Chapter 3
ALTERNATIVES DESCRIPTION

3.1 Program and Project Analysis

Improvements throughout the Joint Outfall System (JOS) have been identified in the Clearwater Program Master Facilities Plan (MFP) and will be evaluated at either the program or project level in this environmental impact report/environmental impact statement (EIR/EIS). A program-level analysis generally evaluates the broad environmental effects of the program with the understanding that additional project-specific environmental review may be required for particular projects covered under the program. The project-specific environmental review would be performed at the time those projects are proposed for implementation and construction. A project-level analysis generally includes the necessary construction information and analyzes the specific environmental effects of the project elements.

As part of the planning process at the program level, the JOS was divided into five *program component areas*. Options within each program component area were formulated and evaluated as described in the following section. Options that passed a comprehensive and systematic screening process were carried forward for evaluation in this EIR/EIS. Four of the five program component areas were only evaluated at the program level. The fifth program component area was also evaluated at the more detailed project level because it would be implemented sooner and project-specific details were less speculative.

3.2 Alternatives Screening Process and Formulation

3.2.1 Alternatives Screening Process (Program)

Determination of the recommended plan required an evaluation of options within each program component area. The program component areas analyzed in the MFP are listed and described in Table 3-1. The program-level alternatives screening process is shown on Figure 3-1 and summarized in the paragraphs that follow. A detailed description of the project-level alternatives analysis process is provided in Chapter 6 of the MFP.

Table 3-1. Program Component Areas

Program Component Area	Description/Function
Wastewater Conveyance and Treatment	Evaluation of sewerage system and treatment plants in terms of capacity and facilities
Water Reclamation Plant (WRP) Effluent Management	Evaluation of effluent management options at the WRPs
Solids Processing	Evaluation of location and capacity of solids processing facilities
Biosolids Management	Evaluation of end uses for biosolids management
Joint Water Pollution Control Plant (JWPCP) Effluent Management	Evaluation of effluent management options at the JWPCP including capacity and aging infrastructure

JOINT OUTFALL SYSTEM – MAJOR PROGRAM COMPONENT AREAS

CONVEYANCE/TREATMENT (CT)	SOLIDS PROCESSING (SP)	BIOSOLIDS MANAGEMENT (BM)	WRP EFFLUENT MANAGEMENT (WE)	JWPCP EFFLUENT MANAGEMENT (JE)
CONCEPTUAL OPTIONS – BY PROGRAM COMPONENT AREA				
1. JWPCP Expansion 2. WRP Expansion – Existing 3. WRP Expansion – New 4. WRP Expansion – Existing & New	1. Centralized Processing at JWPCP 2. Processing at Source Plants 3. Centralized Processing – New Site	1. Current Biosolids Management Practice – Beneficial Use/Landfill 2. Landfill Disposal – All Biosolids 3. Beneficial Use – All Biosolids	1. Current Effluent Management Systems – Reuse & Surface Discharge 2. All Reuse – No Surface Discharge 3. All Surface Discharge – No Reuse	1. Existing Ocean Discharge System 2. New Ocean Discharge System 3. Modified Ocean Discharge System 4. Reduced Ocean Discharge

LEVEL 1 SCREENING – PROGRAM OBJECTIVES

Provide adequate system capacity to meet the needs of the growing population

Provide support for emerging recycled water reuse and biosolids beneficial use opportunities

Provide for overall system reliability by allowing for the inspection, maintenance, repair, and replacement of aging infrastructure

Provide a long-term solution for meeting water quality requirements set forth by regulatory agencies

PRELIMINARY OPTIONS – BY PROGRAM COMPONENT AREA

CT	SP	BM	WE	JE
CT 2A-F WRP Expansion – Existing	SP 1 Centralized Processing at JWPCP	BM 1 Current Biosolids Management Practice BM 3 Beneficial Use – All Biosolids	WE 1 Current Effluent Management Systems	JE 2 New Ocean Discharge System JE 3 Modified Ocean Discharge System JE 4 Reduced Ocean Discharge

LEVEL 2 SCREENING – PROGRAM COMPONENT AREAS SCREENING CRITERIA

CT	SP	BM	WE	JE
Conveyance System Impacts	Treatment Plant Impacts	Maximize Resource Reuse	Maximize Resource Reuse	Available Land/Right-of-Way
Treatment Plant Impacts	Institutional Feasibility	Sustainability	Sustainability	Institutional Feasibility
Regulatory Compliance	Regulatory Compliance	Regulatory Compliance	Regulatory Compliance	Regulatory Compliance
Public Acceptability	Public Acceptability	Public Acceptability	Public Acceptability	Public Acceptability
Operational Flexibility	Operations Familiarity	Operational Flexibility & Reliability	Operations Familiarity	Operational Reliability
Cost Effectiveness	Cost Effectiveness	Cost Effectiveness	Cost Effectiveness	Cost Effectiveness
VIABLE OPTIONS – BY PROGRAM COMPONENT AREA				
CT 2A-E WRP Expansion - Existing (SJCWRP)	SP 1A Continue Use of Existing Solids Processing Systems	BM 1 Current Biosolids Management Practice	WE 1 Current Effluent Management Systems	JE 2 New Ocean Discharge System JE 3 Modified Ocean Discharge System

VIABLE ALTERNATIVES (PROGRAM)

CT 2A : SP 1A : BM 1 : WE 1 : JE 2

CT 2A : SP 1A : BM 1 : WE 1 : JE 3

LEVEL 3 SCREENING – ALTERNATIVES EVALUATION CRITERIA

Project-Level Alternatives Analysis - see Figure 3-2 for detailed evaluation of JE component area

RANKED FEASIBLE ALTERNATIVES

HIGHEST RANKED	Alternative 4:	CE 2A : SP 1A : BM 1 : WE 1 : JE 3
↓	Alternative 1:	CE 2A : SP 1A : BM 1 : WE 1 : JE 2A
	Alternative 3:	CE 2A : SP 1A : BM 1 : WE 1 : JE 2B
LOWEST RANKED	Alternative 2:	CE 2A : SP 1A : BM 1 : WE 1 : JE 2C

ENVIRONMENTAL ANALYSIS (EIR/EIS) - See Figure 3-3

JOINT OUTFALL SYSTEM RECOMMENDED PLAN

FIGURE 3-1

CLEARWATER Program

Master Facilities Plan Program-Level Alternatives Screening Process

Source: Sanitation Districts of Los Angeles County 2011

On the basis of the identified needs within each program component area, *conceptual options* were developed. The conceptual options represent the range of practical options available to the Sanitation Districts of Los Angeles County (Sanitation Districts) for providing comprehensive wastewater management within the JOS.

The conceptual options were evaluated against the Level 1 screening criteria. The Level 1 screening criteria were derived from the Clearwater Program purpose and objectives identified in Chapter 1 of this EIR/EIS. Conceptual options were eliminated from further consideration if they did not meet the program objectives. Those not eliminated were carried forward and were designated as *preliminary options.*

A second level of screening was applied to the preliminary options. The options were rated based on identified program component area screening criteria. Program component area screening criteria included:

- Conveyance system impacts
- Regulatory compliance
- Public acceptability
- Treatment plant impacts
- Operational flexibility, reliability, and familiarity
- Resource reuse
- Sustainability
- Available/land right-of-way
- Institutional feasibility
- Cost-effectiveness

The preliminary options were evaluated by applying Level 2 screening criteria, and some were eliminated from further consideration. Those not eliminated were carried forward and designated as *viable options.* Three of the program component areas – water reclamation plant (WRP) effluent management, solids processing, and biosolids management – each resulted in one viable option. A fourth program component area, wastewater conveyance and treatment, resulted in multiple viable options. The fifth program component area, Joint Water Pollution Control Plant (JWPCP) effluent management, resulted in two viable options. The viable options were then subjected to Level 3 screening to establish the *feasible options*. Level 3 screening for the JWPCP effluent management program component area required a more detailed project-level analysis, which is described in Section 3.2.2.

Actions were identified for each component area to meet the needs of that component area. These actions are referred to as *program elements*. The program elements that compose the feasible options for each program component area are identified and described in Table 3-2.

Table 3-2. Program Elements by Program Component Area

Program Component Area	Program Element	Action Description/Function
Wastewater Conveyance and Treatment	Conveyance Improvements Plant Expansion Process Optimization	Provide conveyance system relief and improvements; Increase plant capacity at the SJCWRP; Optimize treatment processes at the SJCWRP, POWRP, LCWRP, and LBWRP
WRP Effluent Management	WRP Effluent Management	Continue practice of reuse and discharge at the WRPs
Solids Processing	Solids Processing	Centralize solids processing at the JWPCP
Biosolids Management	Biosolids Management	Continue management of biosolids to diversified markets
JWPCP Effluent Management (to be further evaluated at the project level)	JWPCP Effluent Management	Provide a reliable ocean discharge system, including rehabilitation of the existing ocean outfalls

3.2.2 Alternatives Screening Process (Project)

From the program-level analysis, two JWPCP effluent management options were considered viable: a new ocean discharge system and a modified ocean discharge system. Determination of the feasibility and ranking of these options required a systematic screening and assessment process. Both the new and modified ocean discharge systems were divided into five *project elements* in the MFP. The project elements analyzed in the MFP are listed and described in Table 3-3. Viable options from each project element were combined to form a set of viable ocean discharge system project alternatives. These viable project alternatives were further screened and ranked. The process is shown on Figure 3-2 and summarized in the paragraphs that follow. A detailed description of the project-level alternatives screening process for JWPCP effluent management is provided in Chapter 6 of the MFP.

Table 3-3. Ocean Discharge System Project Elements

Project Elements	Description/Function
Onshore Tunnel Alignment	A tunnel from the JWPCP shaft site to an intermediate shaft site
Offshore Tunnel Alignment	A tunnel from an intermediate shaft site to the offshore riser and diffuser area
JWPCP Shaft Site	A shaft located on JWPCP property temporarily used for construction of a tunnel and permanently used for the conveyance of effluent to the onshore tunnel
Intermediate Shaft Site	A shaft located between the JWPCP and the coast temporarily used for construction of a tunnel and/or a valve structure and permanently used for access
Diffuser Area	A riser connects the offshore tunnel to the diffuser; a diffuser located on the seafloor disperses effluent into the ocean

Initial criteria were used to define a study area for the ocean discharge system. The Level 1 screening criteria (e.g., having a minimum of 2 to 4 acres, using public lands, and avoiding utilities) were established for each of the project elements to develop a set of *preliminary options*. The preliminary options were intended to represent the range of practical options available to the Sanitation Districts.

The preliminary options were then evaluated against the Level 2 screening criteria. The Level 2 screening criteria considered technical and environmental constraints, as well as public input to identify proposed locations for project elements. Those not eliminated during the screening process were carried forward and designated as *viable options*.

Viable options from each project element were combined to form *viable alternatives* for the project. These alternatives were subjected to the Level 3 screening criteria, which included:

- Public input
- Cost-effectiveness
- Long-term uncertainty
- Operational considerations
- Constructability
- Environmental impacts

Each element of the viable project alternatives was scored on a scale of 0 to 10 for each of the Level 3 screening criteria. Multi-criteria decision-support software was used to evaluate the scores for each project alternative and to establish four *ranked feasible alternatives* for the project.

STUDY AREA CRITERIA

Use a direct route from JWPCP to diffuser	Remain on continental shelf	Maintain appropriate distance from other outfalls	Avoid Marine Protected Areas

LEVEL 1 SCREENING – PROJECT OBJECTIVES

JWPCP SHAFT SITES	ONSHORE ALIGNMENT	INTERMEDIATE SHAFT SITES	OFFSHORE ALIGNMENT	RISER & DIFFUSER AREA
Minimum area – 8 acres Mostly within JWPCP boundaries Sufficient access Appropriate shape/geometry Avoid existing facilities	Use public ROW and easements Sufficient turning radius for tunnel boring machine Minimize overall length	Sufficient area Appropriate shape/geometry Relatively flat Use public lands Proximity to onshore alignment	Input from viable land and diffuser options All tunnel (T) Combined tunnel & ocean floor pipeline (C)	Perform as well as existing outfalls Slope (straight contour) Geotechnically stable area Avoid other agency outfalls

PRELIMINARY OPTIONS – BY PROJECT ELEMENT

JWPCP SHAFT SITES	ONSHORE ALIGNMENT	INTERMEDIATE SHAFT SITES	OFFSHORE ALIGNMENT	RISER & DIFFUSER AREA
JWPCP West JWPCP East	Fig-NGaf-SGaf Fig-NGaf-Pac Fig-NGaf-Pac-CBch Fig-NGaf-Harb Fig-Nav-West Fig-NGaf-Cap-West Fig-JSG-SGaf Fig-JSG-Pac Fig-JSG-Pac-CBch Fig-JSG-Harb Fig-JSG-Cap-West Fig-CS-Harb Frig-JSG-SGaf Frig-JSG-Pac Frig-JSG-Pac-CBch Frig-JSG-Cap-West Frig-JSG-Harb Frig-CS-Harb Fig-POLA Frig-POLA Wilm-POLA Lom-West	Navy Fuel Depot Fort MacArthur Averill Park Cabrillo Beach Field of Dreams Peck Park Point Fermin Park White Pt Nature Reserve Royal Palms Beach Angels Gate Park Port of Los Angeles	AG-PV(T) AG-SP(T) AG-PV(C) AG-SP(C) LAXT-SWM-PV(T) LAXT-SWM-SP(T) LAXT-SWM-PV(C) LAXT-SWM-SP(C) LAXT-P400-PV(T) LAXT-P400-SP(T) LAXT-P400-PV(C) LAXT-P400-SP(C)	Palos Verdes Shelf San Pedro Shelf at Sea Valley San Pedro Shelf Existing ocean outfalls

LEVEL 2 SCREENING – PROJECT ELEMENT SCREENING CRITERIA

JWPCP SHAFT SITES	ONSHORE ALIGNMENT	INTERMEDIATE SHAFT SITES	OFFSHORE ALIGNMENT	RISER & DIFFUSER AREA
Compatible land use Minimize environmental concerns Minimize impact to public facilities Institutional constraints relative to use	Minimize exposure to faults Compatible with intermediate shaft sites Minimize easement required Minimize length	Compatible land use Minimize environmental concerns Minimize impact to recreational areas Avoid contaminated sites Input from local jurisdictions and public	Stay within state-of-art tunnel/riser limits Minimize cost Minimize marine impacts Avoid offshore crossing of PV Fault	Favorable currents Ability to accommodate future flows

VIABLE OPTIONS – BY PROJECT ELEMENT

JWPCP SHAFT SITES	ONSHORE ALIGNMENT	INTERMEDIATE SHAFT SITES	OFFSHORE ALIGNMENT	RISER & DIFFUSER AREA
JWPCP West JWPCP East	Fig-NGaf-SGaf Fig-Nav-West Fig-NGaf-Cap-West Fig-JSG-Cap-West Fig-JSG-SGaf Wilm-POLA Lom-West Frig-POLA	Angels Gate Park Port of Los Angeles Royal Palms Beach	AG-PV(T) LAXT-SWM-PV(T) LAXT-SWM-SP(T)	Palos Verdes Shelf San Pedro Shelf Existing ocean outfalls

AG: Angels Gate
Cap: Capitol Dr
CBch: Cabrillo Beach
CS: China Shipping
Fig: Figueroa St
Frig: Frigate Ave
Harb: Harbor Blvd
JSG: John S Gibson Blvd
LAXT: Los Angeles Export Terminal
Lom: Lomita Blvd
NAV: Naval Fuel Depot
NGaf: North Gaffey St
Pac: Pacific Ave
P400: Pier 400
POLA: Port of Los Angeles
PV: Palos Verdes Shelf
RP: Royal Palms
SGaf: South Gaffey St
SP: San Pedro Shelf
SWM: Southwest Marine
West: Western Ave
Wilm: Wilmington Blvd

VIABLE ALTERNATIVES (PROJECT)

JWPCP West : Fig-JSG-SGaf : AG : AG-PV(T) : PV
JWPCP West : Fig-NGaf-SGaf : AG : AG-PV(T) : PV
JWPCP East : Wilm-POLA : POLA : LAXT-SWM-PV(T) : PV
JWPCP East : Wilm-POLA : POLA : LAXT-SWM-SP(T) : SP
JWPCP East : Frig-POLA : POLA : LAXT-SWM-SP(T) : SP
JWPCP East : Frig-POLA : POLA : LAXT-SWM-PV(T) : PV
JWPCP West : Fig-Nav-West : RP : Existing ocean outfalls
JWPCP West : Fig-NGaf-Cap-West : RP : Existing ocean outfalls
JWPCP West : Fig-JSG-Cap-West : RP : Existing ocean outfalls
JWPCP West : Lom-West : RP : Existing ocean outfalls

LEVEL 3 SCREENING – ALTERNATIVES EVALUATION CRITERIA (PROJECT)

Public input | Cost effectiveness | Long-term uncertainty | Operational considerations | Constructability | Environmental impacts

RANKED FEASIBLE ALTERNATIVES (PROJECT)

HIGHEST RANKED	Alternative 4 (JE 3):	JWPCP West : Fig-NGaf-Cap-West : RP : Existing ocean outfalls
	Alternative 1 (JE 2A):	JWPCP East : Wilm-POLA : POLA : LAXT-SWM-SP(T) : SP
	Alternative 3 (JE 2B):	JWPCP West : Fig-JSG-SGaf : AG : AG-PV(T) : PV
LOWEST RANKED	Alternative 2 (JE 2C):	JWPCP East : Wilm-POLA : POLA : LAXT-SWM-PV(T) : PV

ENVIRONMENTAL ANALYSIS (EIR/EIS) - See Figure 3-3

RECOMMENDED PROJECT

FIGURE 3-2

Clearwater Program

Master Facilities Plan Project-Level Alternatives Screening Process

Source: Sanitation Districts of Los Angeles County 2011

3.2.3 Recommended Plan

As discussed previously, screening at the program level identified one feasible option for four of the five program component areas (wastewater conveyance and treatment, WRP effluent management, solids processing, and biosolids management). These feasible options were combined to form four feasible alternatives (program). Analysis of the fifth program component area (JWPCP effluent management) resulted in four ranked feasible project alternatives for the ocean discharge system. The four feasible program alternatives were paired with each of the four ranked feasible project alternatives to produce four *ranked feasible alternatives* for the Clearwater Program. The highest ranked of these alternatives was selected as the *recommended plan* in the MFP and identified as the *recommended alternative* in the EIR/EIS.

3.2.4 EIR/EIS Alternatives Formulation

The ranked feasible alternatives developed in the MFP are analyzed in this EIR/EIS. The relationship between the four EIR/EIS alternatives and the MFP alternatives is depicted on Figure 3-3. The relationship between the component areas and the project elements is also shown on Figure 3-3. In addition, a no-project alternative, as required by the California Environmental Quality Act (CEQA), and a no-federal-action alternative, as required by National Environmental Policy Act (NEPA), will be evaluated in this document.

3.3 Description of Alternatives

3.3.1 Description of Alternatives (Program)

The program elements that compose the alternatives (program) have been organized by facility/location for analysis in this EIR/EIS as shown in Table 3-4. It should be noted that all of the program elements are the same for Alternatives 1 through 4 (Program). The program elements for each facility/location are described in detail in the following sections.

Table 3-4. Program Elements by Alternative (Program) and Location/Facility

Alternative (Program)	Conveyance System	SJCWRP	POWRP	LCWRP	LBWRP	WNWRP	JWPCP
1	Conveyance Improvements	Plant Expansion Process Optimization WRP Effluent Management	Process Optimization WRP Effluent Management	Process Optimization WRP Effluent Management	Process Optimization WRP Effluent Management	Process Optimization WRP Effluent Management	Solids Processing Biosolids Management JWPCP Effluent Management
2	Same as Alternative 1						
3	Same as Alternative 1						
4	Same as Alternative 1						
5	No Project - See Section 3.4.1.5						
6	No Federal Action - See Section 3.4.1.6						

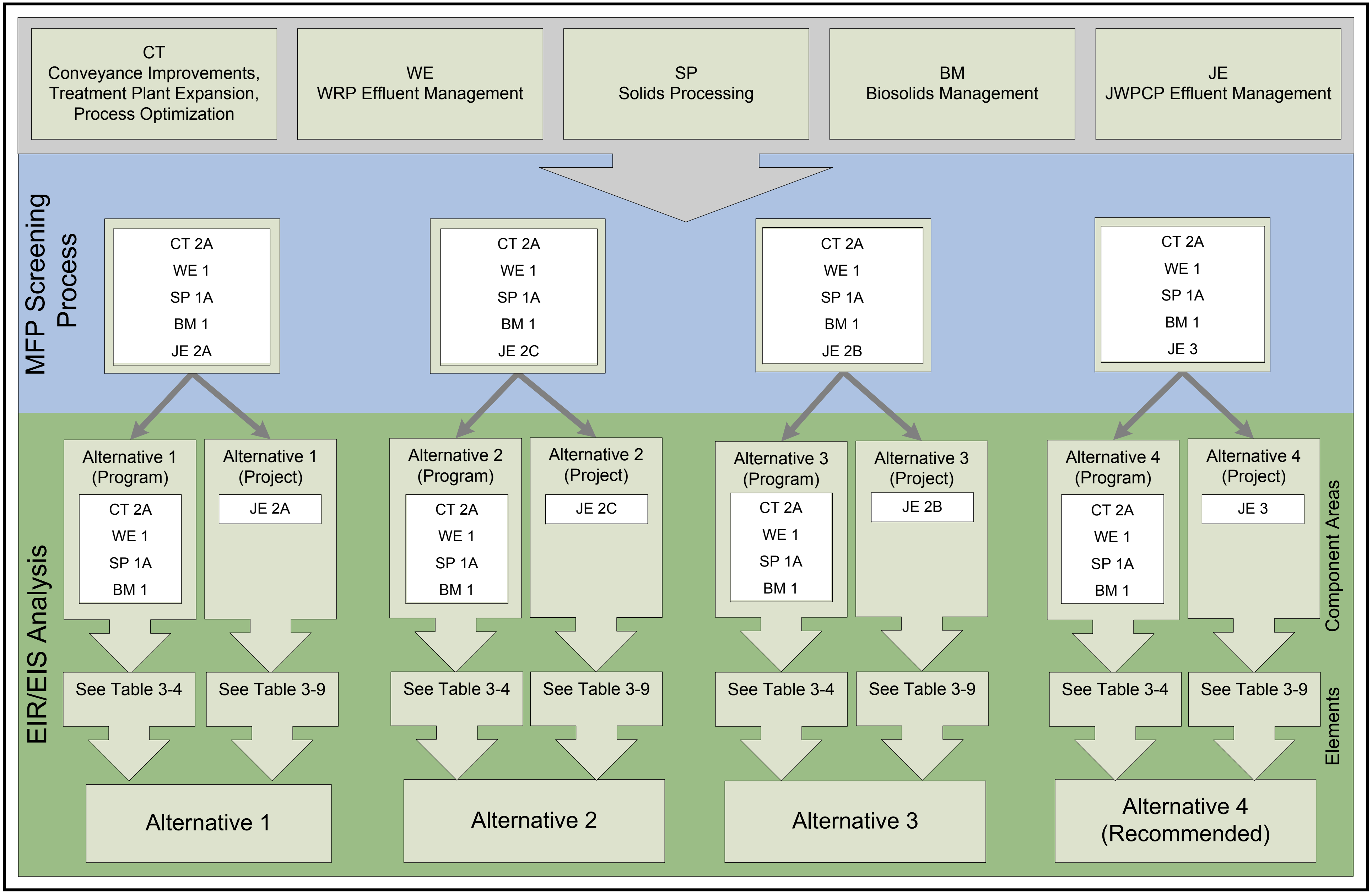


FIGURE 3-3

CLEARWATER Program

Relationship Between Master Facilities Plan and EIR/EIS Alternatives

Source: Sanitation Districts of Los Angeles County 2011

3.3.1.1 Conveyance System

The Sanitation Districts own, operate, and maintain an interconnected network of trunk sewers that convey wastewater to JOS treatment facilities. The projected year 2050 flows within the JOS were evaluated in the MFP through a conveyance system assessment to determine the total length of sewers requiring relief based on the upstream plant expansion described in Section 3.3.1.2. The Sanitation Districts intend to implement conveyance system relief projects on an as-needed basis. Approximately 33 miles of joint outfall (JO) sewer lines would require some type of relief (i.e., replacement of current pipes with larger diameter pipes or addition of parallel pipes). The required conveyance system improvements are identified in Table 3-5 by JO trunk sewers and graphically depicted on Figure 3-4.

Table 3-5. Conveyance System Improvements

Joint Outfall (JO) Trunk Sewers	Total Length of Sewers Requiring Relief (miles)
JO A	10.3
JO B	11.6
JO C	0.4
JO D	1.0
JO E	1.3
JO F	2.6
JO G	0.9
JO H	4.3
JO J	0.1
Total	32.5

3.3.1.2 Water Reclamation Plants

In the MFP, all of the WRPs and the JWPCP were evaluated and analyzed to meet the projected JOS treatment capacity shortfall of approximately 20 million gallons per day (MGD). It was determined that a combination of (1) expansion at the San Jose Creek Water Reclamation Plant (SJCWRP) and (2) process optimization at the SJCWRP[1], Pomona Water Reclamation Plant (POWRP), Los Coyotes Water Reclamation Plant (LCWRP), and Long Beach Water Reclamation Plant (LBWRP) could be implemented to meet the capacity needs of the system and to maximize water reuse opportunities. Capacity expansion consists of the construction of additional treatment facilities within the existing plant boundary to allow for increasing flow at the plant. Process optimization consists of modifications within the existing plant to ensure that the Sanitation Districts continue to consistently meet permit conditions in anticipation of increasing regulatory requirements. Process optimization construction activities include flow equalization through the addition of below-ground storage capacity; treatment system modifications, as well as ancillary support facilities; and other in-plant upgrades.

Only one option for the WRP effluent management program component area passed the screening process. This option involves the continuation of the existing practice of beneficial reuse and surface water discharge as described in Section 2.2.4.2. No major changes to either the discharge locations or protocols employed are proposed as a part of the Clearwater Program.

[1] With respect to this EIR/EIS, process optimization at the SJCWRP only includes facilities associated with SJCWRP West. Process optimization at the SJCWRP East is an existing project with its own environmental coverage and, therefore, is beyond the scope of this document.

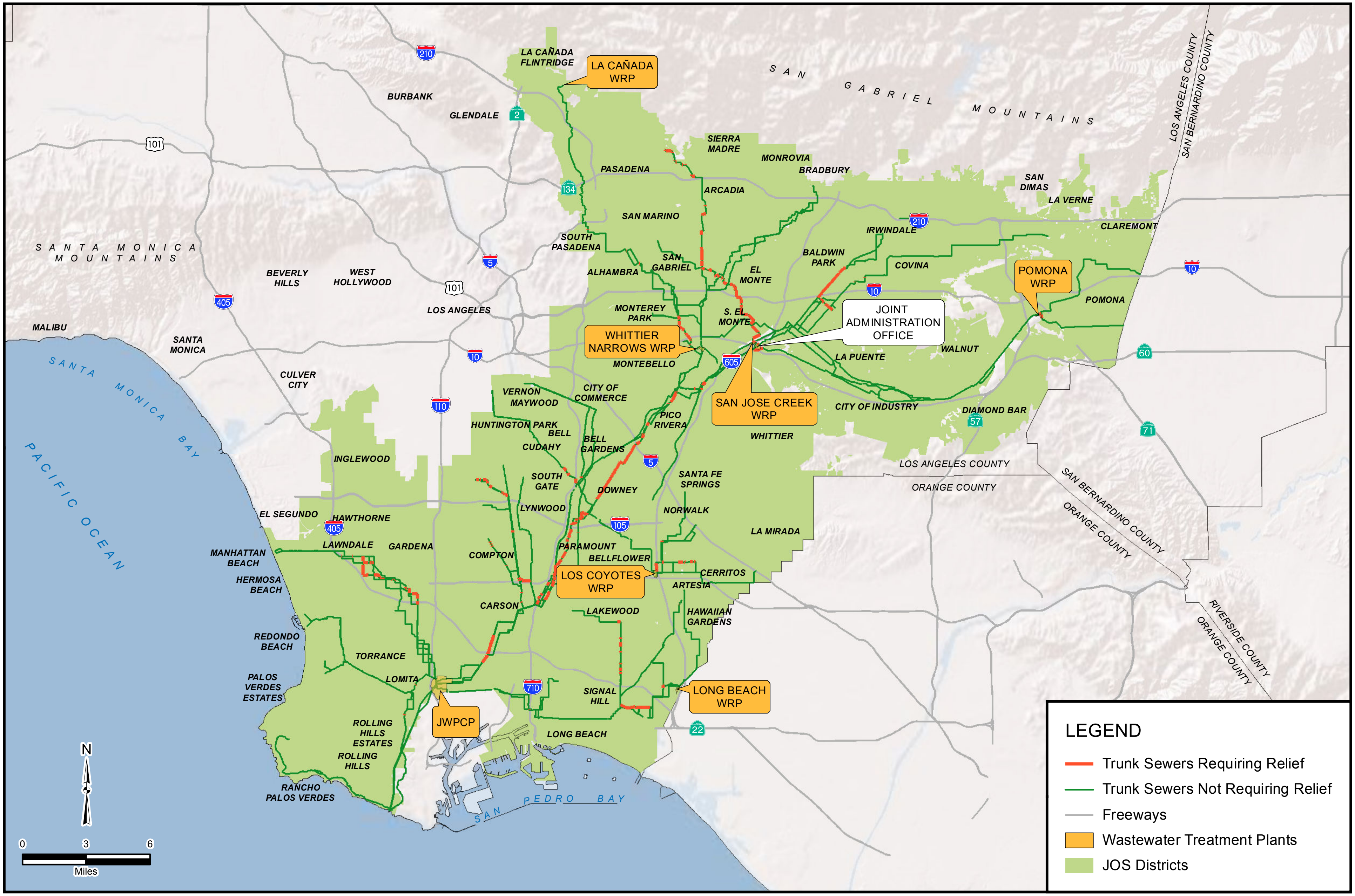


FIGURE 3-4

CLEARWATER Program

Conveyance System Improvements

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros. 2011, ESRI 2011

San Jose Creek Water Reclamation Plant

The SJCWRP would be expanded by two treatment modules for a total of 25 MGD, resulting in a total treatment capacity of 125 MGD. The new treatment and process optimization facilities would be generally located as shown on Figure 3-5. Based on the flow projections, plant expansion would likely be implemented between 2040 and 2050, with a construction duration of 2 to 3 years. Process optimization would likely be implemented between 2018 and 2028, depending on future flows, recycled water demands, regulatory requirements, and funding considerations. The construction time for the process optimization facilities would be about 2 to 3 years.

It is estimated that an annual average of approximately 24 MGD of recycled water would be beneficially reused for groundwater replenishment, with a month-to-month range of 10 to 50 MGD, and 52 to 101 MGD would be distributed for other reuses. This would result in no change in groundwater replenishment and a possible 45 to 94 MGD increase in other reuses by the end of the 2050 planning horizon. This would also result in annual discharges to lined surface waters of approximately 0 to 49 MGD, which would be a potential increase of 8 MGD or decrease of 69 MGD.

Pomona Water Reclamation Plant

At the POWRP, process optimization facilities would be generally located as shown on Figure 3-6. Process optimization would likely be implemented between 2018 and 2028, depending on future flows, recycled water demands, regulatory requirements, and funding considerations. The construction time for the process optimization facilities would be about 1 to 2 years.

It is estimated that an annual average of approximately 5 to 6 MGD of recycled water would be beneficially reused for groundwater replenishment, with a month-to-month range of 5 to 6 MGD, and 9 to 11 MGD would be distributed for other reuses. This would result in a possible 1 to 2 MGD increase in groundwater replenishment and a possible 5 to 7 MGD annual increase in other reuses by the end of the 2050 planning horizon.

Los Coyotes Water Reclamation Plant

At the LCWRP, process optimization facilities would be generally located as shown on Figure 3-7. Process optimization would likely be implemented between 2018 and 2028, depending on future flows, recycled water demands, regulatory requirements, and funding considerations. The construction time for the process optimization facilities would be about 1 to 2 years.

Groundwater replenishment does not take place at this site. It is estimated that an annual average of approximately 6 to 25 MGD of recycled water would be distributed for other reuses, resulting in a possible 3 to 22 MGD increase in other reuses by the end of the 2050 planning horizon. This would also result in discharges to lined surface waters of approximately 12 to 31 MGD, which would be similar to the current range of discharges.

Long Beach Water Reclamation Plant

At the LBWRP, process optimization facilities would be generally located as shown on Figure 3-8. Process optimization would likely be implemented between 2018 and 2028, depending on future flows, recycled water demands, regulatory requirements, and funding considerations. The construction time for the process optimization facilities would be about 1 to 2 years.

Groundwater replenishment does not take place at this site. It is estimated that an annual average of approximately 11 to 16 MGD of recycled water would be distributed for other reuses, resulting in a possible 4 to 10 MGD increase in other reuses by the end of the 2050 planning horizon. This would also

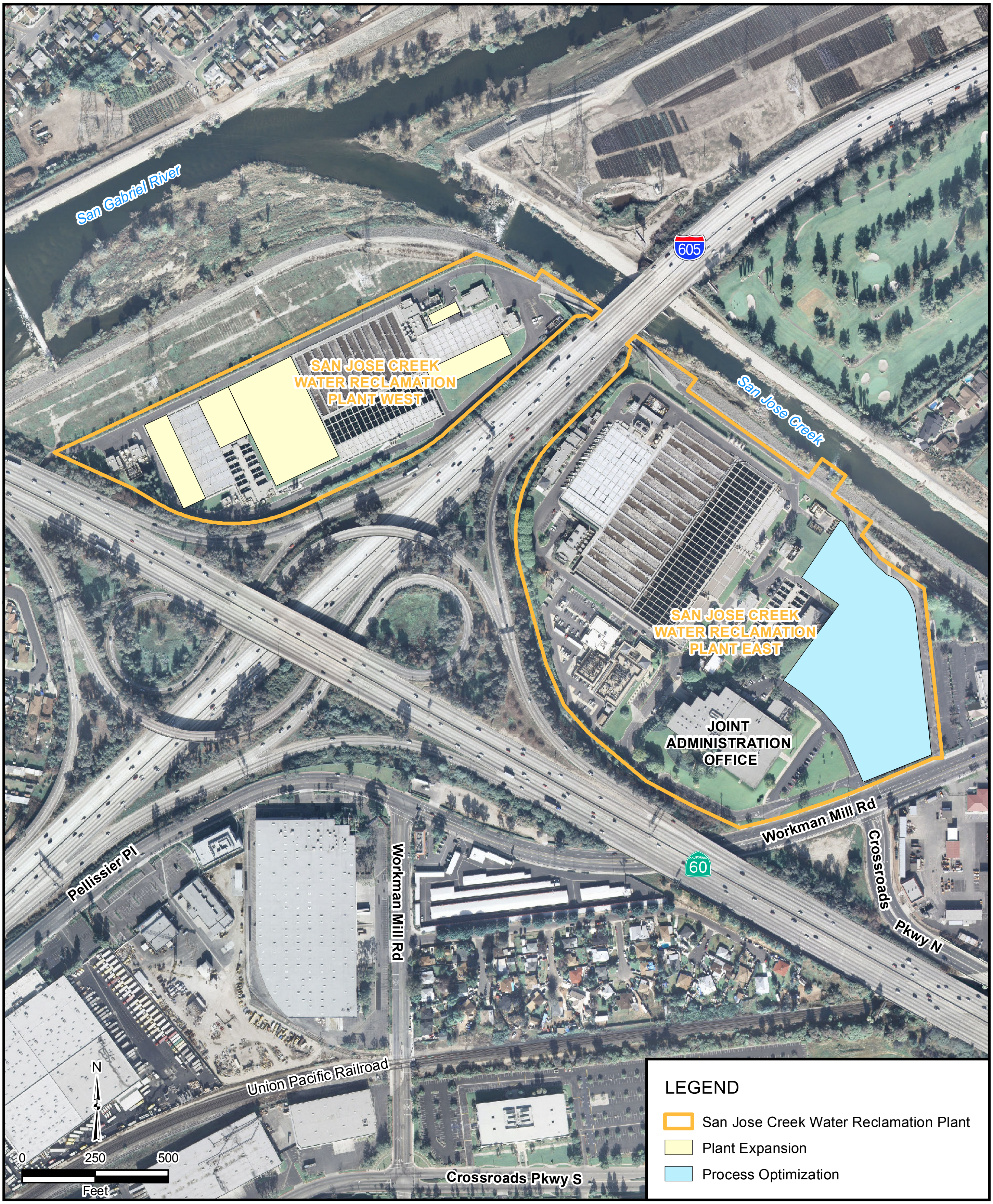


FIGURE 3-5

CLEARWATER Program

San Jose Creek Water Reclamation Plant Proposed Facilities

Source: Sanitation Districts of Los Angeles County 2011, LARIAC 2007

FIGURE 3-6

CLEARWATER Program

Pomona Water Reclamation Plant Proposed Facilities

Source: Sanitation Districts of Los Angeles County 2011, LARIAC 2007

FIGURE 3-7

CLEARWATER Program

Los Coyotes Water Reclamation Plant Proposed Facilities

Source: Sanitation Districts of Los Angeles County 2011, LARIAC 2007

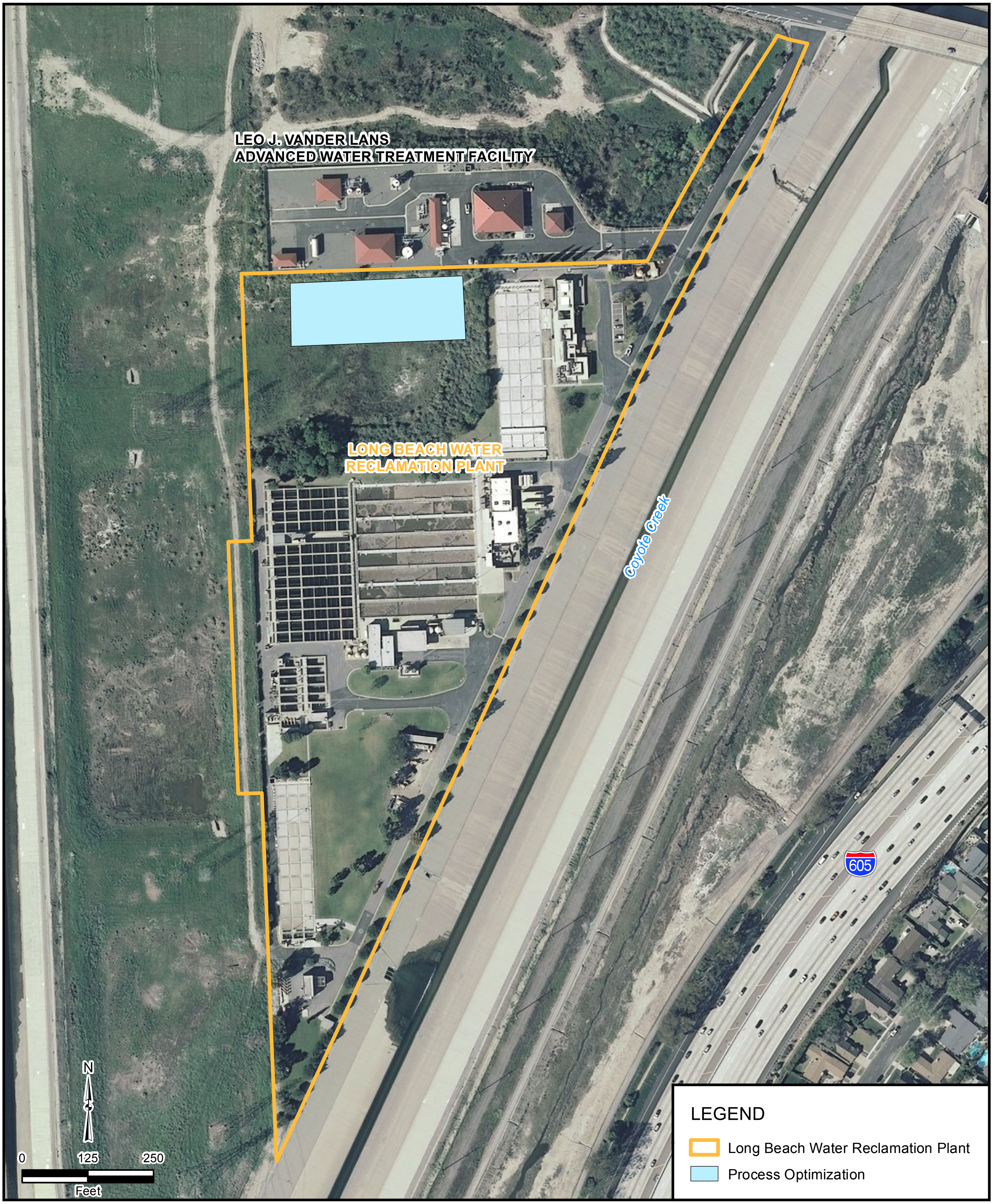


FIGURE 3-8

CLEARWATER Program

Long Beach Water Reclamation Plant Proposed Facilities

Source: Sanitation Districts of Los Angeles County 2011, ESRI 2011

result in a discharge to lined surface waters of approximately 9 to 14 MGD, which would be similar to the current range of discharges.

Whittier Narrows Water Reclamation Plant

At the WNWRP, it is estimated that an annual average of approximately 9 MGD of recycled water would be beneficially reused as groundwater replenishment, and 5 MGD would be distributed for other reuses, resulting in a possible 4 MGD increase in recharge and/or a possible 4 MGD increase in other reuses by the end of the 2050 planning horizon.

3.3.1.3 Joint Water Pollution Control Plant

Through the MFP screening process, it was determined that the JWPCP would not be expanded beyond the existing permitted treatment capacity of 400 MGD. However, the additional flows to the entire JOS would result in increased production of solids that would be processed into biosolids at the JWPCP. Effluent management at the JWPCP was also analyzed in the MFP. Recommendations for solids processing, biosolids management, and effluent management at the JWPCP are described herein.

Solids Processing

Centralized solids processing at the JWPCP would continue in accordance with the existing practices, as described in Section 2.2.4.3. Any new JOS solids processing facilities would be constructed at the JWPCP. This approach provides continuity with existing practices and avoids major expenses for new systems and/or property acquisition. Projections for future solids generated at the JWPCP were based on current per capita generation rates and the projected JOD population for 2050, resulting in the proposed future solids processing facility requirements as summarized in Table 3-6.

Table 3-6. Future Solids Processing Facilities Requirements (2050)

	Sludge Thickening	Sludge Stabilization	Sludge Dewatering
Current Capacity, MGD	11	5	6
Projected Treatment Needs, MGD	8	6	6
Projected Capacity Increase, MGD	0	1	0
Additional Units Required	0	6	0

Sludge Thickening

As shown in Table 3-6, the capacity of the existing sludge thickening facilities at the JWPCP is anticipated to be sufficient to meet the projected needs for 2050. Therefore, no additional sludge thickening systems would be required over the duration of the planning period.

Sludge Stabilization

Sludge stabilization is achieved at the JWPCP through the use of anaerobic digesters. Based on the projected sludge flows, it is estimated that six additional anaerobic digesters would be required by approximately 2040. The proposed digesters would be similar to the existing units, each with a volume of approximately 500,000 cubic feet. The timing for construction of the proposed digesters is dependent upon the future trending of sludge production at the JWPCP. Any indication of increased solids loadings would precipitate implementation of additional digester capacity. The location for the new digesters would be within the JWPCP site as shown on Figure 3-9.

Sludge Dewatering

The capacity of the existing sludge dewatering system is anticipated to be sufficient to meet the projected future digested sludge flow for 2050. Therefore, no additional sludge dewatering facilities would be

FIGURE 3-9

CLEARWATER Program

Joint Water Pollution Control Plant Proposed Facilities

Source: Sanitation Districts of Los Angeles County 2011, LARIAC 2007

required over the duration of the planning period. The Sanitation Districts will continue the existing program of replacing aging centrifuges as needed throughout the duration of the planning period.

Digester Gas Handling and Power Generation

The power plant at the JWPCP currently utilizes two turbines that run on digester gas, a third turbine that is used for standby, four boilers that create steam from digester gas for process heating, and twelve flares that burn excess digester gas. Additional gas resulting from an increased number of digesters will be managed by these facilities. The turbines are currently supplemented with natural gas. As digester gas increases, it will be used in lieu of natural gas.

Biosolids Management

As described in the MFP, the Sanitation Districts propose to continue to utilize beneficial use alternatives that provide enhancement to the environment, are a reliable means for ultimate biosolids disposal, are cost-effective, and comply with all regulatory requirements. The Sanitation Districts will also continue to use existing landfills for co-disposal of biosolids.

The wet weight of Sanitation Districts' biosolids generated is anticipated to increase by approximately 30 percent by 2050. This increase is attributable to several factors including, but not limited to, the population increase within the Sanitation Districts' service area; increased JOS flows; changes in wastewater influent quality; and upgrades, optimization, and new technology at the JWPCP.

Beneficial Use

Although the Sanitation Districts intend to continue to use some of the existing locations described in Chapter 2 for beneficial use, the long-range plans for biosolids management also include operation of a composting facility in Kings County, California, called the Westlake Farms Composting Facility. In 2001, the Sanitation Districts purchased 14,500 acres of land and entitlements to construct a co-composting facility that could process up to 500,000 wet tons per year (wtpy) of biosolids. The Westlake Farms Composting Facility would compost the Sanitation Districts' biosolids, green waste from Central Valley and Southern California communities, and agricultural wastes from the Central Valley using a covered aerated static pile composting technology. The compost product will be used on adjacent agricultural land. Agricultural wastes have specifically been included as feedstock to improve air quality by providing an outlet for material that otherwise would likely be burned openly in the field. Biofilter technology would be used to control odors and air emissions from the facility, along with state-of-the-art covers designed specifically for odor control from aerated static piles. The environmental impact report (EIR) for the Westlake Farms Composing Facility was completed in 2003 and certified in 2004. The facility is being constructed in phases, and the initial phase, scheduled to begin operations in 2013, will allow for up to 100,000 wtpy of biosolids.

Biosolids Management Locations

Approximately 1,850 wet tons per day of biosolids are anticipated to be generated in 2050. Biosolids are currently transported to biosolids management facilities by truck, but may be hauled by rail or other modes of transportation in the future. A typical truck can carry approximately 25 wet tons of biosolids. Approximately 75 trucks would leave the JWPCP each day carrying biosolids, with the peak trips occurring between the hours of 5:00 a.m. and 2:00 p.m. Approximately 27,500 trucks a year would transport biosolids from the JWPCP to the beneficial use and landfill locations. Currently, there are no plans to transport biosolids via rail.

Anticipated future biosolids management locations are identified in Table 3-7. The locations for these facilities are shown on Figure 3-10. It should also be noted that operations at Puente Hills Landfill, which is an existing landfill co-disposal location, are expected to terminate October 31, 2013.

FIGURE 3-10

CLEARWATER Program

Anticipated Future Biosolids Managment Locations

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros. 2011, ESRI 2011

Table 3-7. Future Biosolids Management Locations

Facility	Management Practice	Status	Location	Distance From JWPCP (miles)	Quantity (wtpy)	Total (%)
Westlake Farms	Composting	2013 (Expected)	Kings County, CA	200	100,000–500,000	14–72
EnerTech Environmental SlurryCarb Facility	Renewable Fuel	Operating	Rialto, CA	75	50,000–150,000	7–22
South Kern Industrial Center	Composting	Operating	Kern County, CA	131	50,000–150,000	7–22
Inland Empire Regional Composting Facility	Composting	Operating	Rancho Cucamonga, CA	59	50,000–150,000	7–22
San Joaquin Composting Facility	Composting	Operating	Kern County, CA	170	0–150,000	0–22
Arizona Land Application	Land Application	Operating	Various Counties in AZ	300	0–150,000	0–22
Honey Bucket Farms	Land Application	Operating	Kern County, CA	160	0–150,000	0–22
Mitsubishi Cement Corp	Injection for NO_X Control	Operating	San Bernardino County, CA	129	0–100,000	0–14

wtpy = wet tons per year
NO_X = nitrogen oxide

Other Future Beneficial Use Opportunities

The Sanitation Districts will continue to receive and analyze proposals from contractors to manage biosolids and may enter into agreements for use of sites and technologies that will maintain a diversified portfolio of options. The Sanitation Districts would only consider proposals from contractors that have obtained, or will have obtained prior to startup, all required local, state, and federal permits and have complied with CEQA, NEPA, and/or all other applicable environmental requirements.

The Sanitation Districts may develop additional facilities to serve these same purposes, either individually or in partnership with the public and/or private sector. The Sanitation Districts may own or jointly own any such facilities, and may also directly operate or contract for the operation of any such facilities. A list of other potential landfill and composting facilities that accept wastewater biosolids located within a 100-mile radius of the JWPCP are listed in Table 5-9 of the MFP.

Future management of the Sanitation Districts' biosolids may incorporate a variety of operations, sites, and technologies including, but not limited to:

- Direct land application of Class B or Class A biosolids, either by surface application or subsurface injection
- Monofill and bioreactor technology
- Deep well injection
- Incineration, pyrolysis, gasification, vitrification, or other appropriate technologies
- Reuse of any biosolid-derived products, including, but not limited to, construction materials, glassified products, aggregate, or any other value-based material
- Reclamation uses approved by federal regulations, including, but not limited to, mine reclamation and reclamation of fire-ravaged lands
- Disposal and co-disposal at municipal solid waste landfills

The Sanitation Districts' biosolids may also be processed with other materials in various applications, including, but not limited to:

- Municipal solid waste
- Urban and rural green waste
- Various forms of agricultural waste
- Soil
- Manure and/or animal waste
- Food residuals

Future biosolids processing and/or end-product use locations may include:

- All counties in the state of California
- The state of Arizona
- Other U.S. states and territories, if applicable
- Foreign countries that desire biosolids, or biosolids-derived products, for reuse and/or processing

While biosolids could go to any of these locations, this EIR/EIS analyzes the facilities currently receiving, and the facilities most likely to receive, biosolids listed in Table 2-5 and Table 3-7. This document does not analyze more speculative locations, such as foreign countries or states other than California and Arizona.

JWPCP Effluent Management

The construction of a new or modified ocean discharge system for the JWPCP effluent management program component area was proposed in the MFP. The system would have the capacity to accommodate all current and projected future flows to the JWPCP through the year 2050. In addition to a new or modified ocean discharge system, the MFP recommended rehabilitation of the existing ocean outfalls. If a new system is constructed, the existing system would typically function as back up and would only be used when the new system is not in use (e.g., during maintenance and repair). Overall, this approach provides reliability and redundancy to a critical component of the JOS. The JWPCP effluent management program component area results in a project that is described in greater detail in Section 3.3.2.

3.3.1.4 Alternatives (Program) Summary

As recommended in the MFP, the program elements to undergo program-level analysis in this EIR/EIS include conveyance improvements to the conveyance system; plant expansion at the SJCWRP; process optimization at the SJCWRP, POWRP, LBWRP, and LCWRP; WRP effluent management; solids processing at the JWPCP; and biosolids management at the JWPCP. JWPCP effluent management, including rehabilitation of the existing ocean outfalls, will be evaluated at the project level in the following section. A summary of the proposed changes for the program-level elements for each alternative is shown in Table 3-8.

Table 3-8. Program-Level Elements

	Proposed Changes						
Alternative	**Conveyance Improvements**	**Plant Expansion**	**Process Optimization**	**WRP Effluent Management**	**Solids Processing**	**Biosolids Management**	**JWPCP Effluent Management**
1	33 miles of sewers	25 MGD expansion of SJCWRP	Process optimization at SJCWRP, POWRP, LCWRP, and LBWRP	Increase reuse at all WRPs	Six new digesters at JWPCP	Increase of 20 truck trips	One new or modified ocean discharge system and rehabilitation of existing ocean outfalls
2	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
3	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
4	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1
5 (No Project) [a]	Same as Alternative 1	Same as Alternative 1	None	Same as Alternative 1	Same as Alternative 1	Same as Alternative 1	None
6 (No Federal Action) [b]	N/A	N/A	N/A	N/A	N/A	N/A	N/A

[a] See Section 3.4.1.5.
[b] See Section 3.4.1.6.
MGD = million gallons per day
N/A = not applicable

3.3.2 Description of Alternatives (Project)

The project elements for the JWPCP effluent management program component area that compose the set of alternatives (project) have been grouped for analysis in this EIR/EIS into three functional categories: (1) tunnel alignment (onshore and offshore), (2) shaft site (JWPCP and intermediate), and (3) riser and diffuser area.

The JWPCP effluent management program component area relies on an ocean discharge system. The ocean discharge system would be constructed from the JWPCP to the San Pedro Shelf (SP Shelf) or to the Palos Verdes Shelf (PV Shelf) in the Pacific Ocean or to the existing ocean outfall manifold structure located at the Royal Palms Beach near White Point as depicted on Figure 3-11. The project elements analyzed in this EIR/EIS for the JWPCP ocean discharge system alternatives (project) are shown in Table 3-9, organized by functional category. It should also be noted that each alternative (project) would include rehabilitation of the existing ocean outfalls (as listed in Table 3-9 under the functional category, riser/diffuser area). The rehabilitation construction work is further described in Section 3.3.2.3. Alternatives 1 through 4 (Project) are individually shown on Figure 3-12, Figure 3-13, Figure 3-14, and Figure 3-15 respectively. Project-level construction for the ocean discharge system could be initiated as early as 2015 and continue through approximately 2022.

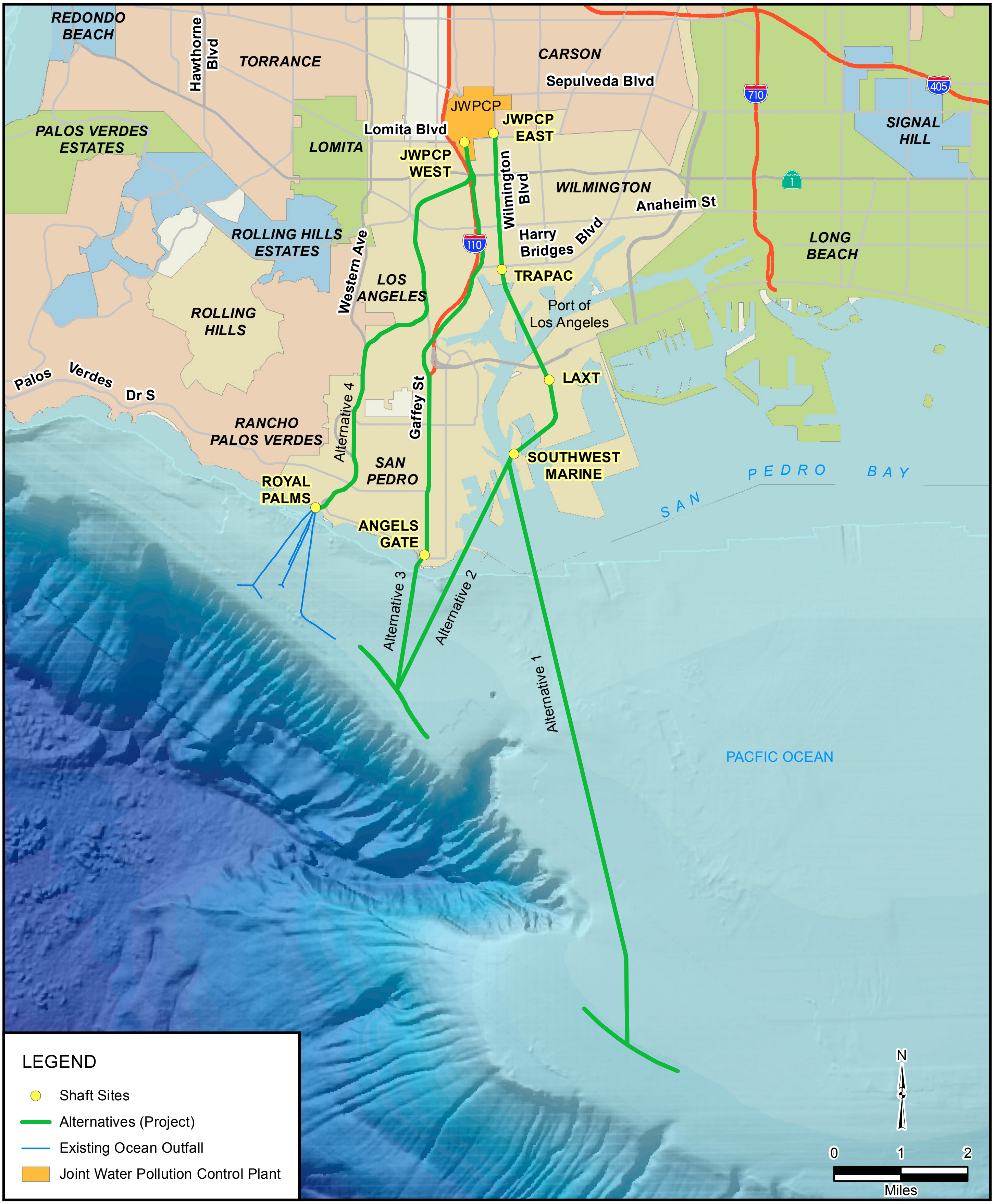


FIGURE 3-11

CLEARWATER Program

Ocean Discharge System Alternatives (Project)

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros. 2011

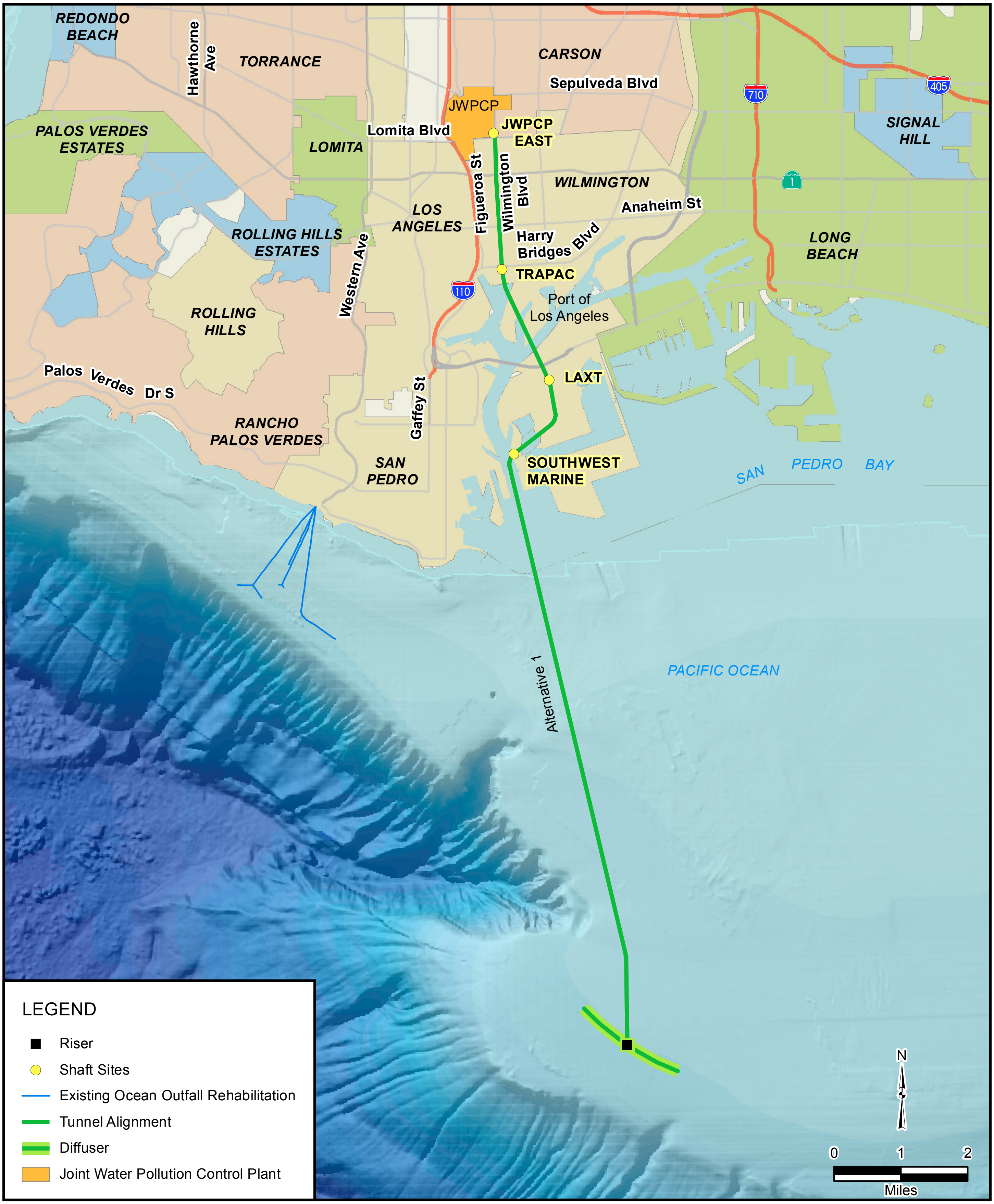


FIGURE 3-12

Clearwater Program

Ocean Discharge System Alternative 1 (Project)

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros. 2011

FIGURE 3-13

CLEARWATER Program

Ocean Discharge System Alternative 2 (Project)

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros. 2011

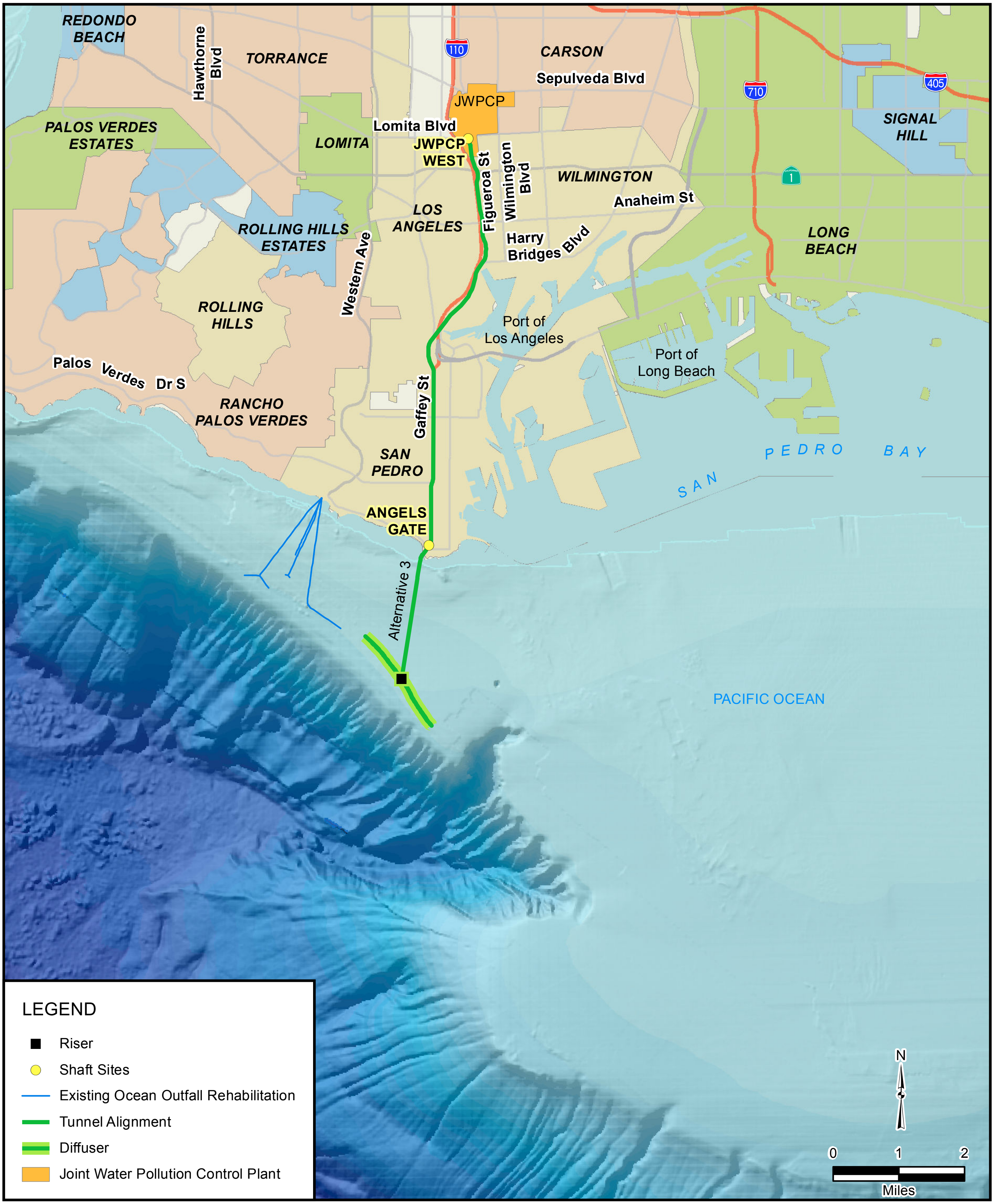


FIGURE 3-14

CLEARWATER Program

Ocean Discharge System Alternative 3 (Project)

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros. 2011

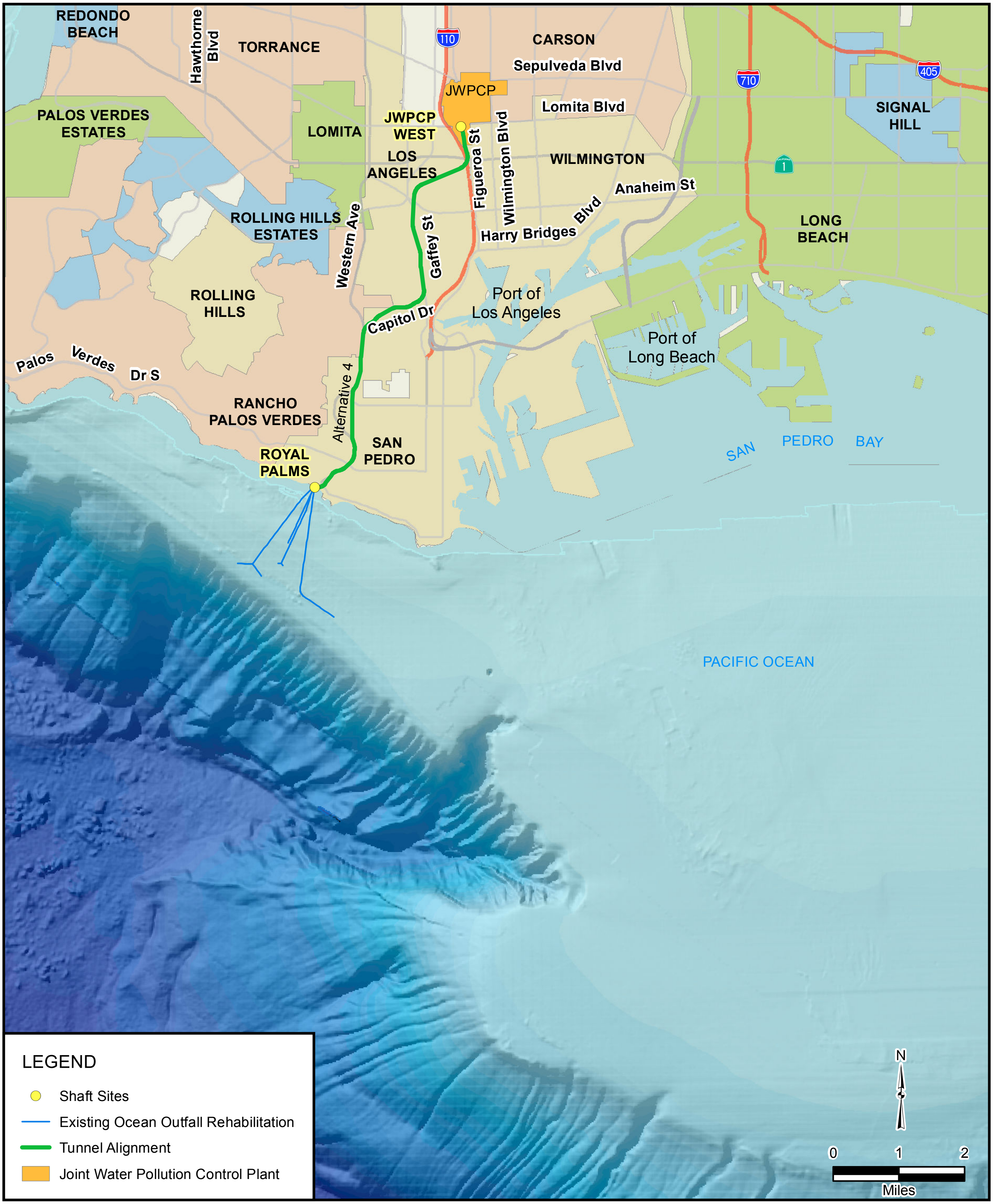


FIGURE 3-15

Clearwater Program

Ocean Discharge System Alternative 4 (Project)

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros. 2011

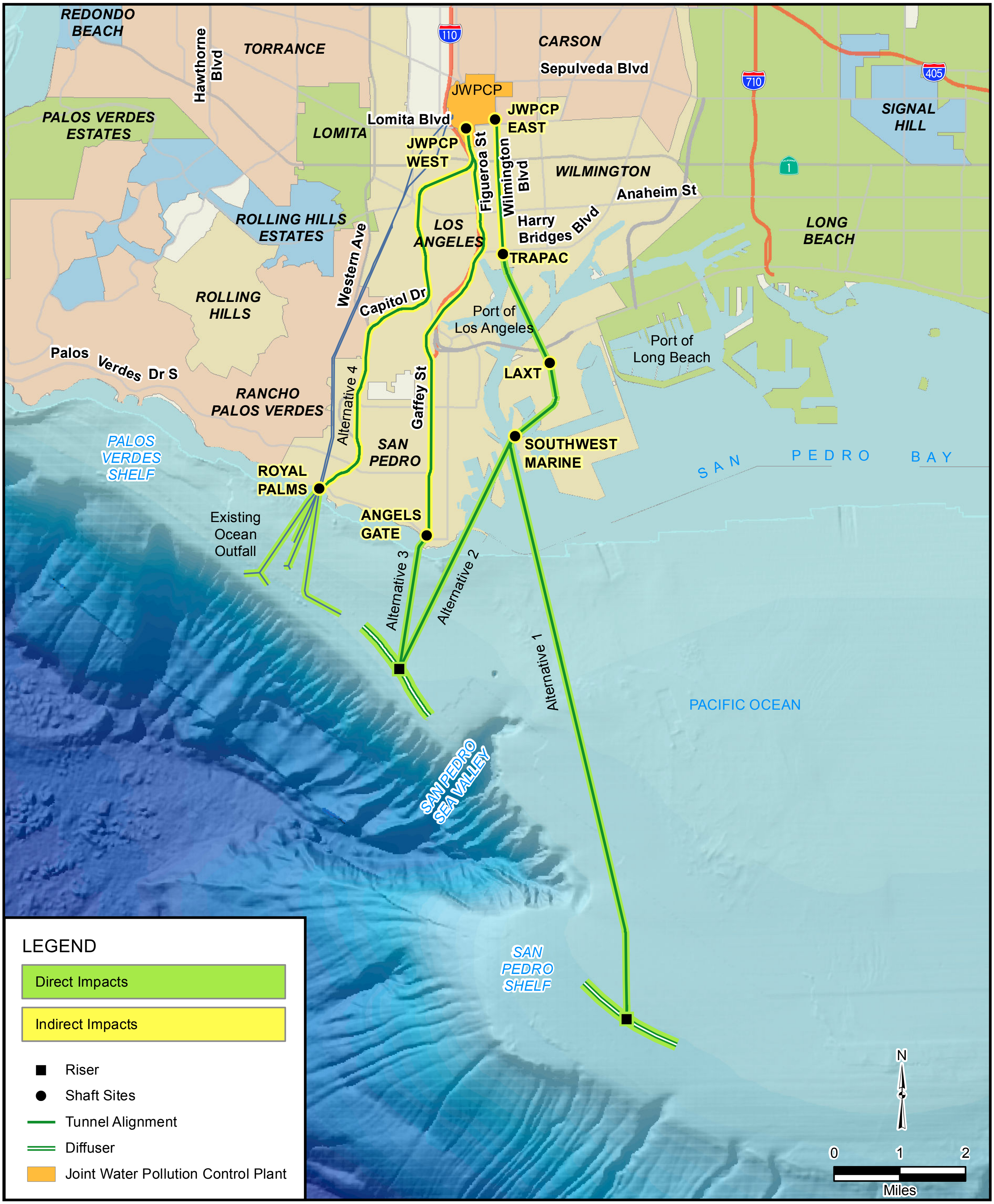


FIGURE 3-16

CLEARWATER Program

Federal NEPA Scope of Analysis

Source: Sanitation Districts of Los Angeles County 2011, Thomas Bros. 2011

Table 3-9. Project Elements by Alternative (Project) and Functional Category

	Functional Category		
Alternative (Project)	**Tunnel Alignment**	**Shaft Sites**	**Riser/Diffuser Area**
1	Wilmington to SP Shelf (Onshore and Offshore)	JWPCP East TraPac LAXT Southwest Marine	SP Shelf Existing Ocean Outfalls
2	Wilmington to PV Shelf (Onshore and Offshore)	JWPCP East TraPac LAXT Southwest Marine	PV Shelf Existing Ocean Outfalls
3	Figueroa/Gaffey to PV Shelf (Onshore and Offshore)	JWPCP West Angels Gate	PV Shelf Existing Ocean Outfalls
4[a]	Figueroa/Western to Royal Palms (Onshore)	JWPCP West Royal Palms	Existing Ocean Outfalls
5	No Project - See Section 3.4.1.5		
6	No Federal Action - See Section 3.4.1.6		

[a] Alternative 4 is the recommended alternative.

3.3.2.1 Tunnel Alignment

There are four potential tunnel alignments that would originate from the JWPCP. Three of these would extend underground to a riser and diffuser area in the Pacific Ocean and one would extend underground to the existing ocean outfall manifold structure at Royal Palms Beach. The federal NEPA scope of analysis for each alternative (project) is depicted on Figure 3-16. The project elements that are to be evaluated by the U.S. Army Corps of Engineers (Corps) as direct or indirect impacts are also identified on this figure. A detailed description of each tunnel alignment is provided in this section. Additionally, refer to Chapter 12 for a discussion on land uses, public right-of-way, and private properties adjacent to each tunnel alignment.

The tunnel would be constructed with a tunnel boring machine (TBM). The TBM, which would be placed underground at a shaft site, would be capable of excavating soil/rock and installing a tunnel liner as it advances. The excavated material would be removed for disposal or, possibly, beneficial use. Tunneling is expected to advance at an average rate of 35 feet per day through soil and an average rate of 40 feet per day through rock. Tunneling would occur 20 to 24 hours a day, 7 days a week, in two 10-hour or three 8-hour shifts. The TBM would require periodic maintenance, including the replacement of cutting bits.

The tunnel would be constructed between approximately 70 to 450 feet below ground surface or the ocean seafloor. The tunnel would have an excavated diameter of approximately 20 to 22 feet and an internal finished diameter of approximately 18 feet. The tunnel would be constructed of pre-fabricated steel-reinforced concrete segments with watertight gaskets. The lining system would be able to withstand the construction, ground, seismic, and hydrostatic loads.

Access for the tunneling process would take place at various shaft sites as further discussed in Section 3.3.2.2. Tunnel construction would require mobilization of various support equipment for activities such as, but not limited to, the installation of a rail system at the bottom of the shaft, assembly of the TBM, and installation of the ventilation system. In addition, the TBM trailing gear would be assembled at the surface for installation as the TBM advances. Preparation and construction of the tunnel

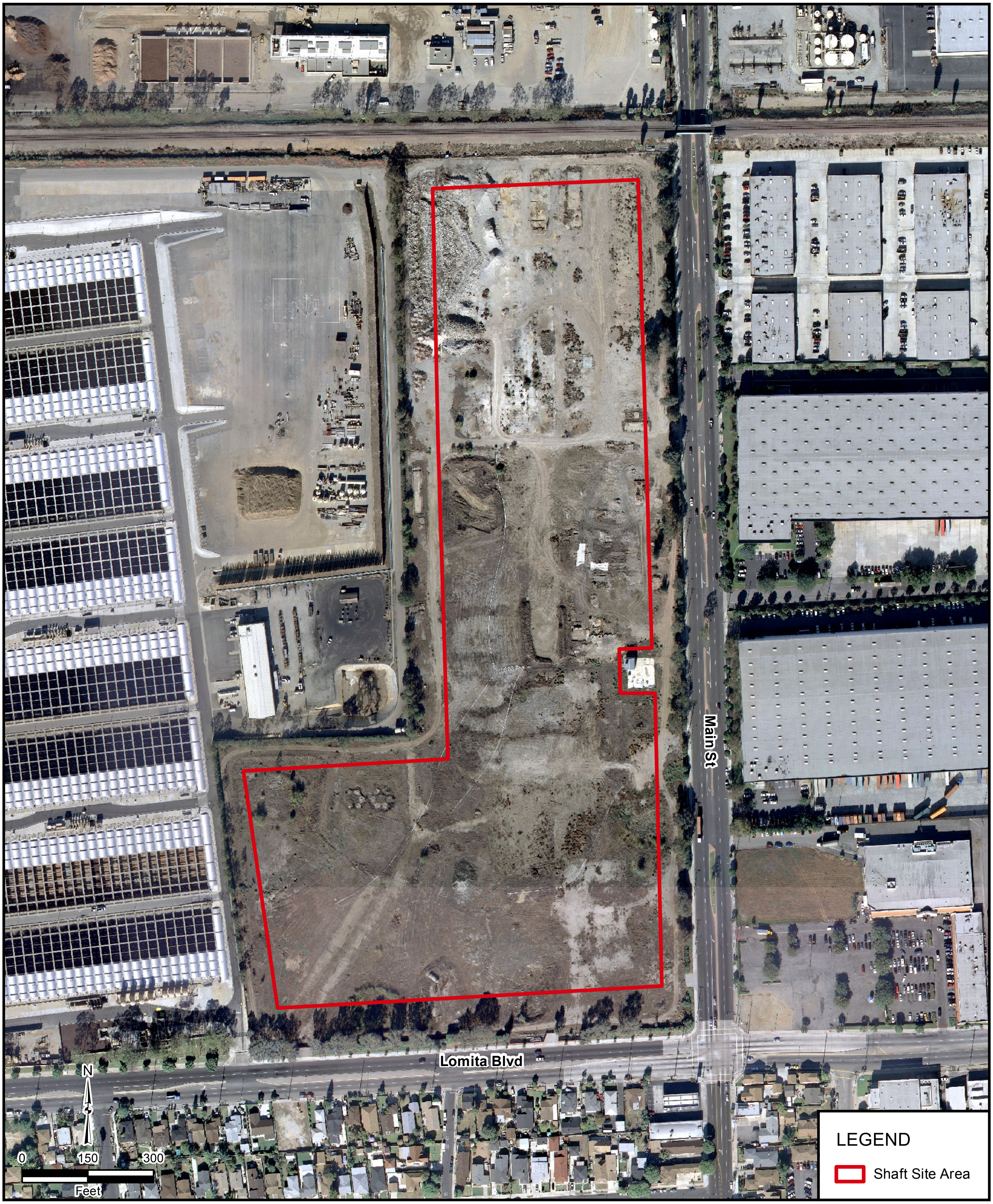


FIGURE 3-17

CLEARWATER Program

JWPCP East Shaft Site

Source: Sanitation Districts of Los Angeles County 2011, LARIAC 2007

would potentially require the equipment listed in Table 1 in Appendix 3-A. Depending on the alternative, one or two TBMs would be used for the construction of the tunnel.

Each tunnel alignment would cross the Palos Verdes Fault. The Palos Verdes Fault is located along the northeastern edge of the Palos Verdes Hills, approximately 1 to 2 miles southwest of the JWPCP. The fault extends about 62 miles from Santa Monica Bay through the Los Angeles Outer Harbor, to the San Pedro Channel, south of Newport Beach and 12 miles off the shore of Laguna Beach. Numerous small earthquakes have occurred near and west of the fault zone. A two-pass liner system would be installed along the portion of the tunnel that crosses the Palos Verdes Fault to minimize the potential for damage due to fault rupture. The Cabrillo Fault is a minor fault that generally parallels the Palos Verdes Fault, and extends approximately 6 miles offshore. Little is known about the probability of seismic activity along this fault line.

Two types of TBMs could be used to build the tunnel: earth-pressure balance (EPB) or slurry. These TBMs differ in how the excavated material generated from the tunneling operations is handled, transported, and treated. With an EPB TBM, locomotives convey the excavated material in rail cars back through the constructed portion of the tunnel to the shaft for removal by crane. The excavated material would be retained at the surface to allow any water to separate before removal. With a slurry TBM, a slurry is supplied by pipe from the ground surface of the shaft to the cutterhead of the TBM to suspend the excavated material, which is then pumped back to the shaft and up to the surface through pipes. In this case, the excavated material would be processed at a slurry separation plant at the surface of the shaft site prior to disposal. A bentonite additive is used in the slurry TBM method, which may preclude ocean disposal of the excavated material. For the purposes of evaluating the greatest potentially significant environmental impacts, the tunnel construction was analyzed assuming either an EPB TBM or a slurry TBM, depending on the resource area.

Wilmington to San Pedro Shelf Alignment

The onshore portion of the Wilmington to SP Shelf tunnel alignment would begin at the JWPCP and follow Wilmington Boulevard south to the Port of Los Angeles (Trans Pacific Container Service Corporation [TraPac] shaft site) for a distance of approximately 10,700 feet. The onshore tunnel depth at tunnel crown would range from approximately 100 to 200 feet below ground surface and would pass through land that is within the public right-of-way.

The offshore portion of the tunnel would be constructed approximately 100 to 200 feet below the ground surface or seafloor, beginning at the TraPac shaft site, extending southeast to cross under the West Basin Channel, Pier A, and the East Main Channel in Los Angeles Harbor. With a few exceptions, most of this land is within the Port of Los Angeles and is owned by the city of Los Angeles. The alignment would then pass under Yusen terminal in the Port of Los Angeles and under the eastern end of the Vincent Thomas Bridge to the Los Angeles Export Terminal (LAXT) shaft site. From the LAXT shaft site, the alignment would pass under Fish Harbor to the Southwest Marine shaft site, and continue to the diffuser area on the SP Shelf. The offshore portion of the alignment would extend approximately 65,200 feet.

This alignment would cross the Palos Verdes Fault zone between the LAXT and the Southwest Marine shaft sites. The alignment also would cross the Cabrillo Fault zone midway across the SP Shelf.

For this alignment, two TBMs would be required, with either one TBM originating from the JWPCP East shaft site and one TBM originating from the LAXT shaft site, or two TBMs traveling in opposite directions originating from the LAXT shaft site. Tunnel construction for the entire alignment would take approximately 6.5 years.

Wilmington to Palos Verdes Shelf Alignment

The onshore portion of the Wilmington to PV Shelf tunnel alignment is the same as the onshore portion of the Wilmington to SP Shelf alignment.

The offshore portion of the tunnel would be constructed approximately 100 to 250 feet below the ground surface or seafloor, beginning at the TraPac shaft site, extending southeast to cross under the West Basin, Pier A, and the East Basin Channel in Los Angeles Harbor. With a few exceptions, most of this land is within the Port of Los Angeles and is owned by the city of Los Angeles. The alignment would then pass under Yusen terminal in the Port of Los Angeles and under the eastern end of the Vincent Thomas Bridge to the LAXT shaft site. From the LAXT shaft site, the alignment would pass under Fish Harbor to the Southwest Marine shaft site, and continue to the diffuser area on the PV Shelf. The offshore portion of the alignment would extend approximately 38,100 feet.

This alignment would cross the Palos Verdes Fault zone between the LAXT and the Southwest Marine shaft sites. The alignment also would cross the Cabrillo Fault zone south of Cabrillo Beach.

For this alignment, two TBMs would be required, with either one TBM originating from the JWPCP East shaft site and one TBM originating from the LAXT shaft site, or two TBMs traveling in opposite directions originating from the LAXT shaft site. Tunnel construction for the entire alignment would take approximately 5 years.

Figueroa/Gaffey to Palos Verdes Shelf Alignment

The onshore portion of the Figueroa/Gaffey to PV Shelf tunnel alignment would begin at the JWPCP and follow Figueroa Street south to Harry Bridges Boulevard. The alignment would pass below land owned by the city of Los Angeles that is operated by the Port of Los Angeles and head southwest under John S. Gibson Boulevard. The alignment would then traverse Interstate (I-) 110 and private property where it would leave John S. Gibson Boulevard to join Gaffey Street to the west. It would follow Gaffey Street until veering southwest to the Angels Gate shaft site. The onshore portion of this alignment would be approximately 34,000 feet. The onshore tunnel depth at tunnel crown would range from approximately 70 to 370 feet below ground surface.

This alignment would cross the Palos Verdes Fault zone just southwest of the intersection of Figueroa and John S. Gibson Boulevard. It also would cross the Cabrillo Fault zone north of Angels Gate Park.

The offshore portion of the tunnel would be constructed approximately 100 to 250 feet below the ground surface or seafloor, beginning at Angels Gate Park and extending approximately 11,400 feet to the PV Shelf riser and diffuser area.

For this alignment, one TBM would be required, which would originate from the JWPCP West shaft site. Tunnel construction for this entire alignment would take approximately 5 years.

Figueroa/Western to Royal Palms Alignment

The Figueroa/Western to Royal Palms tunnel alignment would begin at the JWPCP, continue south on Figueroa Street, southwest under I-110 and Harbor Regional Park, south on North Gaffey Street, west on Capitol Drive, south on Western Avenue (through South Dodson Avenue) to Royal Palms Beach for a distance of approximately 36,600 feet. The onshore tunnel depth at tunnel crown would range from approximately 70 to 450 feet below ground surface, except for where the tunnel alignment would terminate and connect into the Royal Palms shaft and the existing ocean outfall manifold structure at Royal Palms Beach (approximately 30 feet below ground surface). The manifold structure is connected to the existing ocean outfalls that extend offshore from Royal Palms Beach to the PV Shelf. For discussion on the existing conditions of Royal Palms Beach and the ocean outfalls, see Chapter 2 and Figure 2-12.

This alignment would cross the Palos Verdes Fault zone just south of Harbor Regional Park. It also would cross the Cabrillo Fault zone near the intersection of South Dodson Avenue and Western Avenue.

For this alignment, one TBM would be required, which would originate from the JWPCP West shaft site. Tunnel construction for this alignment would take approximately 4 years.

3.3.2.2 Shaft Sites

Shaft sites would be required along each alignment to facilitate tunnel construction. There would be three types of shaft sites: working, access, and exit.

- A working shaft site would be used for approximately 4 to 8 years as the aboveground staging area for the tunneling construction and support system activities. The working shaft would serve as the entry point for construction workers and as the exit point for all of the excavated material. The working shaft site would be within the immediate proximity of the tunnel alignment and require approximately 8 to 25 acres of relatively flat land. During both shaft and tunneling construction, the shaft site may contain a number of onsite facilities to support construction activities such as: a TBM cooling water tower; security, laboratory and office trailers; generators and substations; equipment, electrical, and mechanical shops; and excavated material, slurry separating, and storage areas. There would be, at a minimum, one crane at the shaft site for shaft construction and TBM removal, which could be up to approximately 100 feet tall. Approximately 35 to 40 construction workers would be on site per shift during tunnel construction. The site might also be used for permanent facilities upon completion of the tunnel construction.
- An access shaft site would serve as an entry and exit point for construction workers; TBM maintenance; support systems, such as ventilation; and removal of salvageable portions of the TBM at the project's conclusion. The facilities at the site may include construction trailers. A crane would also be used at the site for shaft construction and to facilitate access. The access shaft site would be approximately 0.5 to 3 acres.
- An exit shaft site would be used for the removal of the TBM and have a land requirement of approximately 1 to 4 acres. A crane would be used at the site for shaft construction and TBM removal.

Parking for the construction workers would be provided within the footprint of each shaft site. Multiple shaft sites may be constructed concurrently. It is estimated that approximately 10 construction workers would be needed to construct a shaft. The shaft construction work would likely occur in one 10-hour shift, 5 days per week. Preparation and construction of each shaft would potentially require the equipment listed in Table 1 in Appendix 3-A. General site preparation would take about 1 month and require approximately 10 trucks per day for materials removal. Shaft construction would take approximately 6 to 15 months, depending on the site. Once the tunnel construction is complete, all of the shafts would be capped with a removable cover for future access to support operation and maintenance of the tunnel. It would take approximately 2 to 5 months to demobilize the site after tunnel construction is complete.

For working shaft sites that support onshore tunnel alignment construction, an average of 48 trucks per day would be needed to haul away the excavated material. During maximum tunneling rates, there could be up to 95 truck trips per day. As the tunnel is advanced, supply trucks would also be required to bring tunnel liner segments and other construction materials to the site. For an onshore alignment, there would be an average of 9 supply trucks per day and up to 16 supply trucks per day under maximum tunneling rates.

For working shaft sites that support offshore tunnel alignment construction, an average of 62 trucks per day would be needed to haul away the excavated material. During maximum tunneling rates, there could be up to 123 trucks per day. There would be an average of 10 supply trucks per day and up to 18 supply trucks per day under maximum tunneling rates.

It is anticipated that the majority of the excavated and cut material resulting from site preparation, shaft construction, and tunneling would be disposed of within approximately 50 miles of the shaft site. The excavated material would be regularly tested per American Society for Testing Materials standards for various contaminants. If the excavated material were considered hazardous, it would be properly handled and disposed of in accordance with all applicable requirements. The majority of the contaminated excavated material would be disposed of within approximately 200 miles of the shaft site. The supply trucks would likely originate from northern Los Angeles County.

JWPCP East Shaft Site (Working and/or Exit)

The JWPCP East shaft site would be located on approximately 25 acres within the JWPCP property boundary near the northwest corner of Main Street and Lomita Boulevard in the city of Carson, as shown on Figure 3-17.

The JWPCP East shaft site would function as either a working or an exit shaft site. Regardless of the shaft type, a noise barrier, approximately 20 feet in height, would be erected between the major sources of noise at the shaft site and nearby sensitive receptors. Access to the JWPCP East shaft site would likely occur from within the JWPCP via Figueroa Street or Sepulveda Boulevard. Site preparation would consist of clearing, grubbing, grading, and equipment mobilization. For the purposes of evaluating the greatest potentially significant environmental impacts, the site was analyzed as a working shaft site rather than an exit shaft site.

The shaft depth would be approximately 115 feet. The shaft diameter would be about 40 to 60 feet. During construction of the shaft, approximately 30 to 65 trucks per day would be required for delivery of supplies and removal of excavated material. Shaft construction would take about 10 to 12 months. Upon completion of the tunneling activities, this shaft would be converted into a drop structure and connected to the existing JWPCP effluent management infrastructure. Approximately 0.5 acre would be required at the shaft site for permanent facilities, which may include a pumping plant and would include a surge tower.

JWPCP West Shaft Site (Working)

The JWPCP West shaft site would be located mostly within the JWPCP property boundary on approximately 18 acres to the south and 1 acre to the north of West Lomita Boulevard near Figueroa Street in the cities of Los Angeles and Carson as shown on Figure 3-18.

The JWPCP West shaft site would function as a working shaft site. A noise barrier, approximately 20 feet in height, would be erected between the major sources of noise at the shaft site and nearby sensitive receptors. Access to the shaft site would likely occur from Figueroa Street via Lomita Boulevard, Pacific Coast Highway, or Sepulveda Boulevard. Site preparation would consist of clearing, grubbing, grading, and equipment mobilization.

FIGURE 3-18

CLEARWATER Program

JWPCP West Shaft Site

Source: Sanitation Districts of Los Angeles County 2011, LARIAC 2007

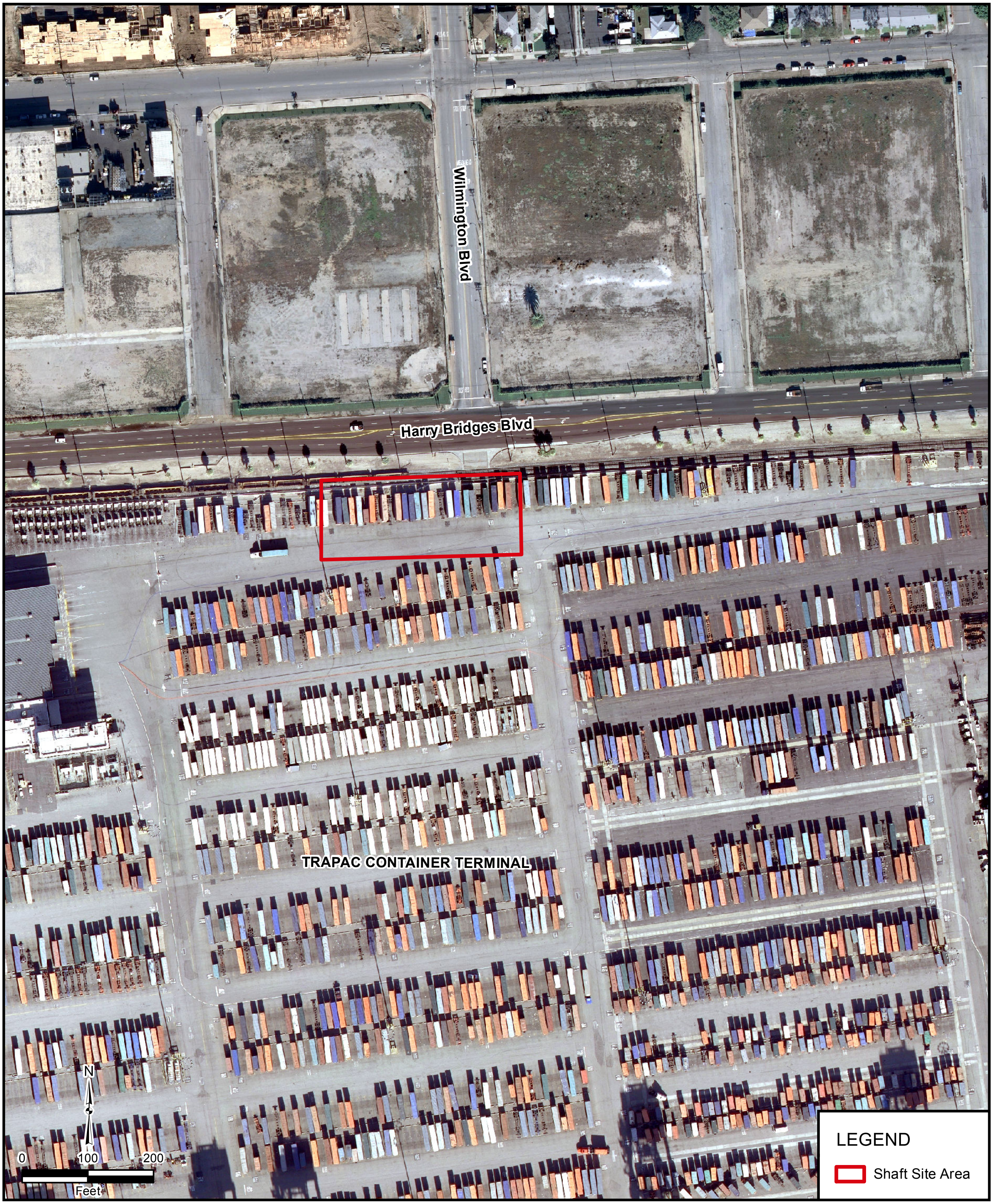


FIGURE 3-19

CLEARWATER Program

TraPac Shaft Site

Source: Sanitation Districts of Los Angeles County 2011, LARIAC 2007

The shaft depth would be approximately 115 feet (Alternative 3) or approximately 140 feet (Alternative 4) and the shaft diameter would be about 40 to 60 feet. During construction of the shaft, approximately 30 to 65 trucks per day would be required for delivery of supplies and removal of excavated material. Shaft construction would take about 10 to 12 months. Upon completion of the tunneling activities, this shaft would be converted into a drop structure and connected to the existing JWPCP effluent management infrastructure, located within the 1-acre area depicted on Figure 3-18 to the north of Lomita Boulevard. This connection would likely either be tunneled or jacked and bored under Lomita Boulevard. Approximately 0.5 acre would be required at the shaft site for permanent facilities, which would include a surge tower and possibly a pumping plant.

TraPac Shaft Site (Access)

The TraPac shaft site would be located south of the intersection of Harry Bridges Boulevard and Wilmington Boulevard within the Port of Los Angeles as shown on Figure 3-19 and would occupy less than 1 acre.

The TraPac shaft site would function as an access shaft site. Access to the shaft site would be through Port of Los Angeles property, either at the existing entrance at Figueroa Street and Harry Bridges Boulevard or at the future relocated entrance at the intersection of Harry Bridges Boulevard and Lagoon Avenue. Site preparation would include removal of existing concrete and asphalt.

The shaft depth would be approximately 165 feet and the shaft diameter would be about 25 to 35 feet. During construction of the shaft, approximately 30 to 65 trucks per day would be required for delivery of supplies and removal of excavated material. Shaft construction would take about 10 to 11 months. After construction of the tunnel, this shaft would be converted into a smaller belowground access structure that would be connected to the tunnel. A permanent access easement of approximately 0.3 acre would be needed for future operation and maintenance activities.

LAXT Shaft Site (Working and/or Exit)

The LAXT shaft site would be located on approximately 8.6 acres on Terminal Island within the Port of Los Angeles as shown on Figure 3-20. The LAXT shaft site would be located on Ferry Street across from the city of Los Angeles Terminal Island Water Reclamation Plant. The shaft would be located on the western portion of the former Petroleum Coke Storage and Reclaim Facility Site. The site is approximately 7 acres in size and is currently developed with railroad tracks maintained by the Port of Los Angeles, a bridge structure, and LAXT structures. The structures are slated for demolition by the Port of Los Angeles, and would be demolished prior to the start of project construction. The railroad tracks and bridge structures would remain.

The LAXT shaft site would function as either (1) a working shaft site that would allow tunnel boring work to take place in two directions or (2) both a working shaft for the entry of a TBM to construct the tunnel to the ocean and an exit shaft site that would allow for the removal of a TBM traveling from the JWPCP East shaft site. If tunnel boring took place in two directions at this site, the shaft size, the tunnel construction workforce, the excavated material truck trips, and the supply truck trips would double.

Access for construction workers would likely be at the intersection of Ferry Street and Eldridge Street, and access for construction equipment would likely be at the intersection of Ferry Street and LAXT. A noise barrier, approximately 20 feet in height, would be erected between the major sources of noise at the shaft site and nearby sensitive receptors. In conjunction with the Southwest Marine shaft site, this shaft site would provide access to the tunnel from each side of the Palos Verdes Fault. A valve would be installed at this site to allow for isolation of the tunnel segment crossing the Palos Verdes Fault. Site preparation would consist of clearing, grubbing, grading, and equipment mobilization. For the purposes

FIGURE 3-20

CLEARWATER Program

LAXT Shaft Site

Source: Sanitation Districts of Los Angeles County 2011, LARIAC 2007

FIGURE 3-21

CLEARWATER Program

Southwest Marine Shaft Site

Source: Sanitation Districts of Los Angeles County 2011, LARIAC 2007

of evaluating the greatest potentially significant environmental impacts, the site was analyzed as a working shaft site that would allow tunnel boring work to take place in two directions.

The shaft depth would be approximately 170 feet and the shaft diameter would be approximately 40 to 60 feet. During construction of the shaft, approximately 30 to 65 trucks per day would be required for delivery of supplies and removal of excavated material. Shaft construction would take about 12 to 15 months. After construction of the tunnel, this shaft would be converted into a smaller belowground access structure that would be connected to the tunnel. A permanent access easement of approximately 0.4 to 0.5 acre would be needed for future operation and maintenance activities.

Southwest Marine Shaft Site (Access)

The Southwest Marine shaft site would be located on less than 1 acre to the west of South Seaside Avenue and to the south of the existing Southwest Marine shipbuilding warehouses in the Port of Los Angeles as shown on Figure 3-21.

The Southwest Marine shaft site would function as an access shaft. A noise barrier, approximately 20 feet in height, would be erected between the major sources of noise at the shaft site and nearby sensitive receptors. Access to the Southwest Marine shaft site would likely be at South Seaside Way via Ferry Street/Terminal Way. In conjunction with the LAXT shaft site, this shaft site would provide access to the tunnel from each side of the Palos Verdes Fault. A valve would be installed at this site to allow for isolation of the tunnel segment crossing the Palos Verdes Fault. Site preparation would include the removal of existing concrete and asphalt.

The shaft depth would be approximately 170 feet and the shaft diameter would be about 25 to 35 feet. During construction of the shaft, approximately 30 to 65 trucks per day would be required for delivery of supplies and removal of excavated material. Shaft construction would take about 10 to 11 months. After construction of the tunnel, this shaft would be converted into a smaller belowground access structure that would be connected to the tunnel. A permanent access easement of approximately 0.3 acres would be needed for future operation and maintenance activities.

Angels Gate Shaft Site (Access)

The Angels Gate shaft site would be located on approximately 3 acres near the southern boundary of Angels Gate Park near the intersection of South Gaffey Street and Shepard Street as shown on Figure 3-22.

The Angels Gate shaft site would function as an access shaft site. A noise barrier, approximately 20 feet in height, would be erected between the major sources of noise at the shaft site and nearby sensitive receptors. Access to the Angels Gate shaft site would likely occur from Shepard Street via South Gaffey Street. A valve would also be installed to allow for isolation of the tunnel segment between the Angels Gate and JWPCP West shaft sites. Site preparation would consist of clearing, grubbing, grading, and equipment mobilization.

The shaft depth would be approximately 245 feet and the shaft diameter would be about 25 to 35 feet. During construction of the shaft, approximately 10 to 40 trucks per day would be required for delivery of supplies and removal of excavated material. Shaft construction would take about 8 to 9 months. After construction of the tunnel, this shaft would be converted into a smaller belowground access structure that would be connected to the tunnel. A permanent access easement of approximately 0.3 acre would be needed for future operation and maintenance activities.

FIGURE 3-22

CLEARWATER Program

Angels Gate Shaft Site

Source: Sanitation Districts of Los Angeles County 2011, ESRI 2011

FIGURE 3-23

Clearwater Program

Royal Palms Shaft Site

Source: Sanitation Districts of Los Angeles County 2011, ESRI 2011

Royal Palms Shaft Site (Exit)

The Royal Palms shaft site would be located on approximately 1.1 acres, mostly within Sanitation Districts' property surrounding the existing ocean outfall manifold structure at Royal Palms Beach near the beach access road off of West Paseo Del Mar as shown on Figure 3-23. The Royal Palms site would function as an exit shaft site for removal of the TBM upon tunnel completion. The shaft site would also be used to connect the new tunnel to the existing ocean outfalls at the manifold structure. A noise barrier, approximately 20 feet in height, would be erected between the major sources of noise at the shaft site and nearby sensitive receptors. Site preparation would consist of clearing, grubbing, grading, and equipment mobilization.

The shaft depth would be approximately 50 feet and the shaft diameter would be about 25 to 35 feet. During construction of the shaft, approximately 10 to 40 trucks per day would be required for delivery of supplies and removal of excavated material. Shaft construction would take about 6 to 9 months.

Alternatives 1 through 3 (Project) would require a new riser and diffuser area, which would be constructed in the Pacific Ocean; Alternative 4 (Project) would utilize the existing diffusers and ocean outfalls. A new underground manifold structure would be constructed next to the exit shaft to facilitate the connections between the tunnel and the existing ocean outfalls. Valves would be installed to control the amount of effluent flow to each of the outfalls and to allow for isolation of the new tunnel between the Royal Palms and JWPCP West shaft sites. There would be approximately 5 to 10 construction workers on site for a 10-hour shift per day, 5 days per week, for approximately 2 years to construct the exit shaft, manifold, valves, and piping interconnections. Demobilization of the site would take about 3 months. After construction, the beach parking area would be restored to its original configuration. A permanent access easement of approximately 0.1 acre would be needed for future operation and maintenance activities.

3.3.2.3 Riser and Diffuser Area

At the downstream terminus of the offshore tunnel alignment for Alternatives 1 through 3 (Project), a riser would be constructed to physically connect the tunnel to a seafloor diffuser as depicted on Figure 3-24. Alternative 4 (Project) would connect to the existing ocean outfalls.

Riser

For Alternatives 1 through 3 (Project), the riser would be constructed of steel with a concrete lining. The riser inner casing diameter would be approximately 13 feet, and the outer casing diameter would be approximately 16 feet. Depending on the diffuser pipe material, the riser head configuration would vary as shown on Figure 3-25. The top of the riser head structure would be positioned approximately 20 feet above the surrounding seafloor. Although the riser would be installed outside of designated ship anchorage areas, ballast rock, the quantity of which is estimated in Section 3.3.2.4, would be placed within a 75-foot radius around the riser head to protect the structure.

Diffuser

For Alternatives 1 through 3 (Project), the seafloor diffuser would be constructed from steel pipe, reinforced concrete pipe (RCP), or high-density polyethelene (HDPE) pipe as shown on Figure 3-25. Each type of piping would include diffuser ports that would be spaced to facilitate initial dilution and distribution of the treated effluent. Although the diffuser would be located outside of designated ship anchorage areas, it would be protected by ballast rock to withstand impact forces from falling anchors and to minimize the risk of snagging by anchor wires and chains.

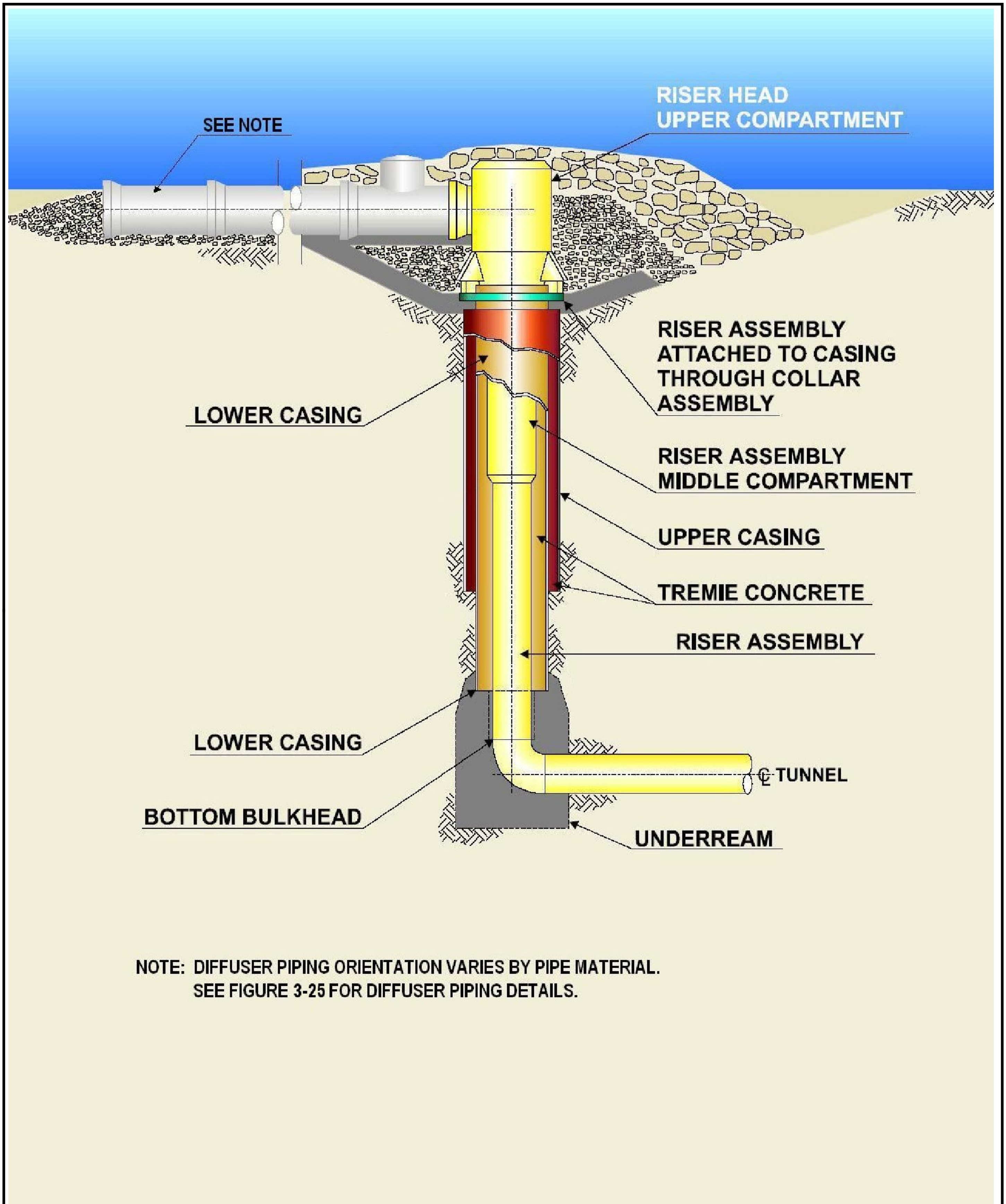
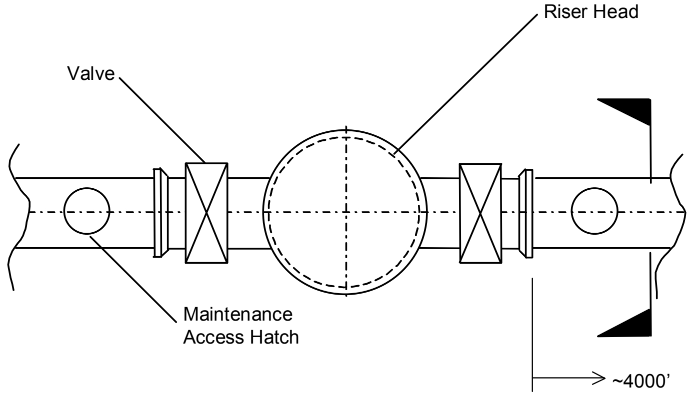


FIGURE 3-24

CLEARWATER Program

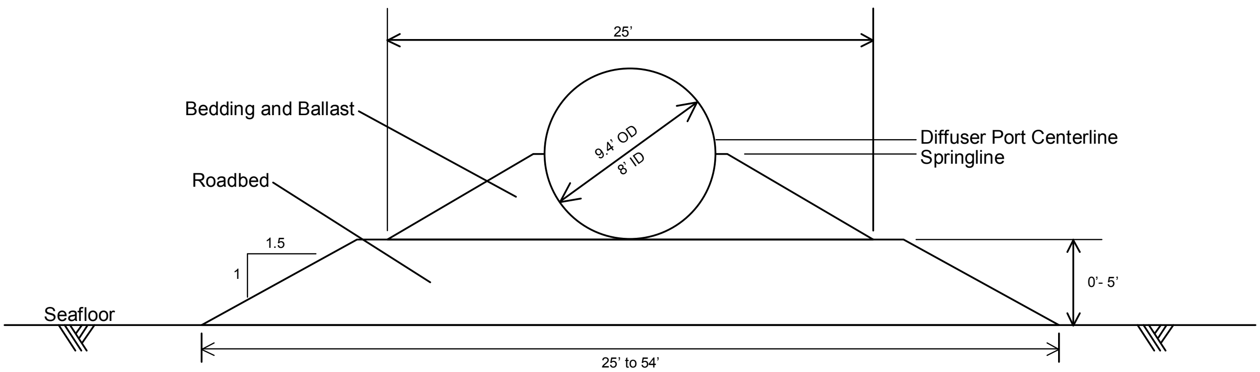
Riser Configuration

Source: Sanitation Districts of Los Angeles County 2011, Parsons 2011



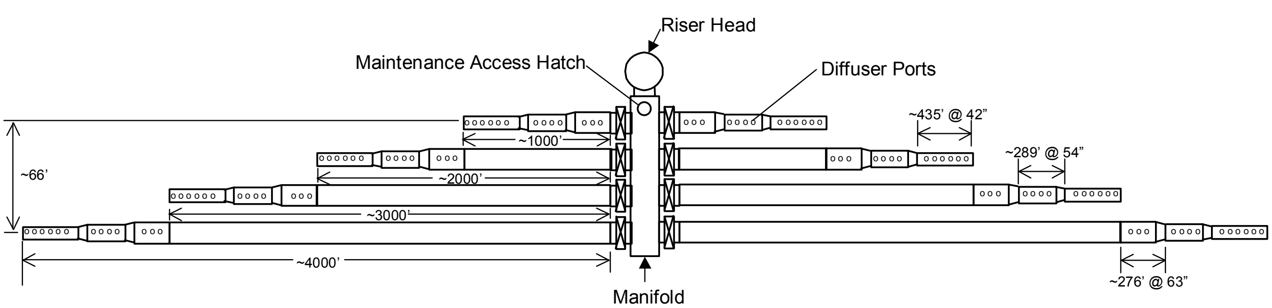
Steel or RCP Diffuser Piping (Plan View)

Not to Scale



Steel or RCP Diffuser Piping (Cross-Section)

Not to Scale



HDPE Diffuser Piping (Plan View)

Not to Scale

FIGURE 3-25

CLEARWATER Program

Riser Head Structure and Diffuser Configuration Options

Source: Sanitation Districts of Los Angeles County 2011, Parsons 2011

FIGURE 3-26

CLEARWATER Program

Location of Ocean Dredged Material Disposal Sites

Source: Sanitation Districts of Los Angeles County 2011, ESRI 2011, Thomas Bros 2011

If the diffuser were constructed of steel or RCP, the diffuser would consist of two legs oriented out of the riser head, 120 or 180 degrees apart. Each leg would be approximately 4,000 feet long. The inner diameter of the steel or RCP diffuser would incrementally decrease in size ranging from approximately 132 inches to 48 inches. Installation of the steel or RCP diffuser would require seafloor grading and possibly trenching or dredging for site preparation purposes. The trenched materials would be sidecast, if feasible. The diffuser installation may also require construction of a roadbed base of ballast rock that would be approximately 25 to 54 feet wide and up to 5 feet thick. The roadbed would be placed either in the trench or on the graded seafloor. The diffuser would be placed on the roadbed with additional ballast rock up to the center of the pipe for stability. The riser and diffuser would cover a seafloor area of approximately 5 to 10 acres, depending on the required roadbed depth. Refer to Section 3.3.2.4 for the estimated quantities of dredged materials and ballast rock for the steel or RCP diffuser.

If the diffuser were constructed of HDPE, no trenching would be required. The HDPE would be placed directly on the seafloor, which may require some minor grading. There would also be a limited amount of ballast rock required to protect the piping and riser as estimated in Section 3.3.2.4. The HDPE design would consist of a manifold with eight diffuser legs configured in a sequentially staggered array from shortest to longest. The pipe outer diameter would range in size from approximately 63 inches to 42 inches. The riser, manifold, and diffuser would cover a seafloor area of approximately 8 acres. Approximately 1,500 pre-installed concrete anchor blocks would be attached to HDPE piping to provide ballast during the sinking and installation process as well as to provide stability against ocean currents and wave-induced hydrodynamic loading.

Riser and Diffuser Assembly and Construction

Both the riser and diffuser assembly would be pre-fabricated on land prior to ocean construction. While the specific location for pre-assembly of the parts and materials for the riser and diffuser is still unknown, for this analysis it was assumed that pre-assembly would occur at the Pasha Terminal within the Port of Los Angeles. Pre-assembly and construction of the riser and diffuser would potentially use equipment as listed in Table 1 in Appendix 3-A. For pre-assembly, approximately 10 to 15 construction workers would be on site for a 10-hour shift per day, 5 days per week, for about 8 to 10 months.

The riser and diffuser construction activities and the corresponding marine vessels required for the work are summarized in Table 3-10. To prepare the site for riser installation, the unconsolidated seafloor material would be sidecast or removed and disposed of as described in Section 3.3.2.3. Hydro-jetting or pile-driving would be used to install the riser casing. The majority of the riser and diffuser construction work would be based on one 10-hour shift per day, 5-day-per-week schedule. However, when the pre-fabricated riser assembly is transported to the installation site, the construction work would take place on a continuous 24-hour-per-day basis for approximately 1 week.

All of the work including mobilization, pre-assembly, site preparation, construction, and demobilization would take approximately 24 months for the riser and approximately 6 to 12 months for the diffuser. There are two proposed riser and diffuser locations.

San Pedro Shelf

The SP Shelf riser and diffuser assembly site would be located approximately 7.5 miles from the Port of Los Angeles breakwater. The riser assembly would be located at a depth of approximately 200 feet of water and would extend approximately 110 feet below the seafloor to meet the tunnel.

The SP Shelf riser and diffuser area is a relatively flat area of the upper slope along the southwest edge of the SP Shelf. It is not located within the boundaries of the EPA designated dichlorodiphenyltrichloroethane/polychlorinated biphenyl (DDT/PCB) contaminated sediment study area.

Palos Verdes Shelf

The PV Shelf riser and diffuser assembly site would be located approximately 2 miles from Point Fermin. The riser assembly would be located at a depth of approximately 175 feet of water and would extend approximately 145 feet below the seafloor to meet the tunnel. It should be noted that construction activities for diffuser placement on the PV Shelf would include grading of the seafloor and placing of ballast rocks. Sediment would not be sidecast or brought to the surface for disposal.

The PV Shelf riser and diffuser area is within the boundaries of the EPA-designated DDT/PCB contaminated sediment study area. An estimated 1,800 metric tons of DDT was discharged onto the PV Shelf between 1953 and 1971. Today, much of the original DDT that was discharged has dispersed throughout the greater PV Shelf, but a reservoir of approximately 100 metric tons remains buried in the seafloor centered on the existing outfalls.

Existing Ocean Outfalls

The existing ocean outfalls extend from the existing manifold structure at Royal Palms Beach offshore into the Pacific Ocean as described in Chapter 2 and Section 3.3.2.2. For Alternatives 1 through 3 (Project), JWPCP effluent would primarily be discharged through the new ocean discharge system. However, the existing ocean outfalls may be used during high flow conditions or during maintenance of the new ocean discharge system. For Alternative 4 (Project), JWPCP effluent would continue to be discharged through the existing ocean outfalls.

Alternatives 1 through 4 (Project) would include improvements to the existing ocean outfalls, such as joint repairs and re-ballasting. The re-ballasting work would occur on the existing 72-, 90- and 120-inch outfalls in water depths ranging from approximately 20 to 50 feet. A small derrick barge would be used to place the ballast rock around the outfalls and support the joint repair work. Joint repairs would involve temporarily removing some of the existing ballast rock from around the outfall to fully expose the joint being repaired. A team of divers would repair an estimated 10 to 40 joints and hand-shovel approximately 2 cubic yards of sediment from each joint. Mechanical dredging would not be required. A coupling, which is a giant clamp that wraps around the joint, would be installed and the annular space filled with concrete. The sediment and existing ballast rock would be replaced around the pipe, and additional ballast rock would be placed as needed. Cathodic protection would also be restored or added where necessary. The marine vessels required for this work are listed in Table 3-10. The majority of the construction work would be based on one 10-hour shift per day, 5 days per week. It is estimated that approximately eight to ten construction workers would be needed for the rehabilitation work. Joint repairs and transport of construction workers would require a work vessel and crew vessel operating one daily round-trip for approximately 1 month, which would most likely deploy from the Port of Los Angeles. All of the work including mobilization, construction, and demobilization would take approximately 9 months.

Table 3-10. Anticipated Marine Construction Activities and Vessels

Project Activity	No.	Vessel Type	Trip Frequency	Schedule	Distance (miles)
Riser					
All work	1	Jack-up Platform or Barge and Tugboat	1 round-trip	24 months	8–16
All work	1–2	Supply Barge and Tugboat	1 round-trip per day	24 months	8–16
Transport and position riser assembly	2	Tugboat	1 round-trip	1 week	8–16
Crew: riser assembly installation	1	Crew Vessel	3 round-trip per day	1 month	8–16
Crew: all other work	1	Crew Vessel	1 round-trip per day	23 months	8–16
Steel or RCP Diffuser					
All work	1	Derrick Barge and Tugboat	1 round-trip	12 months	8–16
Transport diffuser piping	1	Supply Barge and Tugboat	1 round-trip per day	12 months	8–16
Transport ballast rock[a]	1–2	Supply Barge and Tugboat	1 round-trip per 1–2 days	12 months	20–175
Crew: all work	1	Crew Vessel	1 round-trip per day	12 months	8–16
HDPE Diffuser					
Site preparation	1	Derrick Barge and Tugboat	1 round-trip	6 months	8–16
Placement of diffuser piping	1	Pull Barge and Tugboat	1 round-trip	1 month	8–16
Placement of diffuser piping	1	Pump Barge and Tugboat	1 round-trip	1 month	8–16
Transport ballast rock[a]	1–2	Supply Barge and Tugboat	1 round-trip per 1–2 days	60–120 days	20–175
Transport and position diffuser piping	2–4	Tugboat	1 round-trip per day	1 month	8–16
Crew: all work	1	Crew Vessel	1 round-trip per day	6 months	8–16
Existing Ocean Outfalls Rehabilitation					
Transport ballast rock[b]	1	Supply Barge and Tugboat	1 round-trip per 1–2 days	2 months	20–175
Placement of ballast rock	1	Derrick Barge	1 round-trip	1 month	6–8
Transport of materials	1	Supply Barge and Tugboat	1 round-trip per week	1 month	6–8
Joint repair	1	Work Vessel	1 round-trip per day	1 month	6–8
Crew: all work	1	Crew Vessel	1 round-trip per day	1 month	6–8

[a] 60 to 120 total trips

[b] 15 to 20 total trips

3.3.2.4 Dredge, Fill, and Ocean Disposal Activities

In accordance with Section 404 of the Clean Water Act (CWA); Section 10 of the Rivers and Harbors Act (RHA); and Section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA), the Corps has statutory authority over dredging and other work in navigable waters of the United States (waters of the U.S.), discharge of dredged or fill material in waters of the U.S., and transport of dredged materials for ocean disposal, respectively. The estimated volumes of dredged material expected from the project are summarized in Table 3-11. As stated in Section 3.3.2.3, the dredged material for the proposed steel or RCP diffuser would be sidecast, if feasible. For the proposed shaft sites, offshore tunnel, and riser, dredged material determined to be suitable for ocean disposal could be potentially disposed at an Ocean Dredged Material Disposal Site (ODMDS). LA-2 and LA-3 are the two ODMDSs in the vicinity of the project, as identified on Figure 3-26. LA-2 is located approximately 4 miles from the PV Shelf site, 3 miles from the SP Shelf site, and 9 miles from the Port of Los Angeles. LA-3 is located approximately 26 miles from the PV Shelf site, 21 miles from the SP Shelf site, and 26 miles from the Port of Los Angeles. While the specific location from which the excavated dredged material would be loaded onto barges is still unknown, for this analysis it was assumed that the barges would be loaded at Fish Harbor (also within the Port of Los Angeles), which is approximately 0.5 miles from the LAXT shaft site. Any contaminated sediments would be disposed of at inland facilities in accordance with all applicable regulations.

Table 3-11. Estimated Ocean Dredged Materials

Project Activity	Range of Estimated Dredged Material (cubic yards)
Offshore Tunnel Alignment	5,000,000–30,000,000
Riser	40,000–45,000
Steel or RCP Diffuser	10,000–50,000
HDPE Diffuser	N/A

N/A = not applicable

The estimated volumes of ballast rock fill material expected for the project are summarized in Table 3-12. As stated in Section 3.3.2.3, ballast rock would be needed as bedding material for both the riser and diffuser construction for Alternatives 1, 2, and 3 (Project). The ballast rock would be placed in the diffuser trench prior to pipe installation and would be placed around the riser and diffuser piping after installation. For Alternatives 1 through 4 (Project), ballast rock would be needed to re-ballast along the existing ocean outfalls. The ballast rock would be barged to the site.

Table 3-12. Estimated Ballast Rock Material

Project Activity	Range of Estimated Ballast Rock Material (cubic yards)
Riser and Steel or RCP Diffuser	30,000–95,000
Riser and HDPE Diffuser	7,000–20,000
Existing Ocean Outfalls	15,000–18,000

3.3.2.5 Alternatives (Project) Summary

Four alternatives (project), which include rehabilitation of the existing ocean outfalls, were identified in the MFP and are described in Table 3-9. Each alternative (project) is summarized in the following sections.

Alternative 1 (Project)

Alternative 1 (Project) would consist of the Wilmington to SP Shelf tunnel alignment; the JWPCP East, TraPac, LAXT, and Southwest Marine shaft sites; the SP Shelf riser and diffuser area; and the rehabilitation of the existing ocean outfalls. The estimated construction schedule is shown in Table 3-13.

Alternative 2 (Project)

Alternative 2 (Project) would consist of the Wilmington to PV Shelf tunnel alignment; the JWPCP East, TraPac, LAXT, and Southwest Marine shaft sites; the PV Shelf riser and diffuser area, and the rehabilitation of the existing ocean outfalls. The estimated construction schedule is shown in Table 3-13.

Alternative 3 (Project)

Alternative 3 (Project) would consist of the Figueroa/Gaffey to PV Shelf tunnel alignment; the JWPCP West and the Angels Gate shaft sites; the PV Shelf riser and diffuser area; and the rehabilitation of the existing ocean outfalls. The estimated construction schedule is shown in Table 3-13.

Alternative 4 (Project)

Alternative 4 (Project) would consist of the Figueroa/Western to Royal Palms tunnel alignment; the JWPCP West and Royal Palms shaft sites; the existing ocean outfall manifold interconnection; and the rehabilitation of the existing ocean outfalls. The estimated construction schedule is shown in Table 3-13.

3.3.2.6 Project Schedule

The estimated construction schedule for each of the alternatives (project) is summarized in Table 3-13. Final design is estimated to take approximately 2.5 years, with anticipated construction durations ranging from 6.5 to 8 years.

3.4 Alternatives Summary

3.4.1 Alternatives Evaluated

The system-wide alternatives described in this section are assembled from a combination of the program and project alternatives. All four of the program-level component areas (wastewater conveyance and treatment, WRP effluent management, solid processing, and biosolids management) are common to all of the alternatives. Therefore, only the project-level alternatives are summarized and further detailed for comparison in Table 3-14. This document presents a reasonable range of alternatives as required by CEQA and NEPA, and includes the No-Project Alternative pursuant to CEQA, and the No-Federal-Action Alternative pursuant to NEPA.

3.4.1.1 Alternative 1

At the program level, Alternative 1 would include conveyance improvements; plant expansion at the SJCWRP; process optimization at the SJCWRP, POWRP, LCWRP, and LBWRP; WRP effluent management at all the WRPs; and solids processing, biosolids management, and effluent management at the JWPCP. At the project level, Alternative 1 would include the Wilmington to SP Shelf tunnel alignment; the JWPCP East, TraPac, LAXT, and Southwest Marine shaft sites; the SP Shelf riser and diffuser area; and the rehabilitation of the existing ocean outfalls.

Table 3-13. Anticipated Alternative (Project) Schedules

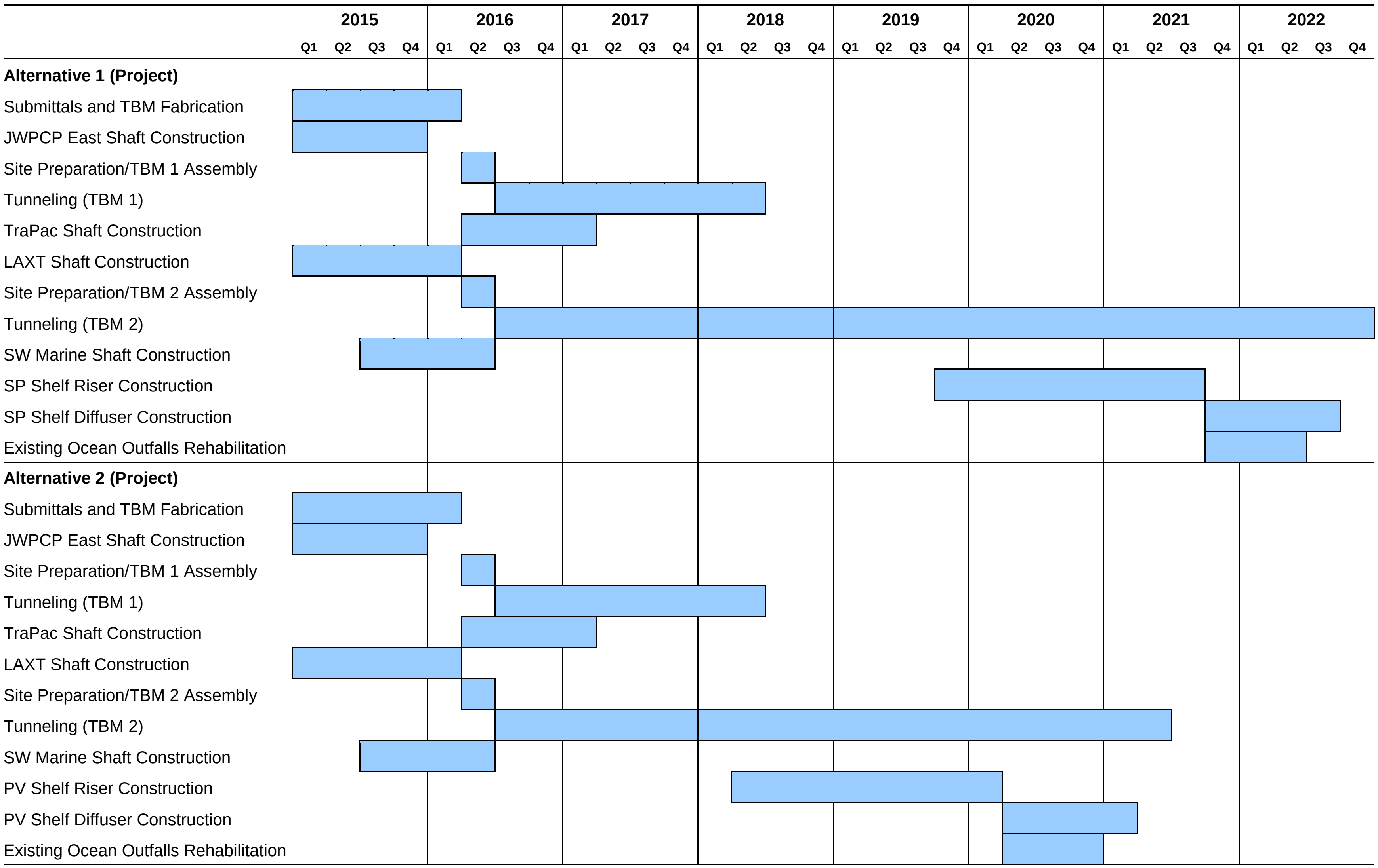


Table 3-13 (Continued)

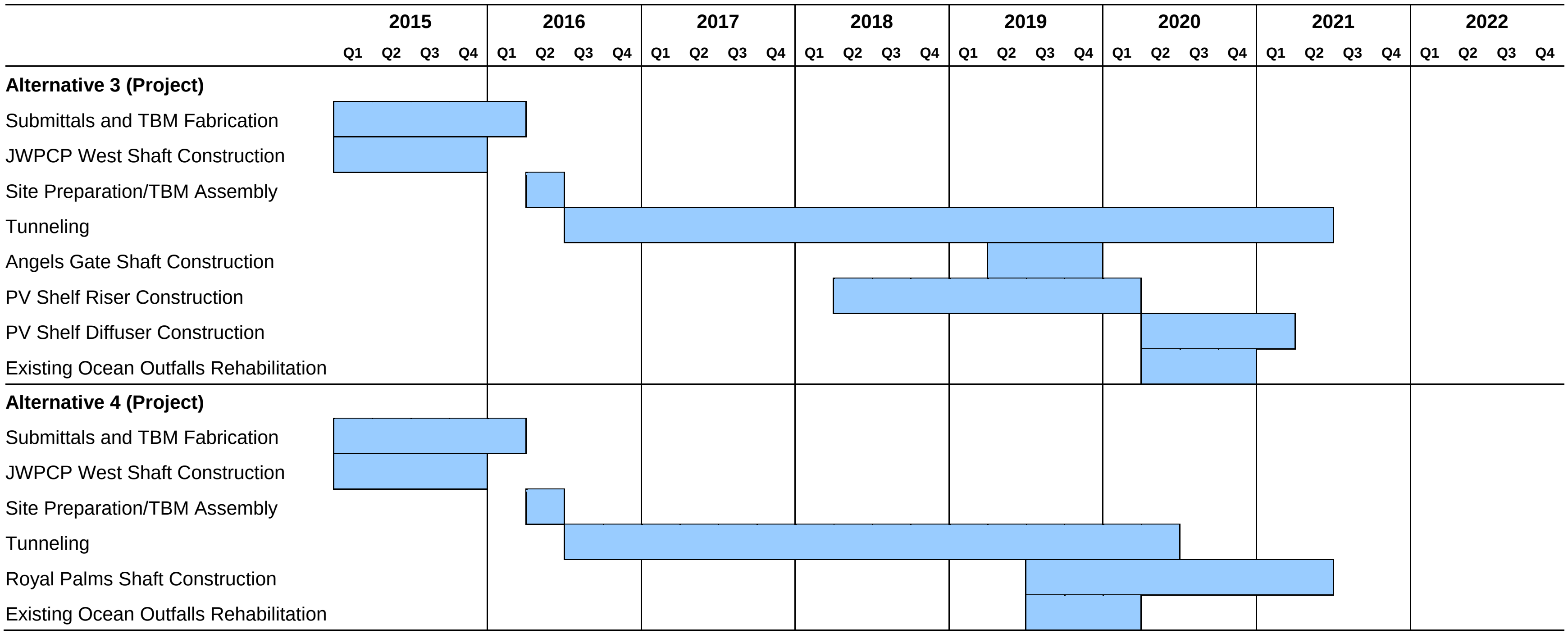


Table 3-14. Alternatives Summarized at the Project Level

	Tunnel Alignment				Shaft Sites							Riser/Diffuser Area		
Alternative[a]	Wilmington to SP Shelf	Wilmington to PV Shelf	Figueroa/ Gaffey to PV Shelf	Figueroa/ Western to Royal Palms	JWPCP East	JWPCP West	TraPac	LAXT	SW Marine	Angels Gate	Royal Palms	SP Shelf	PV Shelf	Existing Ocean Outfalls
1	X				X		X	X	X			X		X
2		X			X		X	X	X				X	X
3			X			X				X			X	X
4 (Recommended)				X		X					X			X
5 (No Project)														
6 (No Federal Action)														

[a] The program elements are not shown in this table because they are common to all alternatives.

3.4.1.2 Alternative 2

At the program level, Alternative 2 is identical to Alternative 1. At the project level, Alternative 2 would include the Wilmington to PV Shelf tunnel alignment; the JWPCP East, TraPac, LAXT, and Southwest Marine shaft sites; the PV Shelf riser and diffuser area; and the rehabilitation of the existing ocean outfalls.

3.4.1.3 Alternative 3

At the program level, Alternative 3 is identical to Alternative 1. At the project level, Alternative 3 would include the Figueroa/Gaffey to PV Shelf tunnel alignment; the JWPCP West and Angels Gate shaft sites; the PV Shelf riser and diffuser area; and the rehabilitation of the existing ocean outfalls.

3.4.1.4 Alternative 4 (Recommended Alternative)

Alternative 4 is the recommended alternative. At the program level, Alternative 4 is identical to Alternative 1. At the project level, Alternative 4 would include the Figueroa/Western to Royal Palms tunnel alignment; the JWPCP West and Royal Palms shaft sites; and the rehabilitation of the existing ocean outfalls.

3.4.1.5 Alternative 5 (No-Project Alternative)

Pursuant to CEQA, an EIR must evaluate a no-project alternative. A no-project alternative describes the no-build scenario and what would be reasonably expected to occur in the foreseeable future if the project were not approved. Under the No-Project Alternative for the Clearwater Program, the Sanitation Districts would continue to expand, upgrade, and operate the JOS in accordance with the 2010 Plan.

The following related projects and reasonably foreseeable actions as recommended by the 2010 Plan could occur even if there were no project:

- Expand the SJCWRP to a treatment capacity of 125 MGD
- Upgrade and provide relief for the existing conveyance system
- Continue current WRP effluent management practices
- Construct additional solids processing facilities
- Continue current biosolids management practices and identify new practices
- Continue use of existing ocean discharge system

Program elements under the No-Project Alternative would be the same as those discussed in Alternatives 1, 2, 3, and 4, excluding process optimization at the WRPs. There would be no construction of a new or modified ocean discharge system from the JWPCP and the existing ocean outfalls would not be rehabilitated. Therefore, the Corps would not make any significance determinations under NEPA and would not issue any permits or discretionary approvals for dredge or fill actions or for transport or ocean disposal of dredged material.

Under the No-Project Alternative, the existing ocean discharge system would be insufficient to convey future projected storm flows. Additionally, if the tunnels were to become inoperable or partially obstructed (e.g., due to earthquake damage), flows would need to be discharged to another location. If there were available capacity in the Wilmington Drain, secondary effluent could be bypassed into the

Wilmington Drain just north of Lomita Boulevard. If sufficient capacity were not available in the Wilmington Drain, the sewers tributary to the JWPCP could overflow and untreated wastewater could enter various water courses, such as the Dominguez Channel and the Los Angeles River. This scenario would be considered "worst case" and would only occur during severe storm events when there is no capacity in the Wilmington Drain. However, discharges of secondary effluent or untreated wastewater to such water courses would be considered a violation of the JWPCP National Pollutant Discharge Elimination System permit and of the CWA.

3.4.1.6 Alternative 6 (No-Federal-Action Alternative)

Pursuant to NEPA, an environmental impact statement (EIS) must evaluate a no-federal-action alternative. The No-Federal-Action Alternative for the Clearwater Program consists of the activities that the Sanitation Districts would perform without the issuance of the Corps' permits. The Corps' permits would be required for the construction of the offshore tunnel, construction of the riser and diffuser, the rehabilitation of the existing ocean outfalls, and the ocean disposal of dredged material. Without a Corps permit to work on the aforementioned facilities, the Sanitation Districts would not construct the onshore tunnel and shaft sites and would not rehabilitate the existing ocean outfalls. Therefore, none of the project elements described in Section 3.3 would be constructed under the No-Federal-Action Alternative. However, the program elements for the recommended alternative would be implemented in accordance with CEQA requirements. The program-level elements for this alternative would not be subject to NEPA.

Under the No-Federal-Action Alternative, the Sanitation Districts would continue to use the existing ocean discharge system, which could result in emergency discharges and/or sewer overflows to various water courses as described in Section 3.4.1.5.

3.4.2 Alternatives Considered and Withdrawn

The Sanitation Districts performed a comprehensive screening process to develop the program- and project-level alternatives. For a comprehensive discussion of the screening process and the alternatives considered and withdrawn as shown on Figure 3-1 and Figure 3-2, refer to Chapter 6 of the MFP.

3.5 NEPA Scope of Analysis

This section further details the Corps' NEPA scope of analysis first introduced in Section 1.4.2, which established the rationale for limiting the NEPA scope of analysis to the project elements of the Clearwater Program. In particular, this section establishes the rationale for distinguishing direct and indirect impacts under NEPA.

Generally, the Corps' geographic area of responsibility includes all waters of the U.S. (geographic jurisdiction), as well as any additional areas of non-jurisdictional waters or uplands (onshore) where there is sufficient federal control and responsibility to justify, including those areas within the Corps' NEPA scope of analysis. In determining whether there is sufficient federal control and responsibility in non-jurisdictional waters or uplands, the Corps evaluates projects according to the four factors indicated in 33 Code of Federal Regulations (CFR), Part 325, Appendix B, Section 7:

- Whether or not the activity would comprise merely a link in a corridor-type project
- Whether there are aspects of the upland facility in the immediate vicinity of the regulated activity that would affect the location and configuration of the regulated activity

- The extent to which the entire project would fall within the Corps' jurisdiction
- The extent of cumulative federal control and responsibility

In applying the four factors, the project elements of the Clearwater Program consist of a corridor-type project that entails both onshore and offshore construction activities. Offshore construction activities would include regulated activities within the Corps' geographic jurisdiction (i.e., the marine environment). In contrast, construction activities onshore could occur without a permit from the Corps because onshore activities are outside of the Corps' geographic jurisdiction. As a result, most onshore construction activities would not be affected by the location and configuration of the regulated activities with the exception of construction shaft sites located near shore. In such a case, the Corps' NEPA scope of analysis would typically be limited to offshore project elements of the project alternatives. However, according to the description of the No-Federal-Action Alternative (see Section 3.4.1.6), the onshore project elements of all four project alternatives would not be constructed without a permit from the Corps to construct the respective offshore project elements. Therefore, environmental effects of the construction of onshore project elements are essentially products of the Corps' authorization for construction of offshore project elements. Accordingly, there is sufficient federal control and responsibility for environmental effects associated with the onshore project elements of the project alternatives. Based on the application of the four factors and in consideration of the No-Federal-Action Alternative, the Corps' NEPA scope of analysis for the project elements of the Clearwater Program would encompass both offshore and onshore elements of all four project alternatives as depicted on Figure 3-16.

3.5.1 Construction and Operational Impacts

The Corps' regulatory authority under Section 10 of the RHA; Section 404 of the CWA; and Section 103 of the MPRSA entails authorizations for project-related offshore construction activities. Accordingly, the Corps has sufficient federal control and responsibility over project construction activities in waters of the U.S. and adjacent upland areas. Upon completion of construction, the Corps generally would continue to maintain sufficient federal control and responsibility over project operations. However, in comparison to project construction activities, federal control and responsibility over project operations would be relatively limited. Therefore, the Corps would primarily apply permit conditions and required mitigation measures to the construction phase of the project.

Future project maintenance activities may require authorizations from the Corps. The Sanitation Districts would be required to obtain separate authorizations as needed from the Corps for such activities. The Corps would analyze environmental effects associated with future maintenance activities as authorization requests are received and processed.

3.5.2 Direct and Indirect Effects Under NEPA

NEPA regulations at 40 CFR, Part 1508.8 make a distinction between direct and indirect effects. The Standard Operating Procedures for the U.S. Army Corps of Engineers Regulatory Program further refines this distinction as it applies to activities requiring permits from the Corps:

> A direct effect is caused by the activity needing the Corps' permit authorization, which occurs at the same time and place.... Indirect effects are those caused by the activity needing the Corps' permit authorization, but which take place later in time or farther removed in distance.

Based on the requirements, the Corps, in general, considers direct and indirect impacts as those environmental effects over which sufficient federal control and responsibility exist. With respect to the project component of the Clearwater Program, environmental effects that would be the direct results of construction activities authorized by the Corps within waters of the U.S. (i.e., the marine environment) would be considered direct impacts under NEPA. With respect to the project component of the Clearwater Program, environmental effects associated with construction activities in the uplands undertaken as a result of authorized activities within jurisdictional areas or environmental effects associated with project operations would be considered indirect impacts under NEPA.

3.6 Introduction to Environmental Analysis

As previously discussed in Chapter 1, Chapters 4 through 20 contain a discussion on the potentially significant effects of the recommended plan and its alternatives. Each of these chapters corresponds with a specific resource area. To assist the reader in comparing information about the various environmental issues, each resource chapter is organized in the following manner:

- Environmental setting
- Regulatory setting
- Impact methodology and assumptions
- Thresholds of significance
- Impacts and mitigation measures
- Residual impacts

Significant cumulative impacts for each environmental resource area are summarized in Chapter 21. The recommended plan and its alternatives are compared to the CEQA and NEPA baselines. They are then evaluated relative to each other based on anticipated impacts for each resource area to determine the environmentally preferred and environmentally superior alternative. The CEQA and NEPA baselines and their application to analysis of potential impacts are explained in detail in Chapter 1.

3.6.1 Methodology Used in This Environmental Analysis

In evaluating the potential impacts of the recommended plan and its alternatives, the level of significance is determined by applying the thresholds of significance presented in each resource area. All of the program and project elements were initially evaluated through a Preliminary Screening Analysis (Appendix 1-A) and were designated as no impact, less than significant impact, or potentially significant impact. The environmental analyses in Chapters 4 through 20 include a detailed discussion and final impact determination for all program and project elements that were determined to have a potentially significant impact during preliminary screening. Program and project elements that were deemed to have no impact or a less than significant impact in the Preliminary Screening Analysis are discussed in detail in Appendix 1-A.

3.6.2 Terminology Used in This Environmental Analysis

The following terms are used to describe each impact:

- **No impact.** A designation of no impact is given when no adverse changes in the environment are expected.
- **Less than significant impact.** A less than significant impact is identified when the recommended plan or alternatives would cause no substantial adverse change in the environment (i.e., the impact would not reach the threshold of significance).

- **Significant impact.** A significant (but mitigable or avoidable) impact is identified when the recommended plan or alternatives would create a substantial or potentially substantial adverse change in any of the physical conditions within the affected resource area. Such an impact would exceed the applicable significance threshold established by CEQA and NEPA, but would be reduced to a less than significant level by application of one or more mitigation measures.
- **Significant unavoidable impact.** A significant unavoidable impact is identified when an impact that would cause a substantial adverse effect on the environment could not be reduced to a less than significant level through any feasible mitigation measure(s).
- **Mitigation.** Mitigation refers to measures that would be implemented to avoid or lessen potentially significant impacts. Mitigation includes:
    - Avoiding the impact altogether by not taking a certain action or parts of an action
    - Minimizing the impact by limiting the degree or magnitude of the action and its implementation
    - Rectifying the impact by repairing, rehabilitating, or restoring the affected environment
    - Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action
    - Compensating for the impact by replacing or providing substitute resources or environments

  The mitigation measures would be proposed as a condition of plan approval and would be monitored to ensure compliance and implementation.
- **Residual impacts.** Residual impacts are the level of impact after the implementation of mitigation measures.