, which could potentially be reused for irrigation of the playfield during the dry season as discussed in Section 5.5. A diversion and bypass system and CDS unit would be installed near 14th Street in Junipero Avenue. The purpose of the diversion and bypass structure would be to divert flows less than or equal to the 85% storm event through the new CDS unit and to the equalization/storage facility. Flows exceeding the 85% flow rate would be diverted around the CDS unit and back into the existing storm drain. The new CDS unit would remove debris, trash and sediment from the water conveyed and collected below the David Avenue Reservoir, prior to water entering the new storage basin.

A new pipeline on Pine Avenue, extending from 7th Street to 19th Street (Pine Avenue Conveyance) would collect runoff from drainage areas uphill (southward) of Pine Avenue, including from the restored David Avenue Reservoir. A new pump station would be installed at the intersection of Pine Avenue and 15th Street, which would deliver water from the new Pine Avenue Conveyance to existing storm drain pipelines northeast down 19th Street. At 15th Street, water would enter a new diversion and bypass structure, where flows less than or equal to the design flow would enter a new CDS unit to remove trash and sediment.[1] Flows exceeding the 85% flow rate would be diverted around the CDS unit and pump station and continue north into the existing storm drain. The new CDS unit would remove debris, trash and sediment from the water conveyed and collected down Pine Avenue, prior to water entering the new pump vault. The Pine Avenue pump station would be a duplex dry pit pump station, including a vertical well extending 15 feet below

[1] Flows exceeding the design flow would bypass the CDS unit and pump station and continue downstream through the existing storm drain which drains to Greenwood Park.

the ground surface, and would have a design flow of 1,155 gpm. From 19th Street runoff would run via gravity through existing storm drains to the intersection of Jewell and Caledonia Avenues.

2.2.1 Design Alternatives

FCE evaluated a potential directional boring extending from 15th Street to 19th Street, as an alternative to the pump station at 15th. The boring would need to connect two existing storm drains over a distance of approximately 1200 feet and given the approximate invert elevations of the existing storm drains a gravity line between 15th and 19th would only have a 0.15% slope. A minimum slope of 0.5% is preferred to efficiently convey collected stormwater via gravity; therefore the directional boring option does not appear feasible at this time.

FCE provided details for two alternative stormwater equalization/storage methods; an underground fiberglass storage tank(s) and a modular storage alternative, as shown on Sheet 3.8 of the 40% design plans. The storage tank alternative from a manufacturer such as Xerxes Corporation is more expensive with an expected life of 30 to 50 years. The modular alternative (Rainstore3) from Invisible Structures, Inc. is lower cost, easier to install and can be easily configured to fit different sites. Rainstore3 quotes a 70 year life expectancy for the structure; although, the impermeable liner has a useful life expectancy of 40 years.[2] As project design continues, these two alternatives can be considered in more detail for each of the two sub-project areas where they are proposed.

FCE also identified an alternative location for the stormwater equalization/storage facility above Pine Avenue. In the event an agreement cannot be reached between the Cities and the Pacific Grove Unified School District to locate stormwater storage beneath the Robert Down Elementary School play fields, the facility could alternatively be located beneath Junipero Avenue, directly southwest of the school play yard. This option is more expensive due to more challenging construction conditions and limited space, potential utility conflicts and additional demolition and resurfacing costs. Within the road right-of-way, it is assumed that shoring would be required during construction as adequate surrounding space is unavailable to lay the trench side slopes back to a safe working angle. Within the school yard, however, space is adequate to lay slopes back and save construction cost for installation.

An additional project design element at Pine Avenue is the incorporation of a satellite stormwater treatment facility at the Robert Down Elementary School. The treatment facility could seasonally draw on stormwater from the underground equalization/storage facility and treated stormwater could then be used to irrigate the school fields. Further analysis of this alternative design element is included in Section 5.5.

2.2.2 Engineering Elements

[2] http://www.invisiblestructures.com/white_papers/RS3LifeExpectancy.pdf

Engineering elements proposed for stormwater conveyance along Pine Avenue are listed below with an accompanying cost estimate in Attachment F. Subsequent design phases will need to field verify the condition, location, and invert elevations of storm drains within the existing system and complete a geotechnical evaluation to identify constraints and opportunities within the proposed project locations.

- Stormwater Storage/Equalization:
  - Approximately 140 lineal feet (LF) of inlet and outlet piping;
  - Diversion and Bypass Structure
  - CDS Unit

- Storage Tank Alternative:
  - 12x 20,000 gallon Fiberglass Tanks
  - Gravel Backfill

- Modular Storage Alternative:
  - Modular Storage Units
  - Impermeable Liner
  - Geogrid Synthetic Liner
  - Imported Fill

- Storage Location In-Road (on Junipero Ave) Alternative
  - Paving Demolition
  - Trench Support
  - Re-paving

- Storage Location School Yard Alternative
  - Clear/Grub
  - Revegetation

- New Storm Drain Conveyance Pipeline:
  - Approximately 2230 LF of gravity pipeline
  - Approximately 520 LF of force main
  - Manholes

- New Pump Station at Pine Avenue and 14th Street:
  - Duplex Dry Pit Pump Station, 1,155 gpm capacity
  - Diversion and Bypass Structure
  - CDS Unit

2.3 Ocean View Boulevard Conveyance

This sub-project would primarily be within the Ocean View Boulevard right-of-way from Forest Avenue west to the retired PGWTP at the Point Pinos Lighthouse Reservation, and would include the following improvements: approximately 1,100 feet of new gravity storm drain conveyance pipeline; approximately 8,000 feet of pipe lining within an existing abandoned sewer force main; an underground storage facility; and three new pump stations. The underground storage facility would be located at the intersection of Caledonia Street and Pacific Avenue, north of a pocket park near the intersection, and

would be approximately 6,400 square feet with a storage capacity of up to 320,000 gallons. Stormwater from the existing storm drains on Caledonia Street and Jewell Street would each enter diversion and bypass structures, which would divert flows less than or equal to the 85% design flow into the storage area.[3] Diverted flow would pass through a proposed CDS unit to remove trash and sediment prior to entering the new underground storage facility. The storage system would serve to delay and reduce peak flows entering the new pump station at Lovers Point and provide a potential source of water for nearby landscape irrigation at the pocket park and golf course.

The three new pump stations along Ocean View Boulevard would be designed to convey stormwater through the retrofitted existing sewer force main to the retired PGWTP site. The new pump stations would be located at the Lovers Point parking lot; in a median separating Ocean View Boulevard and a scenic turnout, north of the intersection of Sea Palm Avenue/Moss Street and Ocean View Boulevard; and near the intersection of Coral Street and Ocean View Boulevard. The features of each pump station are described below.

- The Lovers Point pump station would include a diversion and bypass structure to allow flows exceeding the design capacity to bypass the pump station and discharge through the existing storm drain, a duplex dry pit pump station with horizontal wet well and electrical control vault. This pump station would have a design flow of 2,815 gpm.

- The Sea Palm pump station would receive flow from (1) a new gravity storm drain on Ocean View Boulevard beginning at Clyte Street and extending down to Sea Palm, (2) a storm drain collecting runoff from above Sea Palm, and (3) flow conveyed from the Lovers Point Pump Station west through the existing pipeline. Flow from the Sea Palm storm drain would go through a diversion and bypass structure before joining the gravity pipeline from Clyte Street. The combined flow would pass through a new CDS unit prior to entering the new duplex dry pit pump station with vertical wet well. An associated electrical control vault would be located within the pump station vicinity. This pump station would have a design flow of 3,050 gpm.

- The Coral Street pump station would receive flow from (1) a new gravity line beginning at Coral Street and extending down to an existing MRWPCA pump station and from (2) flow conveyed from the Lovers Point and Sea Palm pump stations west through an existing pipeline. Flow from each of these sources would enter a new duplex dry pit pump station with horizontal wet well. An associated electrical control vault would be located within the pump station vicinity. This pump station would have a design flow of 3,080 gpm.

The Ocean View Conveyance improvements would serve to convey stormwater from the existing storm drain infrastructure at the intersection of Jewell and Pine Avenues to the

[3] Flow volumes exceeding the design capacity would bypass storage and continue into the existing storm drain down to the Lovers Point discharge location.

retired PGWTP site. The Ocean View Boulevard Conveyance improvements are shown in Sheet 3.1 through 3.3.

2.3.1 Design Alternatives

Two alternatives are presented as example stormwater storage facilities; a Xerxes Fiber Glass Tank and a modular storage grid such as the Rainstore3 element. These technologies have different site requirements, expected lifetimes and costs, as describe in Section 2.2.1. At the Caledonia storage location, it is assumed that shoring would be required during construction, as adequate surrounding space is unavailable to lay the trench side slopes back to a safe working angle. In addition, it would likely be very challenging to configure the fiberglass tanks within the available space at the Caledonia intersection and it is expected that the modular storage alternative would be preferable from a cost and constructability perspective at this site.

An additional project design element at the Caledonia stormwater storage location is the incorporation of a satellite stormwater treatment facility. The treatment facility could seasonally draw on stormwater within the underground equalization/storage facility and treated stormwater could then be used to irrigate the school fields. Further analysis of this alternative design element is included in Section 5.5.

2.3.2 Engineering Elements

Engineering elements proposed for stormwater conveyance along Ocean View Boulevard are listed below with an accompanying cost estimate in Attachment F. Subsequent design phases will need to field verify the condition, location, and invert elevations of storm drains within the existing system and complete a geotechnical evaluation to identify constraints and opportunities within the proposed project locations.

- Stormwater Storage/Equalization:
    - Approximately 150 lineal feet (LF) of inlet and outlet piping;
    - Diversion and Bypass Structure
    - CDS Unit

- Storage Tank Alternative:
    - 16x 20,000 gallon Fiberglass Tanks
    - Gravel Backfill

- Modular Storage Alternative:
    - Modular Storage Units
    - Impermeable Liner
    - Geogrid Synthetic Liner
    - Imported Fill

- Storage In-Road Site Work
    - Paving Demolition
    - Trench Support
    - Re-paving

- New Pump Station at Lovers Point:
    - Duplex Dry Pit Pump Station, 2,815 gpm capacity
    - Diversion and Bypass Structure
    - CDS Unit

- New Pump Station at Sea Palm:
    - Duplex Dry Pit Pump Station, 3,080 gpm capacity
    - Diversion and Bypass Structure
    - CDS Unit

- New Pump Station at Coral:
    - Duplex Dry Pit Pump Station, 3,050 gpm capacity
    - Diversion and Bypass Structure

- Storm Drain Conveyance Pipeline:
    - Relining Approximately 7,990 LF of pipeline
    - Approximately 1090 LF of new gravity storm drain
    - Manholes
    - Air Relief Valves

2.4 Point Pinos Stormwater Treatment Facility and Crespi Pond

This sub-project would involve the installation of a stormwater treatment facility at the retired PGWTP. The new treatment facility would be referred to as the Point Pinos Stormwater Treatment Facility. Treated stormwater from the treatment plant would either be discharged to the Monterey Bay through the existing Crespi Pond outfall or be available for reuse as irrigation water. Improvements within the PGWTP site, Crespi Pond, and the outfall are shown in Sheet 4.0 of the 40% Design Plans and described below.

<u>Treatment Train Technology</u>

There is a wide variety of water treatment technology potentially available to treat stormwater. Each manufacturer of pre-engineered treatment systems include proprietary features that are unique to each system, which contribute to varying performance, reliability, costs, size and water quality effluent. The treatment train selected for the 40% design uses multiple treatment technologies combined to treat the stormwater in four treatment phases including a rotary screen, a first stage disc filter, a second stage disc filter and a UV disinfection system.

One of the biggest factors for selection of treatment units is size of the units. The space requirements for the stormwater treatment system had to be considered since it is likely that the Local Water Project will be installed first on the Point Pinos treatment plant site. The following example treatment technologies could work on the site and meet stormwater treatment criteria.

For example, a pre-manufactured rotary screen unit by the Enviro-Care FLO-Drum MBR will cost approximately $190,000 per unit. This system screens, conveys, washes, and

dewaters screenings all in one unit, providing a compact system that comes in an above ground stainless steel housing, and maintains the hydraulic gradient so that stormwater enters into the disc filters via gravity downstream of the rotary screen. The assumed screen size for this system is 6mm, and shall be capable of capturing larger particles and debris in the stormwater. To improve the performance of the stormwater treatment system, FCE recommends installing two rotary screens in series. For system redundancy FCE recommends install two sets of rotary disc filters in parallel.

The disc filters are capable of treating larger volumes of water in a small space. The sizing and costs for the system is based on the Siemens Forty-X disc filters. Each unit costs $240,000 and consists of a 12 disc system capable of treating 3.9 gallon per minute per square foot. As discussed previously, the size and type of the filters will be determined based on the treatment goals to be met. Other systems with similar small footprints which could meet the treatment requirements are the Kruger HydroTech Discfilter and the WesTech WWETCO FlexFilter. The FlexFilter is a different technology that employs a compressible media with a high filtration rate. The technology for high rate filtration is evolving, therefore the filtration method should be investigated further once the treatment goals are understood and the project is closer to construction.

Disinfection is required in the system to eliminate the pathogens in the stormwater if the filtration processes are unable to meet treatment requirements. Currently there is a UV open channel unit for the stormwater treatment system. This is a concrete trough that conveys the water past ultraviolet light that breaks down pathogens and other constituents in the water. The size of the UV unit is typically determined by the water quality and turbidity of the influent and the level of treatment. UV units can be adjusted by the addition of banks of UV lights; however multiple troughs may be necessary if flows are too high for a single channel. Other disinfection technologies could be used in lieu of the UV system including adding chlorine, perchlorate or ozone to the system. Since the stormwater may be discharging to the Monterey Bay, chemical addition of chorine or perchlorate may not be suitable. These methods should be explored further once the treatment goals are understood.

Proposed Stormwater Treatment Facility

The PGWTP was constructed in the early 1950s and began operation in January 1953, with an operational capacity treating 2 million gallons of wastewater per day (mgd) (Archives and Architecture, Inc., n.d.). Treated wastewater was discharged through an outfall to the Pacific Ocean. In 1980, the PGWTP was decommissioned (*ibid*). Since then, wastewater from the City of Pacific Grove has been treated at the MRWPCA Regional Wastewater Treatment Plant in Marina. The retired PGWTP site is now used by the City of Pacific Grove as an equipment and materials storage yard and non-potable water storage facility. Two circular tank structures remain on-site, including a clarifier/administrative office (east tank) and a sludge digester (west tank), and the majority of the site is comprised of dirt driveways, with storage of construction material and debris along the periphery (Denise Duffy & Associates, July 2013). The site is surrounded by mature vegetation, primarily Monterey cypress (*Hesperocyparis macrocarpa*) (*ibid*).

If the results of the Central Coast ASBS Regional Monitoring Program finds that treatment would be required to meet the ASBS Special Protections, a stormwater treatment facility would be constructed on the retired wastewater treatment plant site, primarily along the western section of the site (refer to Sheet 4.0 of the 40% Design Plans), and would be capable of handling flows of up to 1,500 gallons per minute (gpm). All treatment system components would be located within the existing PGWTP site footprint. Also proposed at the site is a satellite recycled water facility that would treat wastewater for non-potable reuse, which would likely be installed prior to the stormwater system. The wastewater and stormwater treatment trains would be independent and be co-located, inhabiting different areas of the site, except for the east tank, which would provide recycled water storage for irrigation reuse for both systems.

The stormwater system improvements include a flow diversion structure and a stormwater treatment system that would likely include screening, equalization, multi-stage filtration, and disinfection with redundancy incorporated to allow single tanks to be taken off-line for maintenance purposes. The two existing tanks on the site would likely be refurbished as part of the satellite recycled water facility improvements, including the east tank, which would also be used to store irrigation water from the wet season. If results from the forthcoming (2013 – 2014) water quality monitoring effort identify a need for treatment to meet the requirements of the ASBS Special Protections, it is expected that the new water quality data would be used to refine the final treatment process design. Also, there may be additional requirements to use the east tank for both recycled wastewater and stormwater that may result in some modifications to the preliminary design.

As currently proposed, stormwater enters the Point Pinos treatment plant from the Ocean View Conveyance pipeline via a proposed flow control structure. The flow control structure would be a 10-foot tall structure located adjacent to the equalization basin and would divert water to three possible locations: the treatment system; the lined equalization basin; or the MRWPCA Regional Wastewater Treatment Plant in Marina. As water begins to fill the flow control structure, water would be diverted to the first stage of the treatment system (or "train"). As the flows increase, water would also be diverted to the equalization basin to store the water before being pumped to the rotary screen. The third diversion would allow a portion of the water to be discharged to the MRWPCA for offsite treatment at the Regional Wastewater Treatment Plant in Marina.

Wet weather equalization would occur in an excavated lined basin as the treatment system meets capacity. The basin is designed to store 430,000 gallons of stormwater, with slopes at 2 to 1 to a total depth of 10 feet. The total surface area of the basin is 6,800 square feet. When the stormwater treatment system is capable of handling more flows, stormwater would be pumped from the wet weather equalization basin to the rotary screen for treatment.

After the flow control structure or equalization basin, stormwater would enter a rotary screen as the first stage of treatment, providing pretreatment to remove grit, trash, and organic debris. The rotary screen collects the pollutants, using a helical screw system to lift and dewater the solid waste before it is conveyed to a dumpster. From the rotary screen system, stormwater would flow through two sets of two-stages of large rotating disc filters set in parallel. A disc filter unit consists of multiple rotating disks, which provide a media for biological growth and filtration to treat the stormwater. The rotation allows the media

to be exposed to the atmosphere, allowing oxidation and slough off of excess solids. Both stages of the disc filters would be identical, but with decreasing media sizes. The mesh sizes vary by manufacturer and range from 50 microns to 1 micron, which determine the removal capabilities of the disc filter. A possible scenario would be the first stage is designed to remove the suspended pollutants using a 50 microns mesh and the second stage is designed to remove very fine pollutants using a 10 microns mesh. From the second disc filter stage, water would be conveyed through an ultraviolet disinfection system to inactivate potential waterborne pathogens remaining in the water.

After disinfection, treated stormwater would either be conveyed to the eastern water storage tank and be available for reuse as a supplemental non-potable supply to the Pacific Grove Local Water Project, or discharged to Crespi Pond so that treated runoff can supplement water in the pond and flow via the existing outfall to Monterey Bay. Crespi Pond is located approximately 250 feet east of the PGWTP site. Residual solids removed through the treatment would be dried, removed and disposed of at the Monterey Regional Waste Management District facilities in Marina.

Site grading would be necessary within the treatment plant site where debris and soil stockpiles have been placed and where the equalization basin would be excavated and lined. New piping and trenching would include connections to a flow control structure and the treatment system components, the equalization basin, an existing treated water storage tank (east tank), Crespi Pond, and the MRWPCA conveyance. The stormwater treatment train would run parallel to the western edge of the site, with water flowing from the equalization basin south to the fence and back north towards the equalization basin. The existing cypress trees and vegetation around the perimeter of the site would remain for screening of the site facilities.

Crespi Pond and Outfall.

Installation of a new pond inlet energy dissipation structure in the northwest portion of the pond (refer to Sheet 4.0 of the 40% Design) would result in some disturbance in Crespi Pond. However, substantial dredging, vegetation removal, or expansion of the pond is not proposed. The new pond inlet energy dissipation structure would include an approximately 2.5-foot tall concrete headwall, tapered side walls, and an approximately three-foot long apron onto which the treated stormwater would be discharged via a new 18-inch pipeline connecting the treatment facility and Crespi Pond. The proposed inlet structure is not anticipated to interfere with periodic maintenance dredging within Crespi Pond. A discharge flow up to approximately 1,500 gallons per minute (gpm) is anticipated through the Crespi Pond outfall during the 85th percentile 24-hour design storm.

Treated stormwater discharged to Crespi Pond would be discharged to the Monterey Bay through an existing outfall from the pond to the Bay. Preliminary hydraulic modeling indicates that the existing 15-inch diameter outfall is adequate to convey the anticipated flow from the treatment plant (1,500 gpm). Therefore, no new outfalls are proposed and the existing 15-inch outfall, located outside of the ASBS, would be used as the primary point of discharge for treated stormwater into the Monterey Bay. Further condition assessments may identify a need to replace or repair the existing outfall.

Treatment Goals

The treatment goals can affect the design of the treatment system. Once the upcoming stormwater quality monitoring effort is complete, the ASBS "natural water quality" parameters will be defined. Based on this, the treatment goals will be determined and the design and size the treatment facility can be refined. If stormwater is reused for irrigation, then treated stormwater would need to meet California Department of Public Health Recycled Water Regulations (Title 22 regulations and criteria). The Title 22 Recycled Water Regulations are very specific criteria that may change the treatment goals of the system depending on the ASBS monitoring results and further characterization of the stormwater quality coming into the treatment system. Once the treatment goals are fully understood, the engineers and manufacturer representatives of the treatment technologies will be able to determine if the treatment units are capable of treating stormwater to the level needed. Upon completion of the design, FCE recommends the Cities conduct a pilot project to ensure that the treatment units meet the performance standards necessary to meet treatment goals.

2.4.1 Design Alternatives

Pacific Grove Local Water Project Site and Facility Sharing

The proposed facilities would be co-located on the retired PGWTP site with the Pacific Grove Local Water Project (a wastewater treatment plant that would supply recycled water to the Pacific Grove Golf Links, Cemetery and other acceptable uses). The Pacific Grove Local Water Project (PGLWP) is currently being planned and is undergoing a separate environmental review process. It is expected that as these two project progress towards implementation, site sharing will be optimized to efficiently use the space while sharing facilities to the maximum extent feasible. During construction of the Pacific Grove Local Water Project it is recommended that project managers consider including site grading required for the ASBS stormwater treatment facility to reduce future mobilization costs.

Reuse of Recycled Stormwater

CDPH has established statewide reclamation criteria for the use of recycled water and has developed guidelines for specific uses. Based on these guidelines, CDPH will determine if this system meets these guidelines for direct reuse of recycled water. One of the primary conditions on the use of recycled water is the protection of public health (California Water Code section 13521, 13522, 13550(a)(3)). If the stormwater is reused from the treatment plant, the stormwater would likely be used for non-potable irrigation on the golf course or other public areas. Under the CDPH Recycled Water Regulations the water may need to meet disinfected tertiary recycled water standards in which filtration and disinfection must meet certain criteria.

Filtration requirements for surface irrigation states: "coagulation need not be used as part of the treatment process provided that the filter effluent turbidity does not exceed 2 NTU, the turbidity of the influent to the filters is continuously measured, the influent turbidity does not exceed 5 NTU for more than 15 minutes and never exceeds 10 NTU, and that

there is the capability to automatically activate chemical addition or divert the wastewater should the filter influent turbidity exceed 5 NTU for more than 15 minutes."[4]

The disinfection requirements require chlorine disinfection or "a disinfection process that, when combined with the filtration process, has been demonstrated to inactivate and/or remove 99.999 percent of the plaque-forming units of F-specific bacteriophage MS2, or polio virus in the wastewater" and "the median concentration of total coliform bacteria measured in the disinfected effluent does not exceed MPN of 2.2 per 100 milliliters utilizing the bacteriological results of the last seven days for which analyses have been completed and the number of total coliform bacteria does not exceed an MPD of 23 per 100 milliliters in more than one sample in any 10 day period. No sample shall exceed an MPN of 240 total coliform bacteria per 100 milliliters."[5] If this requirement exceeds the treatment goals of the ASBS, then additional treatment or more robust treatment technologies may be needed. In addition, in-line turbidity meters would be needed to monitor the turbidity constantly for the disc filter systems.

2.4.2 Engineering Elements

Engineering elements proposed for the stormwater treatment facility and for discharge via Crespi Pond are listed below with an accompanying cost estimate in Attachment F. Subsequent design phases will need to field verify the condition, location, and invert elevations of storm drains within the existing system.

- Wet Weather Equalization Basin (430,000 gallons)

- Stormwater Treatment Plant:
    - Flow Control Structure
    - Duplex Pump System (22 HP pumps)
    - Pre-treatment - Rotary Screens
    - Solids Residual Storage
    - 2-Stage Disc Filters
    - UV Disinfection Systems
    - Diversion and Bypass Structure
    - SCADA Monitoring
    - Equipment and Control Building

- Crespi Pond Inlet Energy Dissipation Structure

- Conveyance Pipeline:
    - Approximately 1,800 LF of pipeline

[4] California Health Laws Related to Recycled Water (Title 22), Section 60304. June 2001.
[5] California Health Laws Related to Recycled Water (Title 22), Section 60301.230. June 2001.

2.4.3 Treatment System Regulatory Requirements

This section describes the regulatory requirements that are applicable to the project and a proposed approach to permit the stormwater treatment system. The stormwater treatment system would be designed to treat stormwater to a 90% reduction in pollutants to meet the requirements of the ASBS Special Protections and provide the potential for irrigation reuse. The following is a discussion on the regulatory requirements and other examples of municipal stormwater treatment systems.

Regulatory Requirements

Municipal stormwater is regulated under the SWRCB and nine Regional Water Quality Control Boards (Regional Boards). The Point Pinos Stormwater Treatment Plant falls under the jurisdiction of the Central Coast Regional Board, where the Cities of Pacific Grove and Monterey have Phase II MS4 NPDES Permits. Treating the stormwater would likely be considered a treatment best management practice under the MS4 permits and a permit amendment would not be required.

The SWRCB and Regional Boards also regulate wastewater discharges and recycled water for reuse. The Regional Board issues waste discharge requirements (WDRs) for wastewater reclamation including on-site treatment systems. Stormwater is not regulated in the same way as sanitary sewer wastewater; however, if the water is recycled for reuse, it can be regulated by the Regional Boards. Based on the State's recycled water laws, two technical reports could be required to permit the stormwater for reuse: the first is an engineering report for the California Department of Public Health (CDPH); and second a Report of Waste Discharge (RWD) to the Regional Board. The recommended procedures for permitting a water recycling project in California based on the agreements between the Regional Board and CDPH is to initially prepare and submit an engineering report to the CDPH for their review and approval prior to submitting a RWD to the Regional Board for subsequent approval and permitting. Once the engineering report for the system is approved, recommendations from CDPH can be incorporated. The RWD and the RWQCB Form 200 are sent to the Regional Board to determine if the application is complete. The Regional Board may request changes or additional information. After the application is deemed complete, the Regional Board has 140 calendar days to issue Waste Discharge Requirements for the project or the applicant can initiate operation in accordance with the RWD as a defacto permit.

Based on past stormwater projects implemented in California, the Regional Board has not required WDRs to be issued for reuse of treated stormwater. The precedence set by other stormwater treatment facilities using treated stormwater for reuse indicate that permitting for stormwater will continue to be regulated by the Regional Boards through stormwater municipal permits. However, sharing the existing eastern tank at the Point Pinos site for reuse of irrigation water with the Local Water Project may increase the requirements necessary. Discussions with the Regional Board would determine if there are any additional requirements in this scenario. The next section describes other projects and the regulatory framework used for each project.

Similar Project Examples

The following describes other stormwater treatment projects in California. In these cases, Waste Discharge Requirements were not issued by the Regional Board where the projects occurred. The projects are all stormwater treatment facilities for reuse. The projects include the Santa Monica Urban Runoff Recycling Facility, the Malibu Civic Center Stormwater Treatment Facility, Aliso Creek Water Runoff Recover and Reuse System, and the Salt Creek Ozone Treatment Plant (Dana Point). All of these projects are located in Southern California. Each facility is discussed below.

Santa Monica Urban Runoff Recycling Facility (SMURRF). The SMURRF was the first stormwater treatment system implemented in California that treats dry weather urban runoff for reuse in landscape irrigation and toilet flushing in dual-plumbing systems in buildings. The system has been operating since 2000 and has the capacity to treat and reuse 50,000 gpd of dry weather runoff. The system cost approximately $12,000,000 including a distribution system for recycled water. The treatment facility operates a system consisting of a CDS unit, a pump system, a rotating drum screen, a grit chamber, a dissolved air floatation unit, a microfiltration unit, and a UV disinfection unit to produce recycled water for landscape irrigation and water for dual-plumbed customers. The treatment system is designed to treat to unrestricted use of tertiary standards in accordance with California Department of Public Health Recycled Water Regulations (Title 22 regulations and criteria). An Engineering Report was required by California Department of Public Health (CDPH), although it was less extensive than normally required for wastewater recycling and it was revised and submitted with the Report of Waste Discharge application (Form 200) to the Los Angeles Regional Water Quality Control Board (LARWQCB). In a letter dated August 22, 1997, the LARWQCB made the conclusion (note the SMURFF was formerly known as the DWRRF) that "*Separate waste discharge requirements will not be required. The DWRRF will be considered as a treatment best management practice to reduce pollutants in dry-weather flows under Board Order No. 96-954.*"[6] A formal Water Quality Monitoring Plan was also prepared for acceptance by the LARWQCB.

Malibu Civic Center Stormwater Treatment Facility. The Malibu Civic Center Stormwater Treatment Facility treats both dry and wet weather stormwater for reuse in landscape irrigation at the Civic Center Park. The system was completed in 2007 and is capable of treating 1,400 gpm. The treatment facility operates a system consisting of screens at three catchment drains, a pump system, a filtration system, and an ozone disinfection unit to produce recycled water for landscape irrigation. The treatment system, in conjunction with a four acre-ft detention pond, was designed to provide compliance with a Bacteria TMDL for the area. The treatment facility cost approximately $5,800,000 for the catchment, conveyance and treatment, but these costs do not appear to include detention, irrigation, and disposal improvements which were part of other improvements constructed at the site. A representative from the City of Malibu was un-reachable during preparation of this report to describe the permitting process and there was no indication an

[6] Boyle Engineering Corporation, Engineering Report for Dry-Weather Runoff, Reclamation, Storage, Pumping, Distribution, and Nonpotable Water Use area Facilities, City of Santa Monica. September 1999.

engineering report was prepared for this project. This project falls under the jurisdiction of the LARWQCB.

Aliso Creek Water Urban Runoff Recovery, Reuse and Conservation Project. The Aliso Creek Urban Runoff Recovery, Reuse, and Conservation Project is designed (not yet constructed) to treat stormwater harvested from Aliso Creek to tertiary treated wastewater standards with the intention of lowering salt concentrations for recycled water irrigation. The wastewater flows had approximately 1,300 ppm total dissolved solids which would be reduced to about 800 ppm through dilution with the treated stormwater. The quantity of urban runoff taken from Aliso Creek would vary from 300,000 to 800,000 gallons per day based on customer demand and available creek flow. The original design of this project began over five years ago and included a fish screen, multimedia and organoclay filters, and reverse osmosis. Currently the project is being redesigned as an ultrafiltration/reverse osmosis membrane treatment facility that alternates between treating dry weather flows and tertiary treated wastewater. The Initial Study[7] for this project indicated that a RWQCB Recycled Water Permit (amendment) and State Water Resources Control Board Application to Appropriate Water as well as other permits and approvals may be required for implementation of the proposed project. This project would have WDRs since wastewater is also being treated. The project falls under the jurisdiction of the San Diego Regional Board (SDRWQCB).

Salt Creek Ozone Treatment Plant. The Salt Creek Ozone Treatment Plant located in the Monarch Golf Links of Dana Point, is designed to treat 1.44 million gallons per day of dry weather flows from Salt Creek. The system was completed in 2005 to provide an advanced treatment BMP to reduce bacteria levels in Salt Creek during dry weather at a cost of approximately $6,700,000. The treatment train consists of a coarse screen grate, solids removal unit, basket strainers, horizontal media filters, an ozone generator and contact chamber. In 2008, the South Coast Water District was exploring the feasibility of using the treated water for landscape irrigation but indicated regulatory obstacles posed challenges. The project falls under the jurisdiction of the SDRWQCB.

2.5 Diversions to MRWPCA

This project would entail upgrading and expanding the existing dry weather diversion system to increase the capacity of the collection system to be able to divert up to the 85th percentile wet weather storm from a portion of the City of Pacific Grove to the MRWPCA. This project component would be primarily within or adjacent to the Ocean View Boulevard right-of-way from Forest Avenue east to David Avenue, as shown in Sheet 5.0. Improvements would include upgrades to the City of Pacific Grove's existing dry weather urban diversion system to increase the capacity to allow the conveyance of wet weather flows in addition to dry weather flows. Specifically, new pumps would be installed at Greenwood Park, Berwick Park, and Eardley Avenue pump stations. In addition, approximately 1,100 feet of 4-inch and 8-inch storm drain lines connecting the Berwick pump station to Greenwood pump station to the MRWPCA would need to be replaced with 10-inch lines.

[7] Environmental and GIS services, LLC, Initial Study and Environmental Checklist for Aliso Creek Urban Runoff Recovery, Reuse and Conservation Project, Laguna Beach, California. July 2008.

This project would capture runoff from approximately 222 acres (23% of the total 950 acre ASBS drainage area) and convey it to the MRWPCA Regional Wastewater Treatment Plant in Marina. On average, approximately 150 AF per year of urban runoff would be delivered to the MRWPCA as a potential supply source to its proposed groundwater replenishment project. Additionally, connections between the stormwater collection system and the MRWPCA are proposed at the existing MRWPCA Coral Street pump station and at the Point Pinos Stormwater Treatment Facility.

The existing dry weather diversion system is sized to convey 200 gpm to the MRWPCA, and includes five pump stations, and over 6,800 feet of conveyance pipeline. The five pump stations are located at (1) Lovers Point, (2) Fountain Avenue, (3) Greenwood Park, (4) Berwick Park (9th St.), and the newest installation at (5) Eardley. Flow from Lovers Point is delivered to the Fountain pump station then into the sanitary sewer system. Flow from Eardley is pumped to Berwick Park which is delivered to the pump station at Greenwood Park and into the sanitary sewer system.

The hydrology analysis estimated peak flows to each of the five dry weather diversion pump stations and the results are summarized in Section 3. Based on an existing capacity at each of the pump stations, the pump stations at Lovers Point and Fountain are adequate to convey the 85% event once conveyance on Pine Avenue is constructed, which would bifurcate contributing sub-basins, and send the majority of the flow currently draining to these pump stations towards Point Pinos.

Table 1. Urban Diversion Pump Station Estimated Peak Flows

Urban Diversion Pump Station	Pumps To:	Summary of Peak Flow tp each Pump Station During 85% Storm Event (gpm)
Lovers Point	Fountain	5
Fountain	MRWPCA	78
Total To MRWPCA		78
Eardley	Berwick	2724
Berwick	Greenwood Park	4526
Greenwood Park	MRWPCA	5356
Total To MRWPCA		5356

Within the eastern portion of the urban diversion system a combination of improvements and new installations are proposed to adapt the existing system to accommodate the larger flow rates. Based on a preliminary review of existing technologies, the installation of Hydrobrakes[8] within the existing storm drain system could provide additional storage within the existing storm drain system, while delaying peak flows moving downstream. Manufacturer testing indicates the use of Hydrobrakes can reduce the need for upstream storage by 15% to 30%. Other alternatives that have been proposed and warrant further consideration during subsequent design phases include diverting flows to the MRWPCA at an alternate location and coordinating with the Monterey Bay Aquarium which is currently planning a dry-weather diversion system.

The pump stations at Eardley, Berwick and Greenwood Park would need to be upsized to accommodate increased flows. The cost estimate to retrofit these pump stations assumes the majority of the pump station would be replaced, but the design capacity would be reduced by 15% due to the installation of hydrobrakes or other equivalent technologies.

A Storm and Sanitary Sewer Analysis model was used to evaluate pipeline capacity within the existing urban diversion system. Within the Lovers Point and Fountain section of the system pipelines are adequate for delivery of the 85% event to the MRWPCA. Within the eastern section of the system, pipelines would need to be increased in diameter to a minimum of 10" via in-situ pipe-splitting or pipe-bursting. It is recommended that subsequent design phases develop a more detailed model of the storm drain system in this area to refine design assumptions and identify optimal hydrobrake installation locations.

2.5.1 Engineering Elements

Engineering elements proposed for stormwater conveyance to the MRWPCA are listed below with an accompanying cost estimate in Attachment F. Subsequent design phases will need to field verify the condition, location, and invert elevations of storm drains within the existing system and complete a geotechnical evaluation to identify constraints and opportunities within the proposed project locations.

- Upsized Pump Station at Eardley
  - Duplex Dry Pit Pump Station, 1,900 gpm capacity
- Upsized Pump Station at Berwick
  - Duplex Dry Pit Pump Station, 3,500 gpm capacity
- Upsized Pump Station at Greenwood Park
  - Duplex Dry Pit Pump Station, 4,150 gpm capacity
- Storm Drain Conveyance:
  - Pipe-splitting approximately 1,100 LF of pipeline
  - 6x Hydrobrake installations

[8] http://www.hydro-int.com/uk/products/hydro-brake-optimum

3. HYDROLOGY ANALYSIS

FCE performed a hydrologic (rainfall-runoff) analysis to estimate peak stormwater runoff rates for the design storm (85th percentile event). The design storm is the basis of compliance with the ASBS Special Protections. Larger storm events are not subject to the same treatment and structural BMP requirements, and can be discharged to the ASBS under the General Exception.

3.1 Methodology and Assumptions

To estimate the peak flow during the design storm, FCE employed Autodesk's *Storm and Sanitary Sewer Analysis* (SSA) software. SSA is a computer model that simulates watershed, pipeline, and water-control structure hydrology and hydraulics and estimates peak discharge (flow) and timing. SSA calculates runoff by computing the volume of water that is intercepted, infiltrated, stored, evaporated or transpired and subtracting it from the precipitation. To illustrate this runoff calculation methodology, Attachment E includes a step-by-step calculation summary for sub-basin 38 as modeled by the SSA software. Sub-basin 38 is the lower (below Pine Avenue) portion of the watershed draining towards Greenwood Park; land use in this sub-basin is primarily urban with residential and commercial districts and a high percent of imperviousness (82%).

Design Storm Runoff Volume Estimation. The runoff volume computations were conducted employing the SCS Curve Number Loss Method and SCS Unit Hydrograph Model for transformation of direct runoff. The SCS Curve Number Loss Method implements the curve number methodology of incremental losses. The SCS Unit Hydrograph Model is an empirical method, which "transforms" excess precipitation into peak runoff and calculates the volume of runoff over a specified time period. A 24-hour design storm was selected with rainfall volume of 0.8 inches for the 85th percentile event[9]. The 85th percentile design storm depth was obtained from the Central Coast Regional Water Quality Control Board[10].

Watershed Characteristics. The sub-watershed boundaries shown in Figure 6 are based on sub-basins delineated by a CSUMB advanced watershed management class under the direction of Assistant Professor Fred Watson during the Fall Semester 2011.[11] In some cases, these sub-basins were divided to define areas southwest of Pine Avenue, from

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[9] The SWRCB defines the ASBS design storm as1-inch in a 24-hour period.

[10]California EPA. 2013. Central Coast Joint Effort for LID and Hydromodification Control. Central Coast Regional Water Quality Control Board. http://www.waterboards.ca.gov/centralcoast/water_issues/programs/stormwater/docs/lid/lid_hydromod_charette_index.shtml

[11] CSUMB Class ENVS 660: Pugh K, Arenas R, Cubanski P, Lanctot M, Purdy A, Bassett R, Smith J, Hession S, Stoner K, Ashbach R, Alberola G, Jacuzzi N, Watson F. 2011. Stormwater outfall watershed delineation, land cover characteristics, and recommended priorities for monitoring and mitigation in the City of Pacific Grove, California. The Watershed Institute, California State Monterey Bay, Publication No. WI-2011-02, 74 pages.
http://ccows.csumb.edu/pubs/reports/CSUMB_ENVS660_ClassReport_PGStormwater_120306.pdf

which stormwater would be conveyed towards the Pacific Grove Golf Links, and areas northeast of Pine Avenue, which would drain to the MRWPCA through an upsized existing Urban Diversion System.

An estimate for the percent of impervious area within each sub-basin was calculated using GIS General Plan data with land use designations for both Pacific Grove and the City of Monterey. The General Plan shapefiles identified land use zoning information for individual parcels within each jurisdiction. Impervious area was estimated based on land use zoning and an assumed impervious percent for each zoning category. The total impervious area of each parcel was estimated and aggregated for each sub-watershed. Table 2 summarizes the impervious percentages assigned to each General Plan zoning category. Roads were assumed to be 95% impervious.

Table 2. Land Use Category and Percent Impervious Assumption

Land Use Code	Description	Percent Impervious
C	Commercial	85%
C-1	Commercial	85%
C-1-T	Commercial	85%
C-2	Commercial	85%
LDR	Low Density Residential	50%
M-H	Mobile Home Park	60%
MDR	Medium Density Residential	60%
O	Open Space	0%
OS	Open Space	0%
PSP	Public Space	35%
R-1	Med Dens to 17.4 DU/ac	60%
R-1-B-3	Low Dens to 5.4 DU/ac	50%
R-1-B-4	Low Dens to 5.4 DU/ac	50%
R-1-H	Med Dens to 17.4 DU/ac	60%
R-2	High Dens 29.0 DU/ac	70%
R-3	High Dens 29.0 DU/ac	70%
R-3-M	dium High Density Residential	60%
R-3-PGB	High Dens 29.0 DU/ac	70%
R-3-PGR	High Dens 29.0 DU/ac	70%
R-4	High Dens 29.0 DU/ac	70%
U	Public	85%
U,O	Public	85%
V-C	Commercial	85%

The SCS Runoff Curve Number (CN) for each sub-basin is estimated based on hydrologic soil group, land use and hydrologic condition. A high CN value (as high as 98) indicates areas where nearly all rainfall becomes runoff. A low CN value (as low as 30) indicates

areas where nearly all rainfall has the potential to infiltrate. To estimate CN for each sub-basin, FCE identified the soil type within each general plan parcel and assigned a curve number based on the soil type and land use for each parcel. Curve numbers were assigned based on the land use categories in. Based on the assigned CN and area of each parcel, an average CN was calculated for each sub-basin. Roadways were assigned a CN of 90. Soils data was acquired from the Natural Resources Conservation Service, US Department of Agricultural Soil Survey Geographic Database.[12]

Table 3. Curve Number Designation by Land Use and Hydrologic Soil Group

	Curve Number by Hydrologic Soil Group			
LAND_USE	**A**	**B**	**C**	**D**
Commercial	89	92	94	95
Group Quarters (GQ)	77	85	90	92
High Dens 29.0 DU/ac	77	85	90	92
Low Dens to 5.4 DU/ac	54	70	80	85
Med Dens to 17.4 DU/ac	77	85	90	92
MHR	77	85	90	92
Open Space	49	69	79	84
OSI	49	69	79	84
PO/HDR	89	92	94	95
Public	89	92	94	95
VA/MDR 17.4 DU/ac	77	85	90	92
VA/MDR 9.3 DU/ac	77	85	90	92
Visitor Accom (VA)	77	85	90	92

The average slope within each ASBS watershed sub-basin was estimated using the Zonal Statistics package of the ArcGIS Spatial Analyst toolbox. The LIDAR data used as the basis for the analysis was acquired in 2010 in the Central Coast Region of California including areas of Monterey, San Benito, and Santa Cruz County through an Association of Monterey Bay Area Governments (AMBAG) project.

The hydraulic Length, or longest flow path within each sub-basin, was measured in GIS as the longest average path a water particle would travel from the sub-basin headwaters to the sub-basin outlet.

Time of concentration is a hydrologic parameter that estimates the time needed for water to flow from the most distant part of a sub-basin to the outlet. To estimate a time of concentration in minutes, FCE used the SCS Lag Equation[13]:

[12] Available at http://soildatamart.nrcs.usda.gov

[13] Civil Engineering Reference Manual, 2008, pg. 20-4 and as presented in Applied Hydrology by V.T. Chow p. 500-501

T_c = (100*L^0.8*((1000/CN)-9)^0.7)/(1900*(S)^0.5)

L = longest distance to collection point in ft,
CN = NRCS runoff curve number,
S = Slope in percent

Table 4 summarizes characteristics about the contributing drainage areas; including the size of each contributing sub-basin, impervious percentage, curve number, hydraulic flow length, slope and time of concentration. Figure 6 includes a map identifying each sub-basin.

Table 4. Summary of Sub-Basin Hydrology Characteristics

Sub-Basin	Area (ac)	Percent Impervious (%)	Curve Number (CN)	Slope (ft)	Hydraulic Length (ft)	Time of Concentration (min)
1	78.1	34%	64	6.3%	3900	58.8
2	0.5	69%	79	3.8%	250	5.6
3	4.9	66%	79	4.5%	1000	15.4
4	18.2	55%	74	5.4%	2150	30.0
5	42.2	61%	76	4.9%	2500	33.6
6	25.3	51%	74	8.7%	1520	18.0
7	19.6	75%	82	5.8%	1600	18.0
8	5.3	73%	81	7.3%	1400	14.9
9	10.6	74%	81	8.6%	1050	10.9
10	8.5	50%	71	9.6%	1500	18.4
11	47.3	63%	79	7.5%	2500	24.9
12	2.8	47%	70	7.6%	770	12.5
13	0.3	88%	85	3.9%	150	3.0
14	5.6	27%	61	5.7%	1400	29.5
15	28.1	74%	86	7.1%	2150	18.0
16	1.3	69%	78	8.8%	450	6.0
17	2.1	57%	74	7.5%	660	10.0
18	0.2	59%	73	12.3%	200	3.1
19	1.4	54%	74	8.0%	620	9.2
20	0.3	59%	73	6.5%	250	5.1
21	2.1	68%	79	6.5%	490	7.3
22	5.9	40%	67	5.1%	1050	21.2
23	78.0	78%	86	6.8%	3290	25.8
24	64.0	74%	91	4.0%	3100	26.4
25	79.1	74%	91	6.3%	5270	32.1
26	2.9	66%	79	5.0%	680	10.8
27	0.2	54%	77	5.5%	125	2.8
28	4.0	60%	76	5.5%	1500	21.1
29	2.9	6%	53	13.3%	300	6.9
30	15.2	74%	79	5.9%	1500	18.7
31	0.1	39%	65	5.9%	50	1.8
32	7.7	81%	83	6.5%	2240	21.6
33	0.2	59%	73	5.9%	150	3.5
34	1.5	75%	79	9.8%	590	6.9
35	3.1	87%	86	6.6%	1300	12.5
36	1.8	76%	80	7.2%	690	8.8
37	2.5	64%	75	10.7%	550	7.0
38	40.2	82%	88	8.7%	2610	17.6
39	113.1	77%	92	7.2%	3350	20.0
40	87.3	63%	85	11.7%	3250	20.2
41	6.0	67%	77	8.2%	1000	12.2
42	10.6	78%	87	8.2%	1760	13.8
43	1.0	44%	68	6.6%	350	7.5
44	26.1	80%	89	11.2%	2025	12.2
45	20.8	74%	91	4.6%	1875	16.5
46	3.8	64%	86	5.6%	1500	15.1
47	0.9	42%	74	17.1%	250	3.0
48	13.2	77%	90	12.1%	1690	9.8
49	0.1	57%	87	13.1%	100	1.1
50	1.4	74%	91	11.6%	730	4.9
51	0.1	68%	89	15.0%	100	1.0
52	1.9	78%	90	13.1%	1130	6.8
53	5.4	77%	90	10.4%	1800	11.1
54	7.6	79%	87	11.2%	1160	8.4
55	21.4	79%	89	8.5%	2000	13.9
56	26.4	82%	90	9.6%	2600	15.5
57	11.9	87%	91	8.0%	1800	12.1

Annual Runoff Estimation. The Simple Method was selected to estimate annual runoff from the PG ASBS watershed area. This method is used by many jurisdictions[14] to calculate annual runoff as a function of annual runoff volume and a runoff coefficient (Rv). Runoff volume is calculated as:

$$R = P \times Pj \times Rv$$

Where: R = Annual Runoff (in)
P = Annual Rainfall (in)
Pj = Fraction of Annual Rainfall events that produce runoff
Rv = Runoff Coefficient

The Runoff Coefficient is estimated for a drainage area based on an observed relationship with impervious area. The following equation is based on a statistical relationship between the Runoff Coefficient and impervious fraction (Ia), from a sample of 47 sites[15] with an R^2 value of 0.71.

$$Rv = 0.05 + 0.9Ia$$

Where: Ia = Impervious fraction (decimal, not percent)

Average Annual Rainfall for the project area was estimated at 14.11 inches, the annual average from 2002-2011[16]. The fraction of annual rainfall events that produce runoff was assumed to be 0.9. The impervious fraction was estimated based on land use and parcel data as summarized in Table 2.

To estimate the annual volume of water diverted within the proposed project, which is designed to capture, divert and treat flows resulting from the 85% rainfall event, the annual runoff volumes estimated using the Simple Method were reduced by 15%. This assumes that 15% of all rainfall would occur during storms exceeding the design capacity of the project, therefore these flows would be diverted to the existing stormwater discharge locations.

Dry Weather Flow Estimation. Dry weather flow estimates are based upon preliminary measurements collected at Greenwood Park by Dr. Fred Watson of CSUMB[17]. Based upon Dr. Watson's review of collected data, dry weather flows were observed to range from 3.1 to 12.7 gallons per minute (gpm). Based on the observed flow range, a ratio of

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[14] For example, New York (http://www.dec.ny.gov/docs/water_pdf/simple.pdf) and North Carolina (http://portal.ncdenr.org/c/document_library/get_file?uuid=a85cdd45-7f1f-44d8-9921-babea9478516&groupId=38364)

[15] The relationship between Rv to imperviousness was first documented in "Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs", published by the Metropolitan Washington Council of Governments (T. Schueler, 1987). The 47 sites used to create the relationship were studied during the National Urban Runoff Program (NURP) research program led by the EPA, and are scattered across the nation.

[16] Fall Creek Engineering, Revised Greenwood Park Water Balance and Low Flow Analysis, Greenwood Park Creek Water Project, Pacific Grove, California, March 19, 2013.

[17] Greenwood Park Low Flow Analysis – Pro-bono report for Sarah Hardgrave (City of PG), by Dr. Fred Watson (CSUMB), March 7, 2013.

flow to watershed area was calculated to range between 0.012 to 0.053. This ratio was used to estimate dry weather flows in the remaining sub-basins where observations were unavailable and sub-basin area was known.

Greenwood Park is located within a natural drainage channel in Pacific Grove, and potentially receives a higher amount of baseflow (from shallow groundwater) than sub-basins in the western portion of the PG ASBS watershed area. As a result, it is possible this method will result in an overestimation of dry weather flows in other parts of the watershed. To minimize this effect, the lower estimate of the flow to area relationship (0.012) was multiplied by the remaining sub-basin areas to estimate dry weather flows. Additional dry-weather flow measurements at other locations in the watershed would help refine this approach.

3.2 Results

A summary of the peak runoff rates within each sub-basin and cumulative runoff to each sub-project is summarized in Table 5, along with estimates of the average annual and dry weather flow estimates. These rainfall-runoff modeling and runoff estimates are preliminary and will be revised based on design updates and field verification of the modeling assumptions as planned through the City of Pacific Grove's Urban Greening Grant Watershed Modeling effort, planned in 2014 and 2015. Similarly, all the estimated pipe and pump sizes are preliminary and would be revised, if needed, with more detailed hydraulic modeling of the proposed storm system improvements.

<u>Model Validation</u>

To validate the SSA model, FCE compared measured stream flow at Greenwood Park, as collected by Dr. Watson's research group at CSUMB, to predicted model runoff. A storm event beginning on the morning of January 20, 2012 and extending over 24 hours was input into the SSA and the resulting runoff at Greenwood Park, as predicted by the SSA model, was compared to observed runoff as measured by a Data Logger maintained and operated by CSUMB students.

Figure 4 shows precipitation as measured at the Monterey Bay Aquarium over the model validation storm and Figure 5 compares the modeled versus measured discharge over the storm event. The model appears to reasonably predict the observed hydrograph including time to peak and magnitude of the peak flow. The model validation results increased confidence in the model's ability to predict runoff based on rainfall throughout all of the modeled sub-basins.

Table 5. Peak, Average Annual and Dry Weather Runoff Rates by Sub-basin and Sub-Project

Drainage Basin #	Watershed Management Approach	Area (ac)	85% Peak Flow estimate (gpm)	85% Runoff Depth (in)	85% Runoff Volume (MGD)	Average Annual Runoff Volume Estimate (AFY)	Average Annual Runoff from storms less than or equal to 85% Event (AFY)	Dry Weather Flow Estimate (gpm)	Dry Weather Flow Estimate (Ap - Oct) (AFY)
40	**To David Avenue Reservoir**	**87**	**404**	**0.09**	**0.21**	**56.74**	**48.23**	**1.13**	**0.91**
24	To Pine Ave and Point Pinos Treatment Plant	64	2,482	0.23	0.40	48.30	41.05	0.82	0.67
25	To Pine Ave and Point Pinos Treatment Plant	79	2,751	0.23	0.49	60.13	51.11	1.02	0.82
39	To Pine Ave and Point Pinos Treatment Plant	113	3,820	0.20	0.61	88.69	75.39	1.46	1.18
45	To Pine Ave and Point Pinos Treatment Plant	21	1,014	0.23	0.13	15.85	13.47	0.27	0.22
46	To Pine Ave and Point Pinos Treatment Plant	4	36	0.11	0.01	2.48	2.11	0.05	0.04
	Subtotal to Pine Avenue	**368**	**10,103**	**1.00**	**1.65**	**215.44**	**183.12**	**3.62**	**2.93**
1	To Point Pinos Treatment Plant	78	-	-	-	29.60	25.16	1.01	0.81
10	To Point Pinos Treatment Plant	8	-	-	-	4.46	3.79	0.11	0.09
11	To Point Pinos Treatment Plant	47	54	0.03	0.04	30.66	26.06	0.61	0.49
12	To Point Pinos Treatment Plant	3	-	-	-	1.39	1.19	0.04	0.03
14	To Point Pinos Treatment Plant	6	-	-	-	1.74	1.48	0.07	0.06
15	To Point Pinos Treatment Plant	28	238	0.11	0.08	21.32	18.12	0.36	0.29
17	To Point Pinos Treatment Plant	2	1	-	-	1.22	1.04	0.03	0.02
19	To Point Pinos Treatment Plant	1	-	-	-	0.79	0.67	0.02	0.01
21	To Point Pinos Treatment Plant	2	2	0.02	0.00	1.45	1.23	0.03	0.02
23	To Point Pinos Treatment Plant	78	570	0.11	0.23	61.97	52.68	1.00	0.81
3	To Point Pinos Treatment Plant	5	4	0.03	0.00	3.30	2.80	0.06	0.05
5	To Point Pinos Treatment Plant	42	22	0.01	0.01	26.60	22.61	0.54	0.44
6	To Point Pinos Treatment Plant	25	4	-	-	13.63	11.58	0.33	0.26
8	To Point Pinos Treatment Plant	5	9	0.04	0.01	3.94	3.35	0.07	0.06
20	To Point Pinos Treatment Plant	0	-	-	-	0.18	0.15	0.00	0.00
13	To Point Pinos Treatment Plant	0	3	0.09	0.00	0.28	0.24	0.00	0.00
16	To Point Pinos Treatment Plant	1	1	0.02	0.00	0.91	0.77	0.02	0.01
18	To Point Pinos Treatment Plant	0	-	-	-	0.15	0.13	0.00	0.00
7	To Point Pinos Treatment Plant	20	36	0.05	0.03	14.95	12.71	0.25	0.20
	Subtotal to Point Pinos Treatment Plant (below Pine Avenue)	**353**	**945**	**0.51**	**0.41**	**218.54**	**185.76**	**4.55**	**3.68**
	Total to Point Pinos Treatment Plant	**721**	**11,452**	**1.51**	**2.27**	**433.98**	**417.12**	**9.29**	**7.51**
2	To Oceanview Boulevard - Outlet LID	1	1	0.02	0.00	0.39	0.33	0.01	0.01
9	To Oceanview Blvd - Outlet LID & Runoff to Sea Palm	11	18	0.04	0.01	7.95	6.76	0.14	0.11
4	To Oceanview Boulevard - Outlet LID	18	4	-	-	10.52	8.95	0.23	0.19
	Total to Local LID	**29**	**23**	**0.06**	**0.01**	**18.86**	**16.03**	**0.38**	**0.31**
26	To (E) Dry Weather Diversion System	2.91	3	0.03	0.00	1.98	1.69	0.04	0.03
28	To (E) Dry Weather Diversion System	4.00	2	0.01	0.00	2.50	2.12	0.05	0.04
30	To (E) Dry Weather Diversion System	15.21	18	0.03	0.01	11.57	9.84	0.20	0.16
32	To (E) Dry Weather Diversion System	7.69	18	0.06	0.01	6.37	5.41	0.10	0.08
34	To (E) Dry Weather Diversion System	1.53	2	0.02	0.00	1.17	0.99	0.02	0.02
35	To (E) Dry Weather Diversion System	3.13	31	0.11	0.01	2.75	2.33	0.04	0.03
36	To (E) Dry Weather Diversion System	1.84	2	0.03	0.00	1.43	1.22	0.02	0.02
38	To (E) Dry Weather Diversion System	40.18	826	0.15	0.16	33.42	28.40	0.52	0.42
42	To (E) Dry Weather Diversion System	10.64	166	0.13	0.04	8.45	7.19	0.14	0.11
44	To (E) Dry Weather Diversion System	26.11	857	0.17	0.12	21.25	18.06	0.34	0.27
48	To (E) Dry Weather Diversion System	13.20	592	0.20	0.07	10.33	8.78	0.17	0.14
50	To (E) Dry Weather Diversion System	1.40	90	0.23	0.01	1.06	0.90	0.02	0.01
52	To (E) Dry Weather Diversion System	1.89	90	0.20	0.01	1.52	1.29	0.02	0.02
22	To (E) Dry Weather Diversion System	5.90	0	-	-	2.58	2.19	0.08	0.06
27	To (E) Dry Weather Diversion System	0.24	0	-	-	0.14	0.12	0.00	0.00
31	To (E) Dry Weather Diversion System	0.09	0	-	-	0.04	0.03	0.00	0.00
33	To (E) Dry Weather Diversion System	0.16	0	-	-	0.10	0.08	0.00	0.00
37	To (E) Dry Weather Diversion System	2.49	1	0.01	0.00	1.65	1.40	0.03	0.03
41	To (E) Dry Weather Diversion System	5.98	4	0.01	0.00	4.14	3.52	0.08	0.06
43	To (E) Dry Weather Diversion System	1.03	0	-	-	0.49	0.42	0.01	0.01
47	To (E) Dry Weather Diversion System	0.92	0	-	-	0.42	0.35	0.01	0.01
49	To (E) Dry Weather Diversion System	0.10	2	0.05	0.00	0.06	0.05	0.00	0.00
51	To (E) Dry Weather Diversion System	0.11	4	0.13	0.00	0.07	0.06	0.00	0.00
29	To (E) Dry Weather Diversion System	2.89	0	-	-	0.33	0.28	0.04	0.03
	Subtotal to Existing Dry Weather Diversion System	**150**	**2,710**	**1.57**	**0.46**	**113.81**	**96.74**	**1.93**	**1.56**
54	To PHASE 3 Dry Weather Diversion System	7.56	144	**0.13**	**0.03**	**6.07**	**5.16**	0.10	0.08
56	To PHASE 3 Dry Weather Diversion System	26.44	1037	**0.20**	**0.14**	**22.10**	**18.78**	0.34	0.28
57	To PHASE 3 Dry Weather Diversion System	11.86	637	**0.23**	**0.07**	**10.44**	**8.88**	0.15	0.12
53	To PHASE 3 Dry Weather Diversion System	5.37	233	**0.20**	**0.03**	**4.23**	**3.59**	0.07	0.06
55	To PHASE 3 Dry Weather Diversion System	21.44	673	**0.17**	**0.10**	**17.21**	**14.63**	0.28	0.22
	Subtotal to Phase 3 Dry Weather Diversion System	**73**	**2,724**	**0.93**	**0.37**	**60.04**	**51.03**	**0.94**	**0.76**
	Total to MRWPCA	**222**	**5,435**	**2.50**	**0.83**	**173.85**	**147.77**	**2.86**	**2.32**
	Total to Manage	**973**	**16,910**	**4.07**	**3.11**	**626.69**	**580.92**	**12.53**	**10.14**

4. PROJECT CONSTRUCTION

This section provides an overview of the anticipated construction length, construction equipment, grading, and truck access routes. This information provided the basis for the necessary construction impact analysis in the Environmental Impact Report that accompanies this report. Construction length, grading, and road closures are summarized in Table 6. The timing and order of project implementation and construction would depend upon funding availability for each sub-project, which is not known at this time.

Table 6. Summary of Sub-Project Construction Details

Sub-Project	Estimated Length of Construction (weeks)	Estimated Grading (CY)			Road Closures or Disturbances
		Cut	Fill	Off-Haul	
David Avenue Reservoir	22	21,420	17,656	3,765	None anticipated.
Pine Avenue Conveyance (ROW Improvements)	17	30,678	29,042	1,636	Two lanes of traffic and the northern on-street parking on Pine Avenue during construction days.
Underground Stormwater Equalization and Storage Facility and CDS Unit	7	8,000	1,600	6,400	15th Street and Pine Avenue and Junipero Avenue between 488 Junipero Avenue and 517 Fountain Avenue.
Ocean View Boulevard Conveyance (ROW Improvements)	12	4,022	3,861	161	One lane plus the northern on-street parking along Ocean View Boulevard.
Caledonia Street Storage and CDS Unit	5	3,556	711	2,844	Pacific Avenue between Caledonia Avenue and Jewell Avenue
Pump Stations (Lovers Point, Sea Palm, and Coral)	9	2,333	1,250	1,083	Lovers Point parking lot, turnout at Sea Palm Avenue and Ocean View Boulevard, westbound lane of Ocean View Boulevard near Sea Palm pump station.
Point Pinos Stormwater Treatment Facility and Crespi Pond	17	2,200	200	2,000	None anticipated.
Diversion to MRWPCA	8	667	167	500	Temporary disruptions to vehicle and bicycle traffic along Ocean View Boulevard.
Total	**97[a]**	**72,876**	**54,487**	**18,389**	**n/a**

a. *Assumes no overlap of construction.*

David Avenue Reservoir. The David Avenue Reservoir improvements would be constructed over an estimated 22 weeks, and would require substantial grading. FCE estimates that

approximately 21,420 cubic yards (CY) of cut and 17,660 CY of fill would be generated. Approximately 3,765 CY of material would be hauled off-site and disposed of at the Monterey Regional Waste Management District landfill in Marina. Grading could include up to 1,200 CY/day and would take approximately 33 days.

Construction equipment would include: an excavator, dozer, front loader, dump truck, water truck, soil compactor, roller, cement truck, and delivery truck for materials. Trucks would access the site from Highway 1 to State Route (SR) 68 to David Avenue. It is not anticipated that there would be any temporary disruptions to vehicle traffic along David Avenue during construction.

Pine Avenue Conveyance. Improvements within the Pine Avenue ROW would be constructed over an estimated 17 weeks, and would require an estimated 30,678 CY of cut and 29,042 CY of fill. Approximately 1,636 CY of material would be hauled off-site and disposed of at the Monterey Regional Waste Management District landfill in Marina.

Installation of the Pine Avenue conveyance facilities would require closure of two lanes of traffic and the northern on-street parking on Pine Avenue during construction days. Each block, starting with 7th Street to 8th Street, would be closed during the daytime hours for approximately four days each. As each section of pipeline is installed, the trench would be covered with traffic-rated steel plates for use during non-construction hours. At the completion of this sub-project, the entire disturbed length of Pine Avenue would be re-paved with asphalt.

In addition to the improvements within the Pine Avenue ROW, this sub-project includes a pump station, CDS unit, and an underground stormwater equalization and storage facility. These facilities would take approximately 7 weeks to install and would require approximately 8,000 CY of cut and 1,600 CY of fill. Approximately 6,400 CY of material would be hauled off-site and disposed of at the Monterey Regional Waste Management District landfill in Marina. Construction would require daytime closure at 15th Street and Pine Avenue and on Junipero Avenue between 488 Junipero Avenue and 517 Fountain Avenue.

Construction equipment would include: an excavator, dozer, front loader, dump truck, water truck, soil compactor, roller, and delivery trucks for materials. Trucks and other vehicles would access the site from SR 68/Forest Avenue to Pine Avenue. Per City requirements, the contractor would be required to prepare and submit a traffic management plan for City approval prior to the start of construction. The traffic management plan would indicate traffic, parking, bicyclist, and pedestrian management techniques to mitigate anticipated disruptions resulting from project construction.

Ocean View Boulevard Conveyance. The Ocean View Boulevard ROW improvements would be constructed over an estimated 12 weeks, and would require approximately 4,022 CY of cut and 3,861 CY of fill. The Caledonia Street storage unit would be constructed over approximately 5 weeks and would require 3,556 CY of cut and 711 CY of fill. The pump stations would require a total of 9 weeks for construction and would result in 2,333 CY of cut and 1,250 CY of fill. A total of 4,088 CY of material to be hauled off-site and disposed of at the Monterey Regional Waste Management District landfill in Marina.

Construction equipment would include: an excavator, dozer, front loader, dump truck, water truck, soil compactor, roller, delivery trucks for materials, asphalt pavers and roller, and a street sweeper. Trucks and other vehicles would access the site from SR 68/Forest Avenue to Sunset Drive to 17 Mile Drive to Lighthouse Avenue to Asilomar Avenue to Ocean View Boulevard. Road closures would be required during construction, including one lane plus the northern on-street parking along Ocean View Boulevard. Each block would be impacted for approximately nine days. As each section of pipeline is installed, the trench would be covered with traffic-rated steel plates for use during non-construction hours. At the completion of this sub-project, the entire disturbed length of Ocean View Boulevard would be re-paved with asphalt.

For the five-weeks of construction for the Caledonia Street storage unit, closure of Pacific Avenue between Caledonia Avenue and Jewell Avenue would be required. The Lovers Point parking lot also would be closed during construction of the Lovers Point pump station (an estimated two week period), and the turnout at Sea Palm Avenue and Ocean View Boulevard would be closed during daytime hours during construction of the Sea Palm pump station (an estimated two week period). In addition, the westbound lane of Ocean View Boulevard in the vicinity of the Sea Palm pump station would be closed for one week and would be closed in the vicinity of the Coral Street pump station for two weeks during construction of these pump stations. Efforts should be made to avoid construction during the tourist peak in July and August. Per City requirements, the contractor would be required to prepare and submit a traffic management plan for City approval prior to the start of construction. The traffic management plan would indicate traffic, parking, bicyclist, and pedestrian management techniques to mitigate anticipated disruptions resulting from project construction.

Point Pinos Stormwater Treatment Facility and Crespi Pond. The Point Pinos Stormwater Treatment Facility improvements would be constructed over an estimated 17 weeks, and would require approximately 2,200 CY of cut, 200 CY of fill, and 1,400 linear feet (lf) of trenching. The remaining 2,000 CY of material would be hauled off-site and disposed of at the Monterey Regional Waste Management District landfill in Marina. Grading and trenching would take approximately 22 days.

Construction equipment would include: an excavator, dozer, front loader, dump truck, water truck, soil compactor, cement truck, and delivery truck for materials. Trucks and other vehicles would access the site from SR 68/Forest Avenue to Sunset Drive to 17 Mile Drive to Lighthouse Avenue to Asilomar Avenue to Ocean View Boulevard. It is not anticipated that there would be any temporary disruptions to vehicle traffic along Ocean View Boulevard during construction.

Diversions to MRWPCA. Improvements to existing diversions to MRWPCA would be constructed over an estimated 8 weeks, and would require approximately 667 CY of cut and 167 CY of fill. Approximately 500 CY of material would be hauled off-site and disposed of at the Monterey Regional Waste Management District landfill in Marina.

Construction equipment would include: an excavator, dozer, front loader, dump truck, water truck, soil compactor, roller, delivery trucks for materials, asphalt pavers and roller, and a street sweeper. Trucks and other vehicles would access the site from SR 68/Forest

Avenue to David Avenue to Ocean View Boulevard. During construction, temporary disruptions to vehicle and bicycle traffic along Ocean View Boulevard would be expected. Per City requirements, the contractor would be required to prepare and submit a traffic management plan for City approval prior to the start of construction. The traffic management plan would indicate traffic, parking, bicyclist, and pedestrian management techniques to mitigate anticipated disruptions resulting from project construction.

5. PRELIMINARY PROJECT COST ESTIMATES

5.1 Preliminary Capital Cost Estimates

FCE has prepared preliminary engineering capital cost estimates for the proposed improvements. A summary of the cost estimates are presented in Table 7. The cost estimates include the material and labor costs, contingency (15%), project complexity factor (15%), engineering design (13%), construction management (8%), administrative and legal fees (2.5%) and inflation factor (4%).

Unit costs for earth work, pipelines, paving and other improvements are based on costs provided by the City of Monterey, the Don Chapin Company, RS*Means 2013 Costs Estimates for Heavy Construction* and selected vendors.

Table 7. Project Cost Estimate Summary by Sub-Project

Project Description	Total Estimated Capital Cost	Annual Debt Payment on Capital (i = 3%, n = 20)
Sub-Project 1: David Avenue Reservoir	$3,575,939	$240,359
Sub-Project 2: Pine Avenue Stormwater System Improvements	$2,383,475	$160,207
Sub-Project 3: Ocean View Boulevard Conveyance	$6,813,338	$457,963
Sub-Project 4: Point Pinos Stormwater Treatment Facility	$4,973,686	$334,310
Sub-Project 5: Urban Diversion System Improvements	$3,997,157	$268,672
Total	$21,743,595	$1,461,511

Attachment F includes cost tables with a more detailed breakdown of costs to implement the each sub-project. Please note that these are preliminary costs and in some instances additional information and project analysis will be required to finalize and refine estimates.

These cost estimates do not include a capacity connection or treatment charge that could be required by the MRWPCA for the portion of the project that would deliver urban runoff into their conveyance and treatment system. This will need to be negotiated with MRWPCA as a source water for their system. It is anticipated that future project phases will evaluate treatment and conveyance improvements necessary to accommodate increased deliveries to the MRWPCA from the proposed project. The capital costs associated with these identified improvements can be negotiated between the MRWPCA and the Cities, along with the potential water supply benefits to the Monterey Peninsula Water Management District (MPWMD).

5.2 Preliminary Operation and Maintenance Cost Estimates

Operation and Maintenance (O&M) costs are post construction activities that ensure the effectiveness of an installed stormwater control practice.[18] O&M costs generally include the cost of labor, materials and energy for equipment, structural and landscape components.

Annual operation costs will depend greatly upon the Cities' policies, specifically related to labor and maintenance schedules. Maintenance requirements can also differ by equipment type, for example between big and small pumps with differing access constraints or warranty obligations. Actual annual operation and maintenance costs can be calculated and are often found to range from between 3% to 5% of the project capital cost. At this stage in project development the O&M costs are assumed to be 3% of the preliminary capital cost estimate as shown in Table 8. Also shown in Table 8 is the average annual O&M over the 20-year loan period calculated as the average of 20-years of O&M costs increased annually by 1.5% inflation.

Table 8. Summary of Estimated O&M Cost for Each Sub-Project

Project Description	Total Estimated Capital Cost	O&M Cost (3% of Capital Cost)	Average Annual O&M[1]
Sub-Project 1: David Avenue Reservoir	$3,575,939	$107,000	$ 123,700
Sub-Project 2: Pine Avenue Stormwater System Improvements	$2,383,475	$72,000	$ 83,200
Sub-Project 3: Ocean View Boulevard Conveyance	$6,813,338	$204,000	$ 235,900
Sub-Project 4: Point Pinos Stormwater Treatment Facility	$4,973,686	$149,000	$ 172,300
Sub-Project 5: Urban Diversion System Improvements	$3,997,157	$120,000	$ 138,700
Total	$21,743,595	$652,000	$753,800

1. Average Annual O&M Cost is the average of the O&M cost adjusted annually for inflation over the 20 year period.

5.3 Equivalent Annual Cost & Life Cycle Cost Analysis

5.3.1 Life Cycle Costs (LCC)

The Life Cycle Cost (LCC) of the proposed project was calculated for each sub-project in terms of the Net Present Value over a 20-year period[19]. Where:

$$LCC = IC + O\&M + DC - SV$$

IC = Initial Construction Cost
O&M = Operation and Maintenance Costs

[18] Narayanan, A. and R. Pitt. Costs of Urban Stormwater Control Practices. University of Alabama, Department of Civil, Construction and Environmental Engineering. June 18, 2006
[19] This methodology is consistent with the 'Final Alternatives Analysis and Data Acquisition for the Pacific Grove and Carmel Bay ASBS' (MACTEC, 2006). The 2006 analysis included additional factors for Energy and the Benefits of other values (e.g. potable water savings).

DC = Decommissioning Cost (including restoration of the local environment and disposal of equipment)
SV = Salvage Value

Salvage and decommissioning values were estimated for mechanical and electrical parts within each of sub-project, specifically for pumps, SCADA and leak detection systems and water treatment equipment. Salvage and decommissioning values were estimated at 12% and 20% of the equipment cost (with contingency factors), respectively. Annual Costs (i.e. O&M and energy costs), future costs (e.g. decommissioning), and salvage values were calculated as present worth (PW) costs according to the following formula:

$$PW = \text{Annual Cost } [(((1+i)^n)-1)/((i*(1+i)^n))]$$

Where i = 0.03 is the discount rate (defined here as the difference between the assumed inflation (4%) and interest rate (7%)) and n = 20. Table 9 summarizes the PW and LCC cost estimates for each of the five sub-projects and the combined project.

5.3.2 Equivalent Annual Cost

The equivalent annual cost (EAC) is the cost per year of owning and operating an asset over its entire lifespan. EAC was calculated as:

$$EAC = (\text{Total PW Cost (or LCC)} * i * (1+i)^t)/(((1+i)^t)-1)$$

i = discount rate
t = expected lifetime of asset

Each of the five sub-projects was assigned an expected lifetime, as summarized in Table 9. David Avenue Reservoir was assumed to have a 75 year lifetime, the pipelines along Pine and Ocean View Boulevard a 50 year lifetime and the treatment plant and pump stations to MRWPCA a 30 year lifetime. An alternative evaluation of annual cost is the Equivalent Annual PW, calculated as the LCC divided by the loan period. For consistency with previous analyses the Equivalent Annual PW was used in the Cost Benefit Analysis in Section 5.4.

Table 9 summarizes the estimated EAC and Equivalent Annual PW for each sub-project and the combined project.

Table 9. Summary of Life Cycle and Equivalent Annual Cost Estimate

	Sub-Project 1: David Avenue Reservoir	Sub-Project 2: Pine Avenue Stormwater System Improvements	Sub-Project 3: Ocean View Boulevard Conveyance	Sub-Project 4: Point Pinos Stormwater Treatment Facility	Sub-Project 5: Urban Diversion System Improvements	Total
Preliminary Captial Cost	$3,575,939	$2,383,475	$6,813,338	$4,973,686	$3,997,157	$21,743,595
Annual O&M	$107,000	$72,000	$204,000	$149,000	$120,000	$652,000
Annual O&M (PW)	$1,591,890	$1,071,178	$3,035,005	$2,216,744	$1,785,297	$9,700,114
Salvage Value	($13,146)	$0	($426,306)	($370,248)	($439,452)	($1,249,152)
Decommissioning Value	$21,910	$0	$710,510	$617,080	$732,420	$2,081,920
Total PW Cost (LCC)	$5,176,593	$3,454,653	$10,132,547	$7,437,261	$6,075,422	$32,276,476
Equivalent Annual PW (LCC/n)	$258,830	$172,733	$506,627	$371,863	$303,771	$1,613,824
Project Life (t, yrs)	75	50	50	30	30	--
Equivalent Annual Cost (EAC)	$174,285	$134,267	$393,806	$379,444	$309,964	$1,391,766

Notes:
- PW = Present Worth, or present value of an investment
- Salvage values were applied only to mechanical equipment that could be moved (e.g. pumps) and were assumed to be 12% of the equipment capital cost.
- Decomissioning values were applied only to mechanical equipment that could be moved (e.g. pumps) and were assumed to be 20% of the equipment capital cost.
- All calculations assume a load period, n = 20 years, inflation = 4%, interest = 7%, discount rate (i) = 3%.

5.4 Cost Benefit Analysis

A cost benefit analysis was conducted to evaluate and compare management options. For this analysis, and for consistency with previous project evaluations in the Pacific Grove ASBS region, Total Suspended Sediment (TSS) was selected as a representative constituent to conduct pollutant load reductions. In 2006, MACTEC used estimates from Alameda County and STORM software to estimate the combined annual TSS load from the New Monterey and Pacific Grove areas at 387,198 pounds/year (or approximately 400 lbs/ac-yr). [20] After the initial Central Coast ASBS Regional Monitoring Program has been completed and additional pollutant load data is available, this analysis should be further developed as part of the final PG ASBS Compliance Plan, due to the SWRCB in 2018. FCE used land use information from GIS to validate this TSS loading estimate. TSS loading factors, estimating the pound equivalent of TSS in stormwater runoff per acre, per year based on land use category, were from a 1999 Environmental Protection Agency (EPA) manual, as summarized in Table 10. The resulting estimate of 360,478 pounds of TSS per year (or approximately 370 lbs/ac-yr) was 7% less than the 2006 estimate.

Table 10. Estimated TSS (lb/yr) load from Pacific Grove ASBS watershed as a result of stormwater runoff.

Land Use Category in PG ASBS Watershed	Area in PG ASBS Watershed (ac)	TSS Loading (lb/ac-yr)[1]	TSS from Runoff (lb/yr)
Commercial	40	1000	39,754
High Dens 29.0 DU/ac	141	420	59,072
Low Dens to 5.4 DU/ac	2	10	19
Low Density Residential	46	10	462
Med Dens to 17.4 DU/ac	267	190	50,661
Medium Density Residential	15	190	2,920
Mobile Home Park	11	420	4,687
Open Space	104	3	312
Public	49	420	20,383
Public Space	4	3	12
Visitor Accomodation or Medium High Density Residential	15	190	2,755
Roadway[2]	280	640	179,441
Sum	**973**		**360,478**

1. Typical pollutant loadings from Runoff by Urban Land Use (lbs/ac-yr) and reported in Table 4-3 of EPA Manual of 'Preliminary Data Summary of Urban Stormwater Best Management Practices', http://water.epa.gov/scitech/wastetech/guide/stormwater/

2. Roadway TSS loading estimated as an average of Freeway (880 lb/ac-yr) and Parking Lot (400 lb/ac-yr) factors.

[20] MACTEC, 2006

Cost Effective Ratio (CER) links outcomes of alternatives (in terms of their water quality benefits) with the costs, and can be calculated in terms of the annual Life Cycle Cost (LCC), where:

CER = (LCC/n) [$/yr] / Pollutant Removal [lbs/year]

In this calculation the annualized LCC is referred to as the Equivalent Annual Present Worth and calculated as the LCC divided by the financing time, in this case where n = 20 years. Table 11 presents the Cost Effective Ratio of the proposed project with an estimated cost of $4.81 per pound of TSS removed.

Table 11. Estimated CER for the proposed project based on pounds of TSS prevented from discharge into the Monterey Bay

Cost Effective Ratio (CER)		
TSS Load	lbs/yr	360,500
	lbs/ac-yr	370
Proposed Project		
Pollutant Removal Efficiency for 85th Percentile Storm Event[1]		93%
Pollutant Removal	lbs/yr	335,300
Life Cycle Cost (LCC)	$	$32,276,476
Equivalent Annual PW (LCC/n)	$/yr	$1,613,824
Cost Effective Ratio (CER)	**$/lbs of TSS Removed**	**$ 4.81**

1. As reported from MACTEC, 2006 as "Average Annual Capture" (i.e. the amount of annual runoff captured and treated) estimated using STORM modeling as a combined efficiency for similations of dry and wet weather storm management for systems designed to manage the 85% storm event.

The two project options identified in the MACTEC (2006) analysis that are most similar to the proposed project were Pacific Grove ASBS Options 3 and 9. Option 3 proposed treatment of wet and dry weather flows up to the 85% storm event at the Point Pinos Treatment site. Option 9 proposed delivery and treatment of all wet and dry weather flows up to the 85% storm event to the MRWPCA. Table 12 summarizes the cost and cost effective ratio of the proposed project as compared to MACTEC Options 3 and 9 (inflated to 2013 dollars). The proposed project CER of $4.81/lb of TSS Removed is less than Option 9 ($4.97/lb TSS) and more than Option 3 ($1.43/lb TSS). It should be noted that neither Option 3 or 9 included rehabilitation of the David Avenue Reservoir. Option 3 also provided for a wet pond with impermeable liner, whereas the proposed project accounts of a stormwater treatment and reuse facility.

Table 12. Summary of Proposed Project Cost and CER Compared to Similar Project Options Identified in MACTEC, 2006 Study

	Proposed Project	**Option 3 From MACTEC, 2006 (2013 $)**	**Option 9 From MACTEC, 2006 (2013 $)**
Preliminary Captial Cost	$21,743,595	$ 9,195,685	$ 31,745,061
Annual Debt Payment	$1,461,511	$618,094	$2,133,767
Annual O&M (PW)	$9,700,114	$400,027	$1,068,177
Salvage Value	($1,249,152)	($183,494)	($434,649)
Decommissioning Value	$2,081,920	$188,066	$885,496
Total PW Cost (LCC)	$32,276,476	$ 9,600,284	$ 33,264,085
Equivalent Annual PW (LCC/n)	$1,613,824	$480,014	$1,663,204
Equivalent Annual Cost (EAC)	$1,391,766	$489,799	$1,697,109
Cost Effective Ratio (CER)	**$ 4.81**	**$ 1.43**	**$ 4.97**

1. All calculations assume a 30-year project life (t), 7% interest on debt, 4% inflation, 3% discount rate (i), and a 20 year loan period (n)

2. MACTEC dollar values inflated from 2006 to 2013 dollars using a factor of 1.22 from RSMeans Historical Cost Indices (2006 = 82, 2013 = 100).

5.5 Market Value Comparison

The primary objective of the proposed project is to manage and treat stormwater discharges into the Pacific Grove ASBS. As a secondary benefit, the proposed project provides the opportunity to reuse collected stormwater for irrigation. Specifically, the proposed project would install three storage facilities located in the vicinity of where irrigation is currently occurring with potable water from Cal-Am; at the Robert Down Elementary School, Caledonia Park and Pacific Grove Golf Links. Potential reuse demands at these locations for recycled water or stormwater have been identified in two previous studies, and are summarized in Table 13.[21] In the vicinity of the Pacific Grove Golf Links, individual demands were identified for the El Carmelo Cemetery and for filling maintenance trucks.

[21] MACTEC, 2006 and the "City of Pacific Grove Local Water Project Draft Facility Plan Report, WRFP No. 3316-010", Brezack and Associates Planning, January 31, 2014.

Table 13. Summary of Potential Reuse Opportunities and Cost for Proposed Project

Proposed Project					
Demand Location	**Robert Down Elementary School**	**Caledonia Park**	**Municipal Golf Links**	**El Carmelo Cemetery**	**Truck Fill**
Potential Reuse Demand (AFY) - MACTEC, 2006	4.6	3.5	273		
Potential Reuse Demand (AFY) - Brezack, 2014	5	1	90	10	24
Proposed On-Site Storage Size (gal)	240,000	320,000			430,000
Proposed On-Site Storage Size (AF)	0.737	0.982	1.320		
With Assumed Loss from Storage of 20% (AFY)[1]	0.589	0.786	1.056		
Dry Weather Flow (AFY)[2]	2.09	2.59	2.83		
Demand Met via On-Site Storage and Dry Weather Flow (AFY)	2.68	3.38	3.89		
Remaining Demand (AFY)	2.32	-2.38	86.11		
Revised Unmet Demand (AFY)[3]	0.00	0.00	83.74		
Total Project Yield (AFY)[4]	12.3				
Annual Cost for Treatment[5]	$18,900				
Cost ($/AF)	$1,500				

1. Assumes storage at capacity at end of wet season and available for irrigation use during dry season.

2. Dry weather flow to Robert Down Elementary is estimated as the sum of dry-weather flow from drainage basins 39 and 40. Dry weather flow to Caledonia Park is estimated as the sum of dry-weather flow from drainage basins 15, 23, 24, & 25. Dry weather flow to Point Pinos is estimated as the total flow Point Pinos Treatment Plant (7.51 AF) minus sum of dry-weather flow from drainage basins 15, 23, 24, 25, 39 and 40.

3. Assumes (1) remaining demand at Robert Down Elementary met with releases from David Avenue Reservoir and (2) excess stored water at Caledonia Park transferred to Point Pinos

4. Sum of demand met at Robert Down Elementary, Caledonia Park and partial demand met at Point Pinos.

5. Annual cost estimate for capital and O&M based on three separate ozonation systems with similar requirements to the Lake Estero Irrigation Ozonation system in the City of Monterey. For consistency, applied Local Recycled Water Project factors of n = 30 years and i = 2%.

Table 13 also summarizes the size of the proposed stormwater storage facilities and anticipated dry weather flows at each of the potential stormwater reuse locations. The proposed Pacific Grove ASBS Stormwater Management project has been designed so that it can also effectively operate to seasonally distribute flows between the four primary storage facilities to meet irrigation demands; from David Avenue Reservoir to Robert Down Elementary, down to Caledonia Park and ultimately to the Stormwater Treatment Facility at Point Pinos. It is anticipated that with additional releases from the

rehabilitated David Avenue Reservoir, stormwater could be managed to meet 5 acre-feet per year (AFY) of irrigation demand at the Robert Down Elementary School, 1 AFY of irrigation demand at Caledonia Park and approximately 6.3 AFY of irrigation demand at Point Pinos (out of approximately 125 AFY total demand at this location, serving the Golf Links, El Carmelo Cemetery or truck filling), for a total of 12.3 AFY.

Additional treatment of the stored stormwater would be required prior to irrigation. Conceptually, the additional treatment could be skid mounted and include a filtration and disinfection system. The ozonation system managed by the City of Monterey at Lake Estero for irrigation at the park was used an example for developing a planning level cost estimate for the additional treatment that potentially would be required at each of the three stormwater reuse locations. Table 14 summarizes the preliminary cost estimate to install three treatment systems at an estimated cost of $252,000, or a total of $1,500/AF for onsite reuse. The total cost would be greater, however, as this cost estimate does not include all necessary and pertinent improvements that would be required at each location (i.e. excludes storage and pipeline delivery and distribution systems).

Table 14. Planning Level Cost Estimate for Distributed Stormwater Treatment at Three Locations for Irrigation

Ozonator (3 systems)[1]	$ 120,000
Pretreatment (15%)	$ 18,000
Tax and Delivery (11%)	$ 13,200
Installation (20%)	$ 24,000
Manufacturer Services (4%)	$ 4,800
Subtotal	$ 180,000
Contingency (30%)	$ 54,000
Engineering Design (10%)	$ 18,000
Total	**$ 252,000**
Annualized Capital Cost[2]	$11,300
Annuallized O&M (3% Construction Cost)	$ 7,600

1. Based on estimate from City of Monterey Estero Lake Ozonator for Irrigation; approximately $100,000 capital cost and $2,600 annual O&M to produce up to 52 AF per year.

2. For consistency, applied Local Recycled Water Project factors of n = 30 years and i = 2%.

The City of Pacific Grove is also currently planning a recycled water scalping plant at the retired Point Pinos Water Treatment Plant. The initial phase of the proposed Local Water Project (LWP) is currently estimated to cost $3,828,600 and would meet up to 125 AFY of demand in the Point Pinos vicinity in the first phase, primarily at the Pacific Grove Golf Links, and up to 500 AF in future phases.[22]

Both the Local Recycled Water Project and potential supplies from the Pacific Grove ASBS Stormwater Management Project would offset potable water currently delivered from CalAm. The cost of potable water from CalAm that is currently used for irrigation at these locations may vary depending on the extent of conservation measures, but at the high end is $13,000/AFY for outdoor irrigation without BMPs.[23]

Without investments in storage, stormwater reuse is not generally feasible to offset large irrigation demands. In the case of the proposed project, storage facilities are proposed to manage peak flows and can be synergistically used to meet local irrigation demands. The cost of additional treatment of stored stormwater prior to irrigation would likely be less than potable water from CalAm that is currently used for irrigation. Treated stormwater may be a source of non-potable water supply in addition to the Local Water Project, most notably at Robert Down Elementary School and Caledonia Park and nearby open space areas.

[22] "City of Pacific Grove Local Water Project Draft Facility Plan Report, WRFP No. 3316-010", Brezack and Associates Planning, January 31, 2014.
[23] Personal communication from J. Krebs, Senior Engineer City of Monterey, July 2013

6. PROJECT IMPLEMENTATION PLAN

6.1 Project Phasing

It is unlikely that each of the five sub-projects would be constructed at the same time. The following is one potential approach to sequencing the construction:

1. David Ave Reservoir
2. Robert Down Elementary School Storage and CDS Unit
    - Treatment system for stormwater reuse to meet irrigation demand
3. Caledonia Storage and CDS Unit
    - Treatment system for stormwater reuse to meet irrigation demand
4. MRWPCA Urban Diversion Improvements
5. Ocean View Conveyance and Pump Stations
6. Pine Avenue Conveyance
7. Point Pinos Stormwater Treatment Facility
    - Treatment system for stormwater reuse to meet a portion of irrigation demand

This implementation sequence maximizes the use of each facility without depending on the completion of a subsequent sub-project to immediately allow the use of each facility. Importantly, the conveyance along Pine Avenue and Ocean View Boulevard should be closely coordinated; Ocean View conveyance would need to be installed to adequately convey the additional flows delivered from Pine Avenue.

6.2 Institutional Agreements

The construction and continued O&M of the proposed project would depend upon agency coordination and institutional agreements between numerous entities. The following list describes institutional agreements likely required for the project.

City of Monterey and City of Pacific Grove – This project is a partnership between both Cities and numerous elements will need to be coordinated and agreed upon, including the following:

- Implementation
    - The project would provide a coordinated approach for the Cities to each achieve ASBS compliance, therefore proportional responsibility would need to be assigned as it pertains to each Cities share of the project costs, including both capital and long term O&M.
    - Due to the range of benefits this project would accomplish if implemented, it is expected to be competitive for grant and other funding opportunities. The Cities will need to coordinate joint pursuit of funding opportunities, in terms of application preparation and management of funds received.

    - Similarly, the Cities will need to agree upon how permitting will be coordinated and led.

- Facility Management
    - The Cities would need to agree upon the coordinated management of the MRWPCA diversion system, which would receive flows from northeastern Pacific Grove and New Monterey.
    - If a facility transfer or sharing agreement is reached with CalAm for the use of the David Avenue site, the Cities will potentially need to agree upon joint ownership and/or management of the property and reservoir.
    - Additionally, if agreed upon, the Cities would need to coordinate the release of water from David Avenue Reservoir to meet irrigation demands and agreed upon locations in Pacific Grove and/or Monterey.

CalAm – CalAm is the current owner and operator of the David Avenue Reservoir site which includes one of their critical distribution facilities, the Eardley Pump Station. CalAm has expressed interest and support of the proposed project and is a necessary partner for successful rehabilitation of the David Avenue Reservoir. In the near term, CalAm will need to be a project permitting partner specifically as it relates to approval and coordination of the proposed reservoir design review with the Division of Safety of Dams (DSOD). With support from CalAm, the City of Monterey, either independently or jointly with the City of Pacific Grove, could coordinate an agreement for transferring the Reservoir to the City for rehabilitation and a return to service for stormwater management. The current use of the site as a maintenance and operations yard would likely require modifications or potentially need to be relocated depending upon the agreed upon final use of the property.

Pacific Grove Unified School District (PGUSD) – The proposed location for storage of stormwater between David Avenue and Pine Avenue is on PGUSD property, specifically the playing fields behind Robert Down Elementary School, near Junipero Avenue. The proposed storage location would need to be negotiated with PGUSD and could provide PGUSD with an irrigation supply source, offsetting the existing 5 AFY potable water demand at potential cost savings to the PGUSD.

MRWPCA – The proposed project would increase deliveries of wet weather flows to the MRWPCA in addition to the existing dry weather diversion system. The additional capacity of the MRWPCA system to receive and treat these flows would need to be confirmed and the cost of any additional improvements negotiated (e.g. capacity fees) if the MRWPCA would use them as a source of supply for recycled water demands.

MPWMD - With the MPWMD/MRWPCA's planned Groundwater Replenishment Project (GRP) it is also in the Cities' interest to clearly define with the MPWMD the amount of stormwater conveyed into the MRWPCA system for treatment in Marina, storage in the Seaside Groundwater Basin, and reuse in the CalAm potable water system. There is the potential that some of the stormwater conveyed to the MRWPCA, treated in Marina, and delivered to the GRP could become a part of each Cities' water supply portfolio or become new water allocation to the Cities. For this to occur, MPWMD must conduct further environmental review to establish new water allocations or credits.

6.3 Permitting

Construction, operation and environmental permits will be required for implementation of the proposed project. Below and consistent with information presented in the Draft EIR for the project is a list of permits that are anticipated for the construction and operation phases of the project.

6.3.1 Construction Permits

- City of Monterey –EIR Certification, Use Permit (Utility, major), Tree Removal Permit (if applicable), Street Opening Permit and Building Permit
- City of Pacific Grove – EIR Certification, Use Permit, Building Permit, Tree Removal Permit(s), and Encroachment Permits
- Authority to Construct (Monterey Bay Air Quality Management District)
- General Construction Stormwater NPDES Permit and compliance with existing Phase II Small Municipal Separate Storm Sewer System (MS4) General Permit requirements (RWQCB)
- Construction, Trenches, Excavation and Demolition (California OSHA)
- Sewer Discharge and Connection Permits (MRWPCA)
- Coastal Development Permit (California Coastal Commission)
- Clean Water Act Section 404 Nationwide Permit (U.S. Army Corps of Engineers)
- Approval of David Avenue Reservoir Improvements (California Department of Water Resources Division of Safety of Dams)
- 1602 Streambed Alteration Agreement (California Department of Fish and Wildlife)

6.3.2 Operational Permits

- Permit to Operate (Monterey Bay Air Quality Management District)
- Compliance with backflow prevention requirements (CalAm and MPWMD)
- California Department of Public Health – approval of treated stormwater for irrigation purposes
- Operational permit for David Avenue Reservoir with the DWR Division of Safety and Dams

6.4 Next Steps

6.4.1 Master Planning Studies

There are a three additional investigations, or special studies, that if completed could expedite project implementation. The proposed investigations are specifically related to continued use of the David Avenue Site, improvements on Pine Avenue and stormwater treatment and reuse. The recommended scope of each of these studies is described in more detail below.

David Avenue Reservoir Master Plan – In addition to the institutional agreement required for successful transfer of the Reservoir site (described in Section 6.2), the proposed rehabilitation of the Reservoir would benefit from a shared vision for how the site can balance competing community, water utility and stormwater management needs. The proposed Master Plan would incorporate representatives from each of these sectors and recommend a strategy for ownership, site use and landscape amenities to the site.

Pine Avenue Master Plan – The conveyance pipeline along Pine Avenue was strategically located to coincide with future improvements on Pine Avenue; a Safe Routes to Schools project and Green Street Low Impact Development (LID) retrofits. The Green Street improvements can be connected to the proposed stormwater conveyance pipeline on Pine Avenue, and would provide additional stormwater water quality benefits for the ASBS. A Pine Avenue Master Plan would provide a cohesive plan for how these three projects can not only be strategically phased but physically interwoven to maximize their individual impacts.

Stormwater Treatment and Reuse Pilot Study – There is currently very little available data documenting the successful treatment and reuse of stormwater. A pilot study treating stormwater runoff from the ASBS watershed could benefit the project by testing stormwater treatment technologies and removal efficiencies. Such a study would not only benefit the ASBS, but other local utilities considering similar water supply projects.

6.4.2 Geotechnical Investigations and Surveying

Additional geotechnical studies and surveying work will need to be conducted in all project areas to support the final design and permitting for the projects. A comprehensive geotechnical investigation of the existing David Avenue Reservoir dam and site would be needed to support the final designs and permitting of the project with the State Division of Safety of Dams. A geotechnical investigation along Pine Avenue, at David Avenue School and at the Caledonia Street storage site will also be required to verify site conditions and determine the most appropriate method of construction in these areas. Additional detailed survey work would be required for these areas as well to verify site layout and utility locations. At the David Avenue Reservoir specifically, field verification of the existing reservoir outlet structure and outlet pipes, in addition to the location and invert elevations of connecting storm drains will be required. At Point Pinos, careful review of existing deed restrictions at the former wastewater treatment plant site will need to occur to ensure consistency with the proposed stormwater treatment facility.

6.4.3 Engineering Design and Permitting

The current preliminary engineering design is at the approximate 40% completion level. FCE recommends subsequent design submittals should be developed and submitted for the Cities review at the 65%, 95% and 100% level of completion. The project cost estimate, construction specifications and a basis of design document should be updated with each design submittal. In addition to field verifying the location of existing utilities as they relate to the proposed project, the 65% design documents should incorporate findings from the geotechnical investigations and detailed site-specific topographic surveys (Section 6.4.2). The 65% Design documents, as related to the David Avenue Reservoir, should be submitted to the DSOD for review and comment along with a hydraulic analysis that includes a probable maximum flood (PMF) analysis within the reservoir and routing through the outlet structure. DSOD has indicated review of 65% level designs, PMF, and routing analysis can take up to 6 months.

A permitting strategy and timeline should be developed that would identify key personnel for coordination and approval milestones for acquiring the construction and operating permits listed in Section 6.3.

6.4.4 Project Construction

Project bid documents should be developed and include the project specifications and 100% design plans. The Cities would then secure a contractor and create a detailed construction schedule. As required for approval, the project (or sub-projects, depending on implementation) would require a Stormwater Pollution Prevention Plan(s) and associated monitoring. During construction on-going supervision and inspection is required to verify the quality and accuracy of construction. Construction should be considered complete once a final review and sign-off of responsible delegates is complete.

6.4.5 Project Monitoring and Evaluation

Once constructed, the proposed project should be regularly monitored to evaluate if the ASBS stormwater pollutant removal targets are being achieved. Water quality monitoring could be conducted within the stormwater collection and conveyance system and also within the ASBS to compare and confirm that natural water quality is not being degraded due to stormwater inflows. If water quality impacts are identified, the stormwater system should be further evaluated and management measures adapted to ensure protection of the ASBS.

The sub-projects should be regularly monitored according to site-specific operation and maintenance (O&M) plans that clearly identify maintenance schedules and routine practices. Adequate (O&M) procedures at the David Avenue Reservoir, the new pump stations and stormwater storage locations, and at the Point Pinos Stormwater Treatment Facility would safeguard facility longevity and protection of the ASBS due to stormwater pollution.

6.4.6 Proposed Project Timeline

Below is a proposed project timeline and the approximate duration to accomplish each milestone, as measured in months to complete each item:

1. Institutional Agreements (18 - 24 months)
2. Project Master Plans
    a. David Avenue Reservoir Master Plan (12 – 18 months)
    b. Pine Avenue Master Plan (12 – 18 months)
    c. Stormwater Treatment and Reuse Pilot Study (24 months)
3. Geotechnical Studies and Surveys (12 months)
4. Engineering Designs and Permitting (12-24 months)
5. Project Construction
    a. David Ave Reservoir (6 months)
    b. Robert Down Elementary School Storage and CDS Unit (2 months)
        i. Treatment system for stormwater reuse to meet irrigation demand (1 month)
    c. Caledonia Storage and CDS Unit (1 – 2 months)
        i. Treatment system for stormwater reuse to meet irrigation demand (1 month)
    d. MRWPCA Urban Diversion Improvements (2 – 3 months)
    e. Ocean View Conveyance and Pump Stations (4 – 5 months)
    f. Pine Avenue Conveyance (3 – 4 months)
    g. Point Pinos Stormwater Treatment Facility (3 – 4 months)

6. Project Monitoring and Evaluation (ongoing)

6.5 Funding Strategy

Along with developing institutional agreements, identifying a funding strategy for the proposed project should be a near term objective for each of the Cities. The funding strategy should be for the proposed project as a whole and for each of the sub-projects because, as mentioned in Section 6.1, it is unlikely all the sub-projects will be implemented simultaneously. A successful funding strategy would consider local, state and federal sources and if implemented would greatly enhance each of the Cities' mandates of successfully managing stormwater runoff in the ASBS watershed.

This project is well suited to qualify for a variety of grant funding opportunities. Three potential opportunities are the (1) Integrated Regional Water Management (IRWM) grant program, (2) funding through Proposition 84 and (3) directly through the Ocean Protection Council (OPC). The OPC generally does not have an open solicitation process, but can be approached directly with funding requests. They have funds available for low impact development (LID) projects and have ASBS related strategic goals. Where match funds are required to receive grant awards, the Cities could potentially apply monitoring efforts and/or property contributions (e.g. at David Avenue Reservoir).

Table 15 outlines available programs for stormwater related projects remaining in Proposition 84 and Proposition 1E as well as Clean Water Act funding, including 319(h) and the State Revolving Loan Fund. A new water bond may be put on the ballot in 2014 and may provide future funding opportunities for the project as a whole or the various sub-projects. Stormwater is supported in all of the existing water bonds with sufficient funding for the costs associated with the ASBS Stormwater Management Project.

Additionally drought emergency legislation currently in effect will expedite an approximate $200 million dollar portion of the Proposition 84 IRWMP funds for a grant round in early Spring 2014. These funds will be especially focused on multi-benefit water supply projects as focused by the drought emergency.

Table 15. Funding Programs for Stormwater Related Projects

Program	**Agency**	**Website**
Clean Beaches Initiative – Proposition 84	State Water Resources Control Board	http://www.waterboards.ca.gov/water_issues/programs/grants_loans/
Stormwater Program – Proposition 84	State Water Resources Control Board	http://www.waterboards.ca.gov/water_issues/programs/grants_loans/
Stormwater Flood Management – Proposition 1E	Department of Water Resources	http://www.water.ca.gov/irwm/grants/stormwaterflood.cfm
Integrated Regional Water Management Program – Proposition 84	Department of Water Resources	http://www.water.ca.gov/irwm/grants/index.cfm
Ocean Protection Council – Proposition 84	State Coastal Conservancy	http://www.opc.ca.gov/category/funding-opportunities/
Clean Water Act 319 h Grant Program	State Water Resources Control Board	http://www.waterboards.ca.gov/water_issues/programs/grants_loans/
State Revolving Loan Fund	State Water Resources Control Board	http://www.waterboards.ca.gov/water_issues/programs/grants_loans/

FIGURES

Figure 1. Pacific Grove Area of Special Biological Significance (ASBS) 56
Figure 2. Project ASBS Watershed Management Areas 57
Figure 3. Sub-Project Areas 58
Figure 4. Precipitation Measured at the Monterey Bay Aquarium from 1/20/2012 to 1/21/2012 59
Figure 5. Comparison of Modeled and Measured Discharge at Greenwood Park 59
Figure 6. Sub-basin Boundaries 60

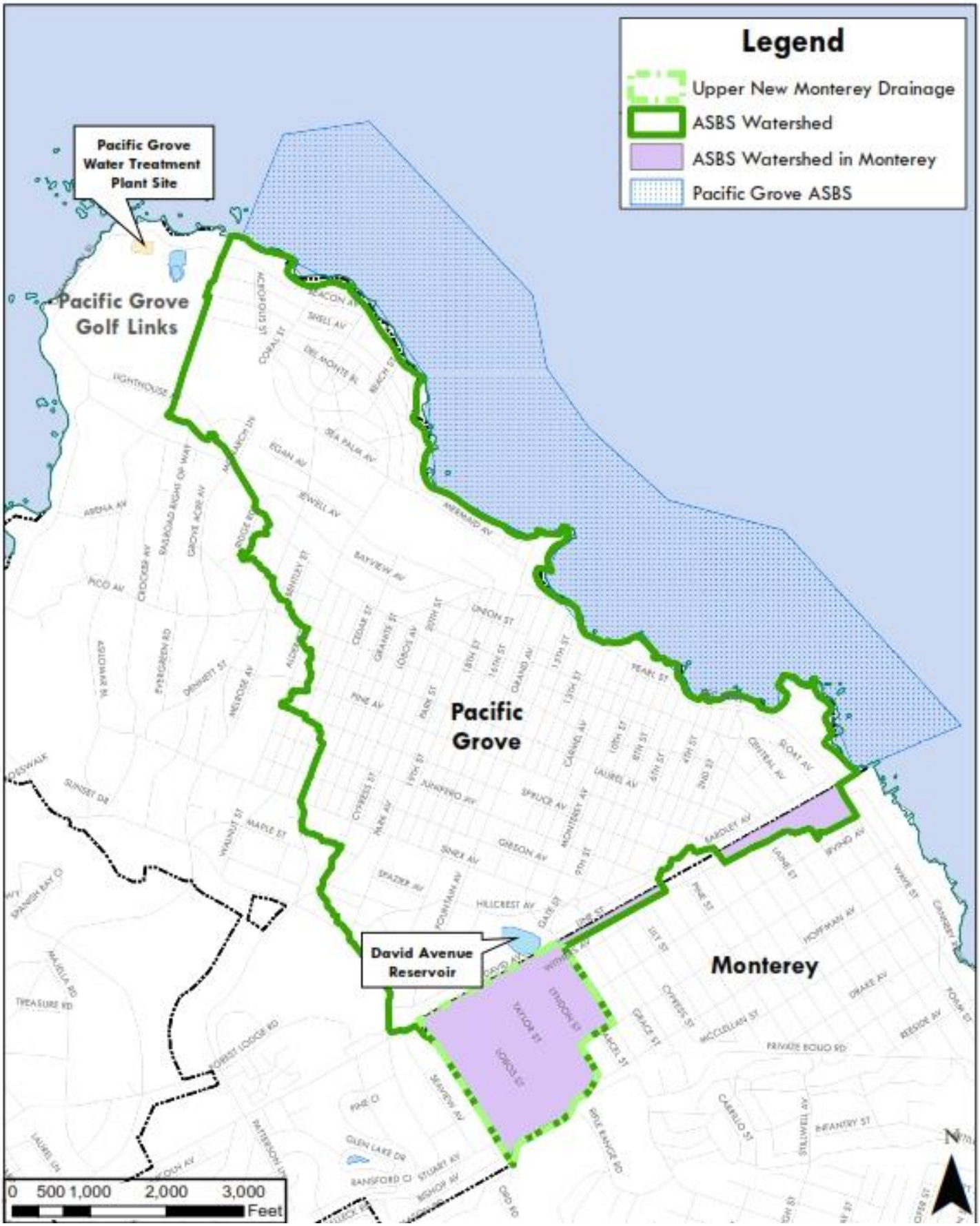
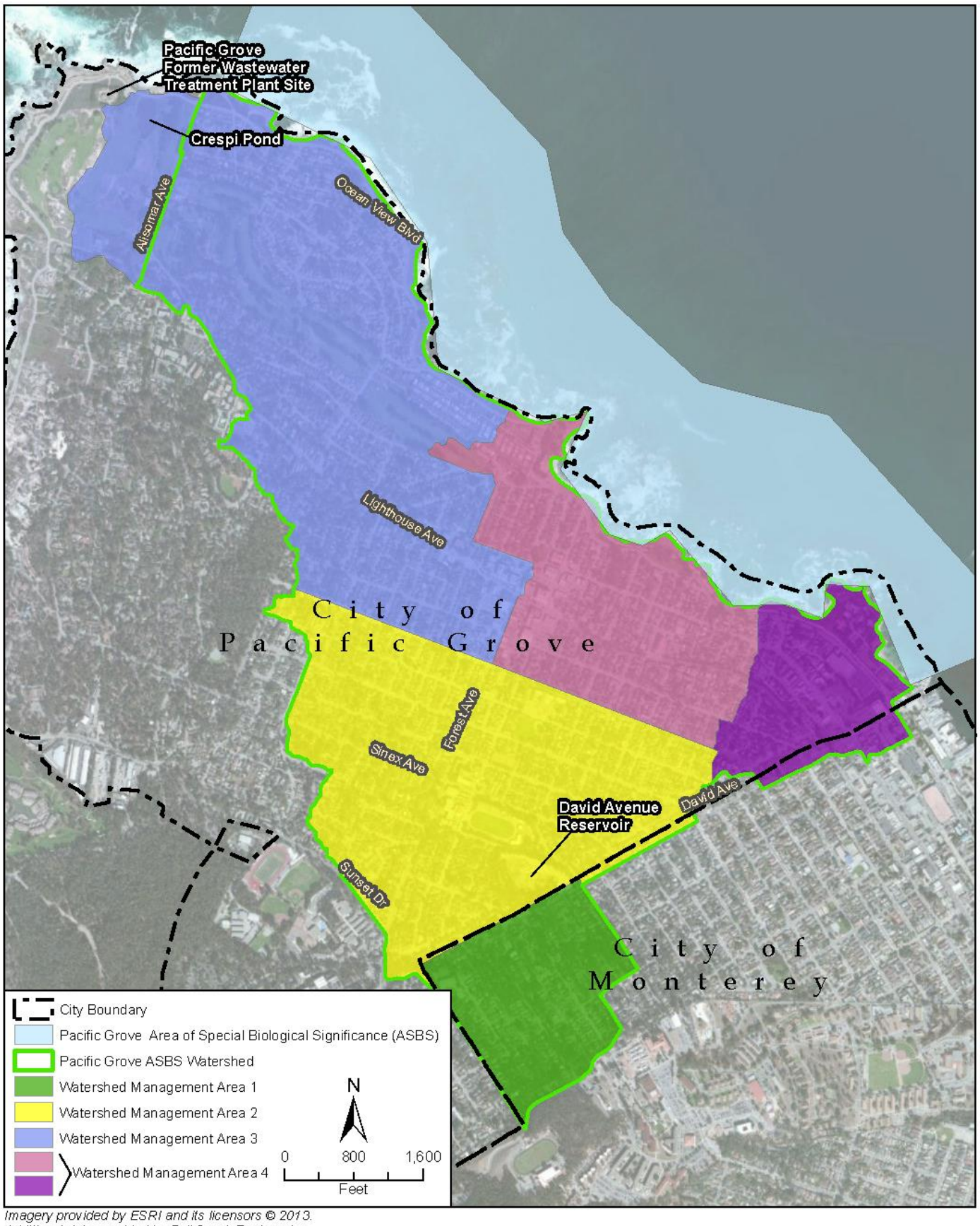


Figure 1. Pacific Grove Area of Special Biological Significance (ASBS)



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Additionsl data provided by Fall Creek Engineering and the City of Pacific Grove, 2013.

Figure 2. Project ASBS Watershed Management Areas

Figure 3. Sub-Project Areas

Figure 4. Precipitation Measured at the Monterey Bay Aquarium from 1/20/2012 to 1/21/2012

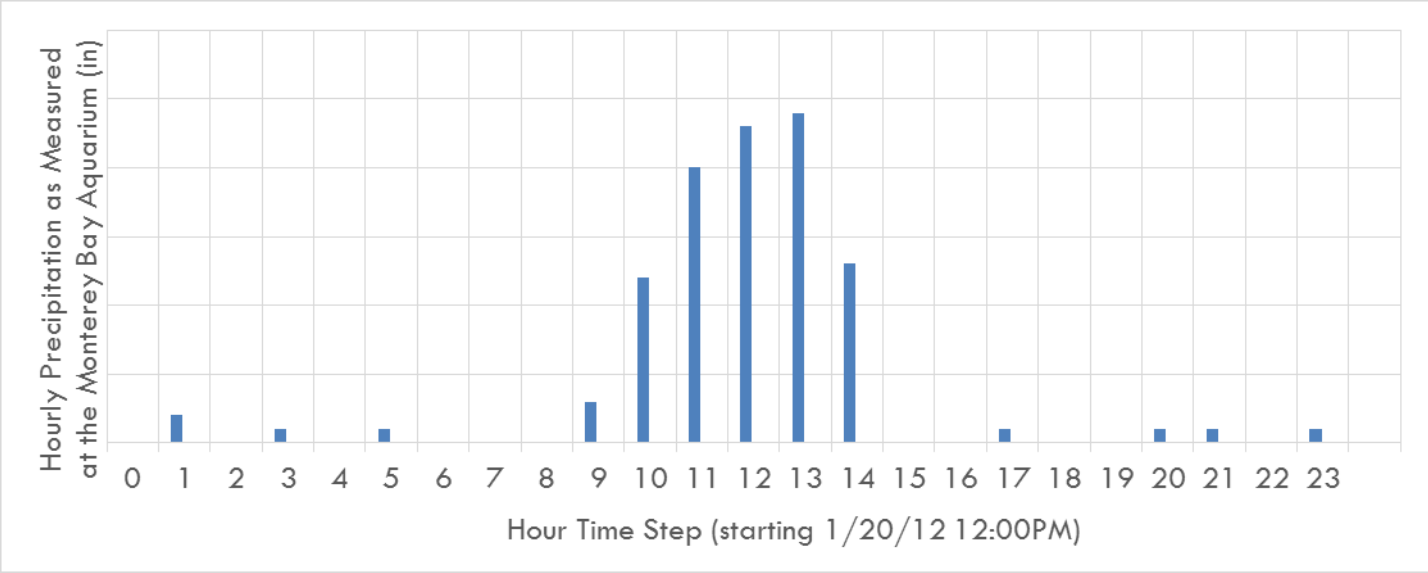
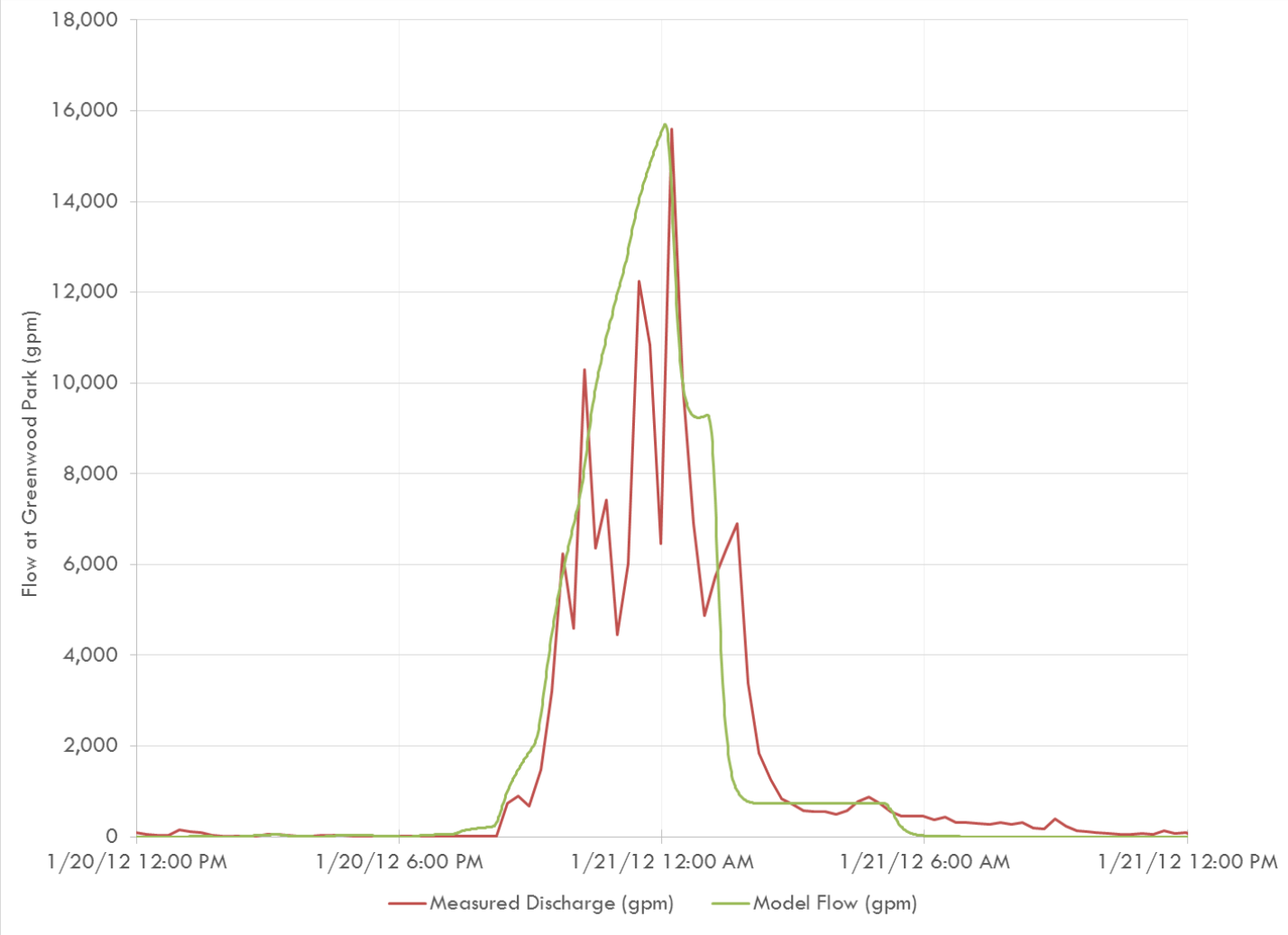


Figure 5. Comparison of Modeled and Measured Discharge at Greenwood Park



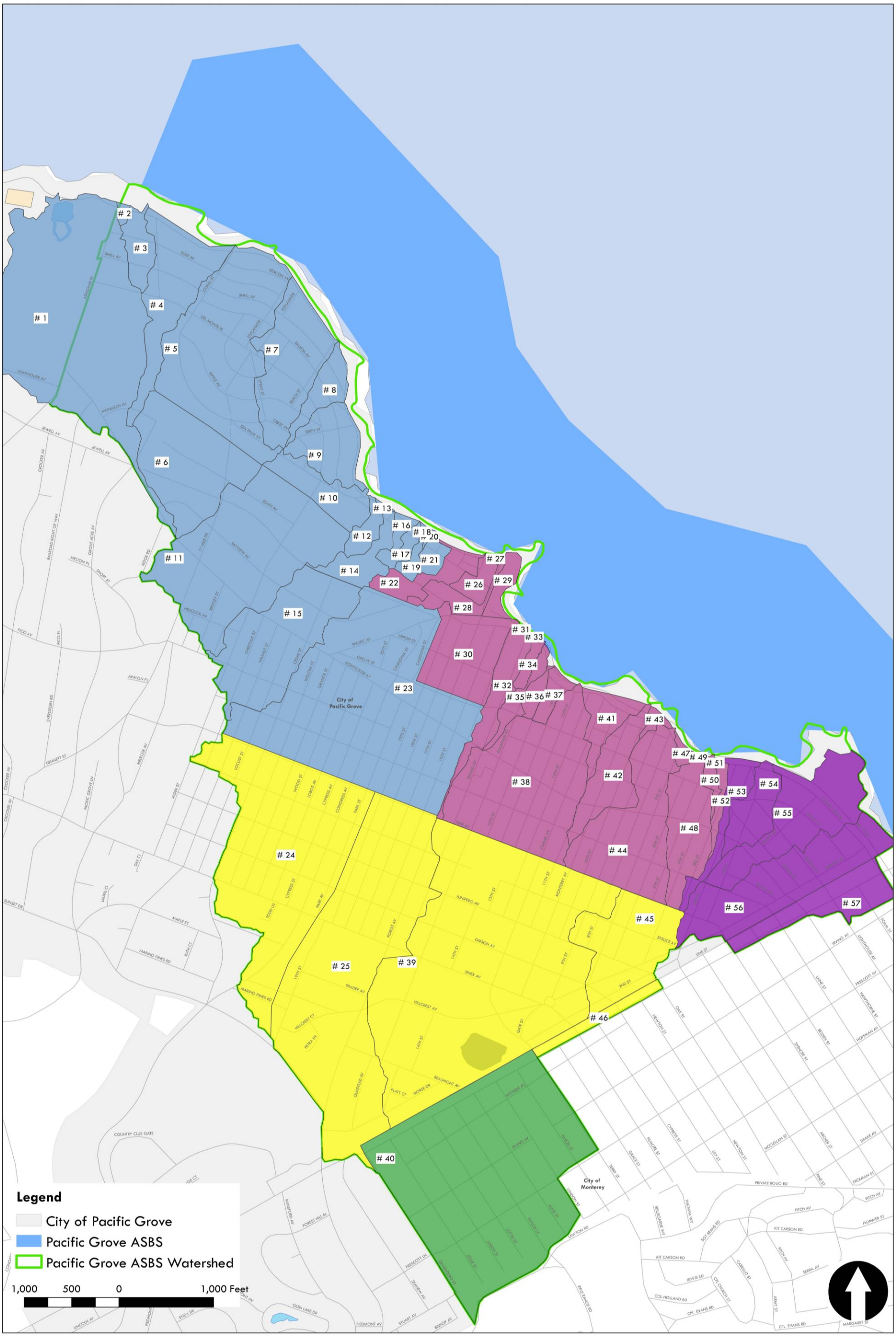


Figure 6. Sub-basin Boundaries

ATTACHMENTS

ATTACHMENT A

Project Alternatives Screening Analysis

May 2013

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Subject: **Screening Analysis of Project Alternatives**
Cities of Monterey and Pacific Grove ASBS Feasibility Study
of Alternative Management Strategies to comply with ASBS Special Protections

Dear Jeff and Sarah:

Fall Creek Engineering, Inc. (FCE) is pleased to present this screening analysis of alternative storm water management strategies to comply with the ASBS special protections requirements issued by the State Water Resource Control Board (SWRCB).

1. Executive Summary

The purpose of this screening analysis was to evaluate potential stormwater management projects within the Cities of Monterey and Pacific Grove, and identify a preferred and alternate project capable of meeting the SWRCB ASBS requirements. The screening analysis compared six project alternatives based on 16 screening criteria and identified a preferred project whereby both dry and wet-weather flows from Pacific Grove and New Monterey would be treated at a rebuilt Pacific Grove Water Treatment Plant (PGWTP). The alternate project would treat both dry and wet-weather flows from Pacific Grove and New Monterey at the Monterey Regional Water Pollution Control Agency, Regional Water Treatment Plant in Marina. Both proposed projects would utilize storage in a modified David Avenue Reservoir, currently owned and operated by the California American Water Company (CalAm).

In the coming months, these two project concepts will be further developed, and preliminary designs completed to assist with evaluation under the California Environmental Quality Act (CEQA).

FCE in collaboration with Balance Hydrologics, Rincon Consultants, Pacific Geologic and staff from the Cities of Monterey and Pacific Grove reviewed and screened several project alternatives. This technical letter summarizes the review and screening methodology, outcomes and summarizes the two preferred project alternatives.

1. Background

In 2006, the City of Monterey obtained a Proposition 50 planning grant from the State Department of Water Resources to analyze a suite of options to address regulatory restrictions imposed by the State Water Resources Control Board (SWRCB) for storm water discharges to the State's designated "Areas of Special Biological Significance" (ASBS). The ASBS analysis was presented in a study completed in 2006 by MACTEC Engineering and Consulting, Inc. (MACTEC)[1]. The focus of this study was to address storm water discharges to the Pacific Grove and Carmel Bay ASBS's coastal zones. The Pacific Grove ASBS receives runoff from the New Monterey District in the City of Monterey and from the City of Pacific Grove. The MACTEC study identified and analyzed twenty two alternative projects including local projects that collect and treat runoff in Pacific Grove before it is discharged to the Monterey Bay, regional projects that pump runoff to the Monterey Regional Water Pollution Control Agency (MRWPCA), a public owned treatment plant in Monterey, and other potential projects.

Subsequently, in 2009 the City of Pacific Grove retained the engineering firm of Malcolm Pirnie to complete Feasibility and Basis of Design studies to evaluate the feasibility of collecting and recycling storm water within the City of Pacific Grove.[2] These studies evaluated four alternative projects; however, the primary objectives of each project was focused on water recycling and not necessarily protection of the ASBS. As a result, the various projects do not fully address the requirements of the ASBS Special Protection Provisions adopted by the SWRCB.

Over the past few years, the Cities of Monterey and Pacific Grove have been evaluating alternative water supply and storm water management projects to address the ASBS requirements and critical water supply issues on the Monterey Peninsula. Based on these recent efforts, several additional or modified projects were identified and screened in this analysis.

On March 20, 2012, the State Water Resources Control Board (SWRCB) adopted the "General Exception and Special Protections for the California Ocean Plan Waste Discharge Prohibition for Storm Water and Nonpoint Source Discharges" into the ASBS. The "Special Protections" are part of a General Exception to the California Ocean Plan (COP), which states, "Waste shall not be discharged to **areas designated as being of special biological significance**. Discharges shall be located a sufficient distance from such designated areas to assure maintenance of natural water quality conditions in these areas." Generally, the Ocean Plan:

- Is the basis for regulation of wastes discharged in coastal waters and establishes water quality objectives for discharges as measured in the ocean *receiving water*.
- Applies to point (typically outfall pipes) and non-point (typically overland flow) source waste discharges.

---

[1]MACTEC. 2006. *Final Alternatives Analysis and Data Acquisition for Pacific Grove and CarmelBay Areas of Special Biological Significance*
[2]Malcom Pirnie, Inc. 2009. *Stormwater Recycling Facility – Basis of Design Report*

The principle requirements in the "General Exception" and "Special Protections" include:

- Elimination of non-storm water urban runoff (e.g. dry weather discharges) into the ASBS;
- Ensuring that wet weather flows do not alter "natural water quality;"
- Ocean receiving water monitoring to ensure marine life and other beneficial uses are protected;
- Best Management Practices (BMPs) to reduce pollutants, debris, and larger particles and,
- Reducing pollutant loads by 90% during wet-weather, if natural water quality is found to be degraded by these discharges and
- Elimination of all trash from outfalls and discharges.

The "Special Protections" and "General Exception" apply statewide in lieu of individual exceptions.

In January 2013, Fall Creek Engineering, Inc. (FCE) was retained by the City of Monterey to complete the *City of Monterey and Pacific Grove ASBS Refined 2006 Feasibility Study of Alternatives Management Plan*. The scope of work in this study is to: (1) refine and select a preferred and alternate project from the broad list of projects identified by MACTEC, (2) select a preferred project alternative, (3) develop conceptual and preliminary plans for the preferred project; prepare the CEQA environmental review document for the preferred and alternative projects; (4) prepare a work plan and grant application for the preferred project.

As the initial task of this project, FCE conducted several meetings with the Cities of Monterey and Pacific Grove, several stakeholders (California American Water (CalAm), MRWPCA, and New Monterey District representatives) to revisit and refine the various project alternatives.

After a cursory review and screening of the twenty two (22) alternatives identified in the 2006 MACTEC Study, six (6) project alternatives were identified and refined with input from the Cities of Monterey and Pacific Grove. These alternatives were then screened by numerical ranking and weighting to select the preferred and alternative projects. This technical letter presents a description of the screening methodology and the results of the analysis.

2. Screening Methodology

A three step screening process was utilized to refine and select the preferred and alternative projects.

<u>Step One – Cursory Project Screening</u>

The first step of screening included a cursory review using three primary criteria:

a. Does the project have the potential to achieve the water quality requirements set forth for the ASBS for both Cities of Pacific Grove and Monterey;

b. Does the project not create regulatory uncertainty by not addressing the requirements of the ASBS Special Provisions that may impact the City of Monterey and/or Pacific Grove if they do not participate in the project; and

c. Is the project financially and technically feasible?

Step Two – Initial Project Ranking and Screening of Alternatives

After the cursory screening of alternatives was completed, four project alternatives were ranked according to fourteen (14) screening criteria by the consulting team. A description of the criteria and ranking methodology is provided. This initial ranking was presented to the Cities of Monterey and Pacific Grove staff, and the matrix was updated to add two additional screening criteria and two alternatives and re-evaluated resulting in the final screening.

Step Three – Final Screening Using Weighted Criteria

To compare each of the selected alternatives, the project team identified sixteen (16) screening criteria and assigned a relative weight, or importance, to each of the criteria. A low priority criteria has a weight of 1 and a high priority criteria has a weight of 5. The four criteria considered the most important, with a weight of 5, were:

- Water Quality Benefits or Ability to Meet ASBS Requirements,
- Impact to Regional Water Treatment Plant (WTP) Capacity,
- Ability for the project to Achieves Multiple Benefits, and
- Access to Potential Funding Opportunities.

Each of the six alternatives (A-F) were then compared to each other and assigned a rank in order from 1 to 6, with 1 being the most favorable and 6 being the least favorable as compared to the other alternatives. A description of each criteria and the factors considered during the ranking is described in the following section.

For each alternative and criteria, the initial ranking was multiplied by the weight and the total for each project is summed at the bottom of the matrix. The summed value was used to determine which projects are preferred and ultimately considered for mitigating stormwater runoff into the ASBS. The alternative with the lowest total is preferred.

The Criteria, Ranking and Weighting

The following is a summary of the 16 screening criteria, in order from the criteria assigned the most important (5) to least important (1).

Weight = 5

1. **Water Quality Benefits/Ability to Meet ASBS Requirements** evaluated the ease with which each alternative could satisfy the ASBS water quality requirements. This may be one or all of the requirements described in Special Protections for Areas of Special Biological Significance, Governing Point Source Discharges of Storm Water and Nonpoint Source Waste Discharges. One significant requirement is a

90% reduction in pollutant loading during wet-weather event if natural water quality is found to be degraded by these discharges.

2. **Regional WTP Capacity** evaluateed the impact to the Cities if the discharge to the Monterey Regional Water Pollution Control Authority's Wastewater Treatment Plant is eventually limited due to capacity. By receiving more dry and wet weather flows it could reduce the ability of the MRWPCA WTP to handle additional future wastewater flows and force the Cities to maintain local storm water treatment facilities to comply with the ASBS requirements. Alternatives D and F increase flows to the WTP and therefore rank less favorably than the remaining alternatives which have no additional flows to the WTP.

3. **Potential Funding Opportunities** ranked an alternative's ability to generate funding from grants and additional local support groups.

4. **Achieves Multiple Benefits** ranked the alternative's ability to achieve multiple benefits or objectives, such as water supply, recreational and wildlife benefits in addition to ASBS water quality benefits.

Weight = 4

5. **Capital, Operational and Maintenance (O&M), and Equivalent Annual Costs** evaluated the estimated capital, operational, maintenance and equivalent annual costs for each alternative, with the most expensive alternatives ranking less favorably.

6. **Permitting Requirements and Difficulty** ranked the feasibility of each alternative to be permitted by regulatory agencies. For example, restoring David Avenue Reservoir to its original size would require Division of Safety of Dams (DSOD) approval, which would require additional technical analyses and an extensive permit review process. As a result, Alternative C, which proposes using the David Avenue Reservoir to treat all the flow from Pacific Grove and New Monterey, would be a more difficult project to permit and thus ranks less favorably than the other project alternatives.

7. **Land and/or Facility Availability and Entitlements** evaluated the Cities' ownership of existing land or facilities or the necessity to acquire additional property(s) to support the project. The more land/facilities that would need to be acquired was considered and ranked for each alternative.

8. **Safety and Vector Control** ranked the alternatives safety and vector risks. For example, using David Avenue Reservoir could increase the volume and duration of surface water stored at the site, potentially requiring maintenance measures to manage mosquito populations.

9. **Aesthetic Benefits** ranked the aesthetic benefits each alternative brings to the Cities'. The alternatives that provided a greater opportunity to provide green space and/or parkland ranked higher than alternatives with no significant change or benefit.

10. **Institutional Agreements** evaluated the number of institutional agreements that may be necessary if the alternative is selected. An example of an institutional agreement would be an agreement with the Cities of Monterey, Pacific Grove and California American Water (CalAm) regarding use of the David Avenue Reservoir site for stormwater storage. The alternative with the highest ranking in this category has the least number of institutional agreements required.

Weight = 3

11. **Biotic and Cultural Resource Issues** evaluated, based on a preliminary review of background data, if the environmental impacts associated with the alternative would likely cause impacts requiring mitigation of biotic and cultural resources. The greater the anticipated impact or mitigation required, the less favorable the ranking.

12. **Stakeholder Involvement and Support** ranked the alternatives with the highest stakeholder involvement and support as highest. Stakeholder involvement may include community interest groups or local non-profit organizations who would benefit from the alternatives and have actively participated in the project development and evaluation process to date.

13. **Constructability** ranked the ease of construction of an alternative. Based on information summarized in previous feasibility and background reports, the alternative with the least construction required would rank highest.

14. **Project Complexity and Timing** ranked the alternatives complexity and timing, where the least complex project that can satisfy the SWRCB's within a reasonable time frame is preferred and ranks the highest.

Weight = 2

15. **Geologic, Liquefaction, and Hydrogeologic Issues** evaluated potential site-specific obstacles or hazards that the existing geology may introduce at any land proposed for development. This includes any areas where landslides, liquefaction, or tsunamis may be an issue.

16. **Water Rights Considerations** ranked the Cities' ability to retain water rights to the treated stormwater for other uses. Alternatives D and F send treated water to the MRWPCA, where the Cities' would potentially forfeit the right to use the stormwater in the future and therefore rank below all remaining alternatives that provide the Cities' with the ability to reuse collected stormwater.

3. Alternative Screening Analysis

Step One - Cursory Screening of Alternatives

Employing the methodology described above, FCE determined that only four alternative projects identified by MACTEC met the initial cursory screening criteria described in Step One of Section 2:

a. Does the project have the potential to achieve the water quality requirements set forth for the ASBS for both Cities of Pacific Grove and Monterey;

b. Does the project not create regulatory uncertainty by not addressing the requirements of the ASBS Special Provisions that may impact the City of Monterey and/or Pacific Grove if they do not participate in the project; and

c. Is the project financially and technically feasible?

These project options, as identified in the MACTEC study are:

Option 1 – Collect and treat dry weather flows locally at PGWWTP

Option 3 – Collect and treat dry and wet weather flows locally at PGWWTP and discharge to ASBS for both New Monterey and Pacific Grove.

Option 6 – Collect and treat dry weather flows at the MRWPCA facility.

Option 9 – Collect and treat dry and wet weather flows at the MRWPCA facility.

Step Two – Initial Project Ranking and Screening of Alternatives

In mid-February 2013, after the cursory review was conducted, the consulting team met and conducted an initial project ranking of the four projects as described in more detail below. This initial ranking was completed for the four (4) alternatives and without weighting of the criteria. The following is a description of the initial alternatives.

Alternative A treats both dry and wet weather flows from Pacific Grove and New Monterey at the abandoned Pacific Grove Wastewater Treatment Plant (PGWTP). Treated water is used to irrigate Pacific Grove Golf Links and the El Carmelo Cemetery.

Alternative B treats both dry and wet weather flows from Pacific Grove and New Monterey at the PGWTP. Equalization is provided at the David Avenue Reservoir by diverting runoff from Upper New Monterey flows via gravity in David Avenue Reservoir. Stored water can then be released at a lower rate into the modified collection system that pumps storm water to the PGWTP for treatment, reuse or discharge. Treated water is used to irrigate Pacific Grove Golf Links and the El Carmelo Cemetery.

Alternative C treats both dry and wet weather flows from Pacific Grove and New Monterey at the David Avenue Reservoir. Flows from Pacific Grove and Lower New

Monterey are pumped up to the reservoir. Treated water is used to irrigate Pacific Grove Golf Links, the El Carmelo Cemetery and two parks in New Monterey close to the Reservoir. This alternative requires the David Avenue Reservoir to be restored to its original size.

Alternative D treats both dry and wet weather flows from Pacific Grove and New Monterey at the Monterey Regional Water Pollution Control Authority Wastewater Treatment Plant (MRWPCA WTP). The storm water is comingled with the domestic wastewater and once treated is either discharged to the ocean during the winter months or recycled for irrigating farmland in North Monterey County. If the groundwater replenishment project proceeds recycled water will also be used for recharging the Seaside Aquifer.

Each alternative was ranked against each other for the different water quality, environmental regulatory, cultural and financial criteria. The results of the initial screening are shown in Table 1. In the initial matrix, the lowest ranking total was considered to the preferred alternative, which is Alternative D. The final ranking is based on weighted criteria, which has been completed based on staff input from the Cities of Monterey and Pacific Grove.

Table 1. Ranking of Initial Four Project Alternatives

Criteria	Alternatives			
	A	B	C	D
Water Quality Benefits/Ability to Meet ASBS Requirements	4	2	2	1
Capital, Operational, and Equivalent Annual Costs	2	3	4	1
Permitting Requirements and Difficulty	3	4	2	1
Project Complexity and Timing	2	3	4	1
Biotic and Cultural Resource Issues	2	3	4	1
Geologic, Liquefaction, and Hydrogeologic Issues	2	3	3	1
Land and/or Facility Availability and Entitlements	2	3	3	1
Stakeholder Involvement and Support	3	2	1	4
WTP Capacity	1	1	1	4
Constructability	2	3	4	1
Safety and Vector Control	2	3	4	1
Potential Funding Opportunities	3	2	4	1
Aesthetic Benefits	3	1	2	4
Water Rights Considerations	1	1	1	4
Total	32	34	39	26

Notes:

These are preliminary ranking, there are no weights associated with the criteria.

A = PG/NM flows to PGWTP to irrigation in PG
B = NM to David Reservoir for equalization and NM/PG flows to PGWTP to irrigation in PG
C = NM/PG to David Reservoir for treatment at reservoir to irrigation in PG
D = NM/PG to MRWPCA WTP

Ranking System: 1 = High, 4 = Low

Step Three – Final Screening Using Weighted Criteria

After the initial ranking of the four alternative projects were presented to the Cities of Monterey and Pacific Grove, additional refinement and two additional project alternatives were considered and added to the list of projects. In total six alternative projects were refined and screened using both ranking and weighted criteria as described above. The following is a description of the two additional projects (Alternative E and F) evaluated along with those described in Step 2 (Alternative A-D).

For reference, Figure 1 includes the location of the sites and facilities considered in these alternatives, specifically the abandoned Pacific Grove Wastewater Treatment Plant site, David Avenue Reservoir and the Monterey Regional Water Pollution Control Authority Wastewater Treatment Plant. Also Figure 2 provides a schematic depicting the flow pathways for each alternative, as well as, for the potential to interconnect the projects to existing storage facilities or future water projects, such as connecting to the Pebble Beach Community Services District Forest Lake reclaimed water reservoir or a Regional Groundwater replenishment project.

Figure 1. Location of Sites Evaluated

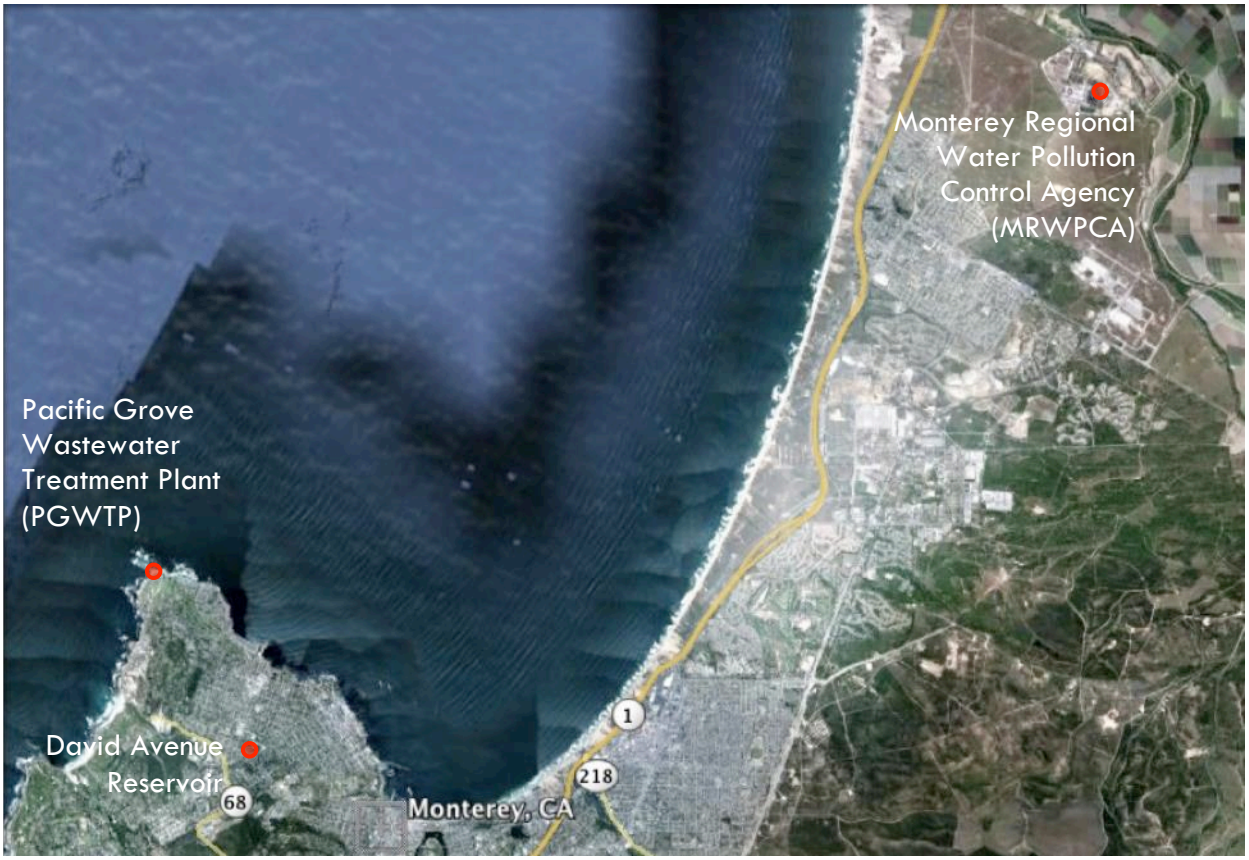

Figure Not To Scale

Alternative E would treat dry and wet weather flows from Pacific Grove at the PGWTP and New Monterey flows at the David Avenue Reservoir site. Treated water from the PGWTP could be used to irrigate Pacific Grove Golf Links and the El Carmelo Cemetery and treated water from David Avenue Reservoir could be used to irrigate two parks in New Monterey close to the Reservoir. This alternative would require the construction of two separate collection and treatment facilities.

Alternative F would treat both dry and wet weather flows from Pacific Grove and New Monterey at the MRWPCA WTP, as in Alternative D, with additional detention for runoff from Upper New Monterey at the David Avenue Reservoir. Runoff stored at David Avenue Reservoir would then be released at a lower rate into the modified MRWPCA collection system. As in Alternative D, Pacific Grove and David Avenue Reservoir stormwater would comingle with the domestic wastewater and once treated be discharged to the ocean during the winter months or recycled for irrigating farmland in North Monterey County. If the groundwater replenishment project proceeds recycled water could also be used for recharging the Seaside Aquifer.

<u>The Alternative Screening Matrix</u>

The six project alternatives were screened using the ranking and weighted criteria. The results of the screening calculations are presented in Table 2. A summary of the reasoning behind the most and least favorable alternative for each criteria is included in Table 3.

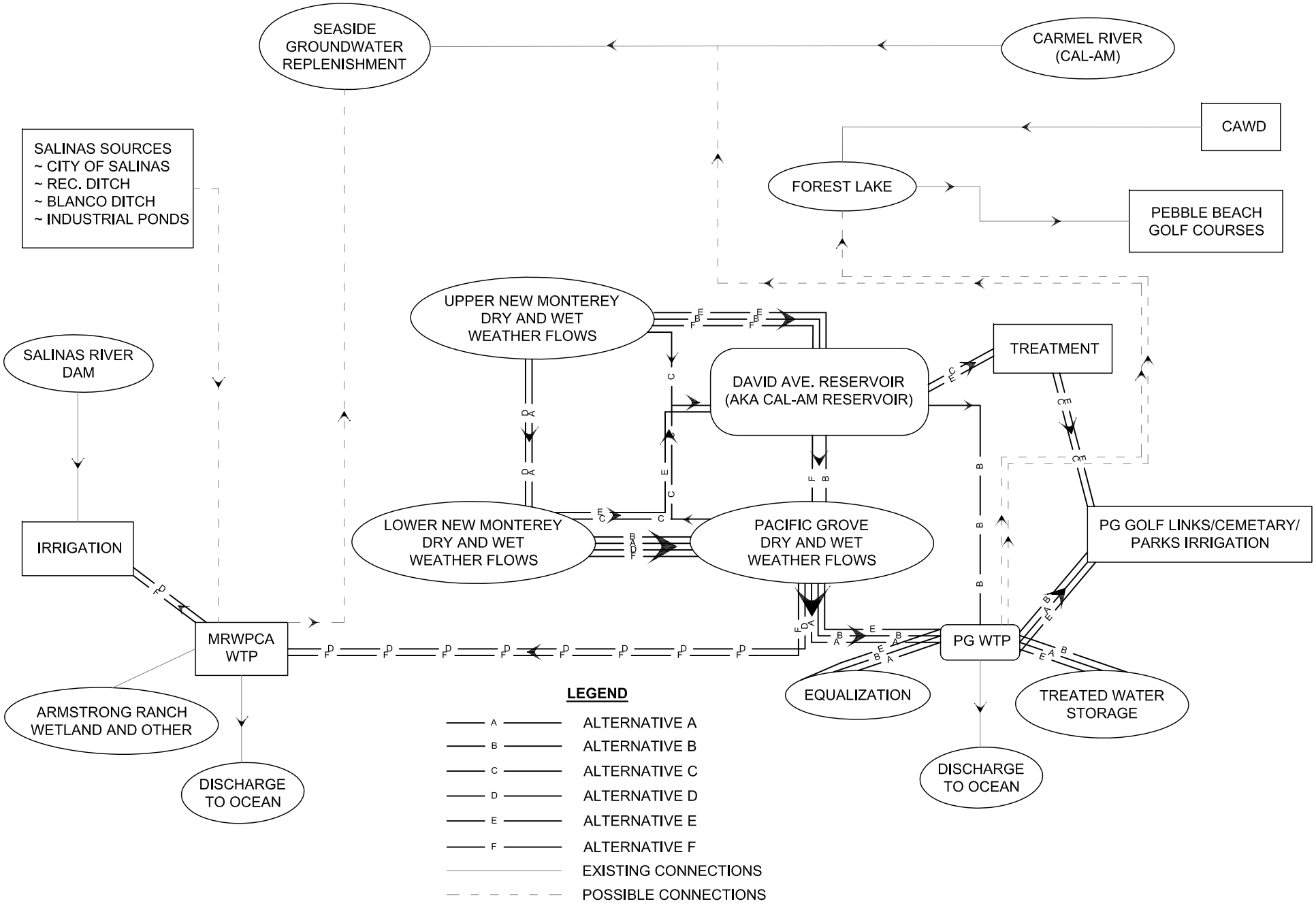

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FIGURE 2
UPDATED SCHEMATIC OF ALTERNATIVES
MONTEREY AND PACIFIC GROVE ASBS
UPDATED SCREENING OF ALTERNATIVES

Table 2: Updated Screening of Alternatives
Monterey and Pacific Grove ASBS

Number	Criteria	Weight	Alternatives Ranking						Alternatives Weighting					
			A	B	C	D	E	F	A	B	C	D	E	F
1	Water Quality Benefits/Ability to Meet ASBS Requirements	5	6	3	3	1	5	2	30	15	15	5	25	10
2	Regional WTP Capacity	5	1	1	1	6	1	5	5	5	5	30	5	25
3	Potential Funding Opportunities	5	4	1	5	3	6	2	20	5	25	15	30	10
4	Achieves Multiple Benefits	5	5	2	4	6	1	2	25	10	20	30	5	10
5	Capital, O&M, and Equivalent Annual Costs	4	1	2	5	3	6	4	4	8	20	12	24	16
6	Permitting Requirements and Difficulty	4	4	6	3	1	5	2	16	24	12	4	20	8
7	Land and/or Facility Availability and Entitlements	4	1	4	4	2	6	3	4	16	16	8	24	12
8	Safety and Vector Control	4	2	4	5	1	5	3	8	16	20	4	20	12
9	Aesthetic Benefits	4	4	1	2	5	3	1	16	4	8	20	12	4
10	Institutional Agreements	4	1	2	2	3	2	3	4	8	8	12	8	12
11	Biotic and Cultural Resource Issues	3	2	4	5	1	5	3	6	12	15	3	15	9
12	Stakeholder Involvement and Support	3	5	2	1	6	3	4	15	6	3	18	9	12
13	Constructability	3	2	4	6	1	5	3	6	12	18	3	15	9
14	Project Complexity and Timing	3	2	3	6	1	5	3	6	9	18	3	15	9
15	Geologic, Liquefaction, and Hydrogeologic Issues	2	2	3	6	1	3	3	4	6	12	2	6	6
16	Water Rights Considerations	2	1	1	1	6	1	3	2	2	2	12	2	6
		Totals	**43**	**43**	**59**	**47**	**62**	**46**	**171**	**158**	**217**	**181**	**235**	**170**

Notes:
A = PG/NM flows to PGWTP to irrigation in PG
B = NM to David Reservoir for equalization and NM/PG flows to PGWTP to irrigation in PG
C = NM/PG to David Reservoir for treatment at reservoir to irrigation in PG/NM
D = NM/PG to MRWPCA WTP
E = NM to David Reservoir to irrigation in NM and PG to PGWTP to irrigation in PG
F = NM/PG to MRWPCA WTP with NM to David Reservoir for equalization

Weighting System: 1 = Low, 2 = Moderate Low, 3 = Average, 4 = Moderate High, 5 = High
Ranking System: 1 = More Favorable , 6 = Less Favorable

PG = Pacific Grove Wet and Dry Weather Drainage
NM = New Monterey Wet and Dry Weather Drainage
PGWTP = Pacific Grove Wastewater Treatment Plant (with Wet Pond Storage/Equalization)
MRWPCA WTP = Monterey Regional Water Pollution Control Authority Wastewater Treatment Plant

Table 3: Most and Least Favorable Alternative for Each Criteria
Monterey and Pacific Grove ASBS

Number	Criteria
1	**Water Quality Benefits/Ability to Meet ASBS Requirements**
	Most Favorable: Alternative D because all wet and dry weather flows would be diverted to MRWPCA instead of to the ASBS.
	Least Favorable: Alternative A because level of storage and treatment limited due to site constraints.
2	**Regional WTP Capacity**
	Most Favorable: Alternatives A, B, C, and E because they do not require treatment at the MRWPCA.
	Least Favorable: Alternatives D and F because they require MRWPCA treatment plant capacity.
3	**Potential Funding Opportunities**
	Most Favorable: Alternative B because of ability to leverage local project support and LID components.
	Least Favorable: Alternative E because independent treatment approach reduces regionial coordination.
4	**Achieves Multiple Benefits**
	Most Favorable: Alternative E because maximizes local storage, treatment and reuse opportunities.
	Least Favorable: Alternaive D because minimizes local storage, treatment and reuse opportunities.
5	**Capital, O&M, and Equivalent Annual Costs**
	Most Favorable: Alternative A because it has the lowest cost (no retrofit of David Avenue Reservoir and construction of a single treatment facility).
	Least Favorable: Alternative E because it requires capital costs to construct dual treatment facilities with dual operations and maintenance costs, in addition to the retrofit of David Avenue Reservoir.
6	**Permitting Requirements and Difficulty**
	Most Favorable: Alternative D because delivers stormwater to an existing approved treatment and discharge facility.
	Least Favorable: Alternative B because requires approval of David Avenue Reservoir retrofit, in addition to permitting a new treatment facility and discharge location.
7	**Land and/or Facility Availability and Entitlements**
	Most Favorable: Alternative A because the PGWTP site is owned by the City of Pacific Grove.
	Least Favorable: Alternative E because requires agreement with CalAm for use of David Avenue Reservoir, in addition to agreements with non-City entities to receive and irrigate with treated stormwater.
8	**Safety and Vector Control**
	Most Favorable: Alternative D because no additional surface waters would be constructed.
	Least Favorable: Alternatives C and E because would store water in David Avenue Reservoir.
9	**Aesthetic Benefits**
	Most Favorable: Alternatives B and F because retrofit of David Avenue Reservoir enhances site and neighborhood characteristics.
	Least Favorable: Alternative D because it does not involve site improvements within either City.
10	**Institutional Agreements**
	Most Favorable: Alternative A, fewest agreements required because the City of Pacific Grove currently owns the PGWTP site, El Carmelo Cemetery and Pacific Grove Golf Links.
	Least Favorable: Alternatives D and F because they require MRWPCA treatment plant capacity.
11	**Biotic and Cultural Resource Issues**
	Most Favorable: Alternative D because involves the smallest construction site footprint.
	Least Favorable: Alternatives C and E because requires David Avenue Reservoir expansion and a relatively larger construction footprint.
12	**Stakeholder Involvement and Support**
	Most Favorable: Alternative C because local stakeholders prefer to store, treat and reuse water locally.
	Least Favorable: Alternative D because it minimizes the investment in local resources.
13	**Constructability**
	Most Favorable: Alternative D because it involves the expansion of the existing dry-weather diversion system.
	Least Favorable: Alternative C because it involves new pumping facilities to convey collected stormwater in Pacific Grove up-slope to David Avenue Reservoir.
14	**Project Complexity and Timing**
	Most Favorable: Alternative D because it involves the expansion of the existing dry-weather diversion system.
	Least Favorable: Alternative C because it involves new pumping facilities to convey collected stormwater in Pacific Grove up-slope to David Avenue Reservoir, along with approval from DSOD for the Reservoir retrofit.
15	**Geologic, Liquefaction, and Hydrogeologic Issues**
	Most Favorable: Alternative D because involves the smallest construction site footprint and expands upon an existing conveyance system.
	Least Favorable: Alternative C because it involves a significant expansion of the David Avenue Reservoir, requiring extensive engineering retrofits to protect against earthquake induced hazards.
16	**Water Rights Considerations**
	Most Favorable: Alternatives A, B, C, and E because all collected and treated water is kept local to potentially offset existing water supplies used for irrigation.
	Least Favorable: Alternative D because all collected water is distributed out of the City Boundaries and if treated to recycled water standards by the MRWPCA, would be used outside of the City Boundaries.

Based on the results of the screening criteria evaluation, Alternative B and F have the lowest scores. Based on these results Alternative B is the preferred project and Alternative F is the feasible alternative. Table 4 summarizes the facilities proposed for use in each alternative along with the results of the screening process.

Table 4: Summary of Alternatives Screening

Alternative	Proposed Facility/Site				Total Score	Ranking
	PGWTP	David Ave Reservoir	David Ave WTP	MRWPCA WTP		
A	X				171	3
B	**X**	**X**			**158**	**1**
C		X	X		217	5
D				X	181	4
E	X	X	X		235	6
F		X		X	170	2

4. Conclusions and Recommendations

The following summarizes the results of the alternatives screening analysis for the Cities of Monterey and Pacific Grove Areas of Special Biological Significance.

1. Of the sixteen (16) criteria, four (4) criteria had the highest priority for the Cities and therefore largest weighted value of 5. These criteria are:

    a. Water Quality Benefits or Ability to Meet ASBS Requirements,
    b. Regional Water Treatment Plant (WTP) Capacity,
    c. Ability for the project to Achieves Multiple Benefits, and
    d. Access to Potential Funding Opportunities.

2. The final screening matrix resulted in the following order of alternatives:

    a. Alternative B;
    b. Alternative F;
    c. Alternative A;
    d. Alternative D;
    e. Alternative C; and
    f. Alternative E.

3. The preferred and alternate projects (Alternative B and Alternative F, respectively) will undergo further analysis to refine assumptions and confirm the screening analysis findings.

4. The City of Pacific Grove has also requested that low impact development (LID) strategies be evaluated and incorporated into the preferred and alternate projects to complement and enhance the treatment strategies. LID strategies could include decentralized stormwater best management practices to slow and treat runoff and potentially reduce the necessary capacity of new collection, treatment and reuse facilities.

5. Next Steps

As a result of the alternative screening, Alternatives B and F have been selected for further analysis and project development.

The next steps involved in the study will be to:

1. Complete the analysis of the existing storm water collection infrastructure to determine the improvements and relative costs required to convey wet weather flows to the PGWTP and/or to the MRWPCA;

2. Complete the analysis of David Avenue Reservoir to determine the improvements and related costs required to reuse this facility and to assist the Cities and CalAm to develop an agreement to transfer the use and potential ownership of the reservoir to the cities.

3. Complete planning, preliminary environmental assessment, and a preliminary geotechnical investigation to evaluate the PGWTP, Crespi Pond and other additional water features at the Pacific Grove Golf Links;

4. All project alternatives will likely be designed to treat runoff up to maximum storm event, such as a two (2) year design storm. Runoff resulting from larger storm events will likely discharge to the bay via existing or modified overflow facilities. FCE will need to determine if the overflow will discharge out of the existing outfalls or if the outfalls will require any modifications, and if so, what improvements and related costs will required for these modifications.

5. Identify and screen potential LID projects within New Monterey and Pacific Grove; and

6. Work with the City staff and potential SWRCB to establish the design criteria (size of storms and water quality goals) for the final project configurations.

7. Prepare an updated engineering cost estimate and effectiveness evaluation to comply with the requirements of the ASBS requirements for the two alternative projects.

8. To identify and target potential funding opportunities for the two projects.

This concludes the screening of project alternatives assessment. Thank you for the opportunity to assist you with this project. FCE looks for to the opportunity to review these results and the next steps outlined above to move forward with the project. Please contact me if you have any questions or require any additional information.

Sincerely,

PETER HAASE, M.S., P.E.
Principal Engineer

ATTACHMENT B

Monterey/Pacific Grove ASBS Project
David Avenue Reservoir Alternatives Screening Analysis Memorandum
August 16, 2013

Rincon Consultants, Inc.
Environmental Scientists Planners Engineers

MEMORANDUM

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Date: August 16, 2013

To: Emily Corwin, Peter Haase

Organization: Fall Creek Engineering, City of Monterey, City of Pacific Grove

From: Megan Jones & Bryce Ternet, Rincon Consultants, Inc.

Email: mjones@rinconconsultants.com; bternet@rinconconsultants.com

cc: Jeff Krebs, Sarah Hardgrave

Re: Monterey/Pacific Grove ASBS Project David Avenue Reservoir Alternatives Screening Analysis Memorandum

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Introduction. The purpose of this memorandum is to provide a preliminary screening analysis of environmental constraints of four (4) alternative improvements being considered for the David Avenue Reservoir (reservoir) site. Potential environmental impacts are outlined herein for each alternative, followed by a matrix comparison of the four alternatives. This memorandum concludes with a brief overview of findings and the identification of an environmentally superior alternative.

The David Avenue Reservoir, located in Pacific Grove adjacent to the intersection of David and Carmel Avenues, is a key component of the Monterey-Pacific Grove Area of Special Biological Significance (ASBS) Stormwater Management Project (the project), located in the cities of Pacific Grove and Monterey. The David Avenue Reservoir was previously used for water storage. However, the reservoir ceased operation in 1989. The project would restore the use of this facility to assist in stormwater management in the ASBS watershed.

This technical memorandum considers the principal environmental categories required for a California Environmental Quality Act (CEQA) review of a selected alternative for the project component. This memorandum is intended to provide initial guidance for the overall design of the project to assist in eventual project construction and implementation. However, this assessment is for preliminary planning purposes alone, as further investigation into the potential impact areas covered in this memorandum would occur once an alternative is selected. CEQA's thresholds of significance have been identified in this memorandum to provide a general overview of potential environmental impacts

on the project site; each threshold will be addressed specifically in the subsequent project CEQA review.

Historical Conditions. Historical information about the David Avenue Reservoir is based upon a *Seismic Safety and Hydrologic Investigation,* dated March 17, 1989, prepared by Converse Consultants Northern California.

The original dam for the reservoir was built in 1882, and an expansion to the downstream (north) side of the dam was added in 1920. According to the 1989 report, the dam is 750 feet long, 30 feet high, has a crest elevation of 240 feet and a crest width of 60 feet. The reservoir retained 56 acre feet of water with a surface water elevation of 235 feet.

The 1989 report concluded the following:

- *The dam and foundation materials were stable under static conditions.*
- *The upstream face of the dam would liquefy during an earthquake resulting in failure of this portion of the dam with movement on the order of five to six feet.*
- *The downstream face of the dam, as well as the foundation of alluvial materials, would be stable under seismic conditions.*
- *The reservoir, spillway and outlet structures are inadequately sized for a design storm situation.*

Safety and stability of a dam is critical due to the consequences of dam failure and the risk to loss of life and property. The safety and stability of a dam is dependent on a number of elements, the most important of which are the stability of the embankment itself, the stability of the foundation materials underneath the dam, and adequate design of the inlet and outlet structures to handle design storm flows. Stability must be evaluated for both the static, long-term conditions, as well as for seismic conditions during a major earthquake. Seepage of water through or underneath a dam is the major cause of dam failures and plays a significant role in dam stability. Based on report conclusions and other considerations, the David Avenue Reservoir stopped being used as a water storage facility in 1989.

Existing Conditions. The David Avenue Reservoir is located adjacent to the intersection of Carmel Avenue and David Avenue in the City of Pacific Grove, near the City of Monterey boundary. The site is located in an urban setting with two houses located directly below the downstream toe (northwest) of the dam. Single-family and multi-family housing and Pacific Grove Middle School are located in the vicinity of the site. The site is owned by California American Water Company (Cal-Am), the local water purveyor. The company uses the site as a maintenance, operations, and materials storage area. The site is restricted with gated entry. Vegetation has grown inside the previously inundated areas of the reservoir since the time the reservoir ceased operating as a water storage facility. Potential impacts to biological resources are further considered in the following sections of this document.

Overview of Alternatives. As identified in the *Draft Engineering Report* (July 1, 2013) prepared by the project engineer, Fall Creek Engineering, the four alternatives under consideration include:

- *Alternative 1*: Rebuilding the dam to the original elevation (dam replacement)
- *Alternative 2*: Rebuilding the dam to a lower elevation (smaller dam)
- *Alternative 3*: Installing a geomembrane liner system within the existing reservoir and modifying the existing spillway
- *Alternative 4*: Installing sheet pile to reinforce the existing dam structure

Each alternative is described in further detail below.

Alternative 1. Alternative 1 would rebuild the existing dam within a similar footprint as the original dam. The crest elevation would be at approximately 243 feet, providing an estimated 60 acre-feet (AF) of storage. The rebuilt dam would include a new clay core and an underdrain system along the toe of the downstream dam face. The upstream slope would be 2.5:1, and the downstream face 2:1 to meet current regulations. This alternative would provide the greatest storage volume and structure longevity; however, the alternative would require the greatest level of disturbance especially to those located near the toe of the existing dam.

Alternative 2. Alternative 2 would rebuild a smaller dam and replace the upstream shell of the existing dam. The crest elevation would be at approximately 238 feet, providing an estimated 36 AF of storage. The rebuilt dam would include a new clay core and an underdrain system along the toe of the downstream dam face. The upstream slope would be 2.5:1, and the downstream face 2:1 to meet current regulations. This alternative would provide less storage volume than Alternative 1; however, this alternative would have longer structure longevity than Alternatives 3 and 4, and less disturbance than Alternative 1.

Alternative 3. Alternative 3 would line the interior of the David Avenue Reservoir with a double liner with a drainage and leak detection system. The crest elevation of would be at approximately 243 feet, providing an estimated 60 AF of storage. All reservoir slopes are assumed to be regraded to 2.5:1. This alternative would have less earthwork and disturbance to nearby properties, though the maintenance costs would potentially be higher. The system would be similar in style to the liner installed at nearby Forest Lake. Though larger, Forest Lake was built at the same time as David Avenue Reservoir.

Alternative 4. Alternative 4 would involve the installation of a sheet pile wall near the toe of the existing dam, with the base of the sheet pile extending down to bedrock. The water surface elevation would be the same as Alternative 2, providing an estimated 36 AF of storage. This alternative requires further analysis related to the longevity and stability of anchoring sheetpile as proposed and providing adequate drainage to maintain system integrity.

Common Elements. Engineering elements common to all four David Avenue Reservoir alternatives include:

- *Inlet*: New connection to the Monterey storm drain collection system near the intersection of David Avenue and Carmel Avenue. The location, size and type of the existing storm drain infrastructure in this vicinity, belonging to both the City of Monterey and the City of Pacific Grove, needs to be field verified. For the purposes of the 15% design plans and preliminary cost estimation, it is assumed that a new approximately 150 foot long, 12-inch diameter pipeline would convey collected water from New Monterey into the David Avenue Reservoir.

- *Outlet*: New connection to the Pacific Grove storm drain collection system near the intersection of David Avenue and Carmel Avenue. The location, size and type of the existing storm drain infrastructure in this vicinity, belonging to both the City of Monterey and the City of Pacific Grove, needs to be field verified. For the purposes of the 15% design and cost estimate, it is assumed that a new approximately 300 foot long, 12-inch diameter outlet pipeline will convey collected water from David Avenue reservoir into the City of Pacific Grove stormwater system.

- *Overflow Spillway*: The overflow spillway is assumed to be a similar size and design as the existing facility; rectangular inlet structure with a 12-inch diameter discharge pipeline, connecting to the Pacific Grove storm drain system.

Preliminary Environmental Assessment of Alternatives. Provided below is a preliminary environmental assessment of existing and potential environmental constraints for each of the four alternatives for the David Avenue Reservoir component of the ASBS project. This section is followed by a comparison of environmental constraints between the four alternatives.

Aesthetics

In accordance with Appendix G of the *State CEQA Guidelines*, a project would have an adverse aesthetic impact if the project would:

- *Have a substantial adverse effect on a scenic vista;*
- *Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway;*
- *Substantially degrade the existing visual character or quality of the site and its surroundings; and/or*
- *Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.*

Setting. As determined during a site visit conducted by Rincon Consultants on July 2, 2013, the majority of the project site is not visible from off-site locations, nor from adjacent roadways (Carmel Avenue and David Avenue). This is primarily due to the presence of existing vegetation, topography, and buildings in the site area. The project site is not located within an area designated for visual sensitivity according to the *City of Pacific Grove General Plan*. State Route (SR) 68 is a State-designated scenic highway for specific segments and passes within the vicinity of the project site. It is located approximately 0.4 miles southeast of the site, but the site is not visible from the highway. Although the site is not generally visible from public roadways or other public viewing areas, it is visible from single-family residences located south of the project site at higher elevations. However, CEQA analyses typically concentrate on viewsheds within the public realm.

Currently the site is used for office facilities and storage for Cal-Am operations. Various buildings and outlying structures are located on the site. Nighttime security lighting is installed on the project site.

Before its termination of active use as reservoir facility, the project site imparted the appearance of a lake to surrounding residents in the community. Lakes and ponds are commonly viewed as pleasant visual features to landscapes, especially in urban and residential areas. Since that time, wetland plants and other vegetation have grown inside the dry reservoir basin. However, due to existing vegetation and topography, the vegetated basin area is not visible from surrounding public viewshed locations.

General Impacts. Each of the four alternatives would result in the removal of some trees related to inlet and outlet connections required to the service storm drain systems. Each alternative would result in the loss of trees and shrubs which have grown in the reservoir basin since its cessation of use as a water storage facility. However, tree removal activity within the basin would be minimal. The overall re-establishment of a water feature at the project site would likely result in a beneficial visual impact for viewers located uphill from the site as contrasted with the materials storage area features that currently characterize the site.

Construction and implementation of the proposed project would result in a change to the visual character of the project site, but the changes would be considered a beneficial change compared to the existing visual character.

While nighttime security lighting can be expected, the site currently has existing night time security lighting and therefore there would not be a substantial change from existing conditions as a result of any of the project component alternatives.

Alternative-Specific Impacts. Because all four alternatives would result in a similar post-construction visual character (transforming the majority of the site from a materials storage area to a pond or water feature), potential impacts to aesthetics and visual resources would be similar between the four alternatives. However, Alternatives 1 and 2 would require the removal of trees on the down slope face of the dam, which could result in significant tree loss from a visual perspective of off-site public viewshed locations. Although it is beyond the scope of this memorandum to quantify the number of trees which would require removal for each of these two alternatives, qualitatively it can be assumed that this would represent a greater impact than for Alternatives 3 and 4. However, aesthetics impacts of the alternatives would be anticipated to be less than significant and/or less than significant with the application of mitigation measures.

Air Quality

In accordance with Appendix G of the *State CEQA Guidelines*, a project would have an adverse air quality impact if the project would:

- *Conflict with or obstruct implementation of the applicable air quality plan;*
- *Violate any air quality standard or contribute substantially to an existing or projected air quality violation;*
- *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 (including releasing emissions which exceed quantitative thresholds for ozone precursors);*
- *Expose sensitive receptors to substantial pollutant concentrations; and/or*
- *Create objectionable odors affecting a substantial number of people.*

Setting. CEQA Guidelines §15125(b) requires that a project is evaluated for consistency with applicable regional plans, including the Air Quality Management Plan (AQMP). The Monterey Bay Unified Air Pollution Control District (MBUAPCD) 2008 AQMP addresses attainment of the State ozone standard and federal air quality standard. The AQMP accommodates growth by projecting growth in emissions based on population forecasts prepared by the Association of Monterey Bay Area Governments (AMBAG) and other indicators. Consistency determinations are issued for commercial, industrial, residential, and infrastructure related projects that have the potential to induce population growth. A project is considered inconsistent with the AQMP if it has not been accommodated in the forecast projections considered in the AQMP.

General Impacts. None of the proposed alternatives includes any development that would result in a long-term increase in area population or vehicle miles traveled, or otherwise conflict with projections in the AQMP. Construction of any of the alternatives would generate a minor amount of regional and localized air pollutant emissions; however, these emissions would be temporary in nature and would be primarily associated with the use of construction equipment and vehicles. The operational phase of the proposed project would result in negligible long-term pollutant emissions from the project site associated with vehicular travel for site maintenance and electricity consumption to operate the pumps and other facility operations.

Similarly, none of the proposed alternatives would result in any new long-term odor-generating land uses. Odors may result from the short-term operation of equipment on-site during the construction

phase, but impacts associated with these odors would be short-term and would remain less than significant. Overall, general impacts from the proposed alternatives would be less than significant.

Alternative-Specific Impacts. The MBUAPCD 2008 CEQA Air Quality Guidelines contains standards of significance for evaluating potential air quality effects of projects subject to the requirements of CEQA. According to MBUAPCD, a project would violate an air quality standard and/or contribute to an existing or project violation if it would:

- *Emit 137 lbs/day or more of volatile organic compounds (VOC/ROG) or oxides of nitrogen (NO_X);*
- *Directly emit 550 lbs/day of carbon monoxide (CO);*
- *Generate traffic that significantly affects levels of service;*
- *Directly emit 82 lbs/day or more of PM_{10} on site during operation of construction;*
- *Generate traffic on unpaved roads of 82 lb/day or more of PM_{10}; or*
- *Directly emit 150 lbs/day or more of oxides of sulfur (SO_X).*

Criteria pollutant emissions from each alternative were estimated using the California Emissions Estimator Model (CalEEMod) version 2013.2. Emissions estimates were based on the anticipated construction schedule, equipment use, and grading volume for each alternative configuration. Fugitive dust and exhaust emissions have the potential to result in short-term impacts to existing air quality. All construction-related emissions would be temporary in nature. The operational phase of the David Avenue Reservoir improvements would result in negligible long-term pollutant emissions from the project site associated with vehicular travel for site maintenance and electricity consumption for facility operations. Estimated emissions from the construction of each alternative are shown in Table 1.

Table 1. Criteria Pollutant Emissions from Project Alternatives

	ROG (lbs/day)	NO_X (lbs/day)	CO (lbs/day)	SO_X (lbs/day)	PM_{10} (lbs/day)
Alternative 1	4.9	42.0	29.7	<0.1	39.3
Alternative 2	5.3	44.2	31.1	<0.1	44.3
Alternative 3	4.6	40.2	28.5	<0.1	31.3
Alternative 4	5.8	44.5	33.3	<0.1	43.3
Significance Threshold	*137*	*137*	*550*	*150*	*82*

Source: California Emissions Estimator Model (CalEEMod version 2013.2. Refer to Appendix A for complete model outputs.

Construction activities would result in regional pollutant emissions, regardless of the alternative selected for the site. However, as shown in Table 1, implementation of any of the four alternatives would not result in emissions that would exceed or violate the applicable air quality standards. While each of the four site alternatives would result in less than significant impacts to regional air quality, Alternatives 2 and 4 would have the highest emissions. Alternative 2 proposes to export and import the largest amount of fill from the site. Alternative 4 would require a lower total volume of soil hauling and would have a shorter grading period during the construction schedule. Alternatives 1 and 3 would result in generally lower emissions than Alternatives 2 and 4. However, impacts from all four alternatives would be less than significant.

Biological Resources

In accordance with Appendix G of the *State CEQA Guidelines*, a project would have an adverse impact on biological resources if the project would:

- *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;*
- *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;*
- *Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (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; and/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.*

Setting. The majority of the project site is currently used for office and equipment and materials storage. A portion of the site includes wetland habitat that has formed in the reservoir bottom. This habitat is dominated by bulrush (*Schoenoplectus* spp.) with cattail (*Typha* spp.), pampas grass (*Cortaderia selloana*), and willow (*Salix* spp.). Riparian habitat is present along the margins of the wetland. The inner slopes and rim of the reservoir are dominated by Monterey pine (*Pinus radiata*), coast live oak (*Quercus agrifolia*) and other mixed hardwood-conifer woodland species. Common wildlife species known or expected to occur on the site include Sierran treefrog (*Pseudacris sierra*), raccoon (*Procyon lotor*), and black-tailed deer (*Odocoileus hemionus*). A wide variety of bird species are expected to occur in the project vicinity, including many that could nest within the project area. Special status species that may have some potential to occur within the project site include the federally threatened California red-legged frog and the western pond turtle (state species of concern). Additionally, the fully protected white-tailed kite (*Elanus leucurus*) and other raptors including the red-shouldered hawk (*Buteo lineatus*) have the potential to nest on the project site. Any other migratory birds that may nest on the site would also be protected under the Migratory Bird Treaty Act (MBTA).

General Impacts. Construction and implementation of any of the four alternatives would result in the loss of the established wetland in the former reservoir area and the loss of vegetation on the project site. Loss of vegetation would include protected trees such as the Monterey pine and potentially coast live oak. However, with mitigation measures to be considered during the project's CEQA review, these impacts would be expected to be less than significant.

Mitigation would likely be required in order to off-set the loss of trees and wetland habitat, which may provide habitat for special-status species such as the federally threatened California red-legged frog and the western pond turtle. Additionally mitigation would be required regarding potential impacts to nesting birds on the project site which may be impacted by project construction activities. Mitigation would include measures for tree-replacement and pre-construction surveys. A single inactive unidentified raptor nest was observed in a Monterey pine on the north side of the reservoir during a site visit conducted by Rincon Consultants on July 2, 2013. A number of native birds could potentially use vegetation on-site for nesting during the nesting season (generally February 1 through August 31). If tree removal (or other vegetation clearing) occurs outside the nesting bird season, no impacts to nesting birds would be expected to occur. If tree removal (or other vegetation clearing) is conducted during the nesting season, mitigation would be required to ensure that impacts to nesting birds would be less than significant.

Alternative-Specific Impacts. Potential impacts to the existing wetland would be roughly equivalent between the four alternatives, since all four would fill the reservoir. However, Alternatives 1 and 2 would require the removal of trees on the down slope face of the dam, thereby increasing impacts related to tree removal and nesting birds, when compared to Alternatives 3 and 4. However, impacts to biological resource are anticipated to be less than significant with mitigation for all four alternatives.

Cultural Resources

In accordance with Appendix G of the *State CEQA Guidelines*, a project would have an adverse impact on cultural resources if the project would:

- *Cause a substantial adverse change in the significance of an historical resource as defined in Section 15064.5;*
- *Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5;*
- *Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature; and/or*
- *Disturb any human remains, including those interred outside of formal cemeteries.*

Setting. The site was previously used as a water storage facility and currently is used for office and storage uses. Ground disturbance that occurred in connection with past operations included the initial establishment of the reservoir and the moving (placement) of fill within the reservoir as sedimentation occurred. This included the placement of construction debris in the northwest corner of the site from during construction of a Cannery Row hotel in 2007. The site is not located within a zone categorized as being highly sensitive for cultural resources within the City of Pacific Grove General Plan.

General Impacts. Ground disturbance associated with construction of any of the four alternatives would be limited to within the existing reservoir and dam footprint. The amount of excavated soil would greatly vary between the alternatives. Alternatives 1 and 2 propose substantial export of soils compared to Alternatives 3 and 4, which would involve no export of soils from the site. These soils have been previously disturbed, and as such, disturbance required for all four alternatives would not be expected to uncover substantial previously unrecorded cultural resources. However, conditions would apply to the project requiring the proper notification of City authorities in the event of the uncovering of previously unidentified cultural resources and/or human remains. In addition, the CEQA Initial Study for the proposed project (including the David Avenue Reservoir component) will include a records search to determine the presence of previously-recorded historical or archaeological resources.

Alternative-Specific Impacts. Alternatives 1 and 2 would result in the greatest amount of ground disturbance, and thus would create a greater potential for impacting known or previously unrecorded cultural resources. Alternatives 3 and 4 would have slightly less potential to uncover resources, given they would require less ground disturbing activities. Additionally, there is a difference in the area of inundation proposed on the site between the four alternatives. Alternatives 1 and 3 would involve 60 AF of water storage and Alternative 2 and 4 would result in 36 AF of water storage on the site. The increased amount of inundated area for Alternatives 1 and 3 would therefore result in a greater level of the possibility of impacting potential resources; however, this is not expected to result in a substantial change in potential impacts. Ultimately, all four alternatives would fill the existing reservoir and require improvements to the existing dam, so the differences in impacts to cultural resources would be minor. Potential impacts to cultural resources resulting from the selected alternative will be further considered in the project's CEQA review.

Greenhouse Gas Emissions

In accordance with Appendix G of the *State CEQA Guidelines*, a project would have an adverse impact related to greenhouse gas (GHG) emissions if the project would:

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

Setting. Greenhouse gases (GHGs) are emitted by both natural processes and human activities. Of these gases, carbon dioxide (CO_2) and methane (CH_4) are emitted in the greatest quantities from human activities. Emissions of CO_2 are largely by-products of fossil fuel combustion, whereas CH_4 results from off-gassing associated with agricultural practices and landfills. Scientific modeling predicts that continued GHG emissions at or above current rates would induce more extreme climate changes during the 21st century than were observed during the 20th century. Different types of GHGs have varying global warming potentials. The global warming potential of a GHG is the potential of a gas or aerosol to trap heat in the atmosphere over a specified timescale (generally, 100 years). Because GHGs absorb different amounts of heat, a common reference gas (CO_2) is used to relate the amount of heat absorbed to the amount of the gas emissions, referred to as "carbon dioxide equivalent" (CO_2E), and is the amount of a GHG emitted multiplied by its global warming potential.

According to the CalEPA's 2010 Climate Action Team Biennial Report, potential impacts of climate change in California may include loss in snow pack, sea level rise, more extreme heat days per year, more high ozone days, more large forest fires, and more drought years (CalEPA, April 2010). While these potential impacts identify the possible effects of climate change at a global and potentially statewide level, in general, scientific modeling tools are currently unable to precisely predict what impacts would occur locally.

The MBUAPCD does not currently have an adopted threshold of significance for GHG emissions. However, potential GHG emissions for each project component alternative have been calculated and analyzed for purposes of this memorandum.

General Impacts. The proposed project would not conflict with any plan, policies, or regulations adopted for the purpose of reducing greenhouse gas emissions. However, construction and operation of the proposed project would generate a minor amount of GHG emissions. GHG emissions would primarily result from short-term construction activities. The proposed project would result in GHG emissions due to the operation of heavy construction equipment, project-generated construction traffic, and operation of the proposed project. The operational phase of the proposed project would result in negligible long-term GHG emissions from the project site associated with vehicular travel for site maintenance and electricity consumption to operate the pumps and other facility operations.

Alternative-Specific Impacts. The MBUAPCD does not currently have an adopted threshold of significance for GHG emissions. However, MBUAPCD recommends use of the adopted San Luis Obispo Air Pollution Control District (SLOAPCD) quantitative emissions threshold of 1,150 metric tons of carbon dioxide equivalent (MT CO2E) per year for most land use projects.

GHG emissions from each alternative were estimated using CalEEMod version 2013.2. Emissions estimates were based on the anticipated construction schedule, equipment use, and grading volume for each alternative configuration. All construction-related emissions would be temporary in nature, but would be amortized over an assumed 30 year project lifetime, consistent with standard methodologies for assessing short-term construction emissions. The operational phase of the proposed project would

result in negligible long-term pollutant emissions from the project site associated with vehicular travel for site maintenance and electricity consumption to operate the pumps and other facility operations. Estimated emissions from the construction of each alternative are shown in Table 2.

Table 2. GHG Emissions from Project Alternatives

	CO_2 (metric tons)	CH_4 (metric tons)	N_2O (metric tons)	Total CO_2E (metric tons)	Annual CO_2E (metric tons/year)
Alternative 1	340.5	0.1	<0.1	342.4	11.4
Alternative 2	357.6	0.1	<0.1	359.2	12.0
Alternative 3	87.6	<0.1	<0.1	88.0	2.9
Alternative 4	76.4	<0.1	<0.1	76.7	2.6

Source: California Emissions Estimator Model (CalEEMod version 2013.2. Refer to Appendix B for complete model outputs.

Construction activities would result in GHG emissions, regardless of the alternative selected for the site. However, as shown in Table 2, implementation of any of the four alternatives would not result in emissions that would exceed the recommended GHG emission threshold. While each of the four site alternatives would result in less than significant impacts to GHG emissions, Alternative 2 would have the highest emissions, as this alternative proposes to export and import the largest amount of fill from the site. Alternative 4 would have the lowest emissions, followed by Alternative 3. Alternative 1 emissions would be lower than Alternative 2, but negligibly so.

Hydrology & Water Quality

In accordance with Appendix G of the *State CEQA Guidelines*, a project would have an adverse impact related to hydrology and water quality if the project would:

- *Violate any water quality standards or waste discharge requirements;*
- *Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted);*
- *Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site;*
- *Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or 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;*
- *Otherwise substantially degrade surface or groundwater quality;*
- *Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map;*
- *Place within a 100-year flood hazard area structures which would impede or redirect flood flows;*
- *Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam; and/or*
- *Inundation by seiche, tsunami, or mudflow.*

Setting. The Pacific Grove ASBS drainage area has been subdivided into four smaller water management areas. Area 1 includes a significant portion of the New Monterey district of the City of Monterey, and the City of Pacific Grove's upper drainage area, with more than 625 acres. Area 2 includes Pacific Grove's lower drainage area, with a more than 130 acres. Area 3 includes a portion of the Pacific Grove drainage primarily in the vicinity of the Pacific Grove Golf Links golf course, with

more than 75 acres. Area 4 is comprised of more than 44 acres which includes portions in the Cities of Pacific Grove and Monterey. The David Avenue Reservoir is located in Area 1. However, as previously described, the David Avenue Reservoir currently is not used for any water management functions, and is not hydrologically connected to the ASBS watershed at the present time.

General Impacts. The proposed project would improve water quality by reducing the amount of pollutants that enter the Pacific Grove ASBS. No permanent hydrology or water quality impacts are anticipated. There is a potential for minor temporary water quality impacts during trenching and other soil disturbing activities during construction activities of project components, including David Avenue Reservoir improvements. The amount of material that could potentially erode from construction sites of project components during temporary construction activities would be greater than under existing conditions due to the minor loss of vegetation and movement of soils. In addition, construction materials, if not properly stored and protected, could contribute to water quality impacts.

Development as proposed by the alternatives on the site would not involve the construction of housing or any other structures that would place people at a risk for flooding in the event of a 100-year flood. The site is not located within a tsunami inundation area; it would not expose people or structures to a significant risk of loss, injury, or death involving a tsunami. Reuse of the site as a water storage facility, as considered by each alternative, would introduce a potential for flooding to occur over the lifespan of the project in the event of dam failure on the site during seismic events. Redevelopment of the site for water storage purposes as envisioned by each alternative would require adherence with geotechnical considerations in order to ensure dam safety to surrounding areas.

The project area is within the region of the Central Coast Regional Water Quality Control Board (CCRWQCB). The overall ASBS project area, including the David Avenue Reservoir site, is cumulatively greater than one acre. Therefore, the project would be required to adopt a Stormwater Pollution Prevention Plan (SWPPP), which would identify construction BMPs that would be applicable to the David Avenue Reservoir site. Construction BMPs typically require preparation of an erosion and sediment control plan to prevent soil and materials from leaving the site. Construction activities must be scheduled so that soil is not exposed for long periods of time, and key sediment control practices must be installed. These practices may include, but are not limited to: perimeter control (use of gravel bags, silt fences, and straw wattles); construction material storage (covered when not in use); dirt and grading measures (daily watering of dirt and travel mounds, covering during the rainy season [October 15 – April 15]); and storm drain measures (use of perimeter controls). With CCRWQCB requirements/conditions of approval applying to the project, potential impacts would be expected to less than significant, regardless of what alternative is selected.

Alternative-Specific Impacts. For purposes of this memorandum, potential hydrology and water quality impacts would be equivalent between the four alternatives for the David Avenue Reservoir component of the overall project because similar construction activities would be involved for each alternative and the ultimate re-use of the site as a water storage facility represents a similar degree of potential impacts on the site, regardless of the selected alternative and/or overall water storage capacity. Despite the greater storage capacity of Alternatives 1 and 3, downstream flooding potential would be addressed through appropriate geotechnical engineering of the modified dam, which is beyond the scope of this memorandum. For the purpose of this analysis, it is assumed that the potential for flooding is similar among the four alternatives. However, potential impacts will be further considered during the project's CEQA review.

Noise

In accordance with Appendix G of the *State CEQA Guidelines*, a project would have an adverse impact on the environment if the project would:

- *Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;*
- *Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;*
- *A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;*
- *A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;*
- *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 expose people residing or working in the project area to excessive noise levels; and/or*
- *For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels.*

Setting. Noise level (or volume) is generally measured in decibels (dB) using the A-weighted sound pressure level (dBA). The A-weighting scale is an adjustment to the actual sound power levels to be consistent with that of human hearing response, which is most sensitive to frequencies around 4,000 Hertz (about the highest note on a piano) and less sensitive to low frequencies (below 100 Hertz). For the most sensitive uses, such as single family residential, 60 dBA Day-Night average level (Ldn) is the maximum normally acceptable exterior level. Ldn is the time average of all A-weighted levels for a 24-hour period, with a 10 dB upward adjustment added to those noise levels occurring between 10:00 p.m. and 7:00 a.m. to account for the general increased sensitivity of people to nighttime noise levels. The Community Noise Equivalent Level (CNEL) is similar to the Ldn except that it adds 5 additional dB to evening noise levels (7:00 p.m. to 10:00 p.m.).

The David Avenue Reservoir site is located in the City of Pacific Grove. The City of Pacific Grove regulates noise through the City's General Plan and the City of Pacific Grove municipal code. The City's General Plan Health and Safety Element identifies 60 dBA CNEL as the maximum recommended allowable noise exposure for residences and other noise sensitive land uses. The closest sensitive receptors to the David Avenue Reservoir are single -family residences and the Pacific Grove Middle School near the site, with the nearest sensitive receptors located approximately 100 feet from the project site.

General Impacts. Operational noise would be limited to activities at the reservoir site and would largely be internalized on the site based on size of the site, existing topography and vegetation, surrounding uses, and the limited amount of noise that would be generated from operation of the David Avenue Reservoir.

Construction activities for each alternative would involve ground disturbance/grading and construction of new facilities on the site. Such activities have the potential to generate temporary noise. Table 3 demonstrates the typical noise levels associated with heavy construction equipment.

Table 3. Typical Construction Equipment Noise Levels

Equipment	Acoustical Usage Factor (%)[1]	Measured Lmax (dB at 50 feet)
Augur Drill Rig	20	84
Backhoe	40	78
Compactor (ground)	20	83
Dozer	40	82
Dump Truck	40	76
Excavator	40	81
Flat Bed Truck	40	74
Front End Loader	40	79
Generator	50	81
Grader	40	83
Impact/Vibratory Pile Driver	20	101
Pickup Truck	40	75
Pneumatic Tools	50	85
Roller	20	80
Scraper	40	84
Warning Horn	5	83
Welder/Torch	40	74

1: The average fraction of time each piece of construction equipment is operating at full power (i.e., its loudest condition) during a construction operation. Source: FHWA, 2006.

Equipment used during construction of the proposed alternatives would be similar, and would include a bulldozer, pick-up trucks, generator sets, loader, water truck, and dump trucks. Alternatives 1, 2, and 3 would not require pile driving. Therefore, maximum combined noise levels from on-site equipment during construction of those alternatives would not be expected to exceed 83-85 dB at 50 feet from the project site boundary. The maximum noise levels during pile-driving activities would be up to 101 dB at 50 feet from the project site boundary.

Noise levels typically attenuate (or drop off) at a rate of 6 dB per doubling of distance from point sources such as construction equipment. The nearest residences are located approximately 100 feet from where proposed construction activities would occur. Therefore, temporary noise generated by construction activities associated with Alternatives 1, 2, and 3 at nearby residences could be as high as 79 dBA. Therefore, temporary noise generated by pile-driving activities associated with Alternative 4 at nearby residences could be as high as about 95 dBA. Although temporary, noise that may cause 24-hour noise levels to exceed 60 dBA CNEL at nearby residences is considered substantial. In addition, construction-related traffic could contribute to a temporary increase in noise in the project vicinity. Therefore, mitigation would be required in order to reduce construction-related noise impacts to a less than significant level, regardless of which alternative is selected.

With respect to groundborne vibration, the alternatives would involve standard construction activities such as asphalt removal and excavation activities. In addition, Alternative 4 would involve driving sheet pile. Standard construction activities may result in some vibration that may be felt in the immediate vicinity of the project component sites, as commonly occurs with construction projects. Pile driving would result in more substantial vibration in the project vicinity. Table 4 identifies various vibration velocity levels for the types of construction equipment that would operate at the project site during construction.

Table 4. Vibration Source Levels for Construction Equipment

Equipment	Approximate VdB at 25 Feet	Approximate VdB at 50 Feet	Approximate VdB at 100 Feet
Loaded Trucks	86	80	74
Jackhammer	79	73	67
Small Bulldozer	58	52	46
Pile Driving (impact)	112	103	94
Pile Driving (sonic)	105	96	87

Source: U.S. Department of Transportation, Federal Railroad Administration. High-Speed Ground Transportation Noise and Vibration Impact Assessment, 1998.

According to the Federal Transit Administration (FTA), groundborne vibration impact criteria for residential receptors are 72 vibration decibels (VdB) for frequent events, 75 VdB for occasional events, and 80 VdB for infrequent events[1] (FTA, 2006). As construction would be temporary and infrequent, a threshold of 80 VdB is used for this analysis.

Based on the information presented in Table 4, vibration levels could temporarily and intermittently reach 74 VdB at approximately 100 feet from the site without pile driving, and could reach up to 94 VdB at 100 feet from the site with pile driving. Vibration levels at nearby residences may temporarily exceed the identified threshold of 80 VdB with pile-driving. Mitigation would be required to reduce construction vibration impacts on nearby residences to a less than significant level.

The closest airport is the Monterey Peninsula Airport, which is approximately 10 miles southeast of the project site. Therefore, the project area is not located within the vicinity of an airport or private airstrip and would not be affected by air traffic noise impacts. No impact would occur under any of the alternatives related to noise associated with airports or airstrips.

Alternative-Specific Impacts. While each alternative would result in increased ambient noise levels in the vicinity of the site from construction-related activities and would require mitigation measures, Alternatives 1 and 2 would result in greater intensity and duration of construction noise than Alternatives 3 and 4.

Alternatives 1 and 2 would involve the greatest amount of ground disturbance of the alternatives; this increased amount of ground disturbance would result in a longer duration of construction noise on the site, as well as increased construction traffic to and from the site. Alternative 4 would result in an

[1]" Frequent events" is defined as more than 70 vibration events of the same source per day; "occasional events" is defined as between 30 and 70 vibration events per day, and "infrequent events" is defined as less than 30 vibration events per day (FTA, 2006).

increased amount of construction noise based on the requirement to drive sheetpile on the site, as proposed by the alternative. While these alternatives would result in significant impacts, mitigation measures would reduce potential impacts to a less than significant level for any of the four alternatives.

Transportation & Traffic

In accordance with Appendix G of the *State CEQA Guidelines*, a project would have an adverse transportation impact if the project would:

- *Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit;*
- *Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways;*
- *Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks;*
- *Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);*
- *Result in inadequate emergency access; and/or*
- *Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.*

Setting. The project site is located adjacent to the intersection of David Avenue and Carmel Avenue, near the City of Pacific Grove's boundary with the City of Monterey. The site is accessed via David Avenue and Carmel Avenue, with the entrance to the site located adjacent to the intersection of these two avenues on Carmel Avenue. Adjacent segments of David Avenue and Forest Avenue are classified as Arterial roadways by the City of Pacific Grove General Plan Transportation Element; Carmel Avenue is classified as a Local Street. David Avenue and Forest Avenue are fed by local streets and collector roadways, providing connections to regional roadways and provide inter-city circulation routes. As a Local Street, Carmel Avenue primarily provides access to properties, including residences, the project site, and a middle school.

Intersection traffic flow operations are evaluated using a level of service (LOS) concept. Intersections are rated based on a grading scale of "LOS A" through "LOS F" with "LOS A" representing free flowing conditions and "LOS F" representing oversaturation where traffic flows exceed design capacity, resulting in long queues and delays. The project site is located approximately 0.5 miles from the intersection of David and Forest Avenue, a primary intersection in the City of Pacific Grove. According to the City's General Plan Transportation Element, this intersection currently operates at LOS D, and is "the most critical intersection in the area." According to the General Plan, LOS D is minimally acceptable.

General Impacts. Operational impacts from implementation of any of the four alternatives would not be expected to result in significant impacts to area roadways or intersections. However, this will be confirmed during the project's CEQA review. The site is currently accessed by Cal-Am employees and during the operational phase of the proposed project any increase in traffic to and from the project site would be negligible.

Construction activities would impact area roadways and intersections, regardless of the alternative selected for the site. Construction traffic to and from the site during the project's construction period would impact David Avenue, Carmel Avenue, and the intersections of David and Carmel Avenue and

David and Forest Avenue. These impacts could be significant; however, are likely to be reduced to less than significant levels with mitigation measures during the project's CEQA review.

Alternative-Specific Impacts. While each of the four alternatives would result in potential impacts to traffic and circulation in the site area, Alternatives 1 and 2 are estimated to have 75 and 100 days, respectively, of export/import activities from the site, compared to Alternatives 3 and 4, which would have 14 and 21 days of imported material days. Alternatives 1 and 2 would, therefore, have greater impacts on area roadways and intersections based on the increased number of trips associated with these alternatives for exporting of soils from and importing soils materials as fill to the project site. Alternative 2 would have the greatest impact, as this alternative proposes to export and import the largest amount of fill from the site; however, the differences between Alternatives 1 and 2 would be marginal compared to the trip generation differences between these two alternatives and Alternatives 3 and 4.

Conclusion and Recommendation. Table 5 compares the identified environmental impacts of the David Avenue Reservoir project alternatives for each of the issue areas addressed above.

Table 5. Preliminary Environmental Impact Comparison

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Aesthetics	+	+	-	-
Air Quality	+	+	-	+
Biological Resources	+	+	-	-
Cultural Resources	+	+	+/-	-
Greenhouse Gas Emissions	+	+	-	-
Hydrology/Water Quality	=	=	=	=
Noise	+	+	-	+
Transportation/Traffic	+	+	-	-
Total "+'s"	**7**	**7**	**0**	**2**

= roughly equivalent impact between alternatives
+ greater impact compared to other alternatives
- less impact compared to other alternatives

When comparing the four project component alternatives, Alternatives 1 and 2 have the greatest potential to result in significant environmental impacts on the site, while Alternative 3 has the least potential to do so. Therefore, the environmentally superior alternative for the David Avenue Reservoir component of the project is Alternative 3.

Alternative 3 is environmentally superior to the other alternatives primarily because it would require less earthwork and associated soil disturbance, thus minimizing impacts to air quality, biological resources, cultural resources, greenhouse gas emissions, noise, and traffic. Although the relatively higher level of inundation, this would not result in substantially greater impacts when compared to alternatives with less water storage.

Alternative 4 would be the environmentally superior alternative among the remaining alternatives, with just two issue areas exceeding the impacts of other alternatives (air quality and noise, based on construction activities associate with installing sheetpile on the site as proposed by the alternative). However, because of less required earthwork and export of soils from the site, this alternative would result in relatively minor impacts to biological resources, greenhouse gas emissions, and traffic.

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Pacific Grove ASBS Refined '06 Feasability Study - Alt 1

Monterey County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Parking	1.00	User Defined Unit	3.60	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.8	**Precipitation Freq (Days)**	55
Climate Zone	4			**Operational Year**	2014
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Off-road Equipment -

Off-road Equipment -

Trips and VMT - Haul trip mileage estimated using applicant-provided data and Google Earth. Total haul trips estimated based on 12cy/trip.

Off-road Equipment - Equipment list and operating schedule for grading and offhaul based on applicant-provided info.

Project Characteristics -

Land Use - 3.6 acre area of historic reservoir estimated in Google Earth.

Construction Phase - Phases and phase length provided by project applicant.

Grading - Material import/export provided by applicant. Acreage estimated using Google Earth

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	230.00	30.00
tblConstructionPhase	NumDays	8.00	168.00
tblConstructionPhase	NumDays	5.00	30.00
tblGrading	AcresOfGrading	84.00	4.00
tblGrading	MaterialExported	0.00	6,960.00
tblGrading	MaterialImported	0.00	29,258.00
tblLandUse	LotAcreage	0.00	3.60
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Grading
tblTripsAndVMT	HaulingTripLength	20.00	15.60
tblTripsAndVMT	HaulingTripNumber	4,527.00	3,019.00
tblTripsAndVMT	WorkerTripNumber	20.00	15.00
tblTripsAndVMT	WorkerTripNumber	18.00	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2014	4.9295	42.0613	29.7372	0.0429	18.0663	1.9186	18.0663	9.9307	1.7651	9.9307	0.0000	4,481.5353	4,481.5353	0.9854	0.0000	4,502.2294
Total	**4.9295**	**42.0613**	**29.7372**	**0.0429**	**18.0663**	**1.9186**	**18.0663**	**9.9307**	**1.7651**	**9.9307**	**0.0000**	**4,481.5353**	**4,481.5353**	**0.9854**	**0.0000**	**4,502.2294**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2014	4.9265	42.0276	29.7163	0.0428	37.3958	1.9170	39.3128	11.0138	1.7636	12.7773	0.0000	4,478.5413	4,478.5413	0.9846	0.0000	4,499.2169
Total	**4.9265**	**42.0276**	**29.7163**	**0.0428**	**37.3958**	**1.9170**	**39.3128**	**11.0138**	**1.7636**	**12.7773**	**0.0000**	**4,478.5413**	**4,478.5413**	**0.9846**	**0.0000**	**4,499.2169**

	ROG	**NOx**	**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	**0.0609**	**0.0801**	**0.0703**	**0.0700**	**-106.9924**	**0.0870**	**-117.6031**	**-10.9065**	**0.0867**	**-28.6652**	**0.0000**	**0.0668**	**0.0668**	**0.0893**	**0.0000**	**0.0669**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
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
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
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
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

	ROG	NOx	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	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Mobilization/Demobilization	Site Preparation	1/29/2014	3/11/2014	5	30	
2	Grading	Grading	3/12/2014	10/31/2014	5	168	
3	Mechanical/Electrical	Building Construction	11/1/2014	12/12/2014	5	30	

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Off-Highway Trucks	1	8.00	400	0.38
Grading	Rollers	1	8.00	80	0.38
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Rubber Tired Loaders	1	1.20	199	0.36
Grading	Skid Steer Loaders	1	8.00	64	0.37
Grading	Tractors/Loaders/Backhoes	1	8.00	97	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
Mechanical/Electrical	9	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	15.00	0.00	3,019.00	10.80	7.30	15.60	LD_Mix	HDT_Mix	HHDT
Mobilization/Demobilization	7	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Mobilization/Demobilization - 2014

Unmitigated Construction On-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Total					**18.0663**	**0.0000**	**18.0663**	**9.9307**	**0.0000**	**9.9307**			**0.0000**			**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.2 Mobilization/Demobilization - 2014

Mitigated Construction On-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Total					**18.0663**	**0.0000**	**18.0663**	**9.9307**	**0.0000**	**9.9307**			**0.0000**			**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.3 Grading - 2014

Unmitigated Construction On-Site

Acres of Grading: 4

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.0807	0.0000	6.0807	3.3180	0.0000	3.3180			0.0000			0.0000
Off-Road	3.2722	36.7347	22.7940	0.0308		1.8232	1.8232		1.6774	1.6774		3,263.3640	3,263.3640	0.9644		3,283.6156
Total	**3.2722**	**36.7347**	**22.7940**	**0.0308**	**6.0807**	**1.8232**	**7.9039**	**3.3180**	**1.6774**	**4.9954**		**3,263.3640**	**3,263.3640**	**0.9644**		**3,283.6156**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.3709	5.2015	5.6214	0.0105	0.2438	0.0939	0.3377	0.0668	0.0864	0.1531		1,074.5032	1,074.5032	9.7100e-003		1,074.7071
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2864	0.1252	1.3218	1.6100e-003	0.1232	1.5200e-003	0.1247	0.0327	1.3800e-003	0.0341		143.6681	143.6681	0.0114		143.9067
Total	**1.6573**	**5.3267**	**6.9431**	**0.0121**	**0.3671**	**0.0954**	**0.4625**	**0.0994**	**0.0877**	**0.1872**		**1,218.1712**	**1,218.1712**	**0.0211**		**1,218.6138**

3.3 Grading - 2014

Mitigated Construction On-Site

Acres of Grading: 4

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.0807	0.0000	6.0807	3.3180	0.0000	3.3180			0.0000			0.0000
Off-Road	3.2692	36.7010	22.7731	0.0307		1.8215	1.8215		1.6758	1.6758	0.0000	3,260.3701	3,260.3701	0.9635		3,280.6031
Total	**3.2692**	**36.7010**	**22.7731**	**0.0307**	**6.0807**	**1.8215**	**7.9022**	**3.3180**	**1.6758**	**4.9938**	**0.0000**	**3,260.3701**	**3,260.3701**	**0.9635**		**3,280.6031**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.3709	5.2015	5.6214	0.0105	31.1919	0.0939	31.2858	7.6631	0.0864	7.7495		1,074.5032	1,074.5032	9.7100e-003		1,074.7071
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2864	0.1252	1.3218	1.6100e-003	0.1232	1.5200e-003	0.1247	0.0327	1.3800e-003	0.0341		143.6681	143.6681	0.0114		143.9067
Total	**1.6573**	**5.3267**	**6.9431**	**0.0121**	**31.3151**	**0.0954**	**31.4105**	**7.6958**	**0.0877**	**7.7835**		**1,218.1712**	**1,218.1712**	**0.0211**		**1,218.6138**

3.4 Mechanical/Electrical - 2014

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Parking	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Parking	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.466568	0.040230	0.201875	0.178210	0.051756	0.007394	0.017953	0.018959	0.004316	0.001974	0.007519	0.000975	0.002270

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Unmitigated	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004

Pacific Grove ASBS Refined '06 Feasability Study - Alt 2

Monterey County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Parking	1.00	User Defined Unit	3.60	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.8	**Precipitation Freq (Days)**	55
Climate Zone	4			**Operational Year**	2014
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - 3.6 acre area of historic reservoir estimated in Google Earth.

Construction Phase - Phases and phase length provided by project applicant.

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - Equipment list and operating schedule for grading and offhaul based on applicant-provided info.

Grading - Material import/export provided by applicant. Acreage estimated using Google Earth

Trips and VMT - Haul trip mileage estimated using applicant-provided data and Google Earth. Total haul trips estimated based on 12cy/trip.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	230.00	30.00
tblConstructionPhase	NumDays	8.00	165.00
tblConstructionPhase	NumDays	5.00	30.00
tblGrading	AcresOfGrading	84.00	4.00
tblGrading	MaterialExported	0.00	15,894.00
tblGrading	MaterialImported	0.00	25,924.00
tblLandUse	LotAcreage	0.00	3.60
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Dozers
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Grading
tblTripsAndVMT	HaulingTripLength	20.00	15.60
tblTripsAndVMT	HaulingTripNumber	4,527.00	3,485.00
tblTripsAndVMT	WorkerTripNumber	20.00	15.00
tblTripsAndVMT	WorkerTripNumber	18.00	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2014	5.2662	44.2753	31.0748	0.0459	18.0663	1.9794	18.0663	9.9307	1.8210	9.9307	0.0000	4,791.7654	4,791.7654	1.0231	0.0000	4,813.2513
Total	**5.2662**	**44.2753**	**31.0748**	**0.0459**	**18.0663**	**1.9794**	**18.0663**	**9.9307**	**1.8210**	**9.9307**	**0.0000**	**4,791.7654**	**4,791.7654**	**1.0231**	**0.0000**	**4,813.2513**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2014	5.2631	44.2404	31.0536	0.0458	42.3275	1.9777	44.3051	12.2582	1.8194	14.0776	0.0000	4,788.6597	4,788.6597	1.0222	0.0000	4,810.1263
Total	**5.2631**	**44.2404**	**31.0536**	**0.0458**	**42.3275**	**1.9777**	**44.3051**	**12.2582**	**1.8194**	**14.0776**	**0.0000**	**4,788.6597**	**4,788.6597**	**1.0222**	**0.0000**	**4,810.1263**

	ROG	**NOx**	**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	**0.0587**	**0.0788**	**0.0684**	**0.0654**	**-134.2901**	**0.0869**	**-145.2368**	**-23.4375**	**0.0862**	**-41.7583**	**0.0000**	**0.0648**	**0.0648**	**0.0899**	**0.0000**	**0.0649**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
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
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
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
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

	ROG	NOx	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	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Mobilization/Demobilization	Site Preparation	1/29/2014	3/11/2014	5	30	
2	Grading	Grading	3/12/2014	10/28/2014	5	165	
3	Mechanical/Electrical	Building Construction	10/29/2014	12/9/2014	5	30	

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Rubber Tired Loaders	1	2.70	199	0.36
Grading	Rollers	1	8.00	80	0.38
Grading	Skid Steer Loaders	1	8.00	64	0.37
Grading	Off-Highway Trucks	1	8.00	400	0.38

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
Mechanical/Electrical	9	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Mobilization/Demobilization	7	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	15.00	0.00	3,485.00	10.80	7.30	15.60	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Mobilization/Demobilization - 2014

Unmitigated Construction On-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Total					**18.0663**	**0.0000**	**18.0663**	**9.9307**	**0.0000**	**9.9307**			**0.0000**			**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.2 Mobilization/Demobilization - 2014

Mitigated Construction On-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Total					**18.0663**	**0.0000**	**18.0663**	**9.9307**	**0.0000**	**9.9307**			**0.0000**			**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.3 Grading - 2014

Unmitigated Construction On-Site

Acres of Grading: 4

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.1965	0.0000	6.1965	3.3791	0.0000	3.3791			0.0000			0.0000
Off-Road	3.3685	38.0366	23.1460	0.0319		1.8675	1.8675		1.7181	1.7181		3,385.1865	3,385.1865	1.0004		3,406.1940
Total	**3.3685**	**38.0366**	**23.1460**	**0.0319**	**6.1965**	**1.8675**	**8.0640**	**3.3791**	**1.7181**	**5.0972**		**3,385.1865**	**3,385.1865**	**1.0004**		**3,406.1940**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.6113	6.1135	6.6071	0.0123	0.2866	0.1104	0.3970	0.0785	0.1015	0.1800		1,262.9109	1,262.9109	0.0114		1,263.1506
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2864	0.1252	1.3218	1.6100e-003	0.1232	1.5200e-003	0.1247	0.0327	1.3800e-003	0.0341		143.6681	143.6681	0.0114		143.9067
Total	**1.8977**	**6.2387**	**7.9288**	**0.0140**	**0.4098**	**0.1119**	**0.5217**	**0.1111**	**0.1029**	**0.2140**		**1,406.5790**	**1,406.5790**	**0.0228**		**1,407.0573**

3.3 Grading - 2014

Mitigated Construction On-Site

Acres of Grading: 4

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					6.1965	0.0000	6.1965	3.3791	0.0000	3.3791			0.0000			0.0000
Off-Road	3.3655	38.0017	23.1247	0.0319		1.8658	1.8658		1.7165	1.7165	0.0000	3,382.0807	3,382.0807	0.9994		3,403.0690
Total	**3.3655**	**38.0017**	**23.1247**	**0.0319**	**6.1965**	**1.8658**	**8.0623**	**3.3791**	**1.7165**	**5.0956**	**0.0000**	**3,382.0807**	**3,382.0807**	**0.9994**		**3,403.0690**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.6113	6.1135	6.6071	0.0123	36.0077	0.1104	36.1181	8.8464	0.1015	8.9479		1,262.9109	1,262.9109	0.0114		1,263.1506
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2864	0.1252	1.3218	1.6100e-003	0.1232	1.5200e-003	0.1247	0.0327	1.3800e-003	0.0341		143.6681	143.6681	0.0114		143.9067
Total	**1.8977**	**6.2387**	**7.9288**	**0.0140**	**36.1310**	**0.1119**	**36.2429**	**8.8791**	**0.1029**	**8.9819**		**1,406.5790**	**1,406.5790**	**0.0228**		**1,407.0573**

3.4 Mechanical/Electrical - 2014

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Parking	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Parking	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.466568	0.040230	0.201875	0.178210	0.051756	0.007394	0.017953	0.018959	0.004316	0.001974	0.007519	0.000975	0.002270

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Unmitigated	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

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

10.0 Vegetation

Pacific Grove ASBS Refined '06 Feasability Study - Alt 3

Monterey County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Parking	1.00	User Defined Unit	3.60	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.8	**Precipitation Freq (Days)**	55
Climate Zone	4			**Operational Year**	2014
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - 3.6 acre area of historic reservoir estimated in Google Earth.

Construction Phase - Phases and phase length provided by project applicant.

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - Equipment list and operating schedule for grading and offhaul based on applicant-provided info.

Grading - Material import/export provided by applicant. Acreage estimated using Google Earth

Trips and VMT - Haul trip mileage estimated using applicant-provided data and Google Earth. Total haul trips estimated based on 12cy/trip.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	230.00	30.00
tblConstructionPhase	NumDays	8.00	46.00
tblConstructionPhase	NumDays	5.00	30.00
tblGrading	AcresOfGrading	84.00	4.00
tblGrading	MaterialImported	0.00	8,332.00
tblLandUse	LotAcreage	0.00	3.60
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Dozers
tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Grading
tblTripsAndVMT	HaulingTripLength	20.00	15.60
tblTripsAndVMT	HaulingTripNumber	4,527.00	695.00
tblTripsAndVMT	WorkerTripNumber	20.00	15.00
tblTripsAndVMT	WorkerTripNumber	18.00	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2014	4.6342	40.1915	28.5605	0.0403	22.4422	1.8683	24.3105	12.1925	1.7188	13.9113	0.0000	4,212.9757	4,212.9757	0.9551	0.0000	4,233.0326
Total	**4.6342**	**40.1915**	**28.5605**	**0.0403**	**22.4422**	**1.8683**	**24.3105**	**12.1925**	**1.7188**	**13.9113**	**0.0000**	**4,212.9757**	**4,212.9757**	**0.9551**	**0.0000**	**4,233.0326**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2014	4.6312	40.1588	28.5399	0.0402	29.4535	1.8666	31.3202	13.9135	1.7173	15.6308	0.0000	4,210.0712	4,210.0712	0.9542	0.0000	4,230.1100
Total	**4.6312**	**40.1588**	**28.5399**	**0.0402**	**29.4535**	**1.8666**	**31.3202**	**13.9135**	**1.7173**	**15.6308**	**0.0000**	**4,210.0712**	**4,210.0712**	**0.9542**	**0.0000**	**4,230.1100**

	ROG	**NOx**	**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	**0.0632**	**0.0815**	**0.0723**	**0.0745**	**-31.2419**	**0.0878**	**-28.8342**	**-14.1150**	**0.0879**	**-12.3602**	**0.0000**	**0.0689**	**0.0689**	**0.0900**	**0.0000**	**0.0690**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
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
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
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
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

	ROG	NOx	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	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Mobilization/Demobilization	Site Preparation	1/29/2014	3/11/2014	5	30	
2	Grading	Grading	3/12/2014	5/14/2014	5	46	
3	Mechanical/Electrical	Building Construction	5/15/2014	6/25/2014	5	30	

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Rollers	1	8.00	80	0.38
Grading	Skid Steer Loaders	1	8.00	64	0.37
Grading	Off-Highway Trucks	1	8.00	400	0.38

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
Mechanical/Electrical	9	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Mobilization/Demobilization	7	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	15.00	0.00	695.00	10.80	7.30	15.60	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Mobilization/Demobilization - 2014

Unmitigated Construction On-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Total					**18.0663**	**0.0000**	**18.0663**	**9.9307**	**0.0000**	**9.9307**			**0.0000**			**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.2 Mobilization/Demobilization - 2014

Mitigated Construction On-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Total					**18.0663**	**0.0000**	**18.0663**	**9.9307**	**0.0000**	**9.9307**			**0.0000**			**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.3 Grading - 2014

Unmitigated Construction On-Site

Acres of Grading: 4

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					22.1140	0.0000	22.1140	12.1037	0.0000	12.1037			0.0000			0.0000
Off-Road	3.1952	35.6931	22.5125	0.0298		1.7878	1.7878		1.6448	1.6448		3,165.9061	3,165.9061	0.9356		3,185.5529
Total	**3.1952**	**35.6931**	**22.5125**	**0.0298**	**22.1140**	**1.7878**	**23.9018**	**12.1037**	**1.6448**	**13.7485**		**3,165.9061**	**3,165.9061**	**0.9356**		**3,185.5529**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.1526	4.3732	4.7262	8.8200e-003	0.2050	0.0790	0.2840	0.0561	0.0726	0.1287		903.4016	903.4016	8.1600e-003		903.5730
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2864	0.1252	1.3218	1.6100e-003	0.1232	1.5200e-003	0.1247	0.0327	1.3800e-003	0.0341		143.6681	143.6681	0.0114		143.9067
Total	**1.4390**	**4.4984**	**6.0480**	**0.0104**	**0.3282**	**0.0805**	**0.4087**	**0.0888**	**0.0740**	**0.1628**		**1,047.0696**	**1,047.0696**	**0.0195**		**1,047.4797**

3.3 Grading - 2014

Mitigated Construction On-Site

Acres of Grading: 4

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					22.1140	0.0000	22.1140	12.1037	0.0000	12.1037			0.0000			0.0000
Off-Road	3.1922	35.6604	22.4918	0.0298		1.7862	1.7862		1.6433	1.6433	0.0000	3,163.0016	3,163.0016	0.9347		3,182.6303
Total	**3.1922**	**35.6604**	**22.4918**	**0.0298**	**22.1140**	**1.7862**	**23.9001**	**12.1037**	**1.6433**	**13.7470**	**0.0000**	**3,163.0016**	**3,163.0016**	**0.9347**		**3,182.6303**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	1.1526	4.3732	4.7262	8.8200e-003	7.2164	0.0790	7.2953	1.7771	0.0726	1.8497		903.4016	903.4016	8.1600e-003		903.5730
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2864	0.1252	1.3218	1.6100e-003	0.1232	1.5200e-003	0.1247	0.0327	1.3800e-003	0.0341		143.6681	143.6681	0.0114		143.9067
Total	**1.4390**	**4.4984**	**6.0480**	**0.0104**	**7.3396**	**0.0805**	**7.4201**	**1.8098**	**0.0740**	**1.8838**		**1,047.0696**	**1,047.0696**	**0.0195**		**1,047.4797**

3.4 Mechanical/Electrical - 2014

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Parking	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Parking	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.466568	0.040230	0.201875	0.178210	0.051756	0.007394	0.017953	0.018959	0.004316	0.001974	0.007519	0.000975	0.002270

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Unmitigated	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

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

10.0 Vegetation

Pacific Grove ASBS Refined '06 Feasability Study - Alt 4

Monterey County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Parking	1.00	User Defined Unit	3.60	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.8	**Precipitation Freq (Days)**	55
Climate Zone	4			**Operational Year**	2014
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - 3.6 acre area of historic reservoir estimated in Google Earth.

Construction Phase - Phases and phase length provided by project applicant.

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - Equipment list and operating schedule for grading and offhaul based on applicant-provided info.

Grading - Material import/export provided by applicant. Acreage estimated using Google Earth

Trips and VMT - Haul trip mileage estimated using applicant-provided data and Google Earth. Total haul trips estimated based on 12cy/trip.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	230.00	30.00
tblConstructionPhase	NumDays	8.00	33.00
tblConstructionPhase	NumDays	5.00	30.00
tblGrading	AcresOfGrading	84.00	4.00
tblGrading	MaterialImported	0.00	11,980.00
tblLandUse	LotAcreage	0.00	3.60
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Dozers
tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Grading
tblTripsAndVMT	HaulingTripLength	20.00	15.60
tblTripsAndVMT	HaulingTripNumber	4,527.00	999.00
tblTripsAndVMT	WorkerTripNumber	20.00	15.00
tblTripsAndVMT	WorkerTripNumber	18.00	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2014	5.7910	44.5807	33.3041	0.0491	31.3766	1.9475	33.3241	17.0196	1.7916	18.8112	0.0000	5,119.6861	5,119.6861	0.9633	0.0000	5,139.9150
Total	**5.7910**	**44.5807**	**33.3041**	**0.0491**	**31.3766**	**1.9475**	**33.3241**	**17.0196**	**1.7916**	**18.8112**	**0.0000**	**5,119.6861**	**5,119.6861**	**0.9633**	**0.0000**	**5,139.9150**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2014	5.7881	44.5480	33.2834	0.0491	41.3666	1.9459	43.3125	19.4717	1.7901	21.2618	0.0000	5,116.7815	5,116.7815	0.9624	0.0000	5,136.9924
Total	**5.7881**	**44.5480**	**33.2834**	**0.0491**	**41.3666**	**1.9459**	**43.3125**	**19.4717**	**1.7901**	**21.2618**	**0.0000**	**5,116.7815**	**5,116.7815**	**0.9624**	**0.0000**	**5,136.9924**

	ROG	**NOx**	**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	**0.0506**	**0.0735**	**0.0620**	**0.0611**	**-31.8389**	**0.0842**	**-29.9733**	**-14.4075**	**0.0837**	**-13.0272**	**0.0000**	**0.0567**	**0.0567**	**0.0893**	**0.0000**	**0.0569**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
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
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
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
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**	**0.0000**	**2.3000e-004**

	ROG	NOx	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	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Mobilization/Demobilization	Site Preparation	1/29/2014	3/11/2014	5	30	
2	Grading	Grading	3/12/2014	4/25/2014	5	33	
3	Mechanical/Electrical	Building Construction	4/26/2014	6/6/2014	5	30	

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Rollers	1	8.00	80	0.38
Grading	Skid Steer Loaders	1	8.00	64	0.37
Grading	Off-Highway Trucks	1	8.00	400	0.38

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
Mechanical/Electrical	9	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Mobilization/Demobilization	7	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	15.00	0.00	999.00	10.80	7.30	15.60	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Mobilization/Demobilization - 2014

Unmitigated Construction On-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Total					**18.0663**	**0.0000**	**18.0663**	**9.9307**	**0.0000**	**9.9307**			**0.0000**			**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.2 Mobilization/Demobilization - 2014

Mitigated Construction On-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Total					**18.0663**	**0.0000**	**18.0663**	**9.9307**	**0.0000**	**9.9307**			**0.0000**			**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.3 Grading - 2014

Unmitigated Construction On-Site

Acres of Grading: 4

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					30.8426	0.0000	30.8426	16.8745	0.0000	16.8745			0.0000			0.0000
Off-Road	3.1952	35.6931	22.5125	0.0298		1.7878	1.7878		1.6448	1.6448		3,165.9061	3,165.9061	0.9356		3,185.5529
Total	**3.1952**	**35.6931**	**22.5125**	**0.0298**	**30.8426**	**1.7878**	**32.6304**	**16.8745**	**1.6448**	**18.5192**		**3,165.9061**	**3,165.9061**	**0.9356**		**3,185.5529**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.3094	8.7624	9.4698	0.0177	0.4108	0.1582	0.5690	0.1125	0.1455	0.2579		1,810.1119	1,810.1119	0.0164		1,810.4554
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2864	0.1252	1.3218	1.6100e-003	0.1232	1.5200e-003	0.1247	0.0327	1.3800e-003	0.0341		143.6681	143.6681	0.0114		143.9067
Total	**2.5958**	**8.8876**	**10.7916**	**0.0193**	**0.5340**	**0.1597**	**0.6937**	**0.1451**	**0.1469**	**0.2920**		**1,953.7800**	**1,953.7800**	**0.0277**		**1,954.3621**

3.3 Grading - 2014

Mitigated Construction On-Site

Acres of Grading: 4

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					30.8426	0.0000	30.8426	16.8745	0.0000	16.8745			0.0000			0.0000
Off-Road	3.1922	35.6604	22.4918	0.0298		1.7862	1.7862		1.6433	1.6433	0.0000	3,163.0016	3,163.0016	0.9347		3,182.6303
Total	**3.1922**	**35.6604**	**22.4918**	**0.0298**	**30.8426**	**1.7862**	**32.6288**	**16.8745**	**1.6433**	**18.5177**	**0.0000**	**3,163.0016**	**3,163.0016**	**0.9347**		**3,182.6303**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	2.3094	8.7624	9.4698	0.0177	10.4007	0.1582	10.5589	2.5645	0.1455	2.7100		1,810.1119	1,810.1119	0.0164		1,810.4554
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.2864	0.1252	1.3218	1.6100e-003	0.1232	1.5200e-003	0.1247	0.0327	1.3800e-003	0.0341		143.6681	143.6681	0.0114		143.9067
Total	**2.5958**	**8.8876**	**10.7916**	**0.0193**	**10.5240**	**0.1597**	**10.6837**	**2.5972**	**0.1469**	**2.7441**		**1,953.7800**	**1,953.7800**	**0.0277**		**1,954.3621**

3.4 Mechanical/Electrical - 2014

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Parking	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Parking	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.466568	0.040230	0.201875	0.178210	0.051756	0.007394	0.017953	0.018959	0.004316	0.001974	0.007519	0.000975	0.002270

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Unmitigated	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

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

10.0 Vegetation

Pacific Grove ASBS Refined '06 Feasability Study - Alt 1

Monterey County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Parking	1.00	User Defined Unit	3.60	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.8	**Precipitation Freq (Days)**	55
Climate Zone	4			**Operational Year**	2014
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Off-road Equipment -

Off-road Equipment -

Trips and VMT - Haul trip mileage estimated using applicant-provided data and Google Earth. Total haul trips estimated based on 12cy/trip.

Off-road Equipment - Equipment list and operating schedule for grading and offhaul based on applicant-provided info.

Project Characteristics -

Land Use - 3.6 acre area of historic reservoir estimated in Google Earth.

Construction Phase - Phases and phase length provided by project applicant.

Grading - Material import/export provided by applicant. Acreage estimated using Google Earth

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	230.00	30.00
tblConstructionPhase	NumDays	8.00	168.00
tblConstructionPhase	NumDays	5.00	30.00
tblGrading	AcresOfGrading	84.00	4.00
tblGrading	MaterialExported	0.00	6,960.00
tblGrading	MaterialImported	0.00	29,258.00
tblLandUse	LotAcreage	0.00	3.60
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Grading
tblTripsAndVMT	HaulingTripLength	20.00	15.60
tblTripsAndVMT	HaulingTripNumber	4,527.00	3,019.00
tblTripsAndVMT	WorkerTripNumber	20.00	15.00
tblTripsAndVMT	WorkerTripNumber	18.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2014	0.4228	3.5531	2.5967	3.5900e-003	0.8117	0.1612	0.9729	0.4358	0.1483	0.5841	0.0000	340.7777	340.7777	0.0751	0.0000	342.3548
Total	**0.4228**	**3.5531**	**2.5967**	**3.5900e-003**	**0.8117**	**0.1612**	**0.9729**	**0.4358**	**0.1483**	**0.5841**	**0.0000**	**340.7777**	**340.7777**	**0.0751**	**0.0000**	**342.3548**

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					
2014	0.4225	3.5495	2.5944	3.5900e-003	3.3134	0.1610	3.4744	1.0499	0.1481	1.1980	0.0000	340.4819	340.4819	0.0750	0.0000	342.0571
Total	**0.4225**	**3.5495**	**2.5944**	**3.5900e-003**	**3.3134**	**0.1610**	**3.4744**	**1.0499**	**0.1481**	**1.1980**	**0.0000**	**340.4819**	**340.4819**	**0.0750**	**0.0000**	**342.0571**

	ROG	**NOx**	**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	**0.0757**	**0.1033**	**0.0878**	**0.0000**	**-308.2126**	**0.1117**	**-257.1305**	**-140.9018**	**0.1079**	**-105.1038**	**0.0000**	**0.0868**	**0.0868**	**0.1198**	**0.0000**	**0.0869**

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	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
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	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
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	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

	ROG	**NOx**	**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	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Mobilization/Demobilization	Site Preparation	1/29/2014	3/11/2014	5	30	
2	Grading	Grading	3/12/2014	10/31/2014	5	168	
3	Mechanical/Electrical	Building Construction	11/1/2014	12/12/2014	5	30	

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Off-Highway Trucks	1	8.00	400	0.38
Grading	Rollers	1	8.00	80	0.38
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Rubber Tired Loaders	1	1.20	199	0.36
Grading	Skid Steer Loaders	1	8.00	64	0.37
Grading	Tractors/Loaders/Backhoes	1	8.00	97	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
Mechanical/Electrical	9	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	15.00	0.00	3,019.00	10.80	7.30	15.60	LD_Mix	HDT_Mix	HHDT
Mobilization/Demobilization	7	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Mobilization/Demobilization - 2014

Unmitigated Construction On-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2710	0.0000	0.2710	0.1490	0.0000	0.1490	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total					**0.2710**	**0.0000**	**0.2710**	**0.1490**	**0.0000**	**0.1490**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Mobilization/Demobilization - 2014

Mitigated Construction On-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2710	0.0000	0.2710	0.1490	0.0000	0.1490	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total					**0.2710**	**0.0000**	**0.2710**	**0.1490**	**0.0000**	**0.1490**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Grading - 2014

Unmitigated Construction On-Site

Acres of Grading: 4

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.5108	0.0000	0.5108	0.2787	0.0000	0.2787	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2749	3.0857	1.9147	2.5800e-003		0.1532	0.1532		0.1409	0.1409	0.0000	248.6798	248.6798	0.0735	0.0000	250.2231
Total	**0.2749**	**3.0857**	**1.9147**	**2.5800e-003**	**0.5108**	**0.1532**	**0.6639**	**0.2787**	**0.1409**	**0.4196**	**0.0000**	**248.6798**	**248.6798**	**0.0735**	**0.0000**	**250.2231**

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	0.1223	0.4554	0.5731	8.8000e-004	0.0199	7.9000e-003	0.0278	5.4600e-003	7.2700e-003	0.0127	0.0000	81.7775	81.7775	7.4000e-004	0.0000	81.7931
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0256	0.0120	0.1089	1.3000e-004	0.0100	1.3000e-004	0.0101	2.6600e-003	1.2000e-004	2.7800e-003	0.0000	10.3204	10.3204	8.7000e-004	0.0000	10.3386
Total	**0.1479**	**0.4674**	**0.6820**	**1.0100e-003**	**0.0299**	**8.0300e-003**	**0.0379**	**8.1200e-003**	**7.3900e-003**	**0.0155**	**0.0000**	**92.0979**	**92.0979**	**1.6100e-003**	**0.0000**	**92.1317**

3.3 Grading - 2014

Mitigated Construction On-Site

Acres of Grading: 4

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.5108	0.0000	0.5108	0.2787	0.0000	0.2787	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2745	3.0820	1.9124	2.5800e-003		0.1530	0.1530		0.1407	0.1407	0.0000	248.3840	248.3840	0.0734	0.0000	249.9254
Total	**0.2745**	**3.0820**	**1.9124**	**2.5800e-003**	**0.5108**	**0.1530**	**0.6638**	**0.2787**	**0.1407**	**0.4194**	**0.0000**	**248.3840**	**248.3840**	**0.0734**	**0.0000**	**249.9254**

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	0.1223	0.4554	0.5731	8.8000e-004	2.5216	7.9000e-003	2.5295	0.6195	7.2700e-003	0.6268	0.0000	81.7775	81.7775	7.4000e-004	0.0000	81.7931
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0256	0.0120	0.1089	1.3000e-004	0.0100	1.3000e-004	0.0101	2.6600e-003	1.2000e-004	2.7800e-003	0.0000	10.3204	10.3204	8.7000e-004	0.0000	10.3386
Total	**0.1479**	**0.4674**	**0.6820**	**1.0100e-003**	**2.5316**	**8.0300e-003**	**2.5396**	**0.6222**	**7.3900e-003**	**0.6296**	**0.0000**	**92.0979**	**92.0979**	**1.6100e-003**	**0.0000**	**92.1317**

3.4 Mechanical/Electrical - 2014

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Parking	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Parking	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.466568	0.040230	0.201875	0.178210	0.051756	0.007394	0.017953	0.018959	0.004316	0.001974	0.007519	0.000975	0.002270

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Unmitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Parking	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Parking	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

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

10.0 Vegetation

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.0000e-005	0.0000	1.1000e-004	0.0000		0.0000	0.0000		0.0000	0.0000		2.2000e-004	2.2000e-004	0.0000		2.3000e-004
Total	**1.0000e-005**	**0.0000**	**1.1000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**2.2000e-004**	**2.2000e-004**	**0.0000**		**2.3000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

Pacific Grove ASBS Refined '06 Feasability Study - Alt 2

Monterey County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Parking	1.00	User Defined Unit	3.60	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.8	**Precipitation Freq (Days)**	55
Climate Zone	4			**Operational Year**	2014
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - 3.6 acre area of historic reservoir estimated in Google Earth.

Construction Phase - Phases and phase length provided by project applicant.

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - Equipment list and operating schedule for grading and offhaul based on applicant-provided info.

Grading - Material import/export provided by applicant. Acreage estimated using Google Earth

Trips and VMT - Haul trip mileage estimated using applicant-provided data and Google Earth. Total haul trips estimated based on 12cy/trip.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	230.00	30.00
tblConstructionPhase	NumDays	8.00	165.00
tblConstructionPhase	NumDays	5.00	30.00
tblGrading	AcresOfGrading	84.00	4.00
tblGrading	MaterialExported	0.00	15,894.00
tblGrading	MaterialImported	0.00	25,924.00
tblLandUse	LotAcreage	0.00	3.60
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Dozers
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Grading
tblTripsAndVMT	HaulingTripLength	20.00	15.60
tblTripsAndVMT	HaulingTripNumber	4,527.00	3,485.00
tblTripsAndVMT	WorkerTripNumber	20.00	15.00
tblTripsAndVMT	WorkerTripNumber	18.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2014	0.4442	3.6755	2.6781	3.7800e-003	0.8150	0.1633	0.9783	0.4367	0.1503	0.5869	0.0000	357.8931	357.8931	0.0766	0.0000	359.5012
Total	**0.4442**	**3.6755**	**2.6781**	**3.7800e-003**	**0.8150**	**0.1633**	**0.9783**	**0.4367**	**0.1503**	**0.5869**	**0.0000**	**357.8931**	**357.8931**	**0.0766**	**0.0000**	**359.5012**

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					
2014	0.4439	3.6718	2.6758	3.7700e-003	3.6510	0.1631	3.8141	1.1328	0.1501	1.2828	0.0000	357.5917	357.5917	0.0765	0.0000	359.1980
Total	**0.4439**	**3.6718**	**2.6758**	**3.7700e-003**	**3.6510**	**0.1631**	**3.8141**	**1.1328**	**0.1501**	**1.2828**	**0.0000**	**357.5917**	**357.5917**	**0.0765**	**0.0000**	**359.1980**

	ROG	**NOx**	**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	**0.0743**	**0.1018**	**0.0851**	**0.2646**	**-347.9675**	**0.1163**	**-289.8643**	**-159.4146**	**0.1131**	**-118.5753**	**0.0000**	**0.0842**	**0.0842**	**0.1175**	**0.0000**	**0.0844**

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	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
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	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
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	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

	ROG	**NOx**	**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	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Mobilization/Demobilization	Site Preparation	1/29/2014	3/11/2014	5	30	
2	Grading	Grading	3/12/2014	10/28/2014	5	165	
3	Mechanical/Electrical	Building Construction	10/29/2014	12/9/2014	5	30	

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Rubber Tired Loaders	1	2.70	199	0.36
Grading	Rollers	1	8.00	80	0.38
Grading	Skid Steer Loaders	1	8.00	64	0.37
Grading	Off-Highway Trucks	1	8.00	400	0.38

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
Mechanical/Electrical	9	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Mobilization/Demobilization	7	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	15.00	0.00	3,485.00	10.80	7.30	15.60	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Mobilization/Demobilization - 2014

Unmitigated Construction On-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2710	0.0000	0.2710	0.1490	0.0000	0.1490	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total					**0.2710**	**0.0000**	**0.2710**	**0.1490**	**0.0000**	**0.1490**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Mobilization/Demobilization - 2014

Mitigated Construction On-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2710	0.0000	0.2710	0.1490	0.0000	0.1490	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total					**0.2710**	**0.0000**	**0.2710**	**0.1490**	**0.0000**	**0.1490**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Grading - 2014

Unmitigated Construction On-Site

Acres of Grading: 4

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.5112	0.0000	0.5112	0.2788	0.0000	0.2788	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2779	3.1380	1.9095	2.6300e-003		0.1541	0.1541		0.1417	0.1417	0.0000	253.3566	253.3566	0.0749	0.0000	254.9289
Total	**0.2779**	**3.1380**	**1.9095**	**2.6300e-003**	**0.5112**	**0.1541**	**0.6653**	**0.2788**	**0.1417**	**0.4205**	**0.0000**	**253.3566**	**253.3566**	**0.0749**	**0.0000**	**254.9289**

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	0.1412	0.5257	0.6616	1.0200e-003	0.0230	9.1200e-003	0.0321	6.3100e-003	8.3900e-003	0.0147	0.0000	94.4003	94.4003	8.6000e-004	0.0000	94.4183
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0252	0.0118	0.1069	1.3000e-004	9.8300e-003	1.3000e-004	9.9600e-003	2.6100e-003	1.1000e-004	2.7300e-003	0.0000	10.1361	10.1361	8.5000e-004	0.0000	10.1540
Total	**0.1663**	**0.5375**	**0.7685**	**1.1500e-003**	**0.0328**	**9.2500e-003**	**0.0421**	**8.9200e-003**	**8.5000e-003**	**0.0174**	**0.0000**	**104.5364**	**104.5364**	**1.7100e-003**	**0.0000**	**104.5723**

3.3 Grading - 2014

Mitigated Construction On-Site

Acres of Grading: 4

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.5112	0.0000	0.5112	0.2788	0.0000	0.2788	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2776	3.1343	1.9073	2.6300e-003		0.1539	0.1539		0.1416	0.1416	0.0000	253.0552	253.0552	0.0748	0.0000	254.6256
Total	**0.2776**	**3.1343**	**1.9073**	**2.6300e-003**	**0.5112**	**0.1539**	**0.6651**	**0.2788**	**0.1416**	**0.4204**	**0.0000**	**253.0552**	**253.0552**	**0.0748**	**0.0000**	**254.6256**

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	0.1412	0.5257	0.6616	1.0200e-003	2.8589	9.1200e-003	2.8681	0.7024	8.3900e-003	0.7108	0.0000	94.4003	94.4003	8.6000e-004	0.0000	94.4183
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0252	0.0118	0.1069	1.3000e-004	9.8300e-003	1.3000e-004	9.9600e-003	2.6100e-003	1.1000e-004	2.7300e-003	0.0000	10.1361	10.1361	8.5000e-004	0.0000	10.1540
Total	**0.1663**	**0.5375**	**0.7685**	**1.1500e-003**	**2.8688**	**9.2500e-003**	**2.8780**	**0.7050**	**8.5000e-003**	**0.7135**	**0.0000**	**104.5364**	**104.5364**	**1.7100e-003**	**0.0000**	**104.5723**

3.4 Mechanical/Electrical - 2014

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Parking	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Parking	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.466568	0.040230	0.201875	0.178210	0.051756	0.007394	0.017953	0.018959	0.004316	0.001974	0.007519	0.000975	0.002270

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Unmitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Parking	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Parking	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

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

10.0 Vegetation

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

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

10.0 Vegetation

Pacific Grove ASBS Refined '06 Feasability Study - Alt 3

Monterey County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Parking	1.00	User Defined Unit	3.60	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.8	**Precipitation Freq (Days)**	55
Climate Zone	4			**Operational Year**	2014
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - 3.6 acre area of historic reservoir estimated in Google Earth.

Construction Phase - Phases and phase length provided by project applicant.

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - Equipment list and operating schedule for grading and offhaul based on applicant-provided info.

Grading - Material import/export provided by applicant. Acreage estimated using Google Earth

Trips and VMT - Haul trip mileage estimated using applicant-provided data and Google Earth. Total haul trips estimated based on 12cy/trip.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	230.00	30.00
tblConstructionPhase	NumDays	8.00	46.00
tblConstructionPhase	NumDays	5.00	30.00
tblGrading	AcresOfGrading	84.00	4.00
tblGrading	MaterialImported	0.00	8,332.00
tblLandUse	LotAcreage	0.00	3.60
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Dozers
tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Grading
tblTripsAndVMT	HaulingTripLength	20.00	15.60
tblTripsAndVMT	HaulingTripNumber	4,527.00	695.00
tblTripsAndVMT	WorkerTripNumber	20.00	15.00
tblTripsAndVMT	WorkerTripNumber	18.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2014	0.1087	0.9291	0.6795	9.2000e-004	0.7869	0.0430	0.8299	0.4293	0.0395	0.4689	0.0000	87.7091	87.7091	0.0199	0.0000	88.1276
Total	**0.1087**	**0.9291**	**0.6795**	**9.2000e-004**	**0.7869**	**0.0430**	**0.8299**	**0.4293**	**0.0395**	**0.4689**	**0.0000**	**87.7091**	**87.7091**	**0.0199**	**0.0000**	**88.1276**

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					
2014	0.1086	0.9281	0.6789	9.2000e-004	0.9421	0.0429	0.9851	0.4674	0.0395	0.5069	0.0000	87.6306	87.6306	0.0199	0.0000	88.0486
Total	**0.1086**	**0.9281**	**0.6789**	**9.2000e-004**	**0.9421**	**0.0429**	**0.9851**	**0.4674**	**0.0395**	**0.5069**	**0.0000**	**87.6306**	**87.6306**	**0.0199**	**0.0000**	**88.0486**

	ROG	**NOx**	**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	**0.0828**	**0.1055**	**0.0912**	**0.0000**	**-19.7194**	**0.0931**	**-18.6936**	**-8.8720**	**0.1265**	**-8.1131**	**0.0000**	**0.0896**	**0.0896**	**0.1004**	**0.0000**	**0.0897**

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	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
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	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
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	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

	ROG	**NOx**	**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	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Mobilization/Demobilization	Site Preparation	1/29/2014	3/11/2014	5	30	
2	Grading	Grading	3/12/2014	5/14/2014	5	46	
3	Mechanical/Electrical	Building Construction	5/15/2014	6/25/2014	5	30	

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Rollers	1	8.00	80	0.38
Grading	Skid Steer Loaders	1	8.00	64	0.37
Grading	Off-Highway Trucks	1	8.00	400	0.38

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
Mechanical/Electrical	9	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Mobilization/Demobilization	7	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	15.00	0.00	695.00	10.80	7.30	15.60	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Mobilization/Demobilization - 2014

Unmitigated Construction On-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2710	0.0000	0.2710	0.1490	0.0000	0.1490	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total					**0.2710**	**0.0000**	**0.2710**	**0.1490**	**0.0000**	**0.1490**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Mobilization/Demobilization - 2014

Mitigated Construction On-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2710	0.0000	0.2710	0.1490	0.0000	0.1490	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total					**0.2710**	**0.0000**	**0.2710**	**0.1490**	**0.0000**	**0.1490**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Grading - 2014

Unmitigated Construction On-Site

Acres of Grading: 4

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.5086	0.0000	0.5086	0.2784	0.0000	0.2784	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0735	0.8209	0.5178	6.9000e-004		0.0411	0.0411		0.0378	0.0378	0.0000	66.0574	66.0574	0.0195	0.0000	66.4674
Total	**0.0735**	**0.8209**	**0.5178**	**6.9000e-004**	**0.5086**	**0.0411**	**0.5497**	**0.2784**	**0.0378**	**0.3162**	**0.0000**	**66.0574**	**66.0574**	**0.0195**	**0.0000**	**66.4674**

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	0.0282	0.1048	0.1319	2.0000e-004	4.5800e-003	1.8200e-003	6.4000e-003	1.2600e-003	1.6700e-003	2.9300e-003	0.0000	18.8259	18.8259	1.7000e-004	0.0000	18.8295
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.0200e-003	3.3000e-003	0.0298	3.0000e-005	2.7400e-003	3.0000e-005	2.7800e-003	7.3000e-004	3.0000e-005	7.6000e-004	0.0000	2.8258	2.8258	2.4000e-004	0.0000	2.8308
Total	**0.0352**	**0.1081**	**0.1618**	**2.3000e-004**	**7.3200e-003**	**1.8500e-003**	**9.1800e-003**	**1.9900e-003**	**1.7000e-003**	**3.6900e-003**	**0.0000**	**21.6517**	**21.6517**	**4.1000e-004**	**0.0000**	**21.6603**

3.3 Grading - 2014

Mitigated Construction On-Site

Acres of Grading: 4

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.5086	0.0000	0.5086	0.2784	0.0000	0.2784	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0734	0.8200	0.5172	6.9000e-004		0.0411	0.0411		0.0378	0.0378	0.0000	65.9788	65.9788	0.0195	0.0000	66.3883
Total	**0.0734**	**0.8200**	**0.5172**	**6.9000e-004**	**0.5086**	**0.0411**	**0.5497**	**0.2784**	**0.0378**	**0.3162**	**0.0000**	**65.9788**	**65.9788**	**0.0195**	**0.0000**	**66.3883**

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	0.0282	0.1048	0.1319	2.0000e-004	0.1598	1.8200e-003	0.1616	0.0394	1.6700e-003	0.0410	0.0000	18.8259	18.8259	1.7000e-004	0.0000	18.8295
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.0200e-003	3.3000e-003	0.0298	3.0000e-005	2.7400e-003	3.0000e-005	2.7800e-003	7.3000e-004	3.0000e-005	7.6000e-004	0.0000	2.8258	2.8258	2.4000e-004	0.0000	2.8308
Total	**0.0352**	**0.1081**	**0.1618**	**2.3000e-004**	**0.1625**	**1.8500e-003**	**0.1644**	**0.0401**	**1.7000e-003**	**0.0418**	**0.0000**	**21.6517**	**21.6517**	**4.1000e-004**	**0.0000**	**21.6603**

3.4 Mechanical/Electrical - 2014

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Parking	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Parking	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.466568	0.040230	0.201875	0.178210	0.051756	0.007394	0.017953	0.018959	0.004316	0.001974	0.007519	0.000975	0.002270

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Unmitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

Pacific Grove ASBS Refined '06 Feasability Study - Alt 4

Monterey County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
User Defined Parking	1.00	User Defined Unit	3.60	0.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.8	**Precipitation Freq (Days)**	55
Climate Zone	4			**Operational Year**	2014
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - 3.6 acre area of historic reservoir estimated in Google Earth.

Construction Phase - Phases and phase length provided by project applicant.

Off-road Equipment -

Off-road Equipment -

Off-road Equipment - Equipment list and operating schedule for grading and offhaul based on applicant-provided info.

Grading - Material import/export provided by applicant. Acreage estimated using Google Earth

Trips and VMT - Haul trip mileage estimated using applicant-provided data and Google Earth. Total haul trips estimated based on 12cy/trip.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	230.00	30.00
tblConstructionPhase	NumDays	8.00	33.00
tblConstructionPhase	NumDays	5.00	30.00
tblGrading	AcresOfGrading	84.00	4.00
tblGrading	MaterialImported	0.00	11,980.00
tblLandUse	LotAcreage	0.00	3.60
tblOffRoadEquipment	OffRoadEquipmentType		Tractors/Loaders/Backhoes
tblOffRoadEquipment	OffRoadEquipmentType		Rubber Tired Dozers
tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	0.00	1.00
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Grading
tblOffRoadEquipment	PhaseName		Grading
tblTripsAndVMT	HaulingTripLength	20.00	15.60
tblTripsAndVMT	HaulingTripNumber	4,527.00	999.00
tblTripsAndVMT	WorkerTripNumber	20.00	15.00
tblTripsAndVMT	WorkerTripNumber	18.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2014	0.0982	0.7420	0.5825	8.1000e-004	0.7885	0.0321	0.8206	0.4297	0.0296	0.4593	0.0000	76.4768	76.4768	0.0144	0.0000	76.7796
Total	**0.0982**	**0.7420**	**0.5825**	**8.1000e-004**	**0.7885**	**0.0321**	**0.8206**	**0.4297**	**0.0296**	**0.4593**	**0.0000**	**76.4768**	**76.4768**	**0.0144**	**0.0000**	**76.7796**

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					
2014	0.0982	0.7413	0.5821	8.1000e-004	0.9471	0.0321	0.9792	0.4687	0.0295	0.4982	0.0000	76.4204	76.4204	0.0144	0.0000	76.7229
Total	**0.0982**	**0.7413**	**0.5821**	**8.1000e-004**	**0.9471**	**0.0321**	**0.9792**	**0.4687**	**0.0295**	**0.4982**	**0.0000**	**76.4204**	**76.4204**	**0.0144**	**0.0000**	**76.7229**

	ROG	**NOx**	**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	**0.0611**	**0.0943**	**0.0755**	**0.0000**	**-20.1180**	**0.1245**	**-19.3263**	**-9.0594**	**0.1353**	**-8.4696**	**0.0000**	**0.0737**	**0.0737**	**0.1387**	**0.0000**	**0.0739**

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	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
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	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
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	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

	ROG	**NOx**	**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	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Mobilization/Demobilization	Site Preparation	1/29/2014	3/11/2014	5	30	
2	Grading	Grading	3/12/2014	4/25/2014	5	33	
3	Mechanical/Electrical	Building Construction	4/26/2014	6/6/2014	5	30	

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Grading	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Grading	Rubber Tired Dozers	1	8.00	255	0.40
Grading	Rollers	1	8.00	80	0.38
Grading	Skid Steer Loaders	1	8.00	64	0.37
Grading	Off-Highway Trucks	1	8.00	400	0.38

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
Mechanical/Electrical	9	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Mobilization/Demobilization	7	0.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	15.00	0.00	999.00	10.80	7.30	15.60	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Mobilization/Demobilization - 2014

Unmitigated Construction On-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2710	0.0000	0.2710	0.1490	0.0000	0.1490	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total					**0.2710**	**0.0000**	**0.2710**	**0.1490**	**0.0000**	**0.1490**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Mobilization/Demobilization - 2014

Mitigated Construction On-Site

Acres of Grading: 0

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.2710	0.0000	0.2710	0.1490	0.0000	0.1490	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total					**0.2710**	**0.0000**	**0.2710**	**0.1490**	**0.0000**	**0.1490**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Grading - 2014

Unmitigated Construction On-Site

Acres of Grading: 4

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.5089	0.0000	0.5089	0.2784	0.0000	0.2784	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0527	0.5889	0.3715	4.9000e-004		0.0295	0.0295		0.0271	0.0271	0.0000	47.3890	47.3890	0.0140	0.0000	47.6831
Total	**0.0527**	**0.5889**	**0.3715**	**4.9000e-004**	**0.5089**	**0.0295**	**0.5384**	**0.2784**	**0.0271**	**0.3056**	**0.0000**	**47.3890**	**47.3890**	**0.0140**	**0.0000**	**47.6831**

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	0.0405	0.1507	0.1897	2.9000e-004	6.5800e-003	2.6200e-003	9.2000e-003	1.8100e-003	2.4100e-003	4.2100e-003	0.0000	27.0605	27.0605	2.5000e-004	0.0000	27.0657
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.0400e-003	2.3700e-003	0.0214	3.0000e-005	1.9700e-003	3.0000e-005	1.9900e-003	5.2000e-004	2.0000e-005	5.5000e-004	0.0000	2.0272	2.0272	1.7000e-004	0.0000	2.0308
Total	**0.0455**	**0.1531**	**0.2110**	**3.2000e-004**	**8.5500e-003**	**2.6500e-003**	**0.0112**	**2.3300e-003**	**2.4300e-003**	**4.7600e-003**	**0.0000**	**29.0877**	**29.0877**	**4.2000e-004**	**0.0000**	**29.0965**

3.3 Grading - 2014

Mitigated Construction On-Site

Acres of Grading: 4

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.5089	0.0000	0.5089	0.2784	0.0000	0.2784	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0527	0.5882	0.3710	4.9000e-004		0.0295	0.0295		0.0271	0.0271	0.0000	47.3326	47.3326	0.0140	0.0000	47.6264
Total	**0.0527**	**0.5882**	**0.3710**	**4.9000e-004**	**0.5089**	**0.0295**	**0.5384**	**0.2784**	**0.0271**	**0.3055**	**0.0000**	**47.3326**	**47.3326**	**0.0140**	**0.0000**	**47.6264**

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	0.0405	0.1507	0.1897	2.9000e-004	0.1652	2.6200e-003	0.1678	0.0407	2.4100e-003	0.0432	0.0000	27.0605	27.0605	2.5000e-004	0.0000	27.0657
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.0400e-003	2.3700e-003	0.0214	3.0000e-005	1.9700e-003	3.0000e-005	1.9900e-003	5.2000e-004	2.0000e-005	5.5000e-004	0.0000	2.0272	2.0272	1.7000e-004	0.0000	2.0308
Total	**0.0455**	**0.1531**	**0.2110**	**3.2000e-004**	**0.1672**	**2.6500e-003**	**0.1698**	**0.0413**	**2.4300e-003**	**0.0437**	**0.0000**	**29.0877**	**29.0877**	**4.2000e-004**	**0.0000**	**29.0965**

3.4 Mechanical/Electrical - 2014

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
User Defined Parking	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
User Defined Parking	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.466568	0.040230	0.201875	0.178210	0.051756	0.007394	0.017953	0.018959	0.004316	0.001974	0.007519	0.000975	0.002270

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Unmitigated	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	1.0000e-005	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.0000e-005	2.0000e-005	0.0000	0.0000	3.0000e-005
Total	**0.0000**	**0.0000**	**1.0000e-005**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.0000e-005**	**2.0000e-005**	**0.0000**	**0.0000**	**3.0000e-005**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Parking	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Parking	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

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

10.0 Vegetation

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Parking	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
User Defined Parking	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
User Defined Parking	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

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

10.0 Vegetation

ATTACHMENT C

David Avenue Alternatives Analysis:
Preliminary Summary of Geotechnical Findings
January 9, 2014

PACIFIC GEOTECHNICAL ENGINEERING

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January 9, 2014
Project 2013.0031

Fall Creek Engineering
c/o Ms. Emily Corwin
227 Fern Street
Santa Cruz, California 95061

SUBJECT: **Preliminary Summary of Geotechnical Findings**
David Avenue Reservoir
Monterey, California

Dear Ms. Corwin,

As requested, we are providing this preliminary summary of the geotechnical elements of the David Avenue Reservoir, located on the northeast corner of David Avenue and Carmel Avenue, in Monterey, California.

We understand the Cities of Pacific Grove and Monterey would like to bring the reservoir back into service as part of the Area of Special Biological Significance (ASBS) stormwater management improvement project. As outlined in the 40% Design Plans and accompanying Engineering Report for the project, the proposed improvements include:

- Upgrading the reservoir to current standards for stability, providing overflow capability for storm events, and providing an aesthetic benefit to adjacent residents;
- Capturing runoff from the portion of the ASBS watershed within the City of Monterey and releasing it (but keeping a minimum reservoir level for aesthetics and vegetation stability) from the David Avenue Reservoir into the existing City of Pacific Grove storm drain system for conveyance downhill (northward) to Pine Avenue.

For this summary, we have performed the following work:

- Contacted Division of Safety of Dams (DSOD) and received and reviewed the contents of their file on the subject dam, including a report titled "Seismic Safety and Hydrologic Investigation" prepared by Converse Consultants Northern California and dated March 1989;
- Discussed the project with representatives of the DSOD to gain an initial understanding of their requirements for bringing the dam back into service;
- Performed a preliminary review of four alternatives mitigation options for the existing dam;
- Reviewed the project design plans and Engineering Report prepared by Fall Creek Engineering; and
- Prepared this letter summarizing the above work.

SUMMARY OF CONVERSE 1989 GEOTECHNICAL REPORT

The following information is based on our review of the data presented in the 1989 Converse Consultants Report (Converse Consultants Northern California, March 1989).

Existing Surface Conditions

The original dam for the reservoir was built in 1882, and an expansion to the downstream (north) side of the dam was added in 1920. According to the Seismic Safety and Hydrologic Investigation

report for the reservoir, the existing dam is approximately 750 feet long, approximately 30 feet high, has a crest elevation of 240 feet and a crest width of approximately 60 feet. The reservoir consists of cut slopes in native soil and bedrock on the south side and earthen fill embankments on the east, north and west sides. The Converse report states that the upstream side of the embankments has inclinations of 2.5:1 (horizontal:vertical), with inclinations as steep as 1.5:1 (horizontal:vertical) on the downstream face. Lidar topography we reviewed during our study indicates the downstream face is somewhat flatter (closer to a 2:1).

The reservoir historically retained 56 acre feet (AF) of water with a surface water elevation of 235 feet (we note that DSOD records indicate a storage capacity of 76 acre feet). In 1989, the reservoir ceased operation as a component of the California American Water Company (CalAm) water supply system, and was drained of water in 1998. In January 2003, DSOD designated the dam as inoperative. The site is still owned by CalAm, and is currently used as a maintenance, operations, and materials storage area. The site is restricted with gated entry. Vegetation has grown inside the previously inundated areas of the reservoir since the time the reservoir ceased operating as a water storage facility, and a small portion of the original reservoir bottom seasonally fills with water.

Subsurface Conditions

Converse Consultants drilled four, 50 foot deep borings, three of them through the crest of the dam and one located at the downstream toe. Piezometers were placed in two of these four borings. Converse's findings regarding the subsurface materials encountered were as follows:

- The dam shell is 30 feet deep and consists of Silty Sand to Silty Sand with Gravel that likely originated from excavation of the reservoir. Based on the standard penetration blow counts, we interpret this material to be poorly to moderately compacted.
- The foundation material under the dam consists of 12 to 17 feet of alluvium underlain by Granitic bedrock. The alluvium consists of Sand with Silt, and is medium dense to dense in relative density. The Granitic bedrock is hard and borings only penetrated about 5 feet into the rock.
- A "puddle core" within the dam interior is identified on Figure 5-1 of the Converse report. This structure is intended to prevent seepage through and under the dam. The "puddle core" was not encountered by any of the Converse borings and is inferred to exist based on drawings provided to Converse Consultants by Monterey Bay Waterworks.

Summary of Converse's Stability Analysis

The Converse report performed a one dimensional dynamic response analysis using the program SHAKE, to evaluate the average cyclic stresses due to a design earthquake and then to evaluate the liquefaction potential within and under the embankment. Additionally, they performed deformation analyses using methods developed by Makdisi and Seed (1977). Although both of these methods are still widely respected among geotechnical professionals, we understand that DSOD currently considers the Makdisi and Seed procedure suitable for preliminary analysis only, and not rigorous enough for final design purposes.

The Converse report has the following findings:

- The dam and foundation materials are stable under static conditions.
- The upstream face of the dam will liquefy during the design earthquake resulting in failure of this portion of the dam with displacement on the order of 5 to 6 feet. This was acceptable

according to Converse, because there was a low probability that this degree of deformation could breach the 60 foot crest width of the dam in a single event.

- The downstream face of the dam, as well as the foundation alluvial materials, are stable under seismic conditions.
- The reservoir, spillway and outlet structures are inadequately sized for the design storm.

CONCEPTUAL MITIGATION OPTIONS - GEOTECHNICAL CONSIDERATIONS

General

The dam is located in a dense urban setting with two single family homes located directly at the downstream toe and a residential subdivision and a school located directly downstream. Safety and stability of the dam is critical due to the consequences of dam failure and the risk to loss of life and property.

The stability and safety of a dam is dependent on a number of elements, the most important of which are the stability of the embankment itself, the stability of the foundation materials underneath the dam, and adequate design of the inlet and outlet structures to handle design storm flows. Stability must be evaluated for both the static, long term and rapid drawdown conditions, as well as for seismic conditions during the design earthquake.

Generally speaking, seepage of water through or underneath dams is a major cause of dam failures and plays a significant role in dam stability. It is questionable whether or not any investigation, regardless of how thorough, could verify that the existing embankment is seismically stable, or that it won't be subject to seepage. The Converse borings show that the dam shell is poorly to moderately compacted, which is not surprising, given that it was constructed in the 1880's. Additionally, there is no firm evidence that an impermeable puddle core exists in the center of the dam, or that a water cut-off that penetrates thought the alluvial materials was constructed under the dam. If a clay core does exist, there is a concern that the last 25 years of in-operation may have dried out and cracked the clay core, leaving it permeable and jeopardizing the stability of the dam.

No matter how extensive a subsurface investigation, the critical elements of the dam would always be in question. The quality and consistency of the earthwork construction of the dam shell materials and the integrity and adequacy of the impermeable clay core cannot be completely proven until they are tested by filling the reservoir or by sustaining a major seismic event. The urban setting and the proximity of structures directly downstream prohibits the option of testing the dam's performance in this manner.

Given the above considerations, four mitigation methods were considered for the dam:

1) Dam Replacement
2) Construction of a smaller dam on the upstream side of the existing dam
3) Installing a liner within the entire reservoir, and
4) Constructing a sheet pile wall on the upstream face of the existing dam

Pertinent features and attributes for each of these options were researched and rough construction estimates were formulated. A preliminary summary of this research is presented in Table 1 below. It should be noted that the rough cost estimates presented in the following table are for preliminary comparison purposes only.

Table 1. Conceptual Mitigation Options Associated Costs and Pertinent Attributes

Option	Rough Cost	Pertinent Features	Pros	Cons
#1 Replace Dam	*$3.3 million*	*Rebuild an equivalent size dam, slightly upstream of existing dam.* *Roughly 60 acre feet of storage capacity.*	• *Provides positive means of seepage cut off through and under the dam* • *New dam will not rely on integrity of old dam* • *Improved longevity with less maintenance than Options 3 and 4*	• *Large volume of earthwork required. Requires greatest material export and import* • *Greatest disturbance to perimeter development* • *Import of clay material for core required*
#2 Smaller Dam	*$3.2 million*	*Build a smaller dam replacing the upstream shell of existing dam.* *Roughly 36 acre feet of storage capacity.*	• *Provides positive means of cutting off seepage of water through and under the dam* • *New dam will not rely on integrity of old dam* • *Less earthwork than Option 1* • *Less impact on neighboring property during construction than Option 1* • *Improved longevity with less maintenance than Options 3 and 4* • *Requires less export/import volume than Option 1*	• *Reduced storage volume* • *Significant portion of old dam embankment remains, but is not counted on for support* • *Monitoring of portions of old embankment required to verify that pore pressures do not build* • *Import of clay material for core required*
#3 Liner	*$1.4 million*	*Line the interior of the reservoir with a double liner, underlain by drainage and a leakage detection system.* *Roughly 50 Acre feet of storage capacity*	• *Less earthwork and impact to neighboring property during construction* • *Positive seepage cut off of impounded water through or under dam*	• *Positive seepage cut-off of ground water under liner not included. Ground water impact on dam foundation TBD.* • *Higher maintenance and shorter lifespan than Options 1 and 2.* • *Monitoring of portions of old embankment required.* • *Earthwork required in order to support liner on dam embankments. Depth and extent of earthwork TBD.*
#4 Sheet Pile	*$1.1 million*	*Install sheet pile on upstream face of existing dam, extending down to bedrock.* *Install drainage behind sheet pile and tunnel through existing dam to drain.* *Roughly 36 acre feet of storage capacity*	• *Less earthwork and disturbance during construction*	• *Reduced storage volume* • *Potential sheet pile leakage could compromise stability of existing dam. Difficult to provide drainage in existing dam.* • *Potential difficulty driving sheet pile in dense alluvium and granite* • *Earthwork required behind sheetpile to decrease load on sheet pile and to buttress toe of existing dam. Depth and extent of earthwork TBD* • *Monitoring of portions of old embankment required.*

The above options and factors were presented to the Cities by the design team and the Cities chose to pursue Option 3 - installation of a double liner within the entire reservoir. This choice is supported by a comparison of the environmental impacts each alternative has on the site and surroundings presented by Rincon Consultants in their August 16, 2013 letter titled "Monterey/Pacific Grove ASBS Project David Avenue Reservoir Alternatives Screening Analysis Memorandum. Additionally it reflects the Cities current positive experience with the Forest Avenue Dam – a nearby dam that was constructed in roughly the same era as the David Avenue reservoir and has been functioning successfully with a liner system since 2006.

Critical Elements of Future Geotechnical Studies

For design of the liner and bringing the dam back into service we suggest geotechnical studies be undertaken in phases. The following points outline the most significant aspects of the first phase of such studies.

1) We understand that the dam will remain under the DSOD's jurisdiction. We strongly advise the owner and/or their representative acquire written conceptual approval from DSOD regarding the chosen mitigation option, prior to any significant investigations or design work being completed.

2) An initial phase of investigation should consist of a minimum number of exploratory borings and cone penetration tests followed by preliminary seismic analysis, using current ground motion parameters for the site and current code standards. We note that the magnitude earthquake used in the Converse analysis (M = 6.5) is lower than the current estimates for the local Tularcitos fault (M = 7.2). We suggest that a preliminary seismic analysis consist of a site response analysis to obtain ground motion parameters at the site using Shake 2000 and a Newmark analysis to obtain a preliminary estimate of the degree of deformation during an earthquake.

3) In our opinion, the analysis performed in 1989 does not adequately address the liquefaction potential of the native alluvial materials underlying the dam. Liquefaction potential of the foundation materials should be reanalyzed using current ground motion design parameters developed by a site response analysis. This, along with a preliminary seismic analysis will help to determine the critical design considerations and the adequacy of the foundation materials for the considered mitigation.

4) Hydrologic characteristics of the bedrock and alluvial materials should be evaluated to better understand the ground water flow regime and how it impacts the proposed liner and dam.

5) Subsequent phases of study would be dependent on the results of the above initial investigation and would be geared towards final design and verification of the static and seismic stability as required by the jurisdictional agencies. Such investigations would likely include further geologic mapping, subsurface investigation and analysis to more closely define the native materials beneath the dam and the extent of past grading at the site. The areal extent and depth of existing fill material needs to be defined in order to assess how much of the existing dam will need to subexcavated and recompacted to provide a stable surface for the liner. More rigorous methods of estimating seismic deformation will be required by DSOD.

I hope that the above information addresses your current needs for this project. We would be please to provide estimates for a first phase geotechnical and seismic evaluation of the dam, once you have received approval from DSOD and we are able to discuss our proposed approach to the project with them. In the meantime, please contact us if you have any questions.

Sincerely,

PACIFIC GEOTECHNICAL ENGINEERING

REGISTERED PROFESSIONAL ENGINEER
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CE 43959
GE 2252

C. Why are we using faux trusses? Wouldn't it make more sense to have the truss members share the live and dead loads for the bridge? Otherwise, the underlying support stringers will be extremely deep and robust. If the truss is not needed, shouldn't we eliminate the truss and use simple guardrails (see attached photos)? Inclusion of a faux truss system that offers no support appears to be an added unnecessary expense. PER INFORMATION PROVIDED TO FCE BY THE DISTRICT, A BOWSTRING TRUSS BRIDGE WAS PROPOSED IN THE PRELIMINARY STAGES OF THE PROJECT. FCE DETERMINED THAT A BOWSTRING TRUSS WOULD NOT FIT INTO THE BUDGET, AND HAS PROPOSED THE STEEL BEAM FAUX TRUSS BRIDGE AS A LESS EXPENSIVE, YET STILL AESTHETICALLY APPEALING ALTERNATIVE. THAT SAID, IF FAUX TRUSSES ARE NOT DESIRED, FCE WILL REMOVE THE FAUX TRUSSES FROM THE DESIGN.

D. Why asphalt paving for a bridge with dirt/gravel road approaches? Would concrete decking be more appropriate? THE CAPITAL COST TO INSTALL ASPHALT IS TYPICALLY LESS EXPENSIVE THAN CONCRETE, BUT CONCRETE WILL BE LESS EXPENSIVE TO MAINTAIN. EITHER OPTION WILL WORK FOR THIS APPLICATION. IF THE STATE PREFERS CONCRETE, FCE IS COMFORTABLE CHANGING THE SPECIFICATION.

E. Shouldn't both bridges be provided in two sections (75 and 90 foot long spans are very long to transport on roads and provide little turning radius) CHECKING WITH BIG R AND CONTECH.....

F. Needs to be clear that Manufacturer is responsible for bearings, expansion joints and all ancillary components. CHECKING WITH BIG R AND CONTECH.....

G. We plan to register the bridges with Caltrans once erected. Specifications should include any information necessary to accomplish registration. CHECKING WITH CALTRANS ON HOW TO REGISTER....

H. Sixteen foot width is fairly narrow. Would an eighteen or twenty foot wide bridge be more appropriate? PER CONVERSATIONS WITH THE DISTRICT, A 16' WIDE BRIDGE WILL ALLOW THEIR TRUCKS TO PASS.

I. Is the weathering steel sufficient protection in a coastal environment? The District has concerns potential future maintenance with the steel bridge and no coating. WEATHERING STEEL CAN BE SUFFICIENT FOR SOME COASTAL ENVIRONMENTS, BUT MAY SEE AN INCREASED RATE OF CORROSION AND DECREASE IN LIFESPAN IN SOME COASTAL AREAS DUE TO HIGH AIRBORNE CL LEVELS AND OTHER FACTORS. FCE DOES NOT HAVE AIRBORNE CL DATA THAT CAN BE USED TO DETERMINE THE FEASIBILITY OF USING WEATHERING STEEL AT THIS LOCATION, AND THEREFORE HAS REVISED THE SPECIFICATIONS TO CALL FOR HOT DIPPED GALVANIZED COATING OR PAINT.

Please let me know your thoughts regarding the above. It might be appropriate for us to set up a conference call to discuss after there has been an opportunity to review and consider the items listed.

Thanks,

-Chris

From: Paul Myer [mailto:pmyer@fallcreekengineering.com]
Sent: Friday, February 07, 2014 11:27 AM
To: Moenig, Chris@Parks
Subject: RE: Mendocino Headlands Bridge Bid

HANAGAN LAND SURVEYING, INC.

PROPOSAL FOR LAND SURVEYING SERVICES

TO:	Paul Myer, Fall Creek Engineering, Inc.		
ADDRESS:	227 Fern Street, Santa Cruz, CA 95060.		
DATE:	March 10, 2014	**FROM:**	Paul Hanagan, L.S. 7797
PROJECT:	Supplemental topographic mapping for the property located at Swanton Pacific Ranch off Swanton Road in Davenport.		

Thank you Paul Myer, Fall Creek Engineering and Swanton Pacific Ranch for considering Hanagan Land Surveying, Inc. to provide our land surveying services. I propose to provide the following surveying services.

Topographic mapping:

I propose to provide supplemental topographic map based on the existing mapping provided by others as shown on the provided attachment. This proposed topographic map will include the existing mapping along with the rest of Old School House Road to include the east well, the west well, the proposed water tank location, the slopes, tops and toes of slopes, the tree line, significant trees along the pipeline routes and other significant features necessary for the proper interpretation of the drawing.

I project that the manipulation of the existing electronic map will take 2 hours at the principal surveyor's rate, the field survey will take 14 hours at the field crew rate; and the map drafting will take 6 hours at the survey technician's rate.

Fee.....$ 3,800.00

Thank you for this opportunity to present this proposal.

Sincerely.

Paul Hanagan, LS 7797
Hanagan Land Surveying, Inc.
305-C Soquel Avenue
Santa Cruz, CA 95062

Client and Consultant agree as follows:

A. Client retains Consultant to perform services per the attached proposal of land surveying services.
B. Consultant agrees to perform the following scope of services per the attached proposal of land surveying services.
C. Client agrees to compensate Consultant for such services as stated in the attached proposal of land surveying services.

Compensation for Services

Any authorized additional services requested by the client will be billed at an hourly rate of $240.00 per hour for field crew services and $140.00 per hour for in office land surveying services. Client agrees that if Client requests services not specified in the scope of services described in this agreement, Client will pay for all such additional services as extra services, in accordance with Consultant's billing rates utilized for this agreement. In the event services are terminated for any reason prior to the completion of the project, client shall pay surveyor for the time expended to that date and for any reasonable expenses incurred by surveyor on behalf of client and completed prior to the termination of surveyor's services.

Access to Site:

Unless otherwise stated, the Consultant will have access to the site for activities necessary for the performance of the services. The Consultant will take precautions to minimize damage due to these activities, but has not included in the fee the cost of restoration of any resulting damage.

Dispute Resolution:

Any Claims or disputes made during the course of services provided, including but not limited to, pre construction, construction or post construction between the Client and the Consultant shall be submitted to non-binding mediation. Client and Consultant agree to include a similar mediation agreement with all contractors, subcontractors, subconsultants, suppliers and fabricators, thereby providing for the mediation as the primary method for dispute resolution between all parties.

Billings/Payments:

Invoices for the Consultants service shall be submitted, at the Consultants' option, either upon completion of such services or on a monthly basis. Invoices shall be payable within 15 days after the invoice date. If the invoice is not paid within 30 days, the Consultant may, without waving any claim or right against the Client, and without liability whatsoever to the Client terminate the performance of the service. Retainers shall be credited to the final invoice. If the client has any questions concerning the monthly billing statement, CLIENT shall contact Hanagan Land Surveying, Inc. immediately and advise Hanagan Land Surveying, Inc. of the problem. If the CLIENT has not done so within ten (10) calendar days of receipt of the monthly statement, CLIENT shall be considered to have agreed that the statement is accurate and valid. All statements for Consulting Services and cost advanced are due and payable upon receipt. CLIENT shall agree to pay each statement within fifteen (15) days of its date.

Late Payments:

Payment is due upon receiving the invoice. If payment is received within 5 days you may take a 5% discount. If paid after 30 days a 10% finance fee will be assessed. A 10% finance fee will be assessed every 30 days there after. In the event that any portion or all of an account remains unpaid 90 days after billing the client shall pay all costs of collection, including reasonable attorney's fees.

Indemnification:

The Client shall, to the fullest extent permitted by law, indemnify and hold harmless the Consultant, his or her officers, directors, employees, agents and subconsultants from any against all damage, liability and cost, including reasonable attorney's fees and defense costs, arising out of or in any way connected with the performance by any of the parties above named of the services under this agreement, excepting only those damages, liabilities or costs attributable to the sole negligence or willful misconduct of the Consultant.

Limitation of Liability:

In recognition of the relative risks, rewards and benefit of the project to both the Client and the Consultant, the risks have been allocated such that the Client agrees that, to the fullest extent permitted by law, the Consultant's total liability to the Client for any and all injuries, claims, losses, expenses arising out of this agreement from any cause or causes, shall not exceed $20,000.00, Twenty Thousand Dollars. Such causes include, but are not limited to, the Consultants negligence, errors, omissions, strict liability, breach of contract or breach of warranty.

Ownership of Documents:

All documents produced by the Consultant under this agreement shall remain the property of the Consultant and may not be used by the Client for any other endeavor without the written consent of the Consultant.

Collection Costs:

In the event that Consultant shall file suit to collect sums due under this Agreement, Client agrees to pay such additional sum as and for attorney's fees as the court may deem reasonable, together with cost of suit.

Acceptance of Proposal

If these terms are acceptable to you, please return the original of this letter of proposal with your signature in the space provided.

Client Date:

Paul Hanagan Date:

Hanagan Land Surveying, Inc.

2014 Standard Hourly Rates

Office Services

Principal Surveyor.....$ 130.00

Survey Technician/CAD Draftsperson.....$ 85.00

Clerical Assistant.....$ 35.00

Expert Witness Testimony.....$ 200.00

Field Services

One or Two Person Field Crew.....$ 230.00

Field Crew, Prevailing Wage.....$ 280.00

Note: Hourly rates are for ordinary surveying services and include all payroll, payroll taxes, office and field overhead, supplies, transportation and professional liability, general liability and automotive insurances.

ATTACHMENT D

Geotechnical Investigation
Pacific Grove ASBS Stormwater Management Project
Cities of Monterey and Pacific Grove, California
August 28, 2013

GEOTECHNICAL INVESTIGATION
PACIFC GROVE ASBS STORMWATER MANAGEMENT PROJECT
CITIES OF MONTEREY AND PACIFIC GROVE, CALIFORNIA

PROJECT 2013.0031

For

Fall Creek Engineering
227 Fern Street
Santa Cruz, California 95060

By

PACIFIC GEOTECHNICAL ENGINEERING
16055 Caputo Drive, Suite D
Morgan Hill, California 95037
(408) 778-2818

August 28, 2013

TABLE OF CONTENTS

1. INTRODUCTION 1
1.1 GENERAL 1
1.2 PROJECT DESCRIPTION 1
1.3 OBJECTIVE AND SCOPE OF INVESTIGATION 1
1.4 INFORMATION PROVIDED 2
2. SITE INVESTIGATION 3
2.1 SUBSURFACE EXPLORATION 3
2.2 LABORATORY TESTING 3
3. FINDINGS 4
3.1 GEOLOGIC SETTING 4
3.2 GEOHAZARDS MAPPING 5
3.3 EARTHQUAKE FAULTING 5
3.4 SEISMICITY 6
3.5 SITE COEFFICIENTS AND SEISMIC GROUND MOTION VALUES 6
3.6 SURFACE CONDITIONS 6
3.6.1 PGWTP Tank Site 7
3.6.2 Crespi Pond and Proposed Wetland Site 7
3.7 SUBSURFACE CONDITIONS 7
3.8 GROUNDWATER 8
3.9 TOP OF BEDROCK SURFACE 8
3.10 VARIATIONS IN SUBSURFACE CONDITIONS 9
4. DISCUSSION AND CONCLUSIONS 10
4.1 GENERAL 10
4.2 SURFACE RUPTURE AND SEISMIC GROUND SHAKING 10
4.3 SHALLOW BEDROCK AND EXCAVATABILTY 10
4.4 LIQUEFACTION AND LATERAL SPREADING 10
4.5 SETTLEMENT OF WATER TANK FOUNDATIONS 11
4.6 EXCAVATIONS AND DEWATERING 12
4.7 EXPANSION POTENTIAL OF NEAR-SURFACE SOILS 12
5. RECOMMENDATIONS 13
5.1 GENERAL 13
5.2 EARTHWORK 13
5.2.1 Clearing and Grubbing 13
5.2.2 Excavations, Shoring and Dewatering 13
5.2.3 Subgrade Preparation 14
5.2.4 Material for Engineered Fill 14
5.2.5 Engineered Fill Placement and Compaction 14
5.2.6 Cut and Fill Slopes 15
5.2.7 Utility Trench Excavation and Backfill 15
5.2.8 Wet Weather Construction 15
5.3 WATER TANK FOUNDATIONS 15
5.4 CONCRETE SLABS-ON-GRADE 16
5.5 SURFACE DRAINAGE 16
6. PLAN REVIEW, EARTHWORK AND FOUNDATION OBSERVATION 17
7. LIMITATIONS 18
8. REFERENCES 19

FIGURES

Figure 1 – Geologic Index Map
Figure 2 - Liquefaction Fault Map
Figure 3 - Tsunami Inundation map
Figure 4 - Overall Site Plan
Figure 5 - PGWTP Site Plan

APPENDIX A

Keys to Soil Classification (Fine and Coarse Grained Soils)
Key to Rock Classification
Log of Exploratory Drill Holes (DH-1 through DH-6)

GEOTECHNICAL INVESTIGATION
PACIFC GROVE ASBS STORMWATER MANAGEMENT PROJECT
CITIES OF MONTEREY AND PACIFIC GROVE, CALIFORNIA

1. INTRODUCTION

1.1 GENERAL

This report presents the results of our geotechnical investigation for proposed improvements associated with the Pacific Grove ASBS Stormwater Management Project, in Pacific Grove, California. The location of the project is shown on our Geologic Index Map (Figure 1), and features in the project vicinity are shown on the Treatment Plant Site Plan (Figure 5) of this report. For purposes of this report "site" refers to the Pacific Grove Water Treatment Plant (PGWTP), the Crespi Pond area and the area of the proposed wetland.

1.2 PROJECT DESCRIPTION

As outlined in the Draft Engineering Report prepared by Fall Creek Engineering, the Pacific Grove ASBS stormwater management project is designed to improve stormwater quality prior to discharge to the "Area of Special Biological Significance" (ASBS) designated along the Pacific Grove coastline. The goal of the project is to achieve a 90 percent reduction in the pollutants that are discharged into the bay by seasonal stormwater discharges. The portions of the project that are addressed by this geotechnical investigation consist of the following:

- Reuse or reconstruction of the existing two tanks at the abandoned Pacific Grove Water Treatment Plant (PGWTP): the two existing tanks at this site are being evaluated for their structural integrity and are planned for reuse for stormwater storage/treatment.

- Expansion of Crespi Pond: the existing pond will be expanded by deepening it up to 5 feet (it's present maximum depth is about 5 feet and proposed maximum depth is about 10 feet), and by extending it approximately 120 feet south and 40 feet west of its existing limits.

- Creation of wetlands: a wetland is proposed for construction about 750 south of Crespi Pond. This wetland will extend about 5 feet below existing grade.

- Installation of utility lines: stormwater pipes will be installed to connect the new wetland, Crespi Pond and the PGWTP site. Utility trenches proposed in other areas of the site are beyond our present scope of work.

Originally, our scope also included expansion of a cistern near the intersection of Del Monte Boulevard and Egan Avenue. We understand this portion of the project is no longer being pursued.

1.3 OBJECTIVE AND SCOPE OF INVESTIGATION

The objective of this investigation was to explore subsurface conditions in the above mentioned project areas; provide geotechnical information to assist in the preliminary design and

evaluation of the proposed improvements; and to prepare geotechnical recommendations for their design and construction.

The following services were performed for our investigation.

1. Reconnaissance of the project areas to observe surface conditions and mark locations for our subsurface exploration.

2. Coordination of our drilling with Underground Service Alert and the City of Pacific Grove.

3. Research of existing regional geologic information including geologic hazards pertinent to the site.

4. Exploration, sampling, and classification of subsurface soils at selected locations by means of six exploratory drill holes.

5. Laboratory testing of selected soil samples recovered from our drill holes.

6. Engineering analysis of the above field and laboratory data and formulation of conclusions and recommendations for the project.

7. Preparation of this report summarizing our findings, conclusions and recommendations.

1.4 INFORMATION PROVIDED

For this investigation, the following was provided to us and used during our study.

- A 6-page set of plans titled "15% Design Plans, Pacific Grove ASBS," prepared by Fall Creek Engineering and dated June 2013.
- A report titled, "Draft Engineering Report: Preliminary Hydrology Analysis and David Avenue Reservoir Design Alternatives Summary, Pacific Grove Area of Special Biological Significance (ASBS) Stormwater Management Project", prepared by Fall Creek Engineering and dated June 20, 2013.
- Design plans for the existing PGWTP tanks consisting of Sheets 2, 7, 9, 10 and 14 of a 23-page set of plans titled "City of Pacific Grove Sewage Pumping and Treatment Works", prepared by Alfred D. Coons, City Manager and Engineer, dated January 1952.
- Base maps for our Figure 4 and 5 provided by Fall Creek Engineering via email and dated 8/5/13.

2. SITE INVESTIGATION

2.1 SUBSURFACE EXPLORATION

The subsurface exploration program included six drill holes (DH-1 through DH-6). The drill holes were located in the field by referencing to existing site features and pacing; therefore, locations should be considered approximate. The approximate locations of the drill holes are shown on Figure 4, with a more detailed map of the PGWTP tank area in Figure 5.

Drill holes DH-1 through DH-6 were advanced on June 4, 2013, to depths between 9 and 24 feet below the ground surface using a Mobile B-53 drilling rig equipped with an 8-inch diameter hollow stem auger.

In the field, our personnel visually classified the materials encountered in the drill holes and maintained a log of each drill hole. Samples were obtained from the drill holes by driving a 2½-inch inside diameter split spoon or a 2-inch outside diameter (1⅜ inch inside diameter) Standard Penetration Test (SPT) sampler up to a depth of 18 inches into the earth material using a 140-pound hammer falling 30 inches. The number of blows required to drive the samplers was recorded for each 6-inch penetration interval. The number of blows required to drive the sampler the last 12 inches, or the penetration interval indicated on the log where harder material was encountered, was shown as blows per foot on the drill hole logs. The hammer was operated by a hydraulic winch and pulley system.

Soil samples were collected from the drill holes at approximately 5-foot vertical intervals. Soil samples were sealed in the field and transported to our laboratory for further evaluation and testing. Visual classification of soils encountered in our drill holes was made in general accordance with the Unified Soil Classification System (ASTM D2487 and D2488). The laboratory test results were used to refine our field classifications. Two Keys to Soil Classification, one for fine grained soils and one for coarse grained soils, and one key for Rock Classification are included in Appendix A together with the logs of the drill holes.

2.2 LABORATORY TESTING

Laboratory tests were performed on selected soil samples. These tests included water content, dry density and percent passing a No. 200 sieve. The laboratory test results are presented on the drill hole logs at the corresponding sample depths.

3. FINDINGS

3.1 GEOLOGIC SETTING

Regional geologic mapping by Clark, Dupre and Rosenberg (1997; Clark and others hereafter for brevity) provides the best available regional-scale geologic mapping for the project area. Our Geologic Index Map (Figure 1) is an excerpt from Clark and others (1997).

The geology of the site vicinity, broadly speaking, is that of an elevated marine terrace cut across granitic bedrock, overlain with a thin mantle of terrace lag deposits and local dune sands.

As mapped by Clark and others (1997), bedrock in the site vicinity is mapped as "porphyritic granodiorite of Monterey of Ross" (map unit Kgdp), which can be thought of as granitic rock.

As relative sea level dropped, a marine (coastal) terrace was planed across the granitic bedrock, with Pleistocene-age (within the last 2 million years) marine terrace deposits deposited across this surface. These deposits ("Peninsula College coastal terrace deposits;" [map unit Qctp] are preserved on high ground about 1500 feet south of the site (see Fig. 1).

As relative sea level dropped further, another marine terrace was planed across the bedrock, leaving the "Ocean View coastal terrace deposits" (map unit Qcto) mapped as fringing the coastline near the site, and underlying the site. Texturally, these deposits are described as consisting of "semi-consolidated, moderately well-sorted marine sand containing thin, discontinuous gravel-rich layers."

Dune sand deposits of Pleistocene age (map unit Qod1) and Holocene age (map unit Qd) have been deposited by the wind in the areas shown on Figure 1 – generally south of the site. The younger (Holocene, map unit Qd) dune sand deposits are described as "unconsolidated, well-sorted, fine- to medium-grained sand." The older (Pleistocene, map unit Qod1) dune sand deposits are described as texturally the same as the younger deposits, and "weakly consolidated."

Approximately 300 to 500 feet east of the PGWTP tanks, Crespi Pond (see Figure 1 and Figure 4) occupies a topographic swale that is mapped as infilled with younger (Holocene age) alluvium. This map unit (Qal) is described as consisting of "unconsolidated, heterogeneous, moderately sorted silt and sand with discontinuous lenses of clay and silty clay". The topographic swale occupied by Crespi Pond likely marks the location of a now-buried stream course that is incised into the top-of-bedrock surface.

Rosenberg (2001) compiled previous and independent geologic mapping for Monterey County that incorporated the geologic mapping of Clark and others (1997), of which he was a co-author. The linework of this compilation is more generalized than that of Clark and others, due to map scale. No significant differences in geologic mapping as it affects the site vicinity are reflected in Rosenberg (2001).

Wagner and others (2002) prepared a regional geologic compilation map that encompasses the site, also at a more generalized scale than that of Clark and others (1997). Wagner and others (2002) drew on both Clark and others (1997) and Rosenberg (2001), and no significant differences in geologic interpretation are reflected in their mapping.

3.2 GEOHAZARDS MAPPING

Rosenberg (2001) prepared a County-wide map of liquefaction susceptibility, as a derivative map associated with the geologic mapping described above. An excerpt of Rosenberg's Liquefaction Susceptibility Map is presented as our Liquefaction Map (Figure 2). Rosenberg's classification ranged across four liquefaction susceptibility classes (Low, Moderate, and High, with a fourth "variable" class used in areas of significant grading). While this map is necessarily generalized, it maps the older marine terrace deposits (map units Qctp and Qcto underlying the PGWTP tank site and the proposed wetland area) and older dune deposits (map unit Qod1), as having a low liquefaction susceptibility. The younger dune deposits (map unit Qd) mapped south of the PGWTP tank site, and the alluvium filling the topographic swale (underlying Crespi Pond), were considered to have a high liquefaction susceptibility. Bedrock and upland areas are mapped as having a "low" liquefaction susceptibility.

There are no known historic liquefaction sites from the 1906 or 1989 earthquakes in the PGWTP site or vicinity.

The PGWTP site is mapped as lying within a State of California "tsunami inundation area" which fringes the coastline as shown in Figure 3 of this report (State of California Emergency Management Agency, 2009). Both the PGWTP site and Crespi pond are within the designated tsunami inundation area. The shoreward limit of inundation is shown as lying at approximately the southern end of the PGWTP site and Crespi Pond, and runs approximately along contour eastward and westward around the end of Point Pinos.

3.3 EARTHQUAKE FAULTING

No active faults are mapped in the project vicinity (Wagner and others, 2002). Faults associated with the Monterey Bay fault zone are mapped east of the site, and the San Gregorio fault west of the site (see Table 1 of seismic sources below).

The greater San Francisco/Monterey Bay Area is seismically dominated by the active San Andreas Fault system, the tectonic boundary between the northward moving Pacific Plate (west of the fault) and the North American Plate (east of the fault). This movement is distributed across a complex system of generally strike-slip, right-lateral and subparallel faults

Regional faults that have a potential to generate large magnitude earthquakes and significant ground shaking at the site are listed in Table 1. Map distances are derived from the USGS Quaternary Fault and Fold database (http://earthquake.usgs.gov/regional/qfaults/), based on a latitude of 36.636513 and a longtitude of -121.934629.

Table 1. Significant Seismic Sources within Project Vicinity

Fault	Approximate Distance	Direction from Project Site to Fault
Monterey Bay/Tularcitos	2.7 km	Northeast
San Gregorio	10.1 km	West
Reliz	11.7 km	Northeast
Zayante-Vergeles	35.6 km	Northeast
San Andreas	41.5 km	Northeast

3.4 SEISMICITY

The Working Group on California Earthquake Probabilities (WGCEP) estimates the probabilities of major earthquakes are now in their fourth iteration. The greatest changes in approach from the first to the fourth iteration are; 1) the treatment of major faults as either segmented, unsegmented or capable of different rupture scenarios; 2) the progressive consideration of more potential seismic sources, and 3) the use of time-independent versus time-dependent models. Current estimates (WGCEP, 2003, 2008) are most detailed for the greater San Francisco Bay Area; WGCEP (2008) estimated a 63% probability of a large (magnitude 6.7 or greater) earthquake in the San Francisco Bay area as a whole over a 30-year period; this overall probability differed only slightly from the previous (WGCEP, 2003) probability of 62%. The current estimate for the Calaveras fault alone is 7% (revised down from the 11% presented by WGCEP, 2003); for the (northern) San Andreas fault alone, 21%; and for the Hayward fault, 31% (revised upward from the WGCEP (2003) value of 27%).

3.5 SITE COEFFICIENTS AND SEISMIC GROUND MOTION VALUES

The site coefficients and seismic ground motion values in Table 2 were developed using the USGS Seismic Design Maps (http://earthquake.usgs.gov/hazards/designmaps/usdesign.php), incorporating both the ASCE 7-05 and ASCE 7-10 codes, and the project site location (latitude 36.636513N, longitude -121.934629W).

Table 2. Seismic Design Parameters

Parameter	ASCE 7-05 Values	ASCE 7-10 Values
Site Class	B	B
Site Coefficient F_a	1.0	1.0
Site Coefficient F_v	1.0	1.0
S_s	1.473	1.549g
S_1	0.614	0.569g
S_{Ms}	1.473	1.549g
S_{M1}	0.614	0.569g
S_{Ds}	0.982	1.033g
S_{D1}	0.409	0.379g

The design peak ground acceleration (PGA) can be taken as the lesser of the values developed from probabilistic approach and deterministic approach. Using the USGS Seismic Design Maps and incorporating both ASCE 7-05 and ASCE 7-10, the PGA value at the site is 0.62g for the Maximum Considered Earthquake (MCE) and 0.41g for the Design Earthquake (DE). MCE corresponds to a 2% probability of exceedance in a 50-year period. Studies have shown that, for the San Francisco Bay Area, DE roughly corresponds to a 10% probability of exceedance in a 50-year period.

3.6 SURFACE CONDITIONS

The PGWTP and Crespi Pond site is located on Point Pinos, at the northern tip of the City of Pacific Grove. The area includes the Pacific Grove golf Links and is bordered by Sunset Drive

and the Pacific Ocean on the north and west, by Asilomar Avenue to the east and by Lighthouse Avenue to the south.

As mentioned above, the proposed development within the area of DH-6 (near the intersection of Del Monte Boulevard and Egan Avenue) was abandoned and is not addressed in this section.

3.6.1 PGWTP Tank Site

The existing ground surface at the tank site slopes gently towards the north at a gradient of about 10:1 (horizontal:vertical), steepening south of the site, and flattening to the north. Past grading for the tank pad appears to have consisted of cuts of 3 to 5 feet in height on the south and west sides of the tanks. There was no evidence of significant fill in the immediate vicinity of the tanks, although the 1952 project plans indicate general fill placement on the east side of the site.

We understand that the existing tanks are also being evaluated for reuse by a structural engineer, Harper and Associates. Based on the information provided in the 1952 design plans, supplemented by information provided to us from Harper and Associates, both tanks are about 57 feet in diameter, 30 to 33 feet in height and are buried 10 to 16 feet below grade. The "clarifier" on the east side, has a sloping base that extends between 13 to 16.5 feet below grade and the "digester" on the west side, has a flat base that extends about 10 feet below existing grade.

3.6.2 Crespi Pond and Proposed Wetland Site

The dune sands that comprise the majority of the golf course form a subtle, roughly north-south trending ridge which forms the eastern border of the topographic swale that terminates at Crespi Pond. The ground surface on the margins of the pond is level to very slightly sloping towards the north. We understand that the existing depth of the pond is about 5 feet, and the entire pond is bordered by the golf course fairway.

The area about 750 feet south of Crespi Pond that is proposed for a new wetland is also located in the topographic swale that borders the dune sand ridge. This area occupies a topographic low with very mild gradients and is also within the golf course.

3.7 SUBSURFACE CONDITIONS

A brief description of the materials encountered in each boring is presented below. For a more detailed description of the soil conditions encountered in our drill holes, refer to the drill hole logs in Appendix A .

DH-1 and DH-2 were located at the PGWTP tank site and extended between 19.5 and 24 feet below ground surface. These boring encountered dune deposits underlain by granite bedrock. The dune deposits consist of Poorly Graded Sand with Clay and are medium dense in the upper two feet, and variably looser in density at variable intervals between about 3 and 12 feet below ground surface. The density increases below about 9 to 12 feet, with granite bedrock located at about 16 feet below ground surface. The granite is severely weathered in the upper portion and increases in density/strength with depth.

DH-3 and DH-4 were located on the northwest and southwest sides of Crespi Pond in the areas of its proposed expansion. Both encountered dune deposits overlying granite. In this

topographic swale, the dune deposits have greater fine grained material and consist of medium dense to loose Poorly Graded Sand with Clay to Clayey Sand. Peat rich sand was encountered just above the bedrock in DH-4. Granite bedrock was encountered in both borings at 3.5 feet (DH-3) and 7.5 feet (DH-4) below ground surface. In DH-3 the field measured blow counts were high, indicating dense granite bedrock at 5 feet below ground surface. In DH-4 the granite appeared relatively soft in rock hardness from 7.5 to 12 feet below ground surface and then became denser/stronger at 12 feet below ground surface.

DH- 5 was located in the area of the proposed wetland/pond. It encountered 12 feet of Poorly Graded Sand with Clay underlain by granite at 12.5 feet below ground surface, both of which displayed similar composition and to the other drill holes.

DH-6 was located near the intersection of Del Monte Boulevard and Egan Avenue. This drill hole encountered 2 feet of older dune deposits consisting of a medium dense Clayey Sand. Weathered granite was encountered at 2 feet below ground surface.and denser granite at 7 feet below ground surface.

3.8 GROUNDWATER

Groundwater was not encountered in any of our borings (DH-1 through DH-6). These conditions likely do not reflect stabilized groundwater depths, and are likely variable. Based on the site geology we interpret that groundwater will locally pond on the granite bedrock surface after heavy rainfall and then drain outwards towards the ocean. In the area of the PGWTP tanks, subsurface drainage is expected to occur relatively quickly and to flow radially outwards as the water is released along the Point Pinos bluffs. In the area around Crespi Pond, subsurface drainage is likely slower and focused northward by the topographic and bedrock swale.

Golf course maintenance personnel report that even in the topographic low areas the fairway is drivable relatively quickly after rains, indicating that drainage of perched water is fairly rapid.

Groundwater depth is subject to fluctuations depending on rainfall, golf course irrigation, pumping in local wells, or other factors that may not be evident at the time of our investigation.

3.9 TOP OF BEDROCK SURFACE

The site is located on a marine terrace surface. Geomorphically, these surfaces are cut by wave action and therefore tend to be quite planar, and nearly level when formed. Our borings are consistent with this, encountering top-of-bedrock at an approximate elevation of 7 feet in DH-2, and an elevation of 5 feet in DH-1, a difference in elevation of 2 feet across a distance of over 100 feet. In general, we expect that most of the top-of-bedrock surface would be similarly planar. Locally incised and buried drainageways may exist (such as that occupied by Crespi Pond), and bedrock would be encountered at greater depths in these areas.

Bedrock encountered at the maximum depth of our drill holes was soft in rock hardness and crumbled to sand size material in the samplers, even when the SPT blow counts were very high. Based on this we infer that material will be excavatable with conventional equipment, but extra time and horsepower will likely be required. Generally speaking, rock quality is expected to improve with depth.

Based on our borings and the topographic maps that were provided, the depth to bedrock, dense bedrock and the elevation of dense bedrock is estimated Table 3. Elevations are based on the datum provided to us by Fall Creek Engineering as shown in Figure 5:

Table 3. Summary of Bedrock Depth and Elevation

Location	Depth Below Ground Surface to Top of Bedrock (feet)	Depth Below Ground Surface to Dense Bedrock (feet)	Elevation of Dense Bedrock (feet)
PGWTP Site (DH-1 and DH-2)	16 to 16.5	16 to 16.5	Elev. 5 to 7
Crespi Pond (DH-3 and DH-4)	3.5 to 7.5	5 to 12	Elev. 10 to 12
Proposed Wetland (DH-5)	12.5	12.5	Elev. 26

3.10 VARIATIONS IN SUBSURFACE CONDITIONS

Our interpretations of soil, bedrock and groundwater conditions, as described in this report, are based on data obtained from subsurface exploration and laboratory testing for this study, and from subsurface data obtained by others. Our conclusions and recommendations are based on these interpretations. The project area has undergone different phases of land usage, with associated grading. Therefore, it is likely that undisclosed variations in subsurface conditions exist within the project area, such as old foundations, abandoned utilities and localized fill deposits of unknown character. Additionally, the hardness of granite bedrock will be locally variable.

We recommend that careful observations be made during construction to verify our interpretations. Should variations from our interpretations be found, we should be notified to evaluate whether any revisions should be made to our recommendations.

4. DISCUSSION AND CONCLUSIONS

4.1 GENERAL

Based on the results of our investigation, we conclude that the site is geotechnically suitable for the proposed improvements, provided the recommendations presented in this report are followed. A review of our conclusions with respect to various hazards is presented below. Detailed recommendations are presented in Section 5.

4.2 SURFACE RUPTURE AND SEISMIC GROUND SHAKING

Because the project area is not located within a State of California Earthquake Fault Zone and no mapped active faults are known to cross the project area, the probability of ground surface rupture at the project area due to displacement along a fault is remote.

The project area is in a region of high seismicity. Based on general knowledge of the local seismicity, it should be anticipated that, during its useful life, the project area will be subject to strong ground shaking. It is also anticipated that the project area will periodically experience small to moderate magnitude earthquakes. Proposed improvements should be designed accordingly.

4.3 SHALLOW BEDROCK AND EXCAVATABILTY

Shallow granite bedrock exists at variable elevations across the site. Granite bedrock, depending on the degree of weathering, may be very difficult to excavate. Approximate depth to dense bedrock as encountered in our borings is summarized in Section 3.9.

Based on DH-3 and DH-4, it appears that hard rock could be encountered at shallow depths below Crespi Pond water elevation and that excavating up to 10 feet below the pond water elevation may be difficult. However, the bedrock surface may dive deeper as one approaches the centerline of the topographic swale in this area, allowing greater excavatability.

Underground contractors should be aware of the presence of shallow bedrock and employ suitable equipment for these conditions. Heavy ripping, jack hammering, and other appropriate means may be required.

4.4 LIQUEFACTION AND LATERAL SPREADING

Soil liquefaction is a phenomenon in which saturated granular soils, and certain fine-grained soils, lose their strength due to the build-up of excess pore water pressure during cyclic loading, such as that induced by earthquakes. Soils most susceptible to liquefaction are saturated, clean, loose, fine-grained sands and non-plastic silts. Certain gravels, plastic silts, and clays are also susceptible to liquefaction. The primary factors affecting soil liquefaction include: 1) intensity and duration of seismic shaking; 2) soil type; 3) relative density of granular soils; 4) moisture content and plasticity of fine-grained soils; 5) overburden pressure; and 6) depth to groundwater.

The regional liquefaction susceptibility mapping reviewed in Section 4.4 considers the marine terrace deposits underlying the PGWTP tank site and the wetland area to have a low liquefaction susceptibility. The alluvial deposits that are mapped to underlay Crespi Pond are mapped as having a high liquefaction potential. Our borings encountered materials we classified as dune deposits, because they are sand-sizes or finer, with fairly uniform grain size, and no large clasts. The dune sand deposits are relatively clean with low fines content and are potentially liquefiable depending on their density and the depth of groundwater. At the PGWTP tank site potentially liquefiable soils were encountered in isolated zones between about 3 and 12 feet below ground surface.

The setting of the PGWTP tank site is such that groundwater generated from rainfall reaches the top of bedrock, and rather than perch on top of the bedrock, it tends to drain away relatively rapidly. This is due to the site being located near the northern end of a bedrock peninsula with virtually no contributing watershed, and the existence of free-draining faces along the bluff margins. None of our borings at the site encountered groundwater during drilling. From the groundwater data we were able to obtain in this investigation (see Section 3.8), we infer that for the majority of the year groundwater does not saturate the 16 feet of soil that mantles the bedrock at the PGWTP site. Therefore, the probability that temporarily perched groundwater would occur at the same time as a major earthquake is low. With this condition, in our opinion the hazard of liquefaction at the site is low.

Because there is a low potential for liquefaction at the PGWTP tanks site, there is a correspondingly a low potential of lateral spreading in this area of the site.

Crespi Pond and the site for a future wetlands are located in a topographic low. Our borings did not encounter ground water in these areas either, but based on the site geology there is a greater likelihood that perched groundwater may remain trapped in these areas for longer periods of time. Also, use of the area as wetlands may result in raising the groundwater elevation. We analyzed the liquefaction potential in these areas based on a PGA value of 0.41g (see Section 3.3), an earthquake moment magnitude of 7.3, and a perched groundwater depth of 5 feet below ground surface.

The results of our liquefaction analysis suggest that the sand layers from 5 to 7 feet in DH-3 and from 5 to 8 feet in DH-4 are potentially liquefiable. Estimated liquefaction-induced ground settlements for these layers are 1/4 inch to 1/3 inch respectively. Case histories have shown that actual liquefaction-induced settlements could be 50 to 200 percent of the estimated values.

4.5 SETTLEMENT OF WATER TANK FOUNDATIONS

Seismic and static settlement of the 0 to 3.5 foot thick soil layer between the bottom of the tanks and the underlying bedrock is a potential issue. During construction of the existing tanks, it is possible that the soil layer that exists between the bottom of the tanks and the bedrock surface was subexcavated and recompacted in place, thus reducing the magnitude of seismic and static settlement of this layer.

The information from our surrounding drill holes may not be representative of the soils beneath the tank foundations, but we judge that they represent a "worst case" condition. Assuming this worst case condition the seismically induced settlement of this area is judged to be less than about ½ inch.

As long as the loads within the tanks (the maximum water level) are similar to the loads they experienced when they were in service, additional static settlement should be minor. Due to the age of the tank it is likely that static settlement occurred years ago.

4.6 EXCAVATIONS AND DEWATERING

Proposed excavations within the Crespi Pond area are planned to be 5 to 10 feet below existing ground surface. Excavation depths for utilities are not presently known. Excavations within the dune sand deposits will encounter cohesionless materials that are subject to collapse and will require shoring or sloping the excavation sidewalls. Detailed recommendations are provided in Section 5.2.

Depending on the time of year of construction, if groundwater is encountered during construction, dewatering may also be required to allow construction to proceed in a "dry" condition.

4.7 EXPANSION POTENTIAL OF NEAR-SURFACE SOILS

The near-surface soils are generally sands with a low percentage of fines. These types of soil generally have low expansion potential.

5. RECOMMENDATIONS

5.1 GENERAL

Recommendations are provided in this section for expansion of the Crespi Pond and the wetland area, for assessment of the existing PGWTP tanks and for construction of utility trenches. General recommendations are provided for other improvements in the area. If new tanks or other improvements are proposed, we request the opportunity to review them to evaluate if our recommendations are suitable.

5.2 EARTHWORK

5.2.1 Clearing and Grubbing

Clearing and grubbing should be performed in areas proposed for earthwork, concrete slabs-on-grade or other development. Clearing and grubbing should include clearing of existing structures, utility lines to be abandoned, deleterious materials, debris, obstructions, and stumps and primary roots of trees and brush (roots over 1 inch in diameter or longer than about 3 feet in length). Depressions, voids and holes that extend below the proposed finish grade should be cleaned and backfilled with engineered fill.

Surface vegetation and organic laden soils should be stripped. Organic laden soils are defined as soils with more than 3 percent by weight of organic content. The required stripping depth should be determined in the field by the Engineer at the time of construction. Stripped material may be stockpiled for use in landscape areas if approved by the project landscape architect, or otherwise removed from the site.

5.2.2 Excavations, Shoring and Dewatering

Excavations up to 10 feet are anticipated for expansion of the Crespi Pond and the new wetland area. Excavations of unknown depth are anticipated for utility lines. Excavations may encounter hard granite bedrock conditions (see Section 3.9 for approximate depth to dense rock encountered in our drill holes). Based on the materials encountered in our borings we infer that excavations can be accomplished with conventional equipment, supplemented by heavy rippers. However, jack hammers in hard granite may be necessary. All underground contractors should be prepared for hard shallow rock conditions.

The contractor is responsible for the design, installation, maintenance and removal of temporary shoring and bracing systems. The presence of nearby existing structures, pavements, and underground utilities must be incorporated in the design of the shoring and bracing systems. The presence of relatively clean sandy soils that are subject to sudden collapse should be taken into consideration in design and construction.

Groundwater was not encountered in any of our drill holes but is expected to seasonally pond on the bedrock surface for short periods of time. Dewatering systems may be necessary. The design, installation, permitting, maintenance and removal of dewatering systems are the responsibility of the contractor.

Excavations adjacent to existing or proposed foundations should be above an imaginary plane having an inclination of 1½:1 (horizontal to vertical) extending down from the top of the

foundations. Otherwise, the effect of the adjacent foundations should be incorporated in the design and construction of the excavations and improvements.

5.2.3 Subgrade Preparation

Subgrade preparation is recommended in areas to receive engineered fill, or to support improvements such as pavements, concrete slabs, etc. Where subgrade preparation is required, the subgrade should be compacted to the recommendations given under Section 5.2.5. "Engineered Fill Placement and Compaction."

Soil with moisture content above optimum value should be anticipated during and shortly after rainy seasons, or for soils below the groundwater level. Where unstable, wet or soft soil is encountered, the soil will require processing before compaction can be achieved. When construction schedule does not allow air-drying, other means such as lime treatment of the soil or excavation and replacement may be considered. Geotextile fabrics may also be used to help stabilize the subgrade. The method to be used should be determined at the time of construction based on the actual site conditions. We recommend obtaining unit prices for subgrade stabilization during the construction bid process.

5.2.4 Material for Engineered Fill

In general, on-site soils with an organic content of less than 3 percent by weight, free of any hazardous or deleterious materials, and meeting the gradation requirements below may be used as general engineered fill to achieve project grades, except when special material is required.

In general, engineered fill material should not contain rocks or lumps larger than 3 inches in greatest dimension, should not contain more than 15 percent of the material larger than 1½ inches, and should contain at least 10 percent passing the No. 200 sieve. In addition to these requirements, import fill should have a low expansion potential as indicated by Plasticity Index of 12 or less, or Expansion Index of less than 20.

All import fills should be approved by the project geotechnical engineer prior to delivery to the site. At least five (5) working days prior to importing to the site, a representative sample of the proposed import fill should be delivered to our laboratory for evaluation.

5.2.5 Engineered Fill Placement and Compaction

Engineered fill should be placed in horizontal lifts each not exceeding 8 inches in thickness, moisture conditioned to the required moisture content, and mechanically compacted. Relative compaction or compaction is defined as the in-place dry density of the compacted soil divided by the laboratory maximum dry density as determined by ASTM Test Method D1557, latest edition, expressed as a percentage.

Moisture conditioning of soils should consist of adding water to the soils if they are too dry and allowing the soils to dry if they are too wet.

Engineered fills consisting of on-site or imported soils should be compacted to a minimum of 90 percent relative compaction. The moisture content of the material should be brought to between 1 and 3 percent above the laboratory optimum value before compaction is performed. In pavement areas, the upper 8 inches of soil should be compacted to a minimum of 95 percent relative compaction.

5.2.6 Cut and Fill Slopes

Generally, cut and fill slopes in sandy soil should be constructed at inclinations no steeper than 2.5:1 (horizontal:vertical). Permanent cut slopes within the metamorphic rock may be constructed at inclinations as steep as 1:1 (horizontal:vertical).

All pavements and concrete slabs-on-grade should be set back at least 5 feet horizontally from the crests of cut or fill slopes.

It may be desirable to lay back cut slopes in sand to as flat as 3:1 on the margins of Crespi Pond and the proposed wetland area. The stability of saturated slopes on the pond margins will be dependent on the percentage of fines within the material and to what degree vegetation is established.

5.2.7 Utility Trench Excavation and Backfill

Trench excavation, bedding and backfill should conform to the City of Pacific Grove Standard Specifications. Construction, shoring, and bracing of excavations should comply with the current CAL-OSHA safety standards and local jurisdiction. The stability and safety of excavations, braced or unbraced, is the responsibility of the contractor.

5.2.8 Wet Weather Construction

If site grading and construction is to be performed during the winter rainy months, the owner and contractors should be fully aware of the potential impact of wet weather. Rainstorms can cause delay to construction and damage to previously completed work by saturating compacted pads or subgrades, or flooding excavations.

Earthwork during rainy months will require extra effort and caution by the contractors. The contractor is solely responsible to protect his work to avoid damage by rainwater. Standing pools of water should be pumped out immediately. Construction during wet weather conditions should be addressed in the project construction bid documents and/or specifications. We recommend the grading contractor submit a wet weather construction plan outlining procedures they will employ to protect their work and to minimize damage to their work by rainstorms.

5.3 WATER TANK FOUNDATIONS

Based on the information provided to us, we understand that the eastern tank (the clarifier) has a base foundation consisting of a 14-inch thick concrete mat that slopes from 13 feet at the edges to 16.5 feet below ground surface at the center. The western tank (the digester) has a flat, 18-inch thick concrete mat that is founded 10 feet below ground surface.

For evaluation of these two tanks we recommend a net allowable bearing capacity of 2500 pounds per square foot on the underlying soils when considering dead plus normal live loading. This allowable foundation soil pressure may be increased by one-third when considering short-term wind or seismic loading. This assumes the existing embedment depths as noted above. Static settlement of the tanks is expected to have already occurred. Total settlement due to seismic shaking may be on the order of ½ inch .

Soil resistance to lateral loads will be provided by a combination of frictional resistance between the bottom of the mat foundations and underlying soils and by passive pressures acting against the embedded sides of the tanks. For frictional resistance at the base of the tanks, an ultimate

coefficient of friction of 0.3 may be used for design. In addition, an allowable passive lateral bearing pressure equal to an equivalent fluid pressure of 300 pounds per cubic foot (pcf) may be used. These values may be used in combination without reduction. This passive pressure can be assumed to act from 2 feet below grade and downward.

The side walls of the tanks should be designed to retain the surrounding soil. We infer that at-rest soil pressures are applicable for the tank walls as they are restrained from deflecting at the top. Assuming drained backfill conditions, the tank walls should be designed to resist an equivalent fluid pressure of 55 pcf.

If the structural engineer wishes to include seismic forces in the design of tank walls, the walls may be evaluated using the above at-rest soil pressure plus a horizontal seismic line force of $10H^2$ pounds per lineal foot (where H is the height of the vertical design plane from the wall base to the ground surface above). The resultant of the seismic force should be applied at 2/3H above the wall base. A reduced factor of safety for overturning and sliding may be used in seismic design as determined by the structural designer.

5.4 CONCRETE SLABS-ON-GRADE

No specific exterior concrete slabs-on-grade are presently proposed. The following recommendations are for exterior slabs in general. Preparation of subgrade soil and placement and compaction of engineered fill for concrete slabs-on-grade should be as outlined in Section 5.2, the "Earthwork" section of this report.

Exterior concrete slabs that are not sensitive to moisture transmission through the slabs, such as exterior flatwork may be constructed directly on properly prepared soil subgrades. Design of reinforcement, joint spacing, etc. is the responsibility of the design engineer.

Exterior concrete slabs-on-grade should be cast free from adjacent foundations or other non-heaving edge restraints. This may be accomplished by using a strip of 1/2-inch asphalt-impregnated felt divider material between the slab edges and the adjacent structure.

5.5 SURFACE DRAINAGE

Engineering design of grading and drainage at the site is the responsibility of the project Civil Engineer. We recommend the following be considered by the project Civil Engineer and incorporated into the project plans where appropriate.

Sufficient surface drainage should be provided to direct runoff away from building foundations, concrete slabs-on-grade and pavements, and towards suitable collection and discharge facilities. Ponding of surface water should be avoided by establishing positive drainage away from all improvements. Water collected from roof downspouts should be discharged into a closed pipe or towards drainage structures, and the water carried to a suitable discharge point.

The dune sand deposits are highly erodible and care should be taken to provide erosion protection where water is discharged and to plant and mulch all disturbed surfaces, establishing vegetation as appropriate, prior to the winter rains.

6. PLAN REVIEW, EARTHWORK AND FOUNDATION OBSERVATION

Post-report geotechnical services by Pacific Geotechnical Engineering (PGE), typically consisting of pre-construction design consultations and reviews, construction observation and testing services, are necessary for PGE to confirm the recommendations contained in this report. This report is based on limited sampling and investigation, and by those constraints may not have discovered local anomalies or other varying conditions that may exist on the project site. Therefore, this report is only preliminary until PGE can confirm that actual conditions in the ground conform to those anticipated in the report. Accordingly, as an integral part of this report, PGE recommends post-report geotechnical services to assist the project team during design and construction of the project. PGE requires that it perform these services if it is to remain as the project geotechnical engineer-of-record.

During design, PGE can provide consultation and supplemental recommendations to assist the project team in design and value engineering, especially if the project design has been modified after completion of our report. It is impossible for us to anticipate every design scenario and use of construction materials during preparation of our report. Therefore, retaining PGE to provide post-report consultation will help address design changes, answer questions and evaluate alternatives proposed by the project designers and contractors.

Prior to issuing project plans and specifications for construction bidding purposes, PGE should review the grading, drainage and foundation plans and the project specifications to determine if the intent of our recommendations has been incorporated in these documents. We have found that such a review process will help reduce the likelihood of misinterpretation of our recommendations which may cause construction delay and additional cost.

Construction phase services can include, among other things, the observation and testing during site clearing, stripping, excavation, mass grading, subgrade preparation, fill placement and compaction, backfill compaction, foundation construction and pavement construction activities.

Pacific Geotechnical Engineering would be pleased to provide cost proposals for follow-up geotechnical services. Post-report geotechnical services may include additional field and laboratory services.

7. LIMITATIONS

In preparing the feasibility-level findings and professional opinions presented in this report, we have endeavored to follow generally accepted principles and practices of the engineering geologic and geotechnical engineering professions in the area and at the time our services were provided. No warranty, express or implied, is provided.

The preliminary recommendations contained in this report are based, in part, on information that has been provided to us. In the event that the general development concept or general location and type of structures are modified, our preliminary conclusions and recommendations shall not be considered valid unless we are retained to review such changes and to make any necessary additions or changes to our recommendations. For Pacific Geotechnical Engineering to remain the geotechnical consultant of record for the proposed project, we must provide supplemental geotechnical services during final design phase, plan review and construction observation services, as outlined above under the Plan Review, Earthwork and Foundation Observation section of this report.

Subsurface exploration is necessarily confined to selected locations and conditions may, and often do, vary between these locations. Should conditions different from those assumed in this report be encountered during project development, additional exploration, testing, and analysis may be required.

Should persons concerned with this project observe geotechnical features or conditions at the site or surrounding areas which are different from those described in this report, those observations should be reported immediately to Pacific Geotechnical Engineering for evaluation.

It is important for project performance that the preliminary recommendations given in this report are made known to the design professionals involved with the project, that they be incorporated into project drawings and documents, and that the preliminary recommendations be validated and/or supplemented by a design level geotechnical investigation.

Report prepared by,

PACIFIC GEOTECHNICAL ENGINEERING

Soma B. Goresky
GE 2252

G. Reid Fisher PhD
CEG 1858

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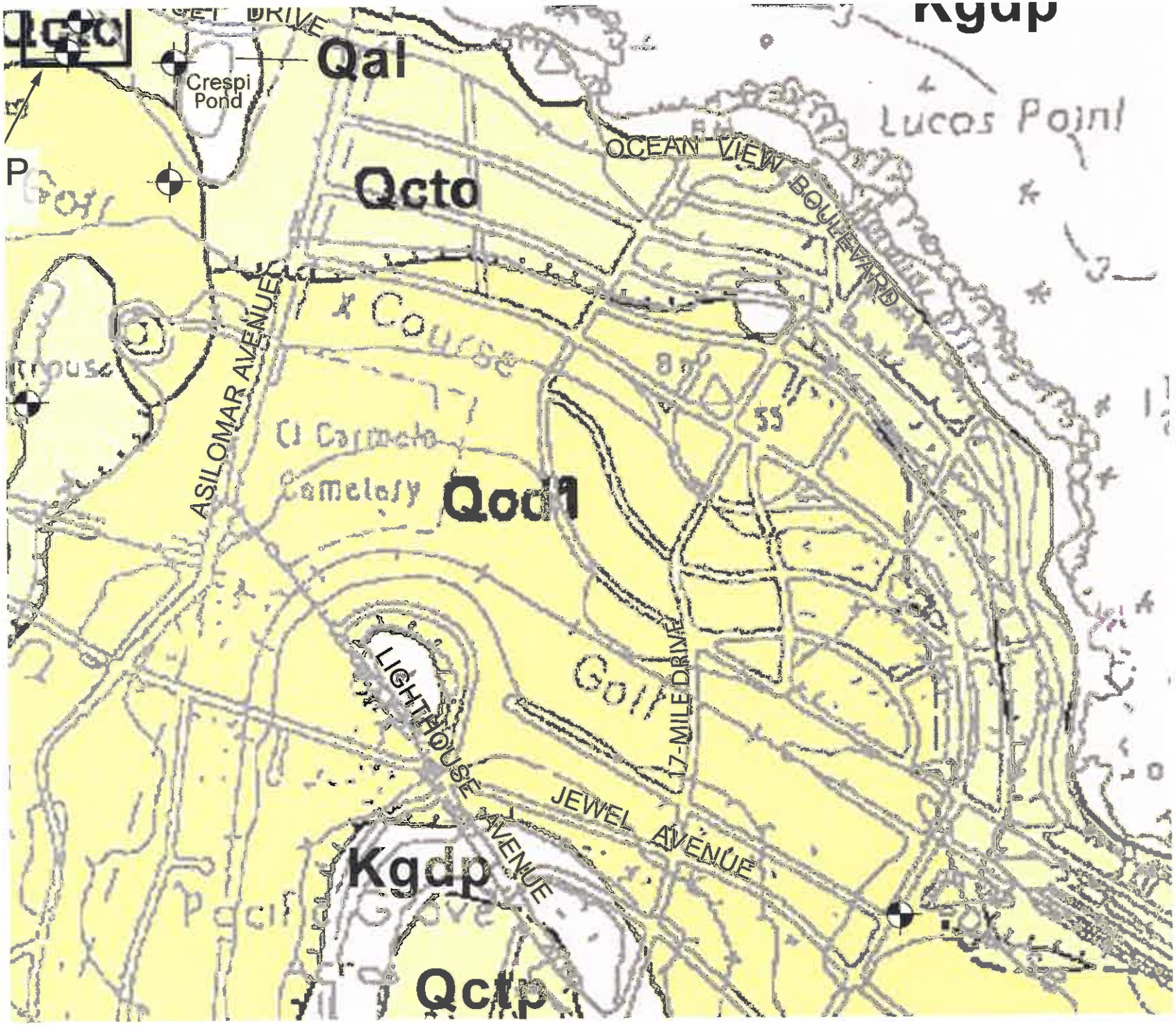
FIGURES



EXPL

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Qal	Alluvi
Qod1	Young (Pleist
Qcto	Ocean (Pleist
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Qctp	Penin (Pleist
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Map of the Monterey and Seaside 7.5-Minute Quadrangles

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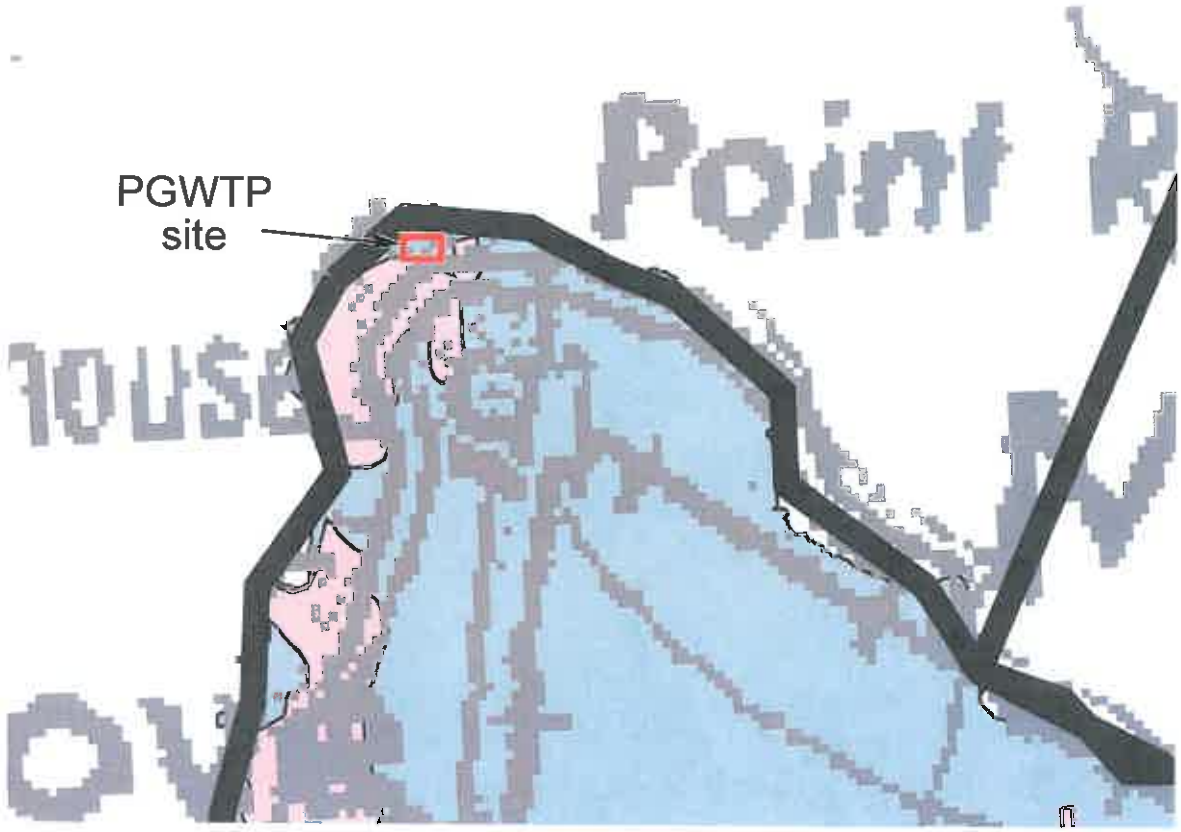
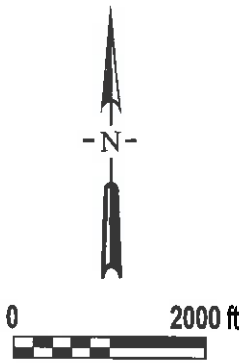




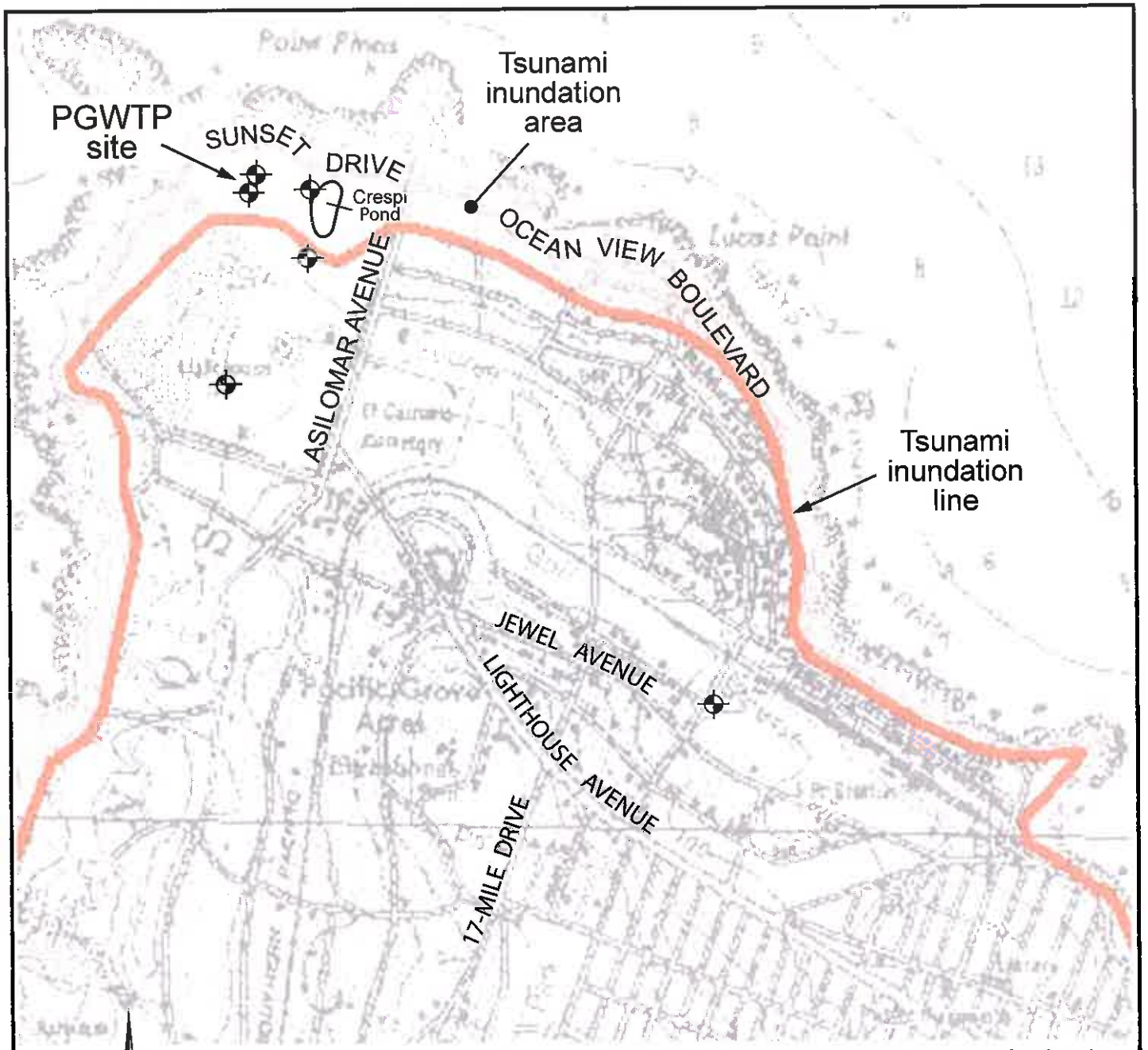
EXPLANATION

High liquefaction susceptibility

Low liquefaction susceptibility

BASE MAP: Digital Map Showing Relative Liquefaction Susceptibility of Monterey County, California (L.I. Rosenberg, 2001).

PACIFIC GEOTECHNICAL ENGINEERING	DRAFTED BY: CSS	**LIQUEFACTION MAP**	**FIGURE** 2
	DATE: AUGUST 2013	**PACIFIC GROVE ASBS STORMWATER MANAGEMENT PROJECT MONTEREY and PACIFIC GROVE, CALIFORNIA**	
	CHECED BY:		**PROJECT** 2013.0031
	REVISION:		



BASE MAP: Tsunami Inundation Map for Emergency Planning, Monterey Quadrangle (California Emergency Management Agency and others, 2009).

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0 1000 ft

EXPLANATION

Drill hole location

PACIFIC GEOTECHNICAL ENGINEERING	DRAFTED BY: CSS DATE: AUGUST 2013 CHECED BY: REVISION:	**TSUNAMI INUNDATION MAP** **PACIFIC GROVE ASBS STORMWATER MANAGEMENT PROJECT MONTEREY and PACIFIC GROVE, CALIFORNIA**	**FIGURE** 3 **PROJECT** 2013.0031

EXPLANA

DH-6 Drill hole lo

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Vater Treatment Plant Vicinity, Pacific Grove ASBS Stormwater Management

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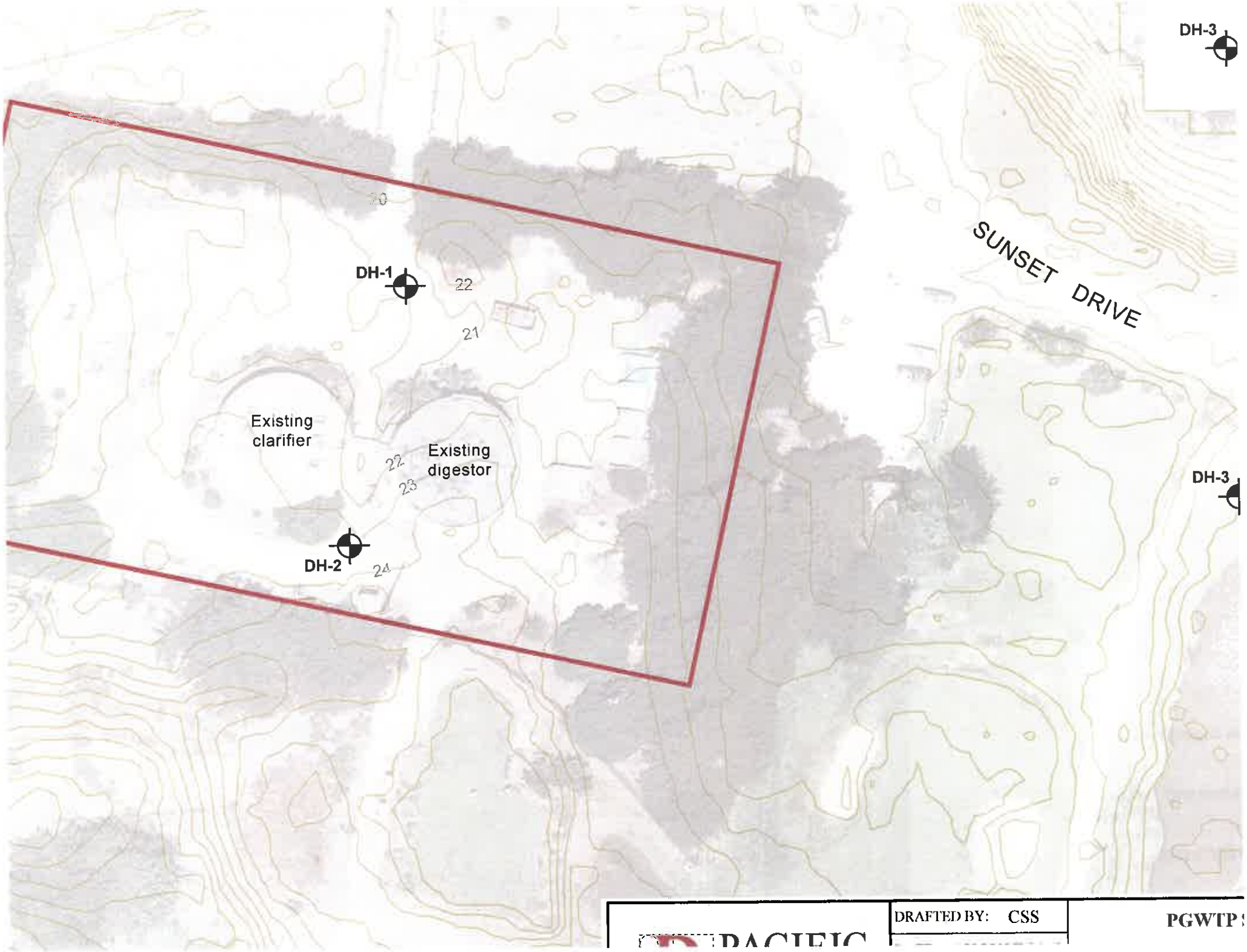

DH-3
SUNSET DRIVE
DH-1
22
21
Existing clarifier
22
Existing digestor
23
DH-3
DH-2
24
DRAFTED BY: CSS
PGWTP

APPENDIX A

KEY TO SOIL CLASSIFICATION - FINE GRAINED SOILS
(50% OR MORE IS SMALLER THAN NO. 200 SIEVE SIZE)
(modified from ASTM D2487 to include fine grained soils with intermediate plasticity)

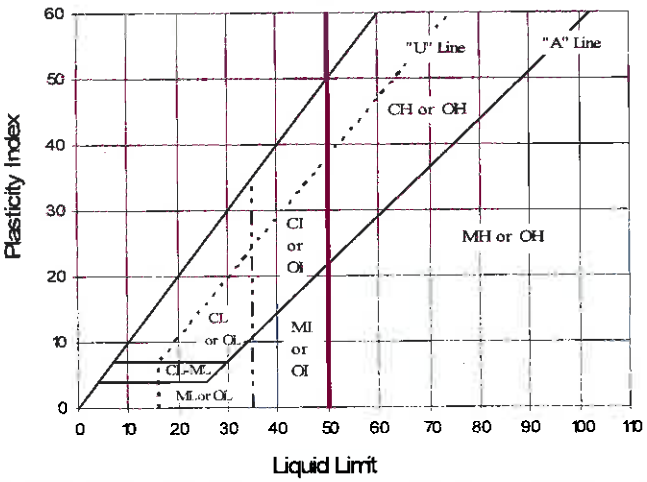
MAJOR DIVISIONS			GROUP SYMBOLS	GROUP NAMES
SILTS AND CLAYS (Liquid Limit less than 35) Low Plasticity	Inorganic	PI < 4 or plots below "A" line	ML	Silt, Silt with Sand or Gravel, Sandy or Gravelly Silt, Sandy or Gravelly Silt with Sand or Gravel
	Inorganic	PI > 7 or plots on or above "A" line	CL	Lean Clay, Lean Clay with Sand or Gravel, Sandy or Gravelly Lean Clay, Sandy or Gravelly Lean Clay with Sand or Gravel
	Inorganic	PI between 4 and 7	CL-ML	Silty Clay, Silty Clay with Sand or Gravel, Sandy or Gravelly Silty Clay, Sandy or Gravelly Silty Clay with Sand or Gravel
	Organic	See footnote 3	OL	Organic Silt (below "A" Line) or Organic Clay (on or above "A" Line) (1,2)
SILTS AND CLAYS (35 ≤ Liquid Limit < 50) Intermediate Plasticity	Inorganic	PI < 4 or plots below "A" line	MI	Silt, Silt with Sand or Gravel, Sandy or Gravelly Silt, Sandy or Gravelly Silt with Sand or Gravel
	Inorganic	PI > 7 or plots on or above "A" line	CI	Clay, Clay with Sand or Gravel, Sandy or Gravelly Clay, Sandy or Gravelly Clay with Sand or Gravel
	Organic	See footnote 3	OI	Organic Silt (below "A" Line) or Organic Clay (on or above "A" Line) (1,2)
SILTS AND CLAYS (Liquid Limit 50 or greater) High Plasticity	Inorganic	PI plots below "A" line	MH	Elastic Silt, Elastic Silt with Sand or Gravel, Sandy or Gravelly Elastic Silt, Sandy or Gravelly Elastic Silt with Sand or Gravel
	Inorganic	PI plots on or above "A" line	CH	Fat Clay, Fat Clay with Sand or Gravel, Sandy or Gravelly Fat Clay, Sandy or Gravelly Fat Clay with Sand or Gravel
	Organic	See note 3 below	OH	Organic Silt (below "A" Line) or Organic Clay (on or above "A" Line) (1,2)

1. If soil contains 15% to 29% plus No. 200 material, include "with sand" or "with gravel" to group name, whichever is predominant.
2. If soil contains ≥30% plus No. 200 material, include "sandy" or "gravelly" to group name, whichever is predominant. If soil contains ≥15% of sand or gravel sized material, add "with sand" or "with gravel" to group name.
3. Ratio of liquid limit of oven dried sample to liquid limit of not dried sample is less than 0.75.

CONSISTENCY	UNCONFINED SHEAR STRENGTH (KSF)	STANDARD PENETRATION (BLOWS/FOOT)
VERY SOFT	< 0.25	< 2
SOFT	0.25 – 0.5	2 – 4
FIRM	0.5 – 1.0	5 – 8
STIFF	1.0 – 2.0	9 – 15
VERY STIFF	2.0 – 4.0	16 – 30
HARD	> 4.0	> 30

MOISTURE	CRITERIA
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp, but no visible water
Wet	Visible free water, usually soil is below the water table

Plasticity Chart



PACIFIC GEOTECHNICAL ENGINEERING

KEY TO SOIL CLASSIFICATION – COARSE GRAINED SOILS
(MORE THAN 50% IS LARGER THAN NO. 200 SIEVE SIZE)
(modified from ASTM D2487 to include fines with intermediate plasticity)

MAJOR DIVISIONS			GROUP SYMBOLS	GROUP NAMES[1]
GRAVELS (more than 50% of coarse fraction is larger than No. 4 sieve size)	Gravels with less than 5% fines	Cu ≥ 4 and 1 ≤ Cc ≤ 3	GW	Well Graded Gravel, Well Graded Gravel with Sand
		Cu < 4 and/or 1 > Cc > 3	GP	Poorly Graded Gravel, Poorly Graded Gravel with Sand
	Gravels with 5% to 12% fines	ML, MI or MH fines	GW-GM	Well Graded Gravel with Silt, Well Graded Gravel with Silt and Sand
			GP-GM	Poorly Graded Gravel with Silt, Poorly Graded Gravel with Silt and Sand
		CL, CI or CH fines	GW-GC	Well Graded Gravel with Clay, Well Graded Gravel with Clay and Sand
			GP-GC	Poorly Graded Gravel with Clay, Poorly Graded Gravel with Clay and Sand
	Gravels with more than 12% fines	ML, MI or MH fines	GM	Silty Gravel, Silty Gravel with Sand
		CL, CI or CH fines	GC	Clayey Gravel, Clayey Gravel with Sand
		CL-ML fines	.GC-GM	Silty Clayey Gravel; Silty, Clayey Gravel with Sand
SANDS (50% or more of coarse fraction is smaller than No. 4 sieve size)	Sands with less than 5% fines	Cu ≥ 6 and 1 ≤ Cc ≤ 3	SW	Well Graded Sand, Well Graded Sand with Gravel
		Cu < 6 and/or 1 > Cc > 3	SP	Poorly Graded Sand, Poorly Graded Sand with Gravel
	Sands with 5% to 12% fines	ML, MI or MH fines	SW-SM	Well Graded Sand with Silt, Well Graded Sand with Silt and Gravel
			SP-SM	Poorly Graded Sand with Silt, Poorly Graded Sand with Silt and Gravel
		CL, CI or CH fines	SW-SC	Well Graded Sand with Clay, Well Graded Sand with Clay and Gravel
			SP-SC	Poorly Graded Sand with Clay, Poorly Graded Sand with Clay and Gravel
	Sands with more than 12% fines	ML, MI or MH fines	SM	Silty Sand, Silty Sand with Gravel
		CL, CI or CH fines	SC	Clayey Sand, Clayey Sand with Gravel
		CL-ML fines	SC-SM	Silty, Clayey Sand; Silty, Clayey Sand with Gravel

US STANDARD SIEVES	3 Inch	¾ Inch	No. 4	No. 10	No. 40	No. 200
	COARSE	FINE	COARSE	MEDIUM	FINE	
COBBLES & BOULDERS	GRAVELS		SANDS			SILTS AND CLAYS

RELATIVE DENSITY (SANDS AND GRAVELS)	STANDARD PENETRATION (BLOWS/FOOT)
Very Loose	0 - 4
Loose	5 – 10
Medium Dense	11 – 30
Dense	31 - 50
Very Dense	50+

1. Add "with sand" to group name if material contains 15% or greater of sand-sized particle. Add "with gravel" to group name if material contains 15% or greater of gravel-sized particle.

MOISTURE	CRITERIA
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp, but no visible water
Wet	Visible free water, usually soi is below the water table

PACIFIC GEOTECHNICAL ENGINEERING

ROCK QUALITY DESCRIPTIONS

HARDNESS**

Very Hard	Cannot be scratched with knife or sharp pick. Breaking of hand specimens requires several hard blows of the geologist's pick
Hard	Can be scratched with knife or pick only with difficulty. Hard blow with hammer required to break sample.
Moderately Hard	Can be scratched with knife or pick. Gouges or grooves to ½ inch can be excavated by hard blow of point of a geologist's pick. Hand specimens broken with moderate blow.
Medium	Can be grooved or gouged 1/16 inch deep by firm pressure on knife or pick point. Can be excavated in small chips about 1 inch maximum in dimension by hard blows of the point of a geologist's pick.
Soft	Can be grooved or gouged readily with knife or pick point. Can be excavated in chips to pieces several inches in size by moderate blows of a pick point. Small pieces can be broken by finger pressure,
Very Soft	Can be carved with knife. Can be excavated readily with point of pick. Pieces one inch or more thickness can be broken with finger pressure. Can be scratched readily by finger nail.

WEATHERING**

Fresh or Unweathered	Rock fresh, crystals bright, few joints and fractures may show slight staining. Rock rings under hammer if crystalline.
Very Slight	Rock generally fresh, fractures and joints stained, some joints may show thin clay coatings, crystals in broken face show bright. Rock rings under hammer if crystalline.
Slight	Rock generally fresh, joints and fractures stained, and discoloration extends into rock up to 1 inch. Joints may contain clay. In granitic rock, some occasional feldspar crystals are dull and discolored. Crystalline rocks ring under hammer.
Moderate	Significant portions of rock show discoloration and weathering effects. In granitic rock, most feldspars are dull and discolored; some show clay. Rock has dull sound under hammer and shows significant loss of strength as compared with fresh rock.
Moderately Severe	All rock except quartz discolored or stained. In granitic rock, all feldspars dull and discolored and majority show kaolinization. Rock shows severe loss of strength and can be excavated with geologist's pick. Rock goes "clunk" when struck.
Severe	All rock except quartz discolored or stained. Rock "fabric" clear and evident, but reduced in strength to strong soil. In granitic rock, all feldspars kaolinized to some extent. Some fragments of strong rock usually left.
Very Severe	All rock except quartz discolored or stained. Rock "fabric" discernible, but mass effectively reduced to "soil" with only fragments of strong rock remaining.
Complete	Rock reduced to "soil." Rock "fabric" not discernible or discernible only in small scattered locations. Quartz may be present as dikes or stringers.

FRACTURE DIMENSIONS*

Fracture	Block Size (or Spacing[1])
Crushed	~5 microns to 0.1 ft
Intensely	0.05 to 0.1 ft
Closely	0.1 to 0.5 ft
Moderately	0.5 to 1.0 ft
Slightly	1.0 to 3.0 ft
Massive	3.0 ft and larger

1 Average distance between adjacent fractures
* Source of data unknown
** Source of data: "Subsurface Investigaiton for Design and Constructio of Foundation Buildings," (1976) American Society of Civil Engineers, Manuals and Reports on Engineering Practice – No. 5

DATE: 6/4/2013	LOG OF EXPLORATORY DRILL HOLE	DH- 1

PROJECT NAME: PGWTP **PROJECT NUMBER:** 2013.0031

DRILL RIG: Mobile B53, 140# downhole hammer & wire winch **LOGGED BY:** CSS

HOLE DIAMETER: 8" hollow stem auger **HOLE ELEVATION:** ±21

SAMPLER: D = 3" OD, 2½" ID Split-spoon; X = 2½" OD, 2" ID Split-spoon; I = Standard Penetrometer (2" OD SPT); S = Slough in sample

GROUND WATER DEPTH: Initial: --- Final: ---

DESCRIPTION OF EARTH MATERIALS	SOIL TYPE	DEPTH (ft)	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	% PASSING #200 SIEVE	LIQUID LIMIT	WATER CONTENT	PLASTICITY INDEX	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
DUNE DEPOSITS: POORLY GRADED SAND WITH CLAY: Very dark brown (10YR 2/2), dry to moist, dense upper, medium dense to loose below; fine sand;	SP-SC	1	S D D	58				3		113		
		2										
		3	S D D	23				4		103		
		4										
		5	S I I									
		6		8		10		3				
		7										
POORLY GRADED SAND WITH CLAY: Brown (7.5YR 4/4), wet, medium dense; fine sand	SP-SC	8										
		9	S I I	17		5		18				
		10										
		11										
POORLY GRADED SAND WITH CLAY: Light brownish grey (10YR 6/2), wet, very dense; fine sand	SP-SC	12										
		13	S I I									
		14		72/10"				22				
		15										
- drilling gets abruptly hard at 16 ft.		16										
BEDROCK: GRANITE: Variable brownish yellow, pale brown, light grey, wet, rock mass is soft due to weathering, individual crystal and fragments are very hard, severely weathered; fracture cannot be determined in samples		17										
		18										
		19	S I I	49								
		20										

DATE: 6/4/2013	LOG OF EXPLORATORY DRILL HOLE	DH- 1

PROJECT NAME: PGWTP **PROJECT NUMBER:** 2013.0031

DRILL RIG: Mobile B53, 140# downhole hammer & wire winch **LOGGED BY:** CSS

HOLE DIAMETER: 8" hollow stem auger **HOLE ELEVATION:** ± 21

SAMPLER:
D = 3" OD, 2½" ID Split-spoon
X = 2½" OD, 2" ID Split-spoon
I = Standard Penetrometer (2" OD SPT)
S = Slough in sample

GROUND WATER DEPTH: Initial: --- Final: ---

DESCRIPTION OF EARTH MATERIALS	SOIL TYPE	DEPTH (ft)	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	% PASSING #200 SIEVE	LIQUID LIMIT	WATER CONTENT	PLASTICITY INDEX	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
BEDROCK: GRANITE: as above - by 23 ft. weathered such that rock separates into individual crystals; no oxidation color in sample, light grey, black, white quartz-plagioclase biotite granitoid		21										
		22										
		23										
		24	I	50/4"								
BOTTOM OF HOLE = 24 Feet No Groundwater encountered		25										
		26										
		27										
		28										
		29										
		30										
		31										
		32										
		33										
		34										
		35										
		36										
		37										
		38										
		39										
		40										

DATE: 6/4/2013	LOG OF EXPLORATORY DRILL HOLE	DH- 2

PROJECT NAME: PGWTP **PROJECT NUMBER:** 2013.0031

DRILL RIG: Mobile B53, 140# downhole hammer & wire winch **LOGGED BY:** CSS

HOLE DIAMETER: 8" hollow stem auger **HOLE ELEVATION:** ± 23

SAMPLER:
D = 3" OD, 2½" ID Split-spoon
X = 2½" OD, 2" ID Split-spoon
I = Standard Penetrometer (2" OD SPT)
S = Slough in sample

GROUND WATER DEPTH: Initial: --- Final: ---

DESCRIPTION OF EARTH MATERIALS	SOIL TYPE	DEPTH (ft)	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	% PASSING #200 SIEVE	LIQUID LIMIT	WATER CONTENT	PLASTICITY INDEX	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
PAVEMENT SECTION (4" AC, no Baserock)												
DUNE DEPOSITS: POORLY GRADED SAND WITH CLAY to CLAYEY SAND: Dark brown (10YR 3/3), dry to moist, medium dense; fine sand	SP-SC to SC	1	S									
		2	D	40				4		113		
		3	D									
POORLY GRADED SAND WITH CLAY: Black (10YR 2/1), dry, medium dense; fine sand	SP-SC	4	S	12								
		5	S									
POORLY GRADED SAND with CLAY and GRAVEL: Dark brown (7.5YR 3/3), moist, medium dense; fine to coarse mostly subangular to angular sand; with fine gravel	SP-SC	6	I	17				20		83		
		7										
		8										
-by 9 ft. dark brown (7.5YR 3/2)		9	S									
- by 9.75 ft. grades to light brownish grey		10	I	12		10		16				
		11										
		12										
		13										
-by 14.5 ft. greenish grey (Gley1 6/10Y)		14	S									
		15	I	24		8		20				
BEDROCK: GRANITE: Variably colored, brown overall; wet; rock mass soft due to weathering, crystals are hard; severely weathered to clayey sand, fractures cannot be determined in samples		16										
		17										
		18										
BOTTOM OF HOLE = 19.5 Feet No Groundwater Encountered		19	S I	50/5"								
		20										

DATE: 6/4/2013	LOG OF EXPLORATORY DRILL HOLE	DH- 3

PROJECT NAME: PGWTP **PROJECT NUMBER:** 2013.0031

DRILL RIG: Mobile B53, 140# downhole hammer & wire winch **LOGGED BY:** CSS

HOLE DIAMETER: 8" hollow stem auger **HOLE ELEVATION:** ± 15

SAMPLER: D = 3" OD, 2½" ID Split-spoon; X = 2½" OD, 2" ID Split-spoon; I = Standard Penetrometer (2" OD SPT); S = Slough in sample

GROUND WATER DEPTH: Initial: --- Final: ---

DESCRIPTION OF EARTH MATERIALS	SOIL TYPE	DEPTH (ft)	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	% PASSING #200 SIEVE	LIQUID LIMIT	WATER CONTENT	PLASTICITY INDEX	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
DUNE DEPOSITS: CLAYEY SAND: Very dark brown (10YR 2/2), dry to moist, loose; fine sand	SC	1	S									
		2	D	13		31		18		110		
CLAYEY SAND: Very dark brown (10YR 2/2), moist, medium dense; with fine sand	SC	3	D									
			S	15								
BEDROCK: (upper 6 in. completely weathered to clayey sand) GRANITE: multi colored grey, white, black with yellowish brown areas from oxidation; dry; rock mass soft due to weathering, crushes into individual crystals		4	D									
		5										
		6	S D	50/4"		9		9		127		
		7										
		8										
		9	D	50/4"								
BOTTOM OF HOLE = 9 Feet No Groundwater Encountered		10										
		11										
		12										
		13										
		14										
		15										
		16										
		17										
		18										
		19										
		20										

DATE: 6/4/2013	LOG OF EXPLORATORY DRILL HOLE	DH- 4

PROJECT NAME: PGWTP **PROJECT NUMBER:** 2013.0031

DRILL RIG: Mobile B53, 140# downhole hammer & wire winch **LOGGED BY:** CSS

HOLE DIAMETER: 8" hollow stem auger **HOLE ELEVATION:** ± 23

SAMPLER:
D = 3" OD, 2½" ID Split-spoon
X = 2½" OD, 2" ID Split-spoon
I = Standard Penetrometer (2" OD SPT)
S = Slough in sample

GROUND WATER DEPTH: Initial: --- Final: ---

DESCRIPTION OF EARTH MATERIALS	SOIL TYPE	DEPTH (ft)	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	% PASSING #200 SIEVE	LIQUID LIMIT	WATER CONTENT	PLASTICITY INDEX	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
DUNE DEPOSITS: POORLY GRADED SAND WITH CLAY: Greyish brown (10YR 5/2), moist, medium dense; fine sand	SP-SC	1										
		2	S D D S	30	>4.5	15		6		109		
CLAYEY SAND: Very dark grayish brown (10YR 3/2), moist, medium dense; fine sand	SC	3	I I	4								
POORLY GRADED SAND WITH CLAY: Grayish brown (10YR 5/2), dry to moist, loose; fine sand	SP-SC	4										
		5	S I									
-peat rich layer begins at ≈ 6.2 ft. ends of sample 6.5 ft.		6		5								
		7										
WEATHERED BEDROCK: Weathered to CLAYEY SAND: Dark greenish grey (Gley1 4/5GY), moist, medium dense; mostly fine sand.	SC	8										
		9	S I I	10		22		14				
		10										
		11										
BEDROCK: GRANITE: Variable colors but dark yellowish brown over all; moist, rock mass soft due to weathering; crumbles		12										
		13										
		14	S I	50/6"								
BOTTOM OF HOLE = 14.5 Feet		15										
		16										
		17										
		18										
		19										
		20										

DATE: 6/4/2013	LOG OF EXPLORATORY DRILL HOLE	DH- 5

PROJECT NAME: PGWTP **PROJECT NUMBER:** 2013.0031

DRILL RIG: Mobile B53, 140# downhole hammer & wire winch **LOGGED BY:** CSS

HOLE DIAMETER: 8" hollow stem auger **HOLE ELEVATION:** ± 38

SAMPLER: D = 3" OD, 2½" ID Split-spoon; X = 2½" OD, 2" ID Split-spoon; I = Standard Penetrometer (2" OD SPT); S = Slough in sample

GROUND WATER DEPTH: Initial: --- Final: ---

DESCRIPTION OF EARTH MATERIALS	SOIL TYPE	DEPTH (ft)	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	% PASSING #200 SIEVE	LIQUID LIMIT	WATER CONTENT	PLASTICITY INDEX	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
DUNE DEPOSITS: CLAYEY SAND: Greyish brown (10YR 5/2), moist to wet, loose; fine sand	SC	1	S									
		2	D	11								
		3	D									
-by 3 ft. wet with water in sample liner, medium dense			S									
? ? ? ? ? ?		4	D	25		13		16		114		
-No recovery at 5.0-6.5 ft.	SP-SC	5	D									
POORLY GRADED SAND WITH CLAY: Light brown light grey (10YR 6/2), wet, medium dense		6	S	12								
		7										
		8										
		9	S									
		10		26		6		23				
		11										
-abruptly drilling gets harder		12										
BEDROCK: GRANITE: Variable colored, grey white, black yellowish brown where oxidized; wet; rock mass soft due to weathering; severely weathered rock crumbles into individual rock crystals		13										
		14	S	50/6"								
		15										
BOTTOM OF HOLE = 14.5 Feet No Groundwater Encountered		16										
		17										
		18										
		19										
		20										

DATE: 6/4/2013	LOG OF EXPLORATORY DRILL HOLE	DH- 6

PROJECT NAME: PGWTP **PROJECT NUMBER:** 2013.0031

DRILL RIG: Mobile B53, 140# downhole hammer & wire winch **LOGGED BY:** CSS

HOLE DIAMETER: 8" hollow stem auger **HOLE ELEVATION:** ± 21

SAMPLER:
D = 3" OD, 2½" ID Split-spoon
X = 2½" OD, 2" ID Split-spoon
I = Standard Penetrometer (2" OD SPT)
S = Slough in sample

GROUND WATER DEPTH: Initial: --- Final: —

DESCRIPTION OF EARTH MATERIALS	SOIL TYPE	DEPTH (ft)	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	% PASSING #200 SIEVE	LIQUID LIMIT	WATER CONTENT	PLASTICITY INDEX	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
OLDER DUNE DEPOSITS: CLAYEY SAND: Very dark brown (10YR 2/2), dry to moist, medium dense; fine sand; Grades slightly coarser with depth to fine sand with some medium sand	SC	1	S									
		2	D D	28				4		109		
WEATHERED BEDROCK: WEATHERED to a CLAYEY SAND: Very dark grey (10YR 3/1), mottled with strong brown (7.5Y 4/6), wet, medium dense to very dense; mostly fine sand		3	S I									
		4	I	16				15				
		5	S									
		6	I	50/5"								
BEDROCK: GRANITE: Variably colored white, grey, black with yellowish brown oxidation; moist; rock mass is soft due to weathering; severely weathered, crumbles to individual hard minerals		7										
		8	S									
		9	I	50/4"								
		10										
		11										
		12										
		13										
		14	I	50/4"								
BOTTOM OF HOLE = 14 Feet No Groundwater Encountered		15										
		16										
		17										
		18										
		19										
		20										

ATTACHMENT E

Hydrology Calculations:
Storm and Sanitary Sewer Analysis (SSA) Model Example
Calculation for Sub-basin 38

SSA Model Calculations Step-by-Step - Example for Sub-basin 38

Variable	Value	Methodology
Curve Number (CN)	88	Calculated in GIS using Land Use, Soils and Parcel Area data
Max. Storage (S)	1.36	1000/CN - 10
Initial Abstraction (I_a)	0.27	0.2*MAX STORAGE
Time of Concentration (T_c) hrs	0.29	CALCULATED USING SCS LAG EQUATION, converted from minutes to hours
Total depth of rainfall (P) in	0.8	From Central Coast Regional Water Quality Control Board
Runoff Depth (Q) in	0.147	[[RAINFALL - (0.2*MAX STORAGE)]^2]/(RAINFALL + (0.8*MAX STORAGE))
Unit Peak Discharge (q_u) $ft^3/s/mi^2/in$	200	Calculated from chart using Type I Rainfall Distribution
Area (A) Acres	40.18	Measured in GIS
Area (A) mi^2	0.0628	Area converted from acres to square miles
Peak Discharge (Q_p) cfs	1.8461	RUNOFF DEPTH*UNIT PEAK DISCHARGE*AREA
Peak Discharge (Q_p) gpm	829	Convert units from cfs to gpm

ATTACHMENT F

40% Design Cost Estimate
February 2014

Appendix F: 40% Itemized Project Cost Estimate
Pacific Grove ASBS Stormwater Management Project
February 2014

	Description	Unit	Estimated Quantity	Contract Unit Price	Bid Amount
Sub-Project 1: David Avenue Reservoir					
Existing Dam Structure with Geomembrane Liner (Apx 49.15 AF of Storage)					
	Mobilization/Demobilization	EA	1	$20,000	$20,000
	Grading - Excavation to Subgrade & Slope Reconditioning	CY	21,500	$5.50	$118,250
	Grading - Engineered Fill	CY	19,000	$10.00	$190,000
	Grading - Hauling	CY	2,500	$10.00	$25,000
	Retaining Wall (950 lineal feet, 5 feet high)	SF	4,750	$20.00	$95,000
	Reservoir Liner - Subgrade Preparation	SF	201,135	$0.30	$60,340
	Reservoir Liner - Anchor Trench Excavation and Backfill	LF	1,850	$21.00	$38,850
	Reservoir Liner - 60-mil Double-Textured HDPE Secondary Geomembrane	SF	210,000	$1.25	$262,500
	Reservoir Liner Double-Sided Geocomposite	SF	210,000	$1.25	$262,500
	Reservoir Liner - 80-mil Double-Textured HDPE Primary Geomembrane	SF	210,000	$1.45	$304,500
	Access Roads - 16 oz. Cushion Geotextile for Concrete	SF	3,200	$0.72	$2,304
	Access Roads - Reinforced Concrete Pavement and Curbs -Access Roads	SF	3,200	$25.00	$80,000
	Leak Detection System	LS	1	$50,000	$50,000
	Groundwater Collection Dry Well	EA	1	$10,000	$10,000
	Groundwater Collection 6-inch Perforated Pipe	LF	788	$20	$15,760
	Groundwater Collection 6-inch Solid Pipeline	LF	119	$20	$2,380
	Supply and Install Submersible Pump and Controls	EA	1	$20,000	$20,000
	Diversion Structure	EA	1	$44,000	$44,000
	CDS Unit	LS	1	$63,000	$63,000
	30-inch PVC Inlet Pipeline	LF	335	$90	$30,150
	Inlet Structure to Forebay	EA	1	$15,000	$15,000.00
	Spillway from Forebay	LS	1	$35,000	$35,000.00
	Overflow from forebay	LS	1	$15,000	$15,000.00
	Energy Dissipator Gabion Baskets	LS	2	$2,553	$5,105.00
	Outlet concrete sill	LS	1	$35,000	$35,000.00
	Outlet Structure with Secondary Spillway	LS	1	$35,000	$35,000
	36-inch PVC Outlet Pipeline	LF	300	$150	$45,000
	12-inch PVC Reservoir Drain	LF	200	$300	$60,000
	Trench Excacation and Paving	LF	1742	$30	$52,260
	Manhole	EA	2	$8,500	$17,000
	Erosion Control Blanket	SF	28817	$5	$144,083
	Erosion Control Construction	LS	1	$15,000	$15,000
	Revegetation	SF	28817	$4	$100,858
	Road Rehabilitation	CY	264	$61	$16,104
				Sub-Project 1 Subtotal	**$2,284,945**

	Description	Unit	Estimated Quantity	Contract Unit Price	Bid Amount
Sub-Project 2: Pine Avenue Stormwater System Improvements					
Stormwater Equalization/Storage					
	24-inch PVC Pipeline	LF	140	$200	$28,000
	Diversion and Bypass Structure	LS	1	$30,000	$30,000
	CDS Unit	LS	1	$108,000	$108,000
				Subtotal	$166,000
Storage Tank Alternative					
	Fiberglass Tank - 20,000 Gallon	EA	12	$30,716	$368,590
	Gravel backfill	CY	444	$75.00	$33,333
	Installation	LS	1	$221,154.00	$221,154
				Subtotal	$623,077
Modular Storage Alternative					
	Rainstore3 System	EA	9672	$26.21	$253,479
	80-mil Double-Textured HDPE Primary Geomembrane	SF	12050	$1.45	$17,473
	Geogrid	SF	15925	$0.45	$7,166
	Imported Fill (1-ft depth)	CY	162	$35.00	$5,686
	Installation	LS	1	$152,087.36	$152,087
				Subtotal	$435,891
Stormwater Equalization/Storage: School Yard Alternative					
	Clear/Grub (Grass)	SF	14400	$1.50	$21,600
	Earthwork on Site	CY	1129	$10.00	$11,287
	Earthwork Offhaul & Disposal	CY	1462	$20	$29,240
	Revegetation	SF	14400	$1.00	$14,400
				Subtotal	$76,527
Stormwater Equalization/Storage: In-Road Alternative					
	Paving Demolition (1-ft depth)	CY	278	$30	$8,333
	Earthwork on Site	CY	637	$20	$12,733
	Earthwork Offhaul & Disposal	CY	1462	$35	$51,170
	Trench Support During Construction: Sheet Pile Materials & Install	SA	4,800	$10	$48,000
	Furnish, place and compact 4" Class II base rock (1-ft)	CY	278	$35	$9,722
	2" AC	SF	278	$3	$833
				Subtotal	$130,792
				Subtotal (Field/Modular Storage Alternative)	$678,417
Stormwater Pump Station and Conveyance on Pine Avenue					
	12-inch PVC Gravity Pipeline	LF	2229	$100	$222,900
	8-inch PVC Force Main	LF	520	$85	$44,200
	Trench Excacation and Paving	LF	2749	$30	$82,470
	Diversion and Bypass Structure	LS	1	$30,000	$30,000
	CDS Unit	LS	1	$63,000	$63,000
	Pump Station,1155 GPM	EA	1	$350,000	$350,000
	Manholes	EA	8	$6,500	$52,000
				Subtotal	$844,570
				Sub-Project 2 Subtotal	**$1,522,987**

Description	Unit	Estimated Quantity	Contract Unit Price	Bid Amount
Sub-Project 3: Ocean View Boulevard Conveyance				
Stormwater Equalization/Storage @ Caledonia and Jewell				
24-inch PVC Pipeline	LF	150	$250	$37,500
Diversion and Bypass Structure	LS	1	$30,000	$30,000
CDS Unit	LS	1	$108,000	$108,000
			Subtotal	$175,500
Storage Tank Alternative				
Fiberglass Tank - 20,000 Gallon	EA	16	$30,116	$481,850
Gravel	CY	593	$50.00	$29,630
Installation	LS	1	$289,110.00	$289,110
			Subtotal	$800,590
Modular Storage Alternative				
Rainstore3 System	EA	12936	$26.13	$337,983
80-mil Double-Textured HDPE Primary Geomembrane	SF	16174	$1.45	$23,452
Geogrid	SF	21313	$0.45	$9,591
Imported Fill (1-ft depth)	CY	215	$35.00	$7,513
Installation	LS	1	$202,789.59	$202,790
			Subtotal	$581,329
Stormwater Equalization/Storage: Site Work				
Paving Demolition (1-ft depth)	CY	296	$30	$8,889
Earthwork on Site	CY	1185	$20	$23,704
Earthwork Offhaul & Disposal	CY	3259	$20	$65,185
Trench Support During Construction: Sheet Pile Materials & Install	SA	4,320	$10	$43,200
Furnish, place and compact 4" Class II base rock (1-ft)	CY	296	$35	$10,370
2" AC	SF	296	$3	$889
Revegetation	SF	7500	$2	$15,000
			Subtotal	$167,237
			Subtotal (Modular Storage Alternative)	$924,066
Stormwater Pump Station: Lovers Point				
Diversion and Bypass Structure	LS	1	$30,000	$30,000
CDS Unit	LS	1	$63,000	$63,000
Pump Station, 2815 GPM	EA	1	$720,000	$720,000
			Subtotal	$813,000
Stormwater Pump Station: Sea Palm				
Diversion and Bypass Structure	LS	1	$30,000	$30,000
CDS Unit	LS	1	$63,000	$63,000
Pump Station, 3050 GPM	EA	1	$770,000	$770,000
			Subtotal	$863,000
Stormwater Pump Station: Coral				
Diversion and Bypass Structure	LS	1	$30,000	$30,000
Pump Station, 3080 GPM	EA	1	$780,000	$780,000
			Subtotal	$810,000
Stormwater Conveyance on Ocean View Boulevard				
Pipe Lining Abandoned 14-inch	LF	7989	$65	$519,285
12-inch PVC Gravity Pipeline	LF	1086	$150	$162,900
Trench Excacation and Paving	LF	1086	$120	$130,320
Manholes	EA	14	$6,500	$91,000
Air Relief Valves	EA	4	$10,000	$40,000
			Subtotal	$943,505
			Sub-Project 3 Subtotal	**$4,353,571**

	Description	Unit	Estimated Quantity	Contract Unit Price	Bid Amount
Sub-Project 4: Point Pinos Stormwater Treatment Facility					
	Clear/Grub (Grass)	SF	10000	$1.50	$15,000
	Earthwork on Site	CY	4062	$20.00	$81,237
	Earthwork Offhaul & Disposal	CY	4062	$20	$81,237
	Flow Control Structure	LS	1	$26,000	$26,000
	Wet Weather Equalization Basin	LS	1	$70,000	$70,000
	Duplex Pump System (22 HP Pumps)	LS	2	$25,000	$50,000
	Pre-Treatment/Rotary Screen	LS	2	$190,000	$380,000
	Solids Residual Storage	LS	1	$5,000	$5,000
	Disc Filter 1	LS	2	$240,000	$480,000
	Disc Filter 2	LS	2	$240,000	$480,000
	UV Disinfection	LS	2	$250,000	$500,000
	Crespi Pond Inlet Energy Dissipation Structure	LS	1	$15,000	$15,000
	SCADA Monitoring System	LS	1	$75,000	$75,000
	Concrete Pads	CF	2500	$35	$87,500
	Equipment Installation/Startup	LS	1	$582,600	$582,600
	18-inch PVC	LF	1800	$100	$180,000
	Trench Excacation and Paving	LF	1800	$35	$63,000
	Equipment and Control Building	SF	100	$65	$6,500
				Sub-Project 4 Subtotal	**$3,178,074**
Project Component 5: Urban Diversion System Improvements					
	Upgrade Eardley Pump Station, 1900 GPM	EA	1	$540,000	$540,000
	Upgrade Berwick Pump Station, 3500 GPM	EA	1	$850,000	$850,000
	Upgrade Greenwood Pump Station, 4150 GPM	EA	1	$950,000	$950,000
	Hydrobrake	EA	6	$10,000	$60,000
	Pipe-Splitting: 4-in FM from Greenwood Pump Station (62 ft) to 10"	ft*in-dia	620	$14	$8,494
	Pipe-Splitting: 8-in Gravity to GW PS (318 ft) to 10"	ft*in-dia	3180	$14	$44,520
	Pipe-Splitting: 4-in FM from Berwick Pump Station (722 ft) to 10"	ft*in-dia	7220	$14	$101,080
				Sub-Project 5 Subtotal	**$2,554,094**
TOTAL AMOUNT					**$13,893,671**
	Contingency		15%		$2,084,050.63
	Complexity		15%		$2,084,050.63
	Engineering Design and Geotechnical Investigation		13%		$1,736,708.86
	Construction Management		8%		$1,042,025
	Administrative. Legal and Permitting		2.5%		$347,342
	Inflation		4%		$555,747
Total Estimated Project Costs					**$21,743,595**