2 ALTERNATIVES

The NEPA (40 CFR 1502.14[a]) and CEQA Guidelines (PRC 15126.6) require that an EIS and an EIR, respectively, describe a range of reasonable alternatives to the Proposed Project, or to the location of the Proposed Project, that could feasibly attain most of the basic objectives of the Proposed Project but would avoid or considerably lessen any significant environmental impacts. Additionally, Section 404(b)(1) guidelines require the approval of only the Least Environmentally Damaging Practicable Alternative (LEDPA), where 'practicable' is defined in terms of cost, logistics, and existing technology that still meets the overall project purpose. The Section 404(b)(1) guidelines focus on impacts to the aquatic environment from discharges of dredged or fill material in waters of the United States. The scope of the 404(b)(1) analysis is narrower than that of the NEPA analysis, and may reach different conclusions regarding the practicability of an alternative. The alternatives evaluated in this Draft SEIS/SEIR support the requirements of the Clean Water Act (CWA).

Alternatives for an EIS and EIR usually take the form of no action, reduced project size, different project design, or suitable alternative project sites (40 CFR 1502.14[c]). The range of alternatives discussed in an EIS need not be beyond a reasonable range (40 CFR 1502.14[a]). An EIR is governed by the "rule of reason" that requires the identification of only those alternatives necessary to permit a reasoned choice between the alternatives and the Proposed Project (14 CFR 15126.6[f]). An EIS and an EIR need not consider an alternative that would be infeasible. CEQA Guidelines 15126.6 explains that the evaluation of project alternative feasibility can consider "site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries, and whether the proponent can reasonably acquire, control or otherwise have access the alternative site." Additionally, an EIR is not required to evaluate an alternative if effects could not be reasonably identified, or if implementation is remote or speculative, and that would not achieve the basic project objectives.

The USACE policy is based on the Economic and Environmental Principles and Guidelines for Water and Land Related Resources Implementation Studies (P&G) adopted by the U.S. Water Resources Council. The P&G provides the framework for water resources planning studies within which USACE seeks to balance economic development and environmental impacts of proposed projects. Emphasis is placed on using an integrated method and assessing a full range of alternatives in developing water resource projects. The P&G states that the plan recommending federal action is to be the plan with the greatest net national economic benefit consistent with protecting the environment (the National Economic Development [NED] plan).

2.1 Alternatives Considered but Eliminated from Detailed Study

The following alternatives were considered but were eliminated from detailed analysis in this Draft SEIS/SEIR:

1. Intermodal Transportation Alternative
2. Increased Use of Lighter Aboard Ships Alternative
3. Locks Alternative
4. Channel Deepening to Depths Shallower than -33 Feet MLLW or Deeper than -35 Feet MLLW and Selective Widening Alternative

2.1.1 Intermodal Transportation Alternative

Intermodal transportation is the movement of freight using multiple modes of transportation (rail, ship, and truck), without any handling of the freight itself when changing modes. This method reduces cargo handling and thereby improves security, may reduce damages and loss, and may allow freight to be transported faster. The Intermodal Transportation Alternative would promote the use of existing terminal facilities at San Francisco Bay area and other west coast ports to handle the oceangoing cargo that cannot be moved efficiently in the existing 30-foot-deep SRDWSC. Under the Intermodal Transportation Alternative, deeper water ports would be used both for topping-off and lightening operations and for stockpiling and processing large volumes of bulk commodities moving to and from the tributary areas served by the SRDWSC. Movement of commodities from deep-water ports to points inland would be by truck.

The cost of transporting goods by truck is significantly higher than the cost of transporting goods via ship. The economies of scale involved create a very strong incentive for shippers to use ships as much as possible. In order for this alternative to be a reasonable alternative to ongoing shipping practices, USACE estimates a 100-fold increase in traffic on the SRDWSC would need to occur. This alternative would only be reasonable or viable if use of the SRDWSC was foreclosed due to either navigation hazards or traffic issues. In addition, the number of trucks placed on streets and highways would likely significantly adversely impact traffic and air quality in several communities.

At its present depth, the SRDWSC can accommodate a significant increase in vessel traffic. Given that such an increase is unrealistic, this alternative is too speculative for consideration, would not result in transportation cost savings to the Port, and, therefore, would not meet the project purpose and need.

2.1.2 Increased Use of Lighter Aboard Ships Alternative

The Lighter Aboard Ship (LASH) transportation system involves carrying cargo aboard ships in lighters or barges. The lighters, which may be loaded at ports with LASH facilities, are

transported to the LASH mother ship and loaded aboard by a heavy-duty shipboard gantry crane. Mother ships are capable of transporting 64 to 89 lighters. The LASH system was developed in the 1960s as an alternative and supplement to the developing container system. In the 1970s, LASH service was provided to the Port from the Port of San Francisco's Pier 96. Containerization proved to be difficult competition for the LASH system and the Port of San Francisco has since discontinued LASH service.

Currently, there are no facilities servicing LASH transportation at the Port or at other nearby ports. Without facilities in place, the LASH system would not provide transportation cost savings to the Port and, therefore, would not meet the project purpose and need.

2.1.3 Locks Alternative

The Locks Alternative would involve constructing a system of hydraulic locks to control water levels in the SRDWSC. As part of the Locks Alternative, USACE anticipates approximately 60 locks would be required between RMs 5.0 to 35.0. A ship traversing the SRDWSC to call on or depart the Port would pass through a series of interconnected locks that would maintain a water depth of 35 feet. As the ship passes from and enters a given segment of the locks, water would be pumped into the locks from up- and downstream segments. This pattern would continue until the ship reaches RM 35.0, where the SRDWSC is currently maintained at a depth of 35 feet. Under the Locks Alternative, it would take a ship approximately 11 hours to access the Port from RM 0.0.

To construct the necessary 60 hydraulic locks over the 30-mile span in the SRDWSC, a significant amount of permanent fill below the MLLW line would be required. In comparison, the Proposed Project and the -33 Feet MLLW Alternative would not result in any permanent fill below MLLW. Preliminary cost estimates for the Locks Alternative are in the range of $0.4 to 2 billion (plus annual operating expenses of $100 to 200 million), making it significantly more expensive than the Proposed Project. Further, this alternative would require a significant water source (perhaps more than available for the already over-committed Sacramento River), and would impart significant adverse impacts on aquatic species, including threatened and endangered species, due to construction and operation. For these reasons, this alternative was eliminated from co-equal analysis in the Draft SEIS/SEIR.

2.1.4 Channel Deepening to Depths Shallower than -33 Feet MLLW or Deeper than -35 Feet MLLW and Selective Widening Alternative

The USACE also considered deepening the SRDWSC to alternate depths. The results of the cost/benefit analyses for dredging to depths of 31 and 32 feet indicate that transportation cost savings would not be optimized; therefore, these alternatives would not achieve the project

purpose and need or objectives. The USACE previously considered deepening the SRDWSC to depths deeper than 35 feet MLLW (i.e., -37, -40, and -45 feet MLLW); however, these depths were eliminated because Reach 5 was already deepened to -35 feet MLLW and because deeper depths are not desired by the non-federal sponsor and would require a re-evaluation of the previously authorized project.

2.2 Alternatives Evaluated

This section provides descriptions of the following three project alternatives that are evaluated in this Draft SEIS/SEIR:

1. Future without Project Conditions (NEPA and CEQA baseline)
2. Channel Deepening to -35 Feet MLLW and Selective Widening Alternative (Proposed Project and the agency proposed alternative) – Reevaluation of the Congressionally approved proposed action to dredge to -35 feet MLLW (with an additional 2-foot overdepth; provisional benefit-to-cost ratio: 2.93; net benefits: $16 million; Appendix E[4])
3. Channel Deepening to -33 Feet MLLW and Selective Widening Alternative (-33 Feet MLLW Alternative) – Dredging to -33 feet MLLW (with an additional 2-foot overdepth; provisional benefit-to-cost ratio: 2.70; net benefits: $10 million; Appendix E)

Based on existing guidance and case law, it has been determined that Future without Project Conditions, the Proposed Project, and the median channel depth of the -33 Feet MLLW Alternative are sufficient for the concise and reasonably accurate analysis of impacts, consistent with NEPA and CEQA regulations, as well as formal Council on Environmental Quality (CEQ) guidance.

As part of the Draft Limited Reevaluation Report (LRR) and USACE's *With-Project Economics Analysis*, an optimization analysis was conducted on a range of potential depths at 1-foot intervals from the SRDWSC's existing depth to the authorized depth of 35 feet. Depths greater than 35 feet were not included in the analysis for the reasons outlined in Section 2.1.4. The intent of this analysis was to reaffirm the federal interest in completing the remainder of the previously-authorized project and to verify that net national economic benefits would not be maximized at a shallower depth. Based on the optimization analysis, it was determined that the Proposed Project's depth of 35 feet yields the greatest net national economic benefits for the range of channel depths considered; however, given the limited scope of the Draft LRR, it is not clear whether this depth also reasonably maximizes net national economic benefits (i.e., net national economic benefits appear to still be increasing

[4] The *With-Project Economic Analysis* is currently under review; thus, the benefit-to-cost ratio is subject to change.

at -35 feet MLLW and could be maximized at a greater depth).

In accordance with USACE policy, because deeper depths were not analyzed in the Draft LRR, the Proposed Project cannot be designated as the NED plan. USACE policy provides for a categorical exemption from the requirement to recommend the NED plan for channel deepening studies where the non-federal sponsor has identified constraints on channel depths. The Proposed Project meets the criteria for this categorical exemption. The requirement to consider depths deeper than those desired by the non-federal sponsor can be removed, and if the Proposed Project is economically justified with higher net benefits than shallower analyzed depths, it can be recommended for full federal participation without the requirement to analyze deeper depths to identify the NED plan (ER 1105-2-100). The USACE policy compliance review of the Draft LRR is in progress; as such, the findings, conclusions, and recommendations contained in the Draft LRR are provisional. While it is expected that the Proposed Project will remain the agency proposed alternative, it is possible that an alternative with a lesser depth may be selected. If that were to occur, then potential environmental impacts will be similar but less than the impacts of the Proposed Project.

This Draft SEIS/SEIR also includes a detailed analysis of dredged material placement site feasibility, which is discussed in Section 2.3. Ten sites were ultimately selected for further evaluation for the Proposed Project to ensure sufficient disposal capacity for the anticipated dredged material volume (approximately 9.9 million cubic yards [cy]; Figure 2), with only seven of those sites included in the -33 Feet MLLW Alternative because of lower capacity requirements for the shallower dredge depth (approximately 5.2 million cy; Figure 4). Although all proposed dredged material placement sites were determined to be stockpile sites with potential for immediate beneficial use of the stockpiled material (Section 2.3), the availability for beneficial reuse will be based on the feasibility of access and users within reasonable distances. As stated above, the SEIS/SEIR also supports a LEDPA determination under Section 404(b)(1).

2.2.1 Environmental Baseline

Under NEPA and the CEQ NEPA implementing regulations (40 CFR 1500 et seq.), federal agencies are required to "include the alternative of no action" in an EIS alternatives analysis. A no federal action alternative is defined by CEQ as a consideration of the environmental consequences of not undertaking the proposed action, compared with the effects of permitting the proposed action or an alternative activity. The analysis of a no federal action alternative provides decision-makers with a benchmark, enabling a comparison of the magnitude of environmental effects of the action alternatives. This comparison provides evidence that the need is real and that it was thoroughly considered and appropriately and adequately answered. The no federal action alternative, or NEPA baseline, is presented in

this SEIS/SEIR as Future without Project Conditions, which forecasts the estimated conditions likely to be present within the SRDWSC study area over the next 50 years in the absence of the Proposed Project. Future without Project Conditions thus consists of a continuation of present shipping practices with no improvements to the SRDWSC other than normal channel maintenance.

Similar to a no federal action alternative under NEPA, CEQA requires the consideration of a no project alternative (14 California Code of Regulations [CCR] 15126.6[e]). Section 15125 of the CEQA Guidelines requires EIRs to include a description of the baseline conditions that exist at the time of the Notice of Preparation (NOP), which was June 18, 2008. Thus, the CEQA baseline is represented by the environmental, operational, physical, and economic conditions; ongoing maintenance dredging; and shipping practices in 2008.

For purposes of the evaluations in this SEIS/SEIR, the NEPA and CEQA baselines are considered equivalent because both cases represent a continuation of present shipping and maintenance practices on the SRDWSC. Thus, a single assessment of impacts and their significance is presented in Section 3. A description of Future without Project Conditions (NEPA and CEQA Baseline) is provided in Section 2.2.1.1. Impacts of the Proposed Project and -33 Feet MLLW Alternative are compared against the environmental baseline in Section 3.

2.2.1.1 Future without Project Conditions (NEPA and CEQA Baseline)

Future without Project Conditions consists of a continuation of present shipping and maintenance practices and estimated conditions likely to be present within the study area over the next 50 years with no improvements to the SRDWSC other than normal channel maintenance.

2.2.1.1.1 Forecasted Growth in Commodity Throughput to the Port

Increases in cargo throughput are forecasted to occur under Future without Project Conditions based on demands of the national and foreign economies. According to the USACE *With-Project Economics Analysis*, the commodities that are forecasted to move through the Port over the next 50 years include rice, urea, anhydrous ammonia, cement, power-generating equipment, biofuels, wood pellets, scrap metal, and potentially slag[5] (Appendix E; USACE 2011). Commodity throughput forecasts made in the USACE *With-Project Economics Analysis* are summarized in Table 2 and described in detail below. All growth is forecasted to level off after 2036 due to uncertainty beyond that point.

[5] Fertilizer is a historical commodity at the Port; however, the Port's main fertilizer importer relocated elsewhere in 2010. As such, projections for future fertilizer imports are not provided in the *With-Project Economics Report*.

Table 2
Forecasted Commodity Imports

Year	Ammonia	Urea	Cement[a]	Biofuels[b]	Scrap Metal	Wood Pellets
2010	63,200	124,652	97,696	0	0	0
2016	63,200	124,652	223,678	375,563	324,452	150,000
2021	63,200	124,652	253,072	549,041	408,210	150,000
2026	63,200	124,652	286,327	704,075	513,591	150,000
2036	63,200	124,652	357,584	1,101,649	776,493	150,000
2065	63,200	124,652	357,584	1,101,649	776,493	150,000

Notes:
All units are in metric tons
a Assumes that the new facility begins importing 100,000 metric tons in 2012, and has an annual throughput growth rate of 2.5%
b Assumes re-permitting occurs that increases the annual throughput growth rate

Rice – Rice exports from the Port were relatively constant over the past 20 years, with a yearly average of approximately 320,000 metric tons (MT). Most rice is exported to Japan, where import facilities restrict the size of individual shipments to just less than 13,000 MT. A small number of rice shipments are exported to South Korea, where import facility constraints limit the size of individual shipments to 20,000 MT. As such, the majority of the rice shipped from the Port leaves in shipments of 13,000 MT and a smaller amount leaves in shipments of 20,000 MT. The USACE *With-Project Economics Analysis* did not forecast the future throughput of rice because it represents a commodity that would not benefit from a deeper channel, unlike other commodities described below and in Sections 2.2.2.5 and 2.2.3.5; however, rice shippers would benefit from the improved navigational safety of a widened SRDWSC. Rice exports are, and will continue to be, an important source of business for the Port.

Power-Generating Equipment – The Port has imported wind power-generating equipment since 2003. Annual throughput of power-generating equipment has ranged from less than 3,500 MT to 25,000 MT with no discernible trend in growth. The amount of power-generating equipment that can fit on a vessel is not heavy enough to cause the vessel to require deeper depths. The USACE *With-Project Economics Analysis* did not forecast the future throughput of power-generating equipment because it represents a commodity that would not benefit from a deeper channel, unlike other commodities described below and in Sections 2.2.2.5 and 2.2.3.5; however, wind power-generating equipment shippers would benefit from the improved navigational safety of a widened SRDWSC. Power-generating equipment imports to the Port are, and will likely continue to be, an important source of business for the Port.

Anhydrous Ammonia and Urea – Anhydrous ammonia (ammonia) and urea were

independently imported to the Port since 1982. Because annual import volumes were relatively constant—at around 63,200 MT for ammonia and 124,652 MT for urea per year—for the past 25 years, it is estimated that they will continue to be imported at about the same rates in the future. Ammonia and urea are important to the agricultural industry as fertilizers.

Cement – Cement imports to the Port began in 2003 and have fluctuated between 70,000 MT and 200,000 MT annually at the existing facility, which is permitted to handle 800,000 MT per year (but has the capacity to handle an additional 600,000 to 1.2 million MT per year, assuming its existing permits are amended). The USACE *With-Project Economics Analysis* forecasts the annual growth rate for cement at the Port to be 2.5%. However, when a separate cement company opens its currently idle import facility, which is permitted to import cement and aggregate, forecasted throughput of cement would increase significantly. According to company representatives, the minimum annual amount that the facility would import would be 100,000 MT. It is uncertain when this facility would begin operations, due to the recent economic downturn that caused a decrease in domestic demand for cement.

Biofuels – Construction of a new alternative fuels facility at the Port is expected to be completed by the end of 2011. All permits for construction and operation of this facility were obtained, and the operators and owners of the facility signed a long-term lease for the Port land on which they are permitted to construct. Raw biofuels would be imported by oil companies intending to mix the fuels with gasoline and diesel to meet California's renewable fuel standards that take effect in 2010. Current facility permitting allows for a maximum import of 540,000 tons of raw materials (to be used for the production of biofuels) per year. It is expected that the first year of facility operations will be 2012, during which roughly half the currently permitted capacity, or 270,000 MT, of raw material will be imported. The USACE *With-Project Economics Analysis* forecasts the annual growth rate for biofuels at the Port to be 8.6% until 2020 and 5.1% until 2035. It is likely that a re-permitting of the facility to allow for additional imports would occur, due to state fuel mandates and the resulting demand for alternative fuels. As such, USACE has forecasted for the growth of biofuels production assuming a re-permitting effort.

Scrap Metal – A metal recycling and shredding facility is expected to begin operating at the Port in 2011. Acquisition of all necessary permits for construction and operation is underway and business operators have engaged in negotiations for a lease with the Port. The facility will use regional metal waste and grind it into scrap metal for exportation to Brazil, Russia, India, and China, where it will be used in the production of steel. The USACE expects the first year of operation of the facility to result in exports of 270,000 MT and forecasts the growth in scrap metal exports to be 4.7% annually (USACE 2011).

Wood Pellets – A new wood pellet production plant is expected to begin operations at the Port in 2012. Acquisition of all necessary permits for construction and operation is underway. Construction is expected to begin in 2011 and be complete by 2012. The USACE and facility operators expect initial exports to be 150,000 MT annually starting in 2013 and to continue at those levels into the future. Wood pellets offer an environmentally friendly substitute for coal in energy production.

Slag – The most recent business to consider entering into a contractual agreement with the Port is an importer of raw and crushed slag (a byproduct of steel production) for the production of an environmentally-sustainable cement alternative. Although the facility's construction has not been confirmed, business representatives have indicated that the Port's existing infrastructure, location, and permitting process make it an attractive choice. The 2-year permitting process makes 2012 the earliest year that operations could begin. If constructed, the maximum annual throughput of the facility would be 750,000 MT. Due to the uncertainty surrounding this development, no forecasts were made for slag.

2.2.1.1.2 Forecasted Change in Vessel Numbers and Fleet Mix

The growth forecasted to occur at the Port under Future without Project Conditions would result in both an increased number of vessels and a different mix of vessels calling on the Port. The USACE's *With-Project Economics Analysis* did not estimate future vessel calls. Estimates for future vessel calls were determined based on forecasted commodity throughput, vessel size and fleet mix. The fleet mix for each vessel type and class was scaled by throughput and vessel payload. The payload represents the weight of commodity that can be loaded on a vessel such that the vessel still clears the available draft of the channel. The estimated change in the number of vessels calling on the Port is displayed in Table 3.

Table 3
Estimated Change in Vessel Numbers under Future without Project Conditions

Year	Vessel Type			
	Bulk Carrier	General Carrier	Tanker	Total
2011	45	9	4	58
2012	50	9	23	82
2013	56	9	25	90
2015	59	9	29	97
2018	64	9	35	108
2023	70	9	41	120
2028	78	9	41	128
2033	87	9	41	137
2053	93	9	41	143
2062	93	9	41	143

The USACE and the Port have recorded data on vessel calls to the Port between 1997 and 2009 (USACE 2010c). The fleet of vessels calling on the Port is heavily weighted toward bulk carriers with design drafts greater than 30 feet. Of the 684 vessel calls at the Port between 1997 and 2009, 559 were bulk carriers[6]. The majority of bulk carriers calling on the Port from 1997 to 2000 were 40,000 deadweight tonnage (DWT) or greater; however, the majority vessel class later shifted to the 25,000 DWT class, likely due to decreased business at the Port. Thus, economic conditions influence the size of vessels transporting cargo to the Port. A deeper channel would allow larger ships and, thereby, improved economies of scale. Table 4 presents the forecasted classes of the bulk carrier fleet mix under Future without Project Conditions.

Table 4
Bulk Carriers – Forecasted Fleet Mix under Future without Project Conditions

DWT Class	Percentage of Fleet
15,000 DWT	3
25,000 DWT	35
35,000 DWT	9
40,000 DWT	38
50,000 DWT	15
60,000 DWT	0

General cargo carriers, which transport smaller shipments of the breakbulk cargo consisting of packaged goods and cargo, represent the next largest proportion of vessel calls at the Port from 1997 to 2009. Of the 684 vessel calls at the Port between these years, 106 were general cargo carriers. The *With-Project Economics Analysis* does not forecast an increase in general cargo carriers under Future without Project Conditions because the commodities expected to realize transportation cost savings would not ship on general carriers. Table 5 presents the classes of the general carrier fleet mix currently calling on the Port, which is likely to be the same under Future without Project Conditions.

Table 5
General Carriers – Forecasted Fleet Mix under Future without Project Conditions

DWT Class	Percentage of Fleet
11,000 DWT	3
14,000 DWT	10
16,000 DWT	17
20,000 DWT	10
24,000 DWT	55
30,000 DWT	5

[6] Only 3 years of data on tanker calls were available for inclusion.

Tankers represent the smallest proportion of vessel calls to the Port, with an average of six vessels per year[7]. Nearly all tankers are in the 25,000 DWT class. Table 6 presents the forecasted classes of the tanker fleet mix calling on the Port under Future without Project Conditions.

Table 6
Tankers – Forecasted Fleet Mix under Future without Project Conditions

DWT Class	Percentage of Fleet
20,000 DWT	0
25,000 DWT	95
35,000 DWT	5
50,000 DWT	0
60,000 DWT	0

Of all vessels forecasted to call on the Port, all but the smallest class of the general carriers (11,000 DWT) have maximum design drafts greater than 30 feet, which means that nearly all vessels calling on the Port under Future without Project Conditions would not be loaded to capacity. As discussed in Section 2.2.1.1.1, vessels carrying rice and power-generating equipment are commonly not loaded to capacity. It can be assumed that vessels carrying all other forecasted commodities and calling on the Port would be light-loaded. Larger vessels carrying other commodities may continue to experience delays in accessing the Port during low tides due to lower water levels in the SRDWSC. In some cases, 40,000 and 50,000 DWT bulk vessels may wait up to 9.5 hours and tankers may wait up to 12 hours for the next high tide before waters are deep enough to access the Port.

2.2.1.1.3 Ongoing Maintenance Dredging and Bank Stabilization

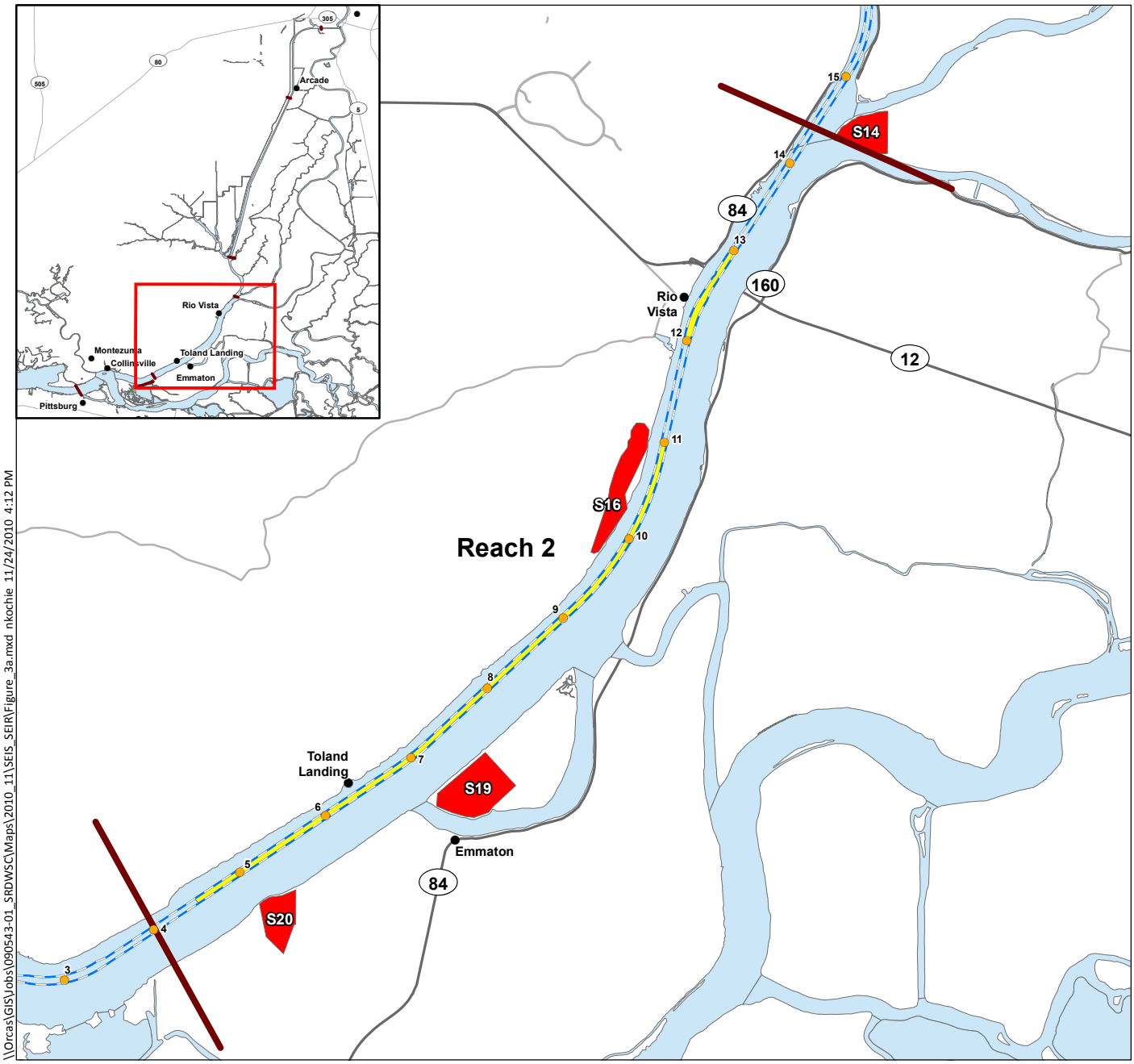
To accommodate ongoing shipping practices, it is assumed that regular operations and maintenance dredging of the SRDWSC would continue on an almost annual, as-needed basis. Maintenance dredging occurred in portions of the SRDWSC in 11 of the past 15 years (from 1995 to 2009), with dredged material volumes ranging from 35,000 to 815,000 cy, averaging just less than 190,000 cy per maintenance dredging event. In some of these years, maintenance dredging was needed in areas of the SRDWSC, but could not be conducted due to delays in receiving environmental approvals and/or the closing of work windows. The portions of the SRDWSC dredged for maintenance purposes over the past decade include river miles (RMs) 4.5 through 13.0, RMs 29.4 through 37.7, and RMs 42.6 through 43.6. Other areas are not maintenance dredged because they are naturally deeper than 30 feet.

[7] Vessel counts of tankers were only available from 2006 to 2008, during which 19 tankers called on the Port. However, those years provide an accurate representation of the average tanker traffic and tonnages that have passed through the Port over the past 2 decades (USACE 2010c).

Material from these dredging events was placed at sites S1, S14, S16, S19, S20, and S31 (see Section 2.3.3 for descriptions of these sites). On average, maintenance dredging and placement activities take approximately 1.5 months annually to complete. Figure 3 shows maintenance dredging areas and dredged material placement sites that were used over the past 15 years. It is assumed that under Future without Project Conditions, regular maintenance dredging of approximately 190,000 cy per event would occur from about RMs 4.5 to 13.0, RMs 29.4 to 37.7, and/or RMs 42.6 to 43.6, with dredged material likely to be placed at dredged material placement sites S1, S14, S16, S19, S20, and S31. The anticipated annual duration of maintenance dredging and placement activities under Future without Project Conditions would be approximately 1.5 months. During maintenance dredging events, the contractor would communicate regularly with the Port, bar pilots, the U.S. Coast Guard, and the California Department of Transportation (Caltrans) to ensure that dredging activities would not block commercial vessel traffic en route to the Port or the Rio Vista/Ryer Island Ferry operations.

Programmatic work windows are established for maintenance dredging of the SRDWSC. The established National Marine Fisheries Service (NMFS) SRDWSC maintenance dredging work window for salmonids is June 1 through February 27; dredging is restricted to the man-made portion of the channel only beginning December 1 (NMFS 2006). The established U.S. Fish and Wildlife Service (USFWS) SRDWSC maintenance dredging work window for delta smelt (*Hypomesus transpacificus*) is August 1 to November 30 (USFWS 2008c). There is no established California Department of Fish and Game (CDFG) programmatic maintenance dredging work window for longfin smelt (*Spirinchus thaleichthys*) in the SRDWSC; however, CDFG has restricted other in-water work in the SRDWSC to August 1 through October 31.

In addition to regular maintenance dredging of the SRDWSC, bank stabilization activities were also authorized in the past. According to the *Sacramento Deep Water Ship Channel Maintenance Dredging and Bank Protection Biological Opinion* (NMFS 2006), SRDWSC bank stabilization activities are limited to the period of June 15 to November 30, with all in-water work limited to the period of June 15 to September 30. All work is limited to the banks of the man-made portion of the SRDWSC, upstream of approximately RM 18.6. Rock placement is only authorized where there is a need for additional rock due to bank erosion. Though bank stabilization activities were included in the Biological Opinion as an activity that may occur annually, they have occurred only once (in 2009) since the Biological Opinion was issued in 2006, and did not occur prior to that since the 1990s (Boedtker, pers. comm. 2010). Therefore, under Future without Project Conditions, placement of maintenance rock could conservatively be expected to occur once every 5 years.



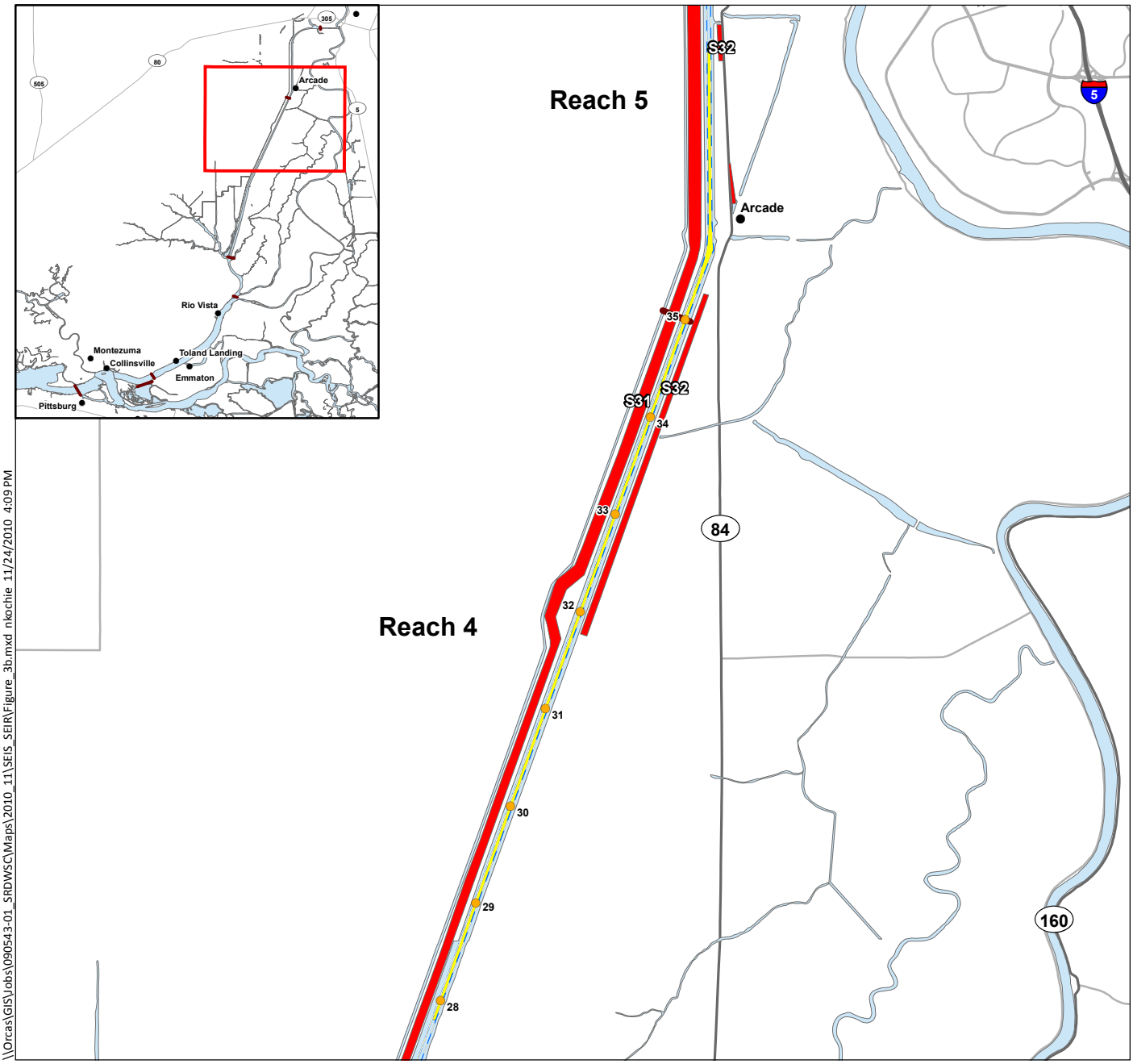
- City
- Port
- River Mile
- Reach Extent
- Major Roads
- Existing Channel
- Maintenance Dredging Areas (1995-2009)
- Placement Sites for Maintenance Dredging Areas (1995-2009)
- Delta/Marsh Waters

NOTE:
Figure shows all maintenance dredging areas from the past 15 years. Based on USACE maintenance dredging statistics between 1995 and 2009, a smaller portion from within the 18.5 miles of river shown on the figure is dredged to remove approximately 190,000 cy of material on average each year.

Miles
0 0.75 1.5

N

Figure 3a
Future without Project Conditions Footprint
SEIS/SEIR
Sacramento River Deep Water Ship Channel



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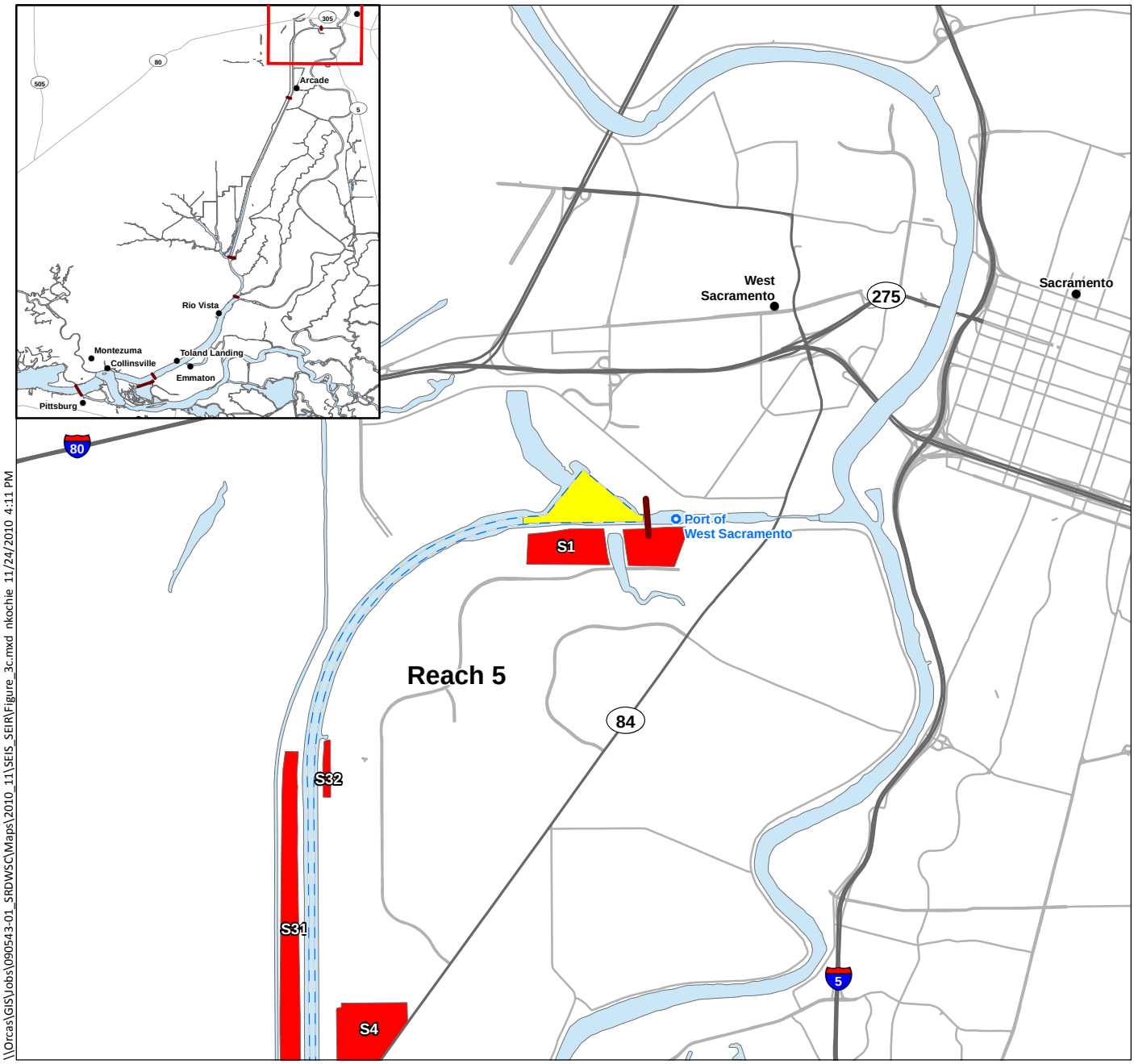
- City
- Port
- River Mile
- Reach Extent
- Major Roads
- Existing Channel
- Maintenance Dredging Areas (1995-2009)
- Placement Sites for Maintenance Dredging Areas (1995-2009)
- Delta/Marsh Waters

NOTE:
Figure shows all maintenance dredging areas from the past 15 years. Based on USACE maintenance dredging statistics between 1995 and 2009, a smaller portion from within the 18.5 miles of river shown on the figure is dredged to remove approximately 190,000 cy of material on average each year.

Miles
0 0.75 1.5

N

Figure 3b
Future without Project Conditions Footprint
SEIS/SEIR
Sacramento River Deep Water Ship Channel



- City
- Port
- River Mile
- Reach Extent
- Major Roads
- Existing Channel
- Maintenance Dredging Areas (1995-2009)
- Placement Sites for Maintenance Dredging Areas (1995-2009)
- Delta/Marsh Waters

NOTE:
Figure shows all maintenance dredging areas from the past 15 years. Based on USACE maintenance dredging statistics between 1995 and 2009, a smaller portion from within the 18.5 miles of river shown on the figure is dredged to remove approximately 190,000 cy of material on average each year.

Miles
0 0.5 1

N

Figure 3c
Future without Project Conditions Footprint
SEIS/SEIR
Sacramento River Deep Water Ship Channel

2.2.2 Proposed Project: Channel Deepening to -35 Feet MLLW and Selective Widening

2.2.2.1 Dredging Operations

The Proposed Project involves the selective widening and deepening of the SRDWSC from Reaches 1 through 4 to -35 feet MLLW, completing the construction that was suspended in 1990. It also includes maintenance dredging of the SRDWSC in Reach 5, which is described further below. The USACE initially developed the Proposed Project's design in support of the 1986 Supplemental EIS, and later modified it based on simulation studies performed in 1987 and 1988 at the Department of the Army (DA) Waterways Experiment Station (later renamed Engineer Research and Development Center [ERDC]). The design modification resulted in a reduction of the amount of material to be dredged from 21.5 million to 6.3 million cy (excluding overdepth). ERDC verified the channel design with an additional simulation study, *Navigation Study for Sacramento Deep Water Ship Channel Improvement Data Report,* conducted in 2010 and included as Appendix F (Webb and Sturm 2010).

Although Reach 5 (RMs 35.0 to 43.4) of the SRDWSC was already deepened to -35 feet MLLW in the two construction contracts carried out in 1989 and 1990, a significant amount of material has since accumulated that has not otherwise required removal. Under the Proposed Project, this material would require removal. Dredging Reach 5 is a dependent action of, and thus part of, the Proposed Project. All other areas where material has accumulated to depths shallower than 30 feet MLLW (that would otherwise be considered a maintenance dredging obligation) would also be dredged as part of the Proposed Project. As shown in Figure 2, some portions of the SRDWSC are already deeper than -35 feet MLLW. If new shoaling occurs in these areas in the future, they would be maintained to the authorized depth, as well. In addition to deepening the SRDWSC, the Proposed Project includes selective widening throughout the channel to improve navigational safety and is based on ship simulation studies conducted in 1987, 1988, and 2010, as well as San Francisco bar pilot recommendations. The portions of the SRDWSC that would be widened under the Proposed Project are detailed in Table 7 (Webb and Sturm 2010).

Table 7
Existing and Proposed SRDWSC Dimensions

Reach	River Miles	Existing		Proposed	
		Width (feet)	Slope	Width (feet)	Slope
Reaches 1, 2, and 3	0.00 to 15.00	300	1V:4H	350	1V:4H
Reach 3	15.00 to 18.60	300	1V:3H	300	1V:3H
Reach 4	18.60 to 21.42	200	1V:3H	200	1V:3H
	21.42 to 21.62	200	1V:3H	250 (curve)	1V:3H
	21.62 to 25.65	200	1V:3H	200	1V:3H
	25.65 to 26.11	200	1V:3H	250 (curve)	1V:3H

Reach	River Miles	Existing		Proposed	
		Width (feet)	Slope	Width (feet)	Slope
Reaches 4 and 5	26.11 to 35.45	200	1V:3H	200	1V:3H
Reach 5	35.45 to 35.88	200	1V:3H	250 (curve)	1V:3H
	35.88 to 40.16	200	1V:3H	200	1V:3H
	40.16 to 43.37	200	1V:3H	250 (curve)	1V:3H

The dredged material volume associated with selectively widening and deepening the SRDWSC to a depth of 35 feet MLLW is 6.3 million cy without overdepth, including the volume previously authorized for dredging in 1986 and the sediment that has since accumulated according to the most recent bathymetric survey data. A total dredged material volume of 8.1 million cy with a 1-foot paid overdepth and just less than 10 million cy with a 2-foot overdepth is anticipated. An overdepth of up to 2 feet would be permitted as part of the Proposed Project; however, to encourage the contractor to dredge as close to -35 feet MLLW as possible, USACE would only pay for up to 1 foot of overdepth, or material dredged as deep as -36 feet MLLW. Therefore, it is unlikely that the contractor would dredge much material between -36 and -37 feet MLLW because they would do so at their own expense.

Table 8 shows the in-situ dredging volumes per reach under the Proposed Project. It specifies the volume of material required for removal to reach a depth of 35 feet, the volume of material in the 1-foot and 2-foot overdepths, and the total volume of material to be dredged per reach, which is reflective of a 2-foot overdepth.

Table 8
Dredging Volumes Per Reach Under the Proposed Project (cy)

Reach	Dredging Volume Required to Reach a Depth of 35 Feet	Volume of 1-Foot Overdepth	Volume of 2-Foot Overdepth	Total Dredging Volume including 2-Foot Overdepth
1	115,000	118,000	236,000	351,000
2	2,443,000	621,000	1,243,000	3,685,000
3	182,000	71,000	142,000	323,000
4	2,452,000	635,000	1,270,000	3,723,000
5	1,127,000	376,000	752,000	1,879,000
Total	6,319,000	1,821,000	3,643,000	9,961,000

Note: Volumes (including totals) are rounded to the nearest 1,000 from more specific engineering values

Dredging would likely be performed using a hydraulic cutterhead suction dredge with a medium discharge pipe, typically a 16-inch-diameter pipe. The dredge would operate 24 hours per day, 7 days per week, during the dredging cycle and would be moved through the SRDWSC by tugboat. Two dredge tenders would be present to pick up and position the dredge's swing anchors and move the dredge short distances. An additional two small skiffs

would be present to transport crews and conduct water quality sampling upstream and downstream of the dredge.

The dredge has two spuds, a digging spud and a fleeting spud. Most of the dredging occurs while the dredge is placed on its digging spud. The cutterhead rotates and has suction capabilities under its own power. The swing anchor, which is placed ahead of the dredge by the dredge tenders, moves the cutterhead back and forth, thus digging into the sediment. After dredging is completed in a given area, the fleeting spud is placed, then the digging spud lifts and places itself until it is at the next area to dredge. When on the fleeting spud, if there is sediment in front of the dredge that needs to be removed, the dredge can remove the sediment or just suck water. The cutterhead transfers the substrate materials through the suction intake to the dredge's centrifugal pump, where both solids and a large volume of water from the surrounding water column are entrained. This material then passes into the flexible discharge pipe, which is attached to a temporary stationary pipe braced to the perimeter of the dredged material placement site. Based on past maintenance dredging events, the slurry that enters the placement sites typically has a solids content of 10 to 15% by weight (NMFS 2006). The pipeline would be placed appropriately to avoid special status species or habitat, may be anchored, and would be marked with buoys and lights to warn boaters of its presence. The contractor would communicate regularly with the Port, bar pilots, the U.S. Coast Guard, and Caltrans to ensure that dredging activities would not block commercial vessel traffic en route to the Port or the Rio Vista/Ryer Island Ferry operations.

As is described in Section 2.2.1.1.3, the most conservative existing maintenance dredging work window in the SRDWSC runs from August 1 to November 30[8]; however, USACE and the Port are currently consulting with NMFS, USFWS, and CDFG to obtain project-specific work windows. Without any work windows in place, construction of the Proposed Project could be completed in approximately 2 years. Under the existing maintenance dredging 4-month work window, construction of the Proposed Project would take approximately 6 years to complete. To avoid the recurrence of environmental impacts, as well as funding uncertainties posed by such a long-term construction period, an annual 6-month work window falling between June 1 and December 31 is requested to construct the Proposed Project. Assuming that a 6-month work window is obtained, the Proposed Project could be constructed in approximately 4 years. This estimate assumes that both federal and state funding sources remain available as needed. If the contractor were to operate two dredges or a larger discharge pipe (i.e., 24-inch diameter), the construction timeframe would be reduced to approximately 2 to 3 years overall.

[8] CDFG programmatic maintenance dredging work windows for longfin smelt are not issued for the SRDWSC; however, CDFG has restricted other in-water work in the SRDWSC to August 1 through October 31.

The USACE is preparing a 20-year Plan for the ongoing navigational maintenance of the SRDWSC and long-term management of the upland dredged material placement sites, which would reflect conditions after deepening the SRDWSC to a depth of 35 feet MLLW. The remaining capacities of the placement sites would be taken into consideration, and the plan would identify methods for recovering capacity at sites proposed for maintenance dredging use in the future. The draft 20-year Plan will be included as part of the Final SEIS/SEIR.

2.2.2.2 Dredged Material Placement Activities

For the Proposed Project, ten dredged material placement sites are proposed to either permanently accommodate or temporarily stockpile dredged sediment for potential future use. These sites and the rationale behind evaluating them in this Draft SEIS/SEIR are described in greater detail in Section 2.3. Table 9 describes the ten proposed placement sites in relation to their proposed use by the Proposed Project, including their approximate locations along the SRDWSC, site-specific in situ proposed dredged material placement volumes, site-specific capacities, and proposed maximum berm heights for each site[9].

Table 9
Dredged Material Placement Site Locations and Capacities for the Proposed Project

Reach	Placement Site	Approximate Location of Dredging In the SRDWSC (RM)	Dredged Material Volume (cy)	Site Capacity (cy)	Maximum Berm Height (feet)
1	S35	0.0 to 4.1	351,000	365,000	8
2	S20	4.1 to 4.6	406,000	407,000	14
	S19	4.6 to 9.6	2,544,000	2,620,000	21
	S16	9.6 to 14.53	473,000	474,000	22
3	S14	14.53 to 16.96	261,000	349,000	17
4	S11	18.75 to 23.25	323,000	447,000	10
	S32	23.25 to 24.25	123,000	173,000	6
	S31	24.25 to 35.5	3,600,000	4,000,000	9
5	S4	32.3 to 34.0	1,550,000	1,616,000	11
	S1	35.5 to 43.5	329,000	659,000	10
Total			9,960,000	11,110,000	

Note: Volumes (including totals) are rounded to the nearest 1,000 from more specific engineering values

2.2.2.3 Wetland Mitigation

Dredged material placement sites were designed to avoid impacts to wetlands and other sensitive habitats to the maximum extent practicable. The portions of each placement site that would be used for placement, while avoiding such impacts, were identified based on

[9] Maximum berm heights represent the highest point of the berm from the lowest elevation within the interior of the site. Due to the varying elevations within placement sites, the maximum berm height is greater than the average berm height.

placement site vegetation and habitat surveys, and are referred to as the "usable portion" of the placement site. Although impacts to wetlands and other sensitive habitats have been minimized to the maximum extent practicable as required, the proposed placement of dredged material and/or berm construction would still result in impacts to wetlands and other habitat types. Mitigation for these impacts is proposed in the form of a wetland preservation project on Prospect Island, further described below.

Prospect Island is located in Reach 3 from approximately RMs 17.0 to 18.8 (Figures 2c and 4c). The portion of the island on which wetland mitigation is proposed is currently owned by the Port. The Port acquired the property when the SRDWSC was originally constructed in 1963. After completing construction of the SRDWSC, the Port sold the northern approximate 1,200 acres, which eventually came under the ownership of the U.S. Bureau of Reclamation (USBR). The property that remained under Port ownership totals approximately 300 acres in size. In the 1990s, USACE completed a study analyzing the creation of habitat throughout the entirety of the 1,200 acres owned by USBR. At that time, the Port did not intend to participate in the habitat creation project with their property adjacent to the USBR land, due to the anticipated continuation of the deepening project and subsequent need for their property as a potential combined dredged material placement and mitigation site.

In March 1995, levees overtopped and washed out along Minor Slough on both the Port and USBR properties, as well as a significant length of the cross-levee separating the Port and USBR properties. Due to a lack of funding, the Port's levee was not repaired until October 1996. In February 1997, the same portions of the levees on the Port and USBR properties, as well as the cross-levee, overtopped and washed out. To fully repair its levee and the cross-levee in dry conditions, USBR repaired the Port's levee in 2000 or 2001 to stop the flow of water onto the island; however, this repair has degraded over time. While it was the intent of the Port to repair its levee and prepare its property for use as a potential combined dredged material placement and mitigation site, lack of necessary funding has prevented this from occurring, and the property remains wet.

Under the proposed mitigation program, the site would remain in its current flooded condition and would be protected in perpetuity as a wetland preservation site offering high quality habitat. The USACE and the Port are consulting with USFWS through the Fish and Wildlife Coordination Act on the use of Prospect Island as a wetland preservation site for the Proposed Project, and the administrative draft Coordination Act Report is included as Appendix D. Under the proposed mitigation program, 9.98 acres of riparian habitat and 1.33 acres of wetland habitat would be preserved, as described in Appendix D.

2.2.2.4 Utility Relocation

The locations and depths of existing utility crossings of the SRDWSC are being confirmed. To date, is has been determined that at least two gas pipelines (Lines 130 and 114) would be in conflict with the depth of the Proposed Project and require replacement; these pipelines are owned by Pacific Gas and Electric (PG&E) and Rosetta Resources. It is possible that another gas pipeline (Line 400) could also require replacement; PG&E and USACE are conducting surveys to identify whether replacement would be necessary. These potential utility relocations are shown on Figure 2, and described below and in the *Draft Utility Investigation Report* (HDR 2010), included as Appendix G. The potential impacts of utility line relocations are discussed in Section 3.3.6.

Line 130 – Line 130 comprises two separate pipelines; both pipelines are in conflict with the dredging footprint of the Proposed Project and would need to be relocated to a lower depth (Thomas 2010a). To access this utility crossing, PG&E proposes to use two 2-acre drilling sites on the west bank of the SRDWSC in Rio Vista (the first is located adjacent to Rio Vista Harbor and the second is just to the south), and three exit and laydown sites on the east bank of the SRDWSC, ranging between 1 and 3 acres. All three east bank access sites are on privately owned agricultural lands (PG&E 2009).

PG&E has identified Line 130 as a segment for longer-term evaluation and planning due to the potential for ground movement to affect the pipeline (e.g., proximity of seismically active areas or potential for soil erosion around the pipeline; PG&E 2010). PG&E will relocate Line 130 to ensure it is not affected by other ground movement concerns.

Line 114 – Line 114 comprises two separate pipelines; both pipelines are in conflict with the dredging footprint of the Proposed Project and would need to be relocated to a lower depth (Thomas 2010a). These pipelines would be replaced with a single pipeline at a lower depth (Thomas 2010a). To access this utility crossing, PG&E proposes to use a drilling site on each bank of the SRDWSC. The west bank drilling site is located adjacent to Toland Road, approximately 1 acre in size, and is on government-owned grazing land adjacent to a wind energy farm. The proposed east bank access site is just less than 2 acres in size and located on privately owned agricultural land (PG&E 2009). PG&E is determining whether the existing, abandoned Line 114 would need to be removed after the new pipeline is installed, or whether it can be covered and left in place non-operationally (Thomas 2010a).

PG&E has identified Line 114 as a segment for longer-term evaluation and planning due to the potential for ground movement to affect the pipeline (e.g., proximity of seismically active areas or potential for soil erosion around the pipeline; PG&E 2010). PG&E will relocate Line 114 to ensure it is not affected by other ground movement concerns.

Line 400 – PG&E is determining whether relocation of Line 400 is required. Confirmation of a depth of 42 feet MLLW could indicate that Line 400 would not need to be relocated under the Proposed Project, but the existing cover could need to be replaced with approximately 2 feet of rock cover. If Line 400 is required to be relocated, it is unlikely that the existing pipeline would need to be removed (Thomas 2010a). PG&E and USACE are conducting surveys to identify whether replacement of Line 400 would be necessary.

Appendix G identifies an additional 14 utilities that could potentially cross the SRDWSC. For these 14 crossings, Appendix G indicates either the known depths of the existing crossings (and hence whether they would likely conflict with dredging required under the Proposed Project) or, as is the case for the majority of the crossings, that more information is needed to determine their depth, current status, and ownership.

Potential impacts to upland construction access areas for utility replacement activities are analyzed as part of the Proposed Project. PG&E would complete all of the utility replacement and removal activities under the Proposed Project, using the following process:

- Establish a construction area in an upland access area.
- Attach a small-diameter pilot bit onto the end of the drill pipe, which would be electronically controlled to ensure proper vertical and horizontal alignment.
- When the pilot bit reaches the exit point, attach a reamer larger than the pipe to be installed to the drill pipe. The reamer would then be pulled back.
- Attach the new pipe to the swivel on the back side of the reamer and pull it into the bore.
- Pump drilling mud into the reamed bore, which will allow for both the transport of the cuttings to a settlement pit and the pipe to be pulled with minimal friction. The drilling mud also provides internal support to the bore.

2.2.2.5 Continuation of Commercial Shipping

As noted in Section 2.2.1.1.1, growth is forecasted to occur at the Port under Future without Project Conditions. Forecasted increases in commodity throughput to the Port would be the same for the Proposed Project as under Future without Project Conditions, only fewer vessels would be needed to carry the same amount of cargo. For the purposes of analyses in this SEIS/SEIR, economic data were used to estimate vessel numbers traversing the SRDWSC under the Proposed Project; vessel count estimates were not included in the USACE *With-Project Economics Analysis*. Assuming that construction of the Proposed Project is completed in 2015, the estimated change in the number of vessels calling on the Port under the Proposed Project is displayed in Table 10.

Table 10
Estimated Change in Vessel Numbers under the Proposed Project

Year	Vessel Type			
	Bulk Carrier	General Carrier	Tanker	Total
2011	45	9	4	58
2012	50	9	23	82
2013	56	9	25	90
2015	40	9	20	69
2018	43	9	24	76
2023	48	9	28	85
2028	53	9	28	90
2033	59	9	28	96
2053	63	9	28	100
2062	63	9	28	100

The USACE *With-Project Economics Analysis* also forecasts the likely fleet mix at the Port under the Proposed Project. Forecasts for bulk carriers and tankers are detailed in Tables 11 and 12, respectively (USACE 2011). General carriers are anticipated to continue to call on the Port under baseline levels, which are shown in Table 5.

Table 11
Bulk Carriers – Change in Forecasted Fleet Mix from Future without Project Conditions to the Proposed Project

Alternative	15,000 DWT	25,000 DWT	35,000 DWT	40,000 DWT	50,000 DWT	60,000 DWT
Future without Project Conditions	3%	35%	9%	38%	15%	0%
Proposed Project	0%	25%	15%	20%	35%	5%

Table 12
Liquid Tankers – Change in Forecasted Fleet Mix from Future without Project Conditions to the Proposed Project

Alternative	20,000 DWT	25,000 DWT	35,000 DWT	50,000 DWT	60,000 DWT
Future without Project Conditions	0%	95%	5%	0%	0%
Proposed Project	0%	75%	20%	5%	0%

2.2.2.6 Relationship to the San Francisco Bay to Stockton Deep Water Ship Channel Plan

As noted in Section 1.5, the San Francisco Bay to Stockton Deep Water Ship Channel Plan (Stockton Deepening Plan) is a Congressionally authorized project being implemented by

USACE, the Port of Stockton, and the Contra Costa County Water Agency. The San Francisco Bay to Stockton Deep Water Ship Channel is maintained to a depth of 35 feet MLLW, 5 feet deeper than the SRDWSC. Despite the shallower depth of the SRDWSC, a number of shippers have recently made long-term leasing commitments and investments in facilities at the Port of West Sacramento, due to its new business model focusing on a wider mix of import/export commodities that allows for more tailoring of Port facilities for and by clients. Therefore, it can be assumed that there is minimal likelihood of these companies moving to the Port of Stockton if the Stockton Deepening Plan was constructed.

The USACE *With-Project Economics Analysis* indicates that the Ports of Stockton and West Sacramento have captured niche markets and are generally not in direct competition with one another. Five commodities overlap between the two ports: rice, wind power-generating equipment, cement, ammonia, and fertilizer products. Import facility constraints limit the size of rice shipments from both the Ports of Stockton and West Sacramento; thus, a deeper channel would offer no advantage for rice exports. Similarly, vessels carrying wind power-generating equipment do not require deeper depths. Although deeper drafts could be used by vessels carrying cement, because a new cement terminal was recently constructed at the Port of West Sacramento, it is reasonable to expect that future cement shipments would be brought through that port rather than the Port of Stockton. Vessels carrying ammonia and fertilizer products to the Port of West Sacramento could benefit from a deeper channel, but shipper representatives have indicated that it is not likely that they would shift to the Port of Stockton.

2.2.3 Channel Deepening to -33 Feet MLLW and Selective Widening Alternative

2.2.3.1 Construction Dredging Operations

The -33 Feet MLLW Alternative is similar to the Proposed Project, except it involves deepening the SRDWSC to -33 feet MLLW and selective widening. Like the Proposed Project, this alternative includes the maintenance dredging required in Reach 5. The -33 Feet MLLW Alternative design includes widening throughout the channel to improve navigational safety and is based on ship simulation studies conducted in 1987, 1988, and 2010, as well as San Francisco bar pilot recommendations (Webb and Sturm 2010). The portions of the SRDWSC that would be widened under the Proposed Project are detailed in Table 7. Figure 4 shows the footprint of the -33 Feet MLLW Alternative, inclusive of dredging locations in relation to the channel bathymetry, and the seven proposed dredged material placement sites.

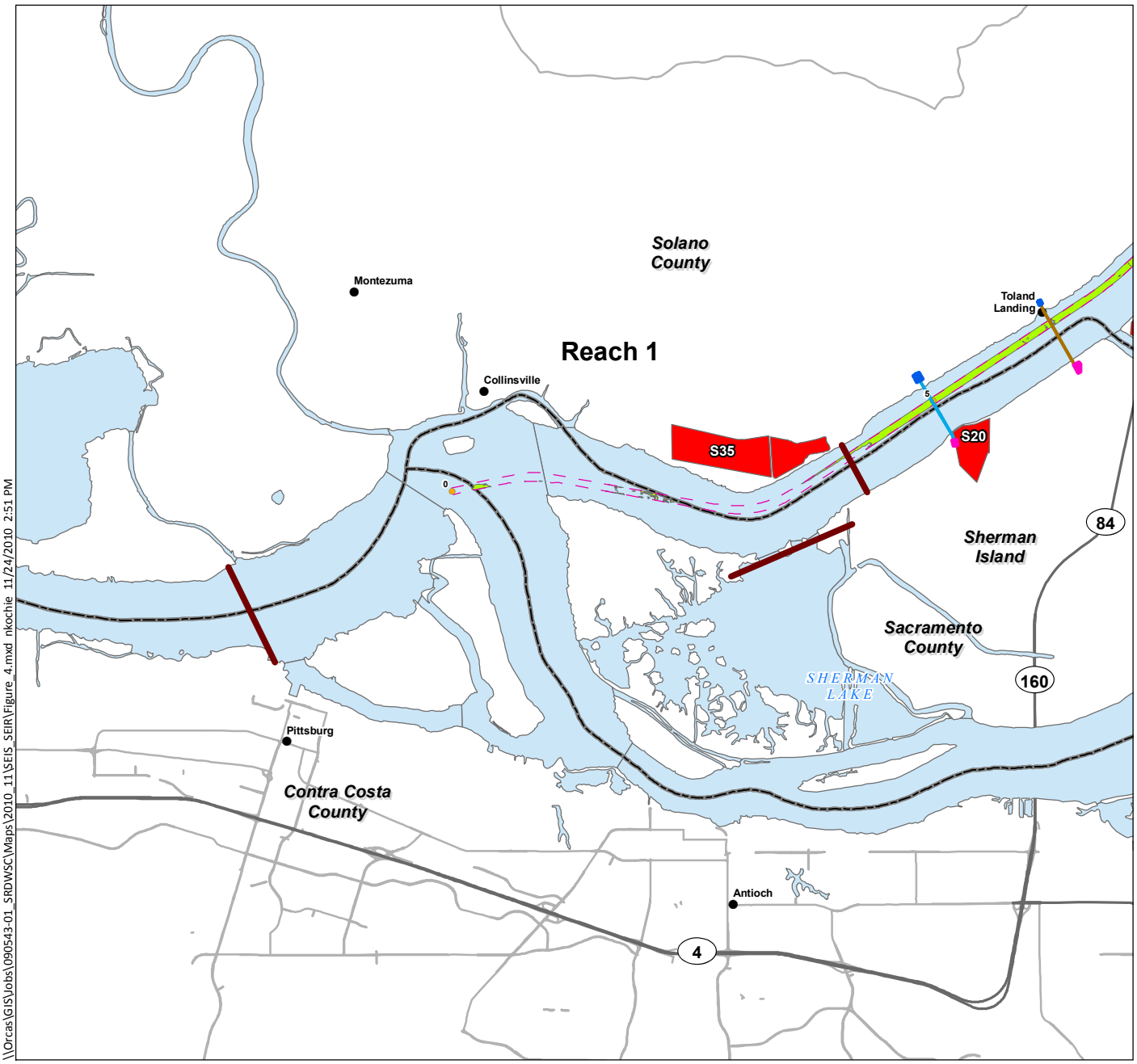


Figure 4a

Overview of the Channel Deepening to -33 Feet MLLW and Selective Widening Alternative

SEIS/SEIR

Sacramento River Deep Water Ship Channel

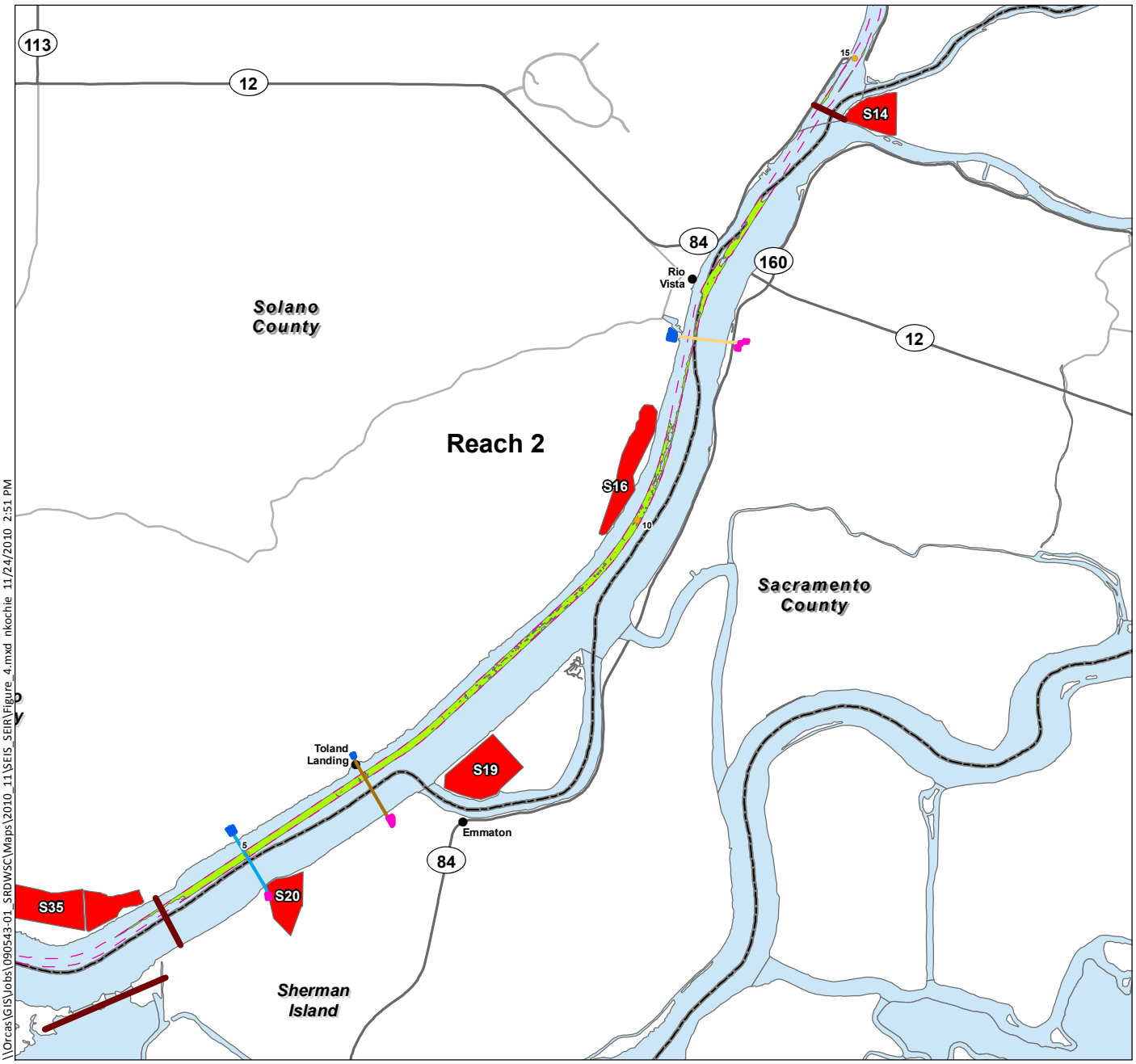


Figure 4b

Overview of the Channel Deepening to -33 Feet MLLW and Selective Widening Alternative

SEIS/SEIR

Sacramento River Deep Water Ship Channel

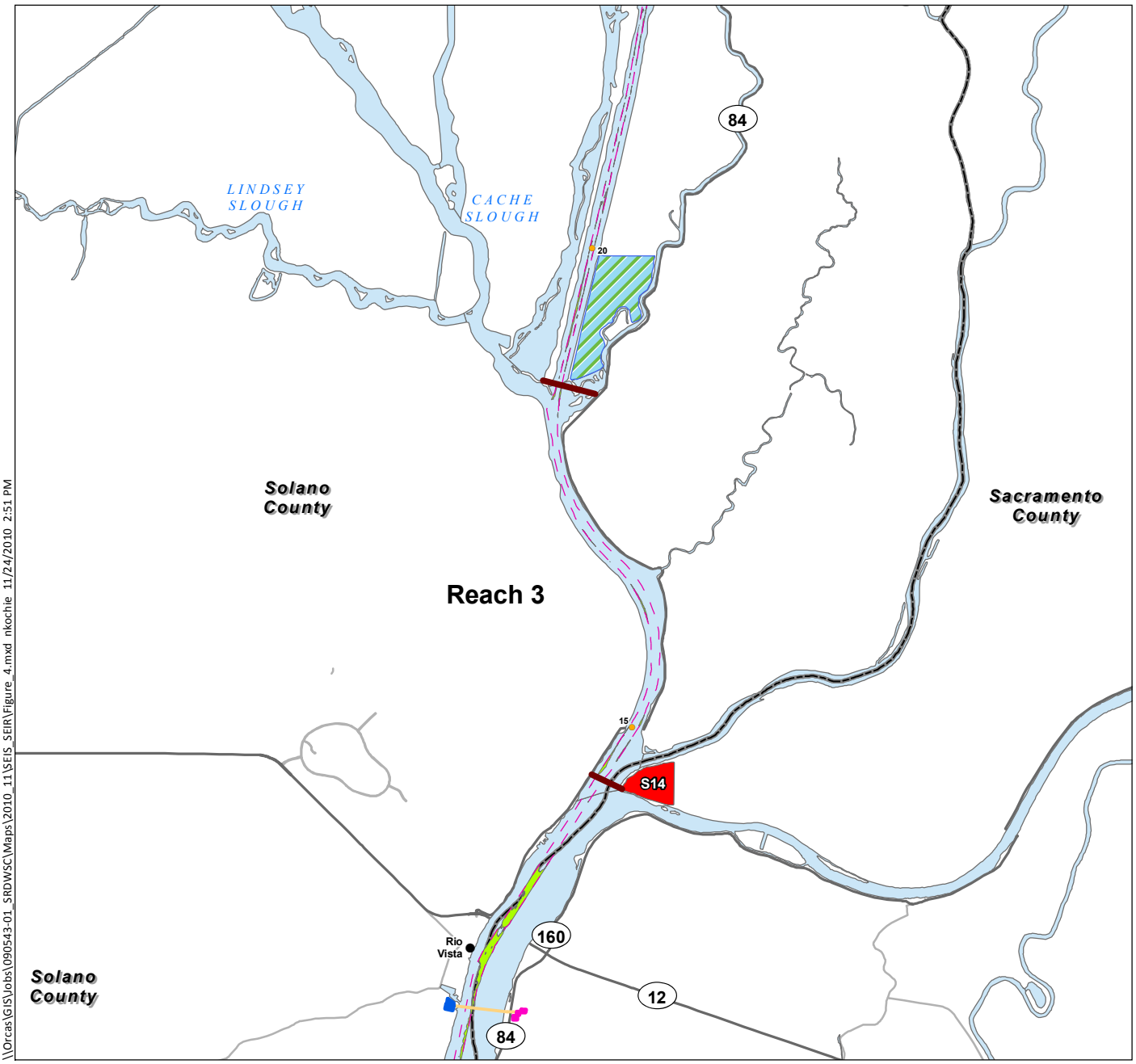


Figure 4c

Overview of the Channel Deepening to -33 Feet MLLW and Selective Widening Alternative

SEIS/SEIR

Sacramento River Deep Water Ship Channel

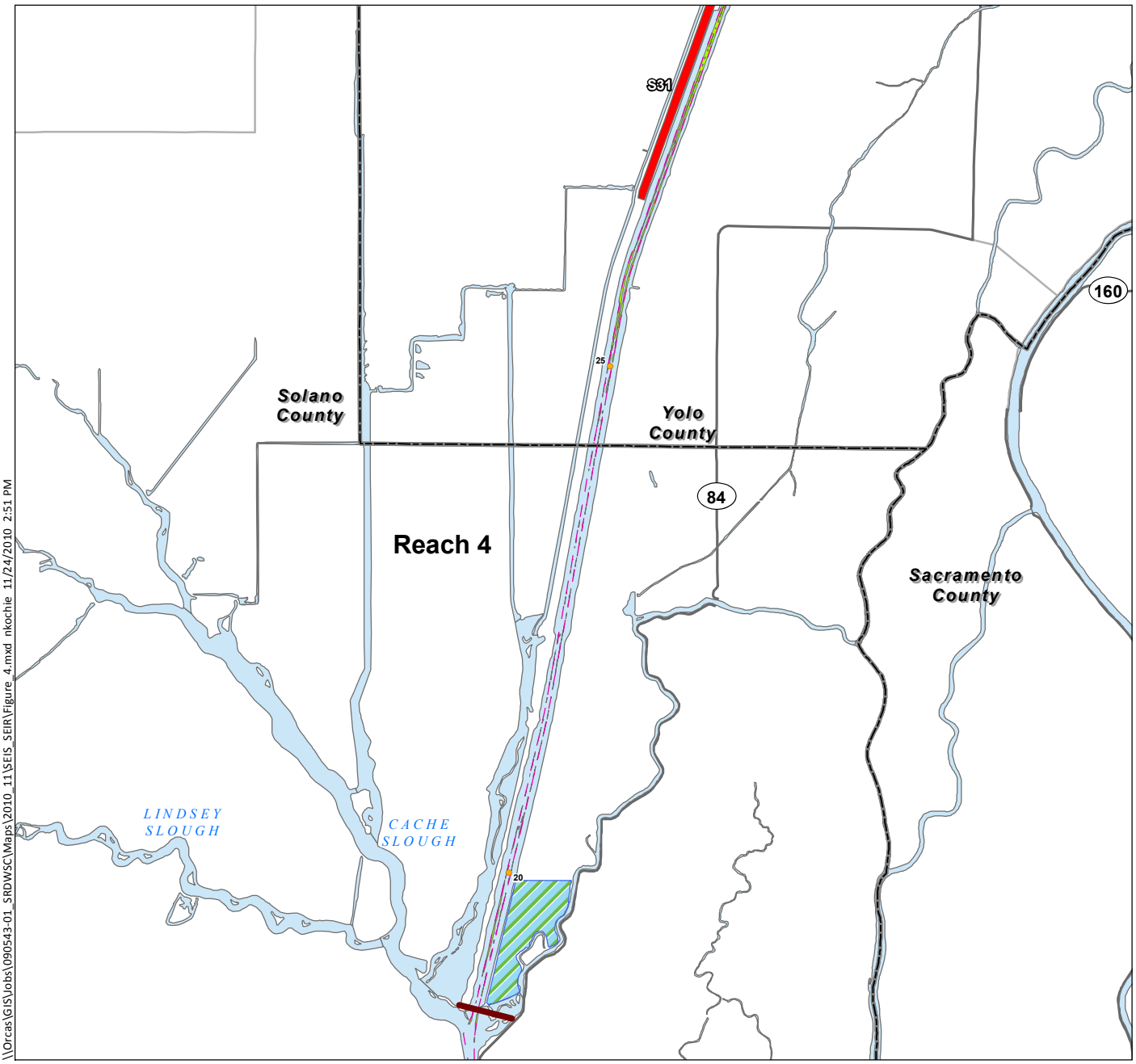
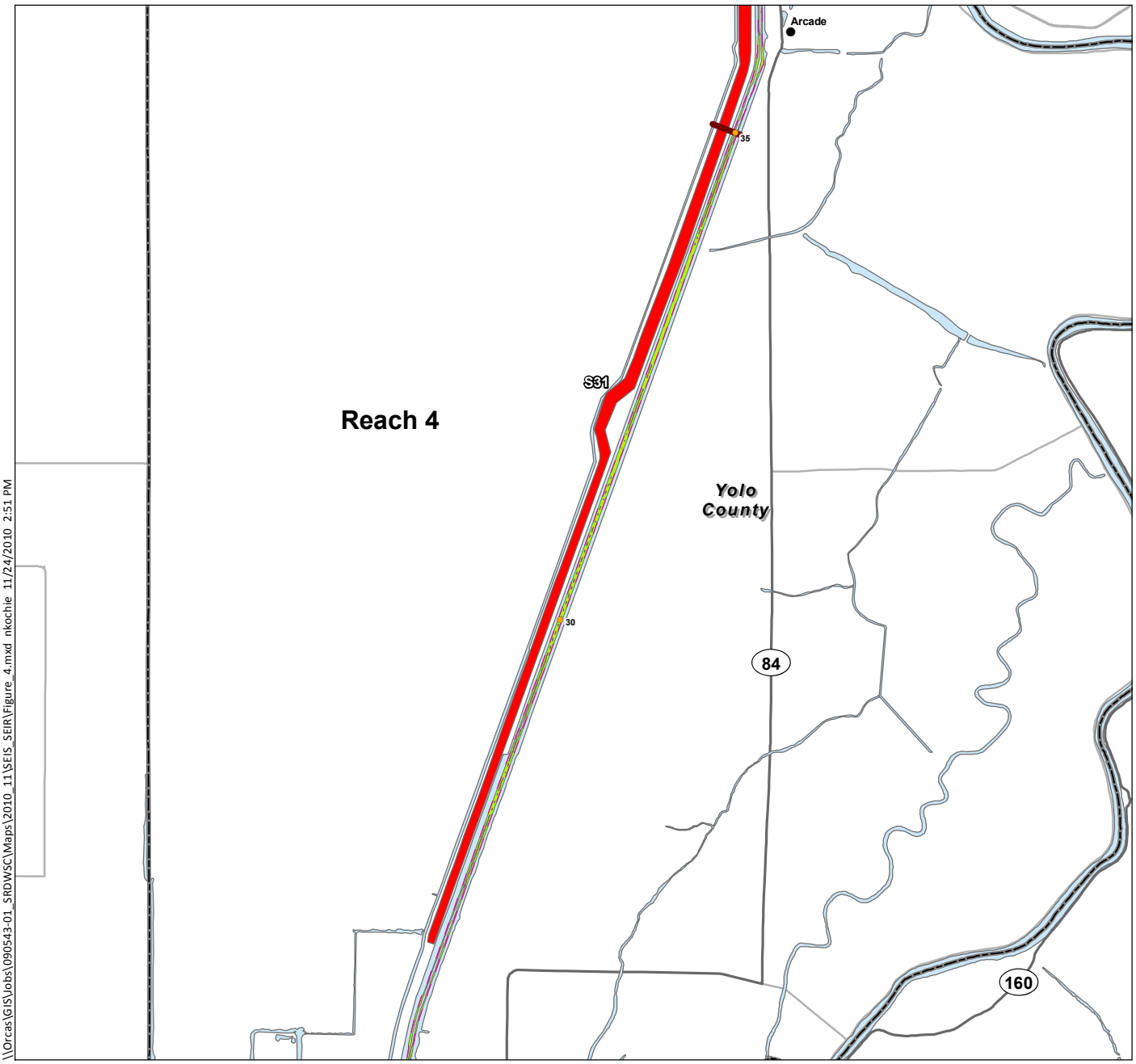


Figure 4d

Overview of the Channel Deepening to -33 Feet MLLW and Selective Widening Alternative

SEIS/SEIR

Sacramento River Deep Water Ship Channel



City
Port
River Mile
Reach Extent
Major Roads
Placement Sites
County Line
Delta/Marsh Waters
Proposed Channel Alignment
Channel Deepening to -33 Feet MLLW and Selective Widening Alternative Dredging Area
Proposed Prospect Island Wetland Preservation Site
Utility Line 114
Utility Line 130
Utility Line 400
Proposed Drilling
Proposed Exit

Miles
0 0.75 1.5 2.25 3
N

Figure 4e
Overview of the Channel Deepening to -33 Feet MLLW and Selective Widening Alternative
SEIS/SEIR
Sacramento River Deep Water Ship Channel

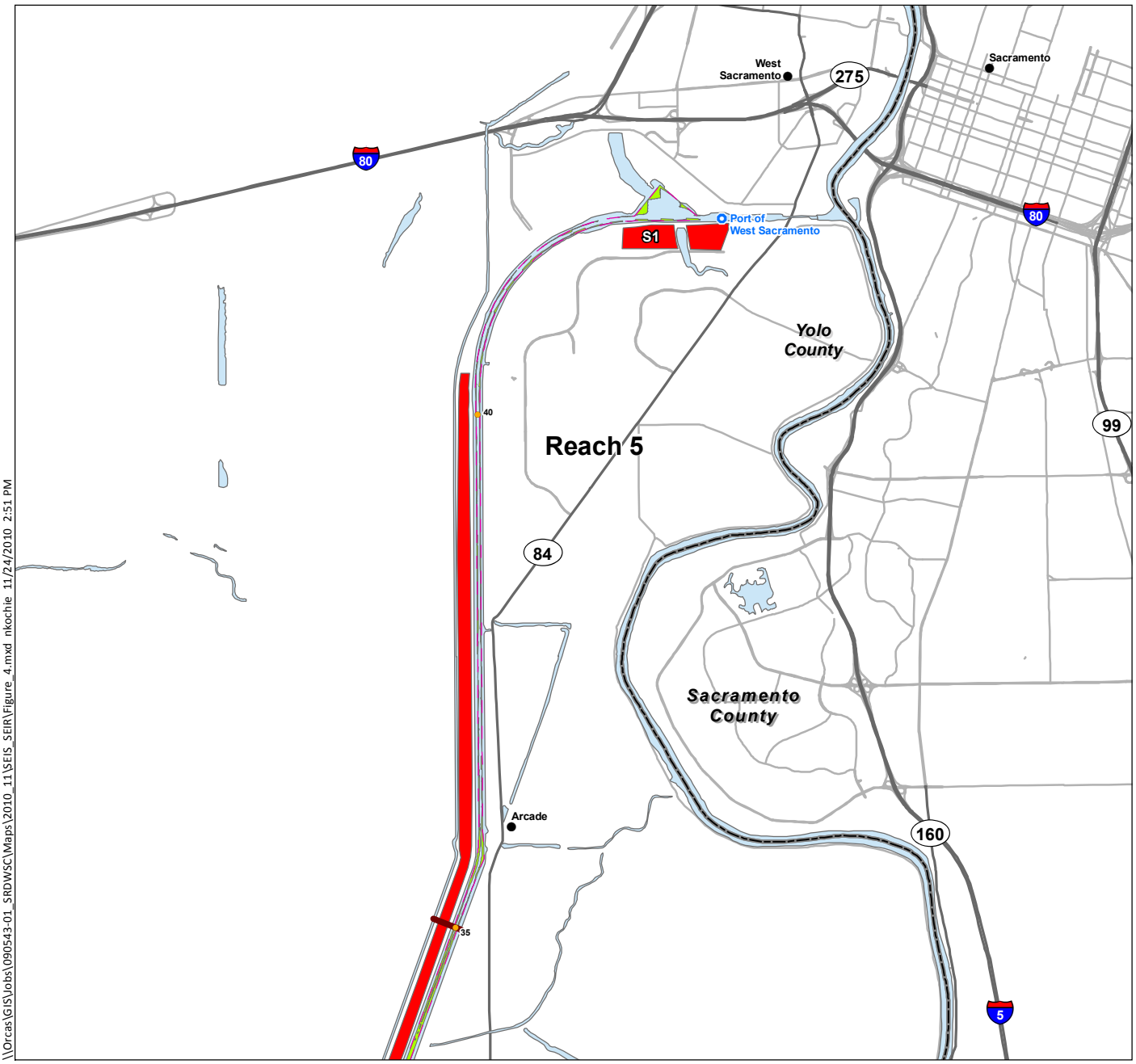


Figure 4f

Overview of the Channel Deepening to -33 Feet MLLW and Selective Widening Alternative

SEIS/SEIR

Sacramento River Deep Water Ship Channel

The total dredged material volume associated with deepening and widening the SRDWSC under the -33 Feet MLLW Alternative is 2.8 million cy, which includes the volume previously authorized for dredging in 1986 and the sediment that has since accumulated according to the most recent bathymetric survey data. A total dredged material volume of 4 million cy with a 1-foot overdepth and 5.2 million cy with a 2-foot overdepth is anticipated.

Table 13 shows the in-situ dredging volumes per reach under the -33 Feet MLLW Alternative. It specifies the volume of material required for removal to reach a depth of 35 feet, the volume of material comprised in both 1-foot and 2-foot overdepths, and the total volume of material to be dredged per reach, which is reflective of a 2-foot overdepth.

Table 13
Dredging Volumes Per Reach Under the Channel Deepening to -33 Feet MLLW and Selective Widening Alternative (cy)

Reach	Dredging Volume Required to Reach a Depth of 33 Feet	Volume of 1-Foot Overdepth	Volume of 2-Foot Overdepth	Total Dredging Volume including 2-Foot Overdepth
1	16,000	26,000	52,000	68,000
2	1,145,000	565,000	1,130,000	2,275,000
3	109,000	16,000	32,000	141,000
4	1,084,000	427,000	853,000	1,937,000
5	475,000	166,000	331,000	807,000
Total	2,829,000	1,200,000	2,398,000	5,228,000

Note: Volumes (including totals) are rounded to the nearest 1,000 from more specific engineering values

The most conservative existing maintenance dredging work window in the SRDWSC is August 1 to November 30[10]; however, USACE and the Port are currently consulting with NMFS, USFWS, and CDFG to obtain project-specific work windows. Without any work windows in place, construction of the -33 Feet MLLW Alternative could be completed in approximately 1 year. Under the existing maintenance dredging 4-month work window, construction of this alternative would take approximately 3 years to complete. As with the Proposed Project, an annual 6-month work window of June 1 to December 31 is requested to construct the -33 Feet MLLW Alternative. Assuming that a 6-month work window is obtained, this alternative could be constructed in approximately 2 to 3 years. This estimate assumes that both federal and state funding sources remain available as needed. If the contractor were to operate two dredges or a larger discharge pipe (i.e., 24-inch-diameter), the construction timeframe would be reduced to approximately 1 to 2 years overall.

[10] CDFG programmatic maintenance dredging work windows for longfin smelt are not issued for the SRDWSC; however, CDFG has restricted other in-water work in the SRDWSC to August 1 through October 31.

Dredging equipment and construction methodology for the -33 Feet MLLW Alternative would be the same as the Proposed Project. Like the Proposed Project, under this alternative, the contractor would communicate regularly with the Port, bar pilots, the U.S. Coast Guard, and Caltrans to ensure that dredging activities would not block commercial vessel traffic en route to the Port or the Rio Vista/Ryer Island Ferry operations.

Under the -33 Feet MLLW Alternative, the USACE draft 20-year Plan for the ongoing navigational maintenance of the SRDWSC and long-term management of the upland dredged material placement sites would reflect conditions after deepening the SRDWSC to 33 feet MLLW. The remaining capacities of the placement sites would be taken into consideration, and the plan would identify methods for recovering capacity at sites proposed for maintenance dredging use. It is anticipated that a draft 20-year Plan will be included as part of the Final SEIS/SEIR.

2.2.3.2 Dredged Material Placement Activities

The proposed dredging volume under the -33 Feet MLLW Alternative is approximately 4,000,000 cy less than that of the Proposed Project; therefore, fewer dredged material placement sites are needed to provide sufficient capacity. Seven of the Proposed Project's ten dredged material placement sites are proposed to either permanently accommodate or temporarily stockpile sediment dredged in this alternative. S4, S32, and S11 are not proposed for use in the -33 Feet MLLW Alternative for the following reasons:

- S4 – Within Reach 5, two existing sites, S1 and S31, provide greater than sufficient capacity for this alternative's proposed dredging volume.
- S32 – Within Reaches 4 and 5, two existing sites, S1 and S31, provide greater than sufficient capacity for this alternative's proposed dredging volume.
- S11 – Within Reach 3, the existing site S14 provides sufficient capacity for this alternative's proposed dredging volume.

Table 14 describes the seven proposed placement sites in relation to their proposed use by the -33 Feet MLLW Alternative, including their approximate locations along the SRDWSC, site-specific in situ dredged material placement volumes, site-specific capacities, and maximum berm heights for each site[11]. These sites, and the rationale behind evaluating them in this Draft SEIS/SEIR, are described in greater detail in Section 2.3.

[11] Maximum berm heights represent the highest point of the berm from the lowest elevation within the interior of the site. Due to the varying elevations within placement sites, the maximum berm height is greater than the average berm height.

Table 14
Dredged Material Placement Site Locations and Capacities for the Channel Deepening to -33 Feet MLLW and Selective Widening Alternative

Reach	Placement Site	Approximate Location of Dredging In the SRDWSC (RM)	Dredged Material Volume (cy)	Site Capacity (cy)	Maximum Berm Height (feet)
1	S35	0.0 to 4.1	68,000	100,000	3
2	S20	4.1 to 6.0	406,000	407,000	14
	S19	6.0 to 12.6	1,437,000	1,625,000	17
	S16	12.6 to 14.6	432,000	474,000	22
3	S14	14.6 to 18.8	141,000	147,000	10
4 and 5	S31	22.6 to 38.7	2,261,000	4,000,000	9
5	S1	38.7 to 43.5	482,000	659,000	10
Total			5,227,000	7,412,000	

Note: Volumes (including totals) are rounded to the nearest 1,000 from more specific engineering values

2.2.3.3 Wetland Mitigation

Similar to the Proposed Project, the placement of dredged material and/or berm construction on the dredged material placement sites under the -33 Feet MLLW Alternative would result in impacts to wetlands. Mitigation for these impacts is proposed in the form of a wetland preservation project on Prospect Island, as described in Section 2.2.2.3.

2.2.3.4 Utility Relocation

As is noted in Section 2.2.2.4, the location and depths of existing utility crossings of the SRDWSC are being confirmed. From what has been determined to date, at least two gas pipelines (Lines 130 and 114) would be in conflict with the -33 Feet MLLW Alternative and require replacement; these pipelines are owned by PG&E and Rosetta Resources. It is possible that another gas pipeline (Line 400) could also require replacement; PG&E and USACE are conducting surveys to identify whether replacement would be necessary. These potential utility relocations are described in Section 2.2.2.4 and Appendix G. Appendix G also identifies an additional 14 utilities that could potentially cross the SRDWSC. For these 14 crossings, Appendix G indicates either the known depths of the existing crossings (and hence whether they would likely conflict with dredging required under the -33 Feet MLLW Alternative) or, as is the case for the majority of the crossings, that more information is needed to determine their depth, current status, and ownership.

2.2.3.5 Continuation of Commercial Shipping

Forecasted increases in commodity throughput to the Port would be the same for the -33 Feet MLLW Alternative as under Future without Project Conditions, only fewer vessels would be needed to carry the same amount of cargo. As is discussed in Section 2.2.1.1.2, for the purposes of analyses in this SEIS/SEIR, economic data were used to estimate vessel

numbers traversing the SRDWSC under the -33 Feet MLLW Alternative; vessel count estimates were not included in the USACE *With-Project Economics Analysis*. Assuming that construction of this alternative is completed in 2013, the estimated change in the number of vessels calling on the Port is displayed in Table 15.

Table 15
Estimated Change in Vessel Numbers under the Channel Deepening to -33 Feet MLLW and Selective Widening Alternative

	Vessel Type			
Year	Bulk Carrier	General Carrier	Tanker	Total
2011	45	9	4	58
2012	50	9	23	82
2013	44	9	20	73
2015	47	9	23	79
2018	50	9	28	87
2023	55	9	32	96
2028	62	9	32	103
2033	69	9	32	110
2053	73	9	32	114
2062	73	9	32	114

The USACE *With-Project Economics Analysis* also forecasts the likely fleet mix at the Port under the -33 Feet MLLW Alternative. Forecasts for bulk carriers and tankers are detailed in Table 16 and Table 17, respectively (USACE 2011). As with the Proposed Project, general carriers are anticipated to continue to call on the Port under baseline levels, which are shown in Table 5.

Table 16
Bulk Carriers – Change in Forecasted Fleet Mix from Future without Project Conditions to the Channel Deepening to -33 Feet MLLW and Selective Widening Alternative

Alternative	15,000 DWT	25,000 DWT	35,000 DWT	40,000 DWT	50,000 DWT	60,000 DWT
Future without Project Conditions	3%	35%	9%	38%	15%	0%
Channel Deepening to -33 Feet MLLW and Selective Widening Alternative	1%	32%	9%	30%	25%	3%

Table 17
Liquid Tankers – Change in Forecasted Fleet Mix from Future without Project Conditions to the Channel Deepening to -33 Feet MLLW and Selective Widening Alternative

Alternative	20,000 DWT	25,000 DWT	35,000 DWT	50,000 DWT	60,000 DWT
Future without Project Conditions	0%	95%	5%	0%	0%
Channel Deepening to -33 Feet MLLW and Selective Widening Alternative	0%	85%	15%	0%	0%

2.2.3.6 Relationship to the San Francisco Bay to Stockton Deep Water Ship Channel Plan

For the same reasons as the Proposed Project (described in Section 2.2.2.6), there is minimal likelihood of shippers relocating from the Port to the Port of Stockton or other ports if the Stockton Deepening Plan was constructed.

2.3 Dredged Material Placement Alternatives

To accommodate dredging as required by the Proposed Project or the -33 Feet MLLW Alternative, a range of dredged material placement site options were identified in the study area, emphasizing beneficial reuse[12] where practicable. To facilitate this evaluation, a study entitled *Placement and Beneficial Use Sites for the Sacramento River Deep Water Ship Channel* (hereafter referred to as the "Placement Site Report"; USACE 2010f) was completed in May 2010 and is included as Appendix H. The Placement Site Report documents the options for placement of dredged material in the vicinity of the SRDWSC, including stockpile and beneficial reuse options. The report also describes engineering constraints, regulatory constraints, and estimated costs for acquiring and converting the sites for dredged material placement or reuse. Certain sites included in the Placement Site Report are existing placement sites used for annual maintenance dredging.

2.3.1 Placement Sites Categories

The Placement Site Report considered placement site options within the legal boundary of the Delta as well as within 15,000 feet of the SRDWSC, which resulted in an overall geographic coverage of approximately 1,200 square miles (Figure 5). To identify sites, the analysis included geographical information system (GIS) data, maps, and information obtained from interviews with representatives from local Reclamation Districts; corporations; educational institutions; non-governmental organizations; special government

[12] Beneficial reuse refers to any use of the material that provides for some purpose other than disposal (ocean or landfill).

districts and entities; and city, county, and federal governments. The Placement Site Report categorized potential sites for screening as follows:

- **Stockpile Sites.** These sites are intended to directly receive dredge slurry (sediment and accompanying water) and are managed over time to dewater the sediments. Once sufficiently dewatered, sediment could be removed from the site via truck or barge for subsequent beneficial reuse opportunities. The Placement Site Report identified stockpile sites that are both new and existing (i.e., were used for dredged material placement from maintenance dredging events in the past).
- **Reuse Sites.** These sites offer beneficial reuse opportunities that require the delivery of dewatered sediment directly to the site. Reuse sites do not have the facilities to receive or manage dredge slurry prior to being dewatered. Examples of reuse sites identified in the Placement Site Report include levees (including those along railroad lines), filling or shallowing of channels, habitat development of uplands and wetlands, landfill cover, residential development, road construction, and subsidence reversal projects. These sites can be distant from the SRDWSC itself, and would require trucking or other rehandling methods to bring dredged material to the site, which is a logistical constraint.
- **Placement and Reuse Sites.** These sites can be designed to directly receive dredge slurry, in addition to dewatered sediment, as well as reuse the material on-site. Placement and reuse sites avoid the rehandling and transportation costs associated with beneficially reusing dredged material at other types of sites. After the dredge slurry is dewatered at a placement and reuse site, the dewatered sediment would be moved within, or immediately adjacent to, the site for beneficial reuse. Examples of placement and reuse sites identified in the Placement Site Report include levee enhancement, subsidence reversal, and wetland habitat creation projects.

For the purposes of this Draft SEIS/SEIR, the term "placement site" generally refers to all types of sites (i.e., "stockpile," "reuse," and "placement and reuse sites"); however, distinct placement site categories are noted in Section 2.3 and throughout this Draft SEIS/SEIR where they are critical to a resource-specific analysis.

The Placement Site Report identified 124 placement site options throughout an approximately 1,200-square-mile study area. Of these options, 68 were categorized as "stockpile sites," 18 were categorized as "reuse sites," and 38 were categorized as "placement and reuse sites." These sites are described in Table 4 of Appendix H.

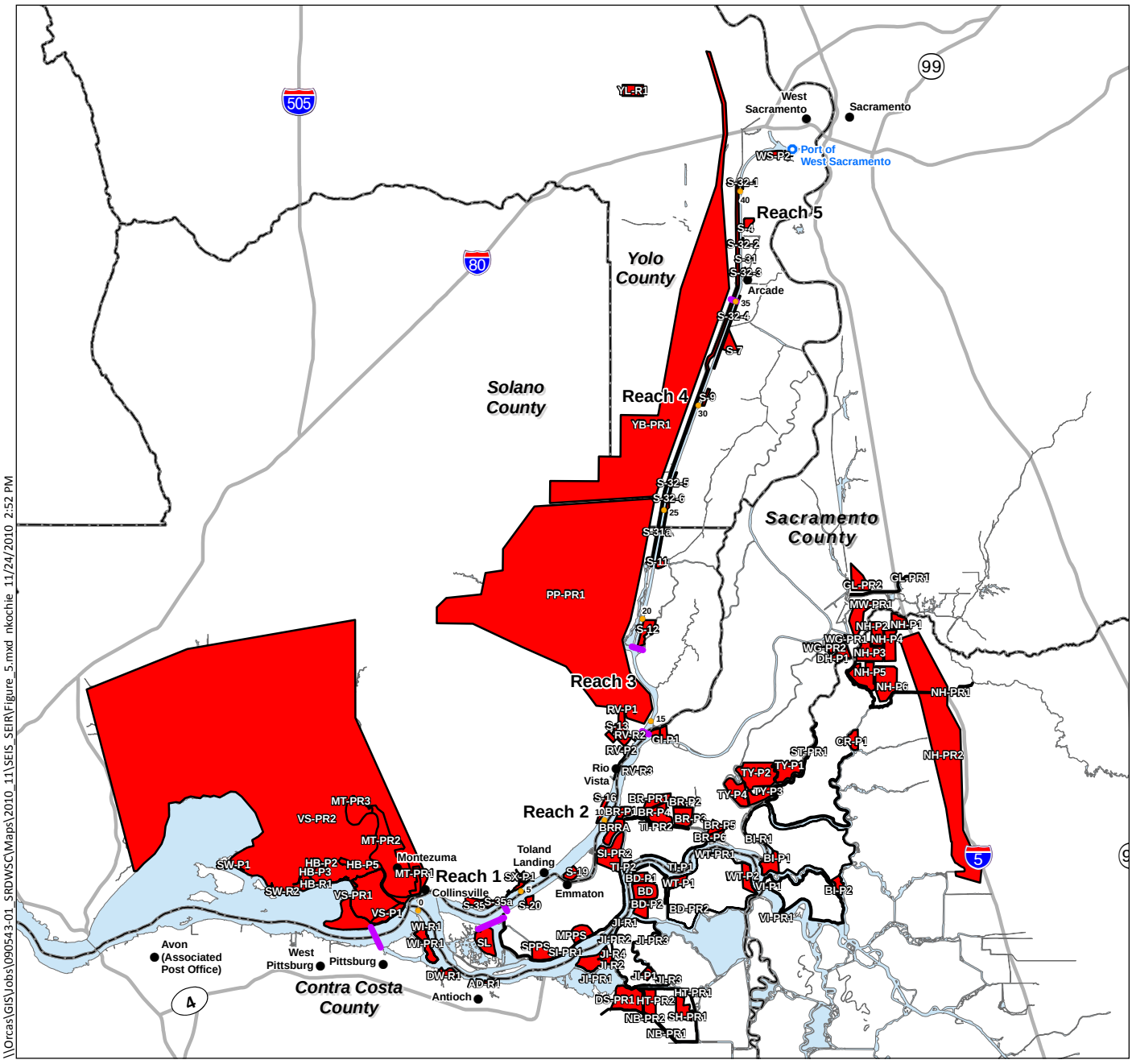


Figure 5
Inventory of Potential Placement Sites
Identified in the Placement Site Report
SEIS/SEIR
Sacramento River Deep Water Ship Channel

2.3.2 Screening Criteria for Determining Placement Site Practicability

Three tiers of criteria were developed to evaluate the practicability of each potential placement site identified in the Placement Site Report, using an iterative process. All potential sites were evaluated against the Tier 1 criteria; only those sites that met Tier 1 criteria were evaluated against Tier 2 criteria; and only those sites that met Tier 2 criteria were evaluated against Tier 3 criteria. Descriptions of, and results for, each of the three tiers of criteria are described in the sections below.

Four of the potential placement and reuse sites in the Placement Site Report were identified on the basis that they could provide material for wetland creation sites that are part of the Delta Habitat Conservation and Conveyance Program's (DHCCP's) Bay Delta Conservation Plan (BDCP). The DHCCP does not currently have estimates for the volume of material that would be needed for these wetland creation activities, and is not prepared to accept material currently or for the foreseeable future. Therefore, sites VS-PR2, SI-PR2, PP-PR1, and YB-PR1 are considered unusable and are hereby removed from further analysis. In addition, S12, located on Prospect Island, overlaps with the proposed wetland preservation area described in Sections 2.2.2.3 and 2.2.3.3. Therefore, S12 is also considered unusable and is hereby removed from further analysis. All removed sites are shown on Figure 5.

2.3.2.1 Tier 1 Criteria and Results

Tier 1 criteria focus specifically on aspects related to bringing the hydraulic pipeline from the dredge to each of the remaining 120 potential placement sites. Potential placement sites were eliminated based on the following Tier 1 criteria:

- **Sites that would require the use of a booster pump.** Placement sites that are located greater than 10,000 feet from the SRDWSC would require the use of a booster pump. It is assumed that an extra booster pump would be required for each additional 10,000-foot distance. Placement at sites that require the use of a single booster pump cost approximately $10.25 per cy of dredged material, or 43% more than sites that do not, which cost approximately $7.15 per cy (USACE 2010f). The costs for additional booster pumps increase further. The initial placement of the booster pump and the recurring need to reposition greater than 10,000 feet of pipeline also pose implications to the overall construction schedule and would likely result in unpredictable delays. For these reasons, any site farther than 10,000 feet from the SRDWSC was eliminated from further evaluation.
- **Hydraulic pipeline route to the site would result in impacts to adjacent land uses.** If existing land uses such as roadways, high traffic areas, recreational areas (i.e., parks, public beaches, marinas, etc.), or active agricultural fields not otherwise affected by the Proposed Project or alternatives would be impacted or impaired by the placement of the hydraulic pipeline to access a potential site, the site was eliminated from

further evaluation.

Table 18 shows the results of evaluating the remaining 120 potential placement sites against the Tier 1 criteria. The checkmark symbol (✓) indicates that a site met the specified criteria and was advanced to further screening.

Table 18
Tiers 1 and 2 Criteria Results

Potential Placement Site	Tier 1		Tier 2		Tier 3
	Booster Pump Not Required (<10,000 Feet from SRDWSC)	Avoids Impacts to Adjacent Land Uses from Pipeline Placement	Avoids Impacts to Prime Farmland	Avoids Use of Mechanical Dredging Equipment	Sites To Be Analyzed in Tier 3
Stockpile Sites					
BD					
BD-P1					
BD-P2					
BD-P3					
BI-P1					
BI-P2					
BR-P1	✓	*(Highway 160)*			
BR-P2					
BR-P3					
BR-P4	✓	*(Highway 160)*			
BR-P5					
BR-P6					
BRRA	✓	*(Highway 160)*			
CR-P1					
DH-P1					
GI-P1	✓	✓	✓	✓	✓
HB-P1					
HB-P2					
HB-P3					
HB-P4					
HB-P5					
JI-P1					
MPPS					
NH-P1					
NH-P2					
NH-P3					
NH-P4					
NH-P5					
NH-P6					
RV-P1	✓	*(River Rd)*			
RV-P2	✓	*(River Rd)*			

Potential Placement Site	Tier 1		Tier 2		Tier 3
	Booster Pump Not Required (<10,000 Feet from SRDWSC)	Avoids Impacts to Adjacent Land Uses from Pipeline Placement	Avoids Impacts to Prime Farmland	Avoids Use of Mechanical Dredging Equipment	Sites To Be Analyzed in Tier 3
S11	✓	✓	✓	✓	✓
S13	✓	*(River Rd)*			
S14	✓	✓	✓	✓	✓
S16	✓	✓	✓	✓	✓
S19	✓	✓	✓	✓	✓
S20[13]	✓	✓	✓	✓	✓
S31	✓	✓	✓	✓	✓
S31a	✓	✓	✓	✓	✓
S32-1	✓	✓	✓	✓	✓
S32-2	✓	✓	✓	✓	✓
S32-3	✓	✓	✓	✓	✓
S32-4	✓	✓	✓	✓	✓
S32-5	✓	✓	✓	✓	✓
S32-6	✓	✓	✓	✓	✓
S35	✓	✓	✓	✓	✓
S35a	✓	✓	✓	✓	✓
S4	✓	✓	✓	✓	✓
S7	✓	✓		✓	
S9	✓	✓		✓	
SL	✓	✓	✓		
SPPS					
SW-P1					
SX-P1	✓	✓	✓	✓	✓
TI-P1					
TI-P2	✓	*(Sherman Isl. Rd)*			
TY-P1					
TY-P2					
TY-P3					
TY-P4					
VI-P1					
VS-P1	✓	✓	✓	✓	✓
WG-P1					
WS-P1	✓	✓	✓	✓	✓
WS-P2	✓	✓	✓	✓	✓
WT-P1					
WT-P2					
Placement and Reuse Sites					
BD-PR1					

[13] S20 is separated from the SRDWSC by West Sherman Island Road; however, USACE and the Port have used this placement site for maintenance dredging activities during 3 of the past 9 years without causing impacts to traffic on the roadway. As such, S20 was not eliminated by Tier 1 criteria.

Potential Placement Site	Tier 1		Tier 2		Tier 3
	Booster Pump Not Required (<10,000 Feet from SRDWSC)	Avoids Impacts to Adjacent Land Uses from Pipeline Placement	Avoids Impacts to Prime Farmland	Avoids Use of Mechanical Dredging Equipment	Sites To Be Analyzed in Tier 3
BD-PR2					
BR-PR1	✓	*(Highway 160)*			
BR-PR2	✓	*(Highway 160)*			
DS-PR1					
GL-PR1					
GL-PR2					
HB-PR1					
HT-PR1					
HT-PR2					
JI-PR1					
JI-PR2					
JI-PR3					
JI-PR4					
MT-PR1	✓	✓	✓		
MT-PR2					
MT-PR3					
MW-PR1					
NB-PR1					
NB-PR2					
NH-PR1					
NH-PR2					
SH-PR1					
SI-PR1	✓	✓		✓	
ST-PR1					
TI-PR1					
TI-PR2	✓	*(Highway 160)*			
TI-PR3	✓	*(Sherman Isl. Rd)*			
VI-PR1					
VS-PR1	✓	✓	✓	✓	✓
WG-PR1					
WG-PR2					
WI-PR1	✓	✓	✓		
WT-PR1					
Reuse Sites					
AD-R1					
BI-R1					
DW-R1					
HB-R1					
JI-R1					
JI-R2					
JI-R3					
JI-R4					

Potential Placement Site	Tier 1		Tier 2		Tier 3
	Booster Pump Not Required (<10,000 Feet from SRDWSC)	Avoids Impacts to Adjacent Land Uses from Pipeline Placement	Avoids Impacts to Prime Farmland	Avoids Use of Mechanical Dredging Equipment	Sites To Be Analyzed in Tier 3
R4-R1					
R4-R2					
RV-R1	✓	*(River Rd)*			
RV-R2	✓	*(River Rd)*			
RV-R3	✓	*(River Rd)*			
SW-R1					
SW-R2					
SW-R3					
WI-R1	✓	✓	✓		
YL-R1					

2.3.2.2 Tier 2 Criteria and Results

Tier 2 criteria focus on the unique characteristics of each of the 30 potential placement sites that met Tier 1 criteria. All 30 remaining sites were screened against the following criteria:

- **Dredged material placement at the site would result in impacts to prime farmland.** If the placement of dredged material at a potential site would result in impacts to prime farmland areas as designated by the Natural Resources Conservation Service (NRCS), the site was eliminated from further evaluation.
- **Dredged material placement at the site would require the use of mechanical dredging equipment.** If using a potential site would result in the need to mobilize a mechanical dredge plant, thereby adding unnecessary costs when compared to the small amount of material and slow speed at which material could be dredged and transported to the site, the site was eliminated from further evaluation. Potential sites that require the use of mechanical dredging equipment include the Montezuma Wetland Restoration site and sites that are predominantly open water where there are no berms to allow for dewatering of the dredge slurry, such as Winter Island.

Table 18 shows the results of evaluating the remaining 30 potential placement sites against the Tier 2 criteria.

2.3.2.3 Tier 3 Criteria and Results

Tier 3 criteria focus on potential site capacities relative to reach-specific dredging volume estimates for the 22 potential placement sites that met Tier 2 criteria. Potential site capacities were obtained from the Placement Site Report and from more precise estimates developed by USACE and the Port. A reach-specific evaluation of potential sites was conducted in which sites that would provide redundant capacity in an area where there are

closer suitable sites, and sites that are not pre-existing dredged material placement sites, were eliminated from further evaluation. The following four sites were eliminated for the reasons described below:

- GI-P1 – This potential site, identified in the Placement Site Report as a "stockpile site," is directly to the east of S14 in Reach 3. S14, an existing maintenance dredging placement site, provides sufficient capacity for the estimated volume of dredged material coming from Reach 3; thus, the use of GI-P1 as a placement site is not necessary and it is eliminated from further evaluation.
- SX-P1 – This potential site, identified in the Placement Site Report as a "stockpile site," is directly across the SRDWSC from S20 in Reach 2. S20, an existing maintenance dredging placement site, provides sufficient capacity for the estimated volume of dredged material coming from Reach 2; thus, the use of SX-P1 as a placement site is not necessary and it is eliminated from further evaluation. In addition, according to National Wetlands Inventory (NWI) data, approximately one-third (29.8 of 93.3 acres) of SX-P1 is composed of sensitive habitat that USACE and the Port seek to avoid in dredged material placement activities.
- VS-P1 – This potential site, identified in the Placement Site Report as a "stockpile site," is approximately 12,000 feet west of S35 at the westernmost extent of Reach 1. VS-P1 is located approximately 6,000 feet west of the dredging footprint of the Proposed Project. S35 and S35a are closer to the Proposed Project dredging footprint than VS-P1, and provide sufficient capacity for the estimated volume of dredged material coming from Reach 1; thus, the use of VS-P1 as a placement site is not necessary and it is eliminated from further evaluation.
- VS-PR1 – This potential site, identified in the Placement Site Report as a "placement and reuse site," is located approximately 12,000 feet west of S35 at the westernmost extent of Reach 1. VS-PR1 is located approximately 7,000 feet west of the dredging footprint of the Proposed Project. As with VS-P1, S35 and S35a are closer to the Proposed Project dredging footprint than VS-PR1, and provide sufficient capacity for the estimated volume of dredged material coming from Reach 1; thus, the use of VS-PR1 as a placement site is not necessary and it is eliminated from further evaluation.

2.3.3 Placement Sites Evaluated in this Draft SEIS/SEIR

For the purposes of this Draft SEIS/SEIR, 12 of the 18 remaining proposed placement sites were re-grouped to avoid the use of repetitive naming terminology. S1 consists of WS-P1 and WS-P2, S31 consists of S31 and S31a, S32 consists of its subsections 1 through 6, and S35 consists of S35 and S35a. As such, the ten placement sites evaluated in this Draft SEIS/SEIR correspond to the 18 remaining sites as they were identified in the Placement Site Report.

These ten sites were further screened using the results of habitat and vegetation surveys

completed by USACE, which identified sensitive habitat areas including wetlands, riparian areas, and oak woodlands. The USACE and the Port designed "usable portions" within the previously-defined boundaries of each placement site to avoid impacting wetlands and other sensitive habitat areas to the maximum extent practicable. Impacts would be further avoided or minimized by constructing berms to prevent dredged material from entering those sensitive habitat areas. Table 19 describes the ten proposed placement sites that were carried forward for evaluation in this Draft SEIS/SEIR, including their approximate location along the SRDWSC, total area, usable portion, ownership, and recent use (within the past 15 years, or after 1995) for dredged material placement and reuse.

Table 19
Proposed Dredged Material Placement Site Details

Site Name	Site Name as Defined in the Placement Site Report	Reach(es) within 10,000 Feet of Site	Total Site Area (ac)	Site Usable Portion (ac)	Site Owner	Site Type	Used as a Maintenance Dredging Placement Site After 1995?[a]
S35	S35 and S35a	Reaches 1 and 2	281	60	GreenPort Energy Park	Stockpile	No[a]
S20	S20	Reaches 1 and 2	91	23	DWR	Placement and Reuse	Yes[b]
S19	S19	Reach 2	173	172	D.I. Aggregate Management, LLC	Stockpile	Yes
S16	S16	Reach 2	136	61	USACE	Stockpile	Yes
S14	S14	Reach 3	91	19	USACE	Stockpile	Yes
S11	S11	Reach 4	184	40	Port and Private	Stockpile	No[a]
S31	S31, S31a	Reaches 4 and 5	1,086	382	Port	Stockpile	Yes
S32	S32-1, S32-2, S32-3, S32-4, S32-5, and S32-6	Reaches 4 and 5	243	213	Port and Private	Stockpile	No[a]
S4	S4	Reach 5	112	111	Private	Stockpile	No[a]
S1	WS-P1 and WS-P2	Reach 5	129	79	Port	Stockpile	Yes

Notes:

a While these sites have not been used recently as maintenance dredging placement sites, they were used as placement sites during the original SRDWSC construction, the two construction contracts carried out in 1989 and 1990, or for maintenance dredging occurring prior to 1995.

b Anecdotal evidence from the property manager of S20 indicates that dredged material was removed from the site in the past, possibly for beneficial reuse; however, specific details have not been confirmed.

Each of the ten proposed placement sites offers different storage capacities. Tables 9 and 14

correlate dredging locations and volumes under the Proposed Project and -33 Feet MLLW Alternative, respectively, with proposed placement sites. Tables 9 and 14 also define placement site capacity assuming existing berms are raised or new berms are constructed to increase site capacity. The usable portions of each placement site are the same for both alternatives; the only difference is the berm heights. Additional placement site information is provided in a table in Appendix I, including site descriptions, summaries of zoning constraints, and potentially present protected species. Descriptions of the ten proposed dredged material placement sites evaluated in this Draft SEIS/SEIR are provided below.

S35 – Site S35 is located in Reach 1 near Collinsville on the north bank of the SRDSWC from approximately RMs 2.0 to 3.1. Approximately 60 acres of the 281-acre site would be used for dredged material placement. To obtain the greatest capacity from this site, berms could be constructed up to 8 feet in height (in sloped areas) for the Proposed Project, or 3 feet in height (in sloped areas) for the -33 Feet MLLW Alternative. Dredged material placement rights for this site are not yet acquired.

S20 – Site S20 is located in Reach 2 on the east bank of the SRDWSC from approximately RMs 5.0 to 5.5. Approximately 23 acres of the 91-acre site would be used for dredged material placement. To obtain the greatest capacity from this site, berms could be constructed up to 14 feet in height (in sloped areas). California Department of Water Resources (DWR) currently owns the site and has acquired dredged material placement rights for it. Site S20 is located directly south of the Rio Viento RV Park.

S19 (Decker Island) – Site S19 is located in Reach 2 and on Decker Island, on the east bank of the SRDWSC from approximately RMs 6.9 to 8.5. Approximately 172 acres of the 173-acre site would be used for dredged material placement. To obtain the greatest capacity from this site, berms could be constructed up to 21 feet in height (in sloped areas) for the Proposed Project or 17 feet in height (in sloped areas) for the -33 Feet MLLW Alternative. The USACE and the Port have an agreement with the adjacent landowner, Megasand Enterprises, Inc., that permits the removal of material from S19 for industrial reuse.

S16 – Site S16 is located in Reach 2, south of the city of Rio Vista on the west bank of the SRDWSC from approximately RMs 9.5 to 11.0. Approximately 61 acres of the 136-acre site would be used for dredged material placement. It is currently used for the placement of dredged material. To obtain the greatest capacity from this site, berms could be constructed up to 22 feet in height (in sloped areas). The USACE has acquired dredged material placement rights for this site.

S14 – Site S14 is located in Reach 3 and on the western portion Grand Island, on the east

bank of the SRDWSC from approximately RMs 14.4 to 14.6. Approximately 19 acres of the 91-acre site would be used for dredged material placement. To obtain the greatest capacity from this site, brush and trees could be cleared from approximately 40 acres in the southwest portion and berms could be constructed up to 17 feet in height (in sloped areas) for the Proposed Project or 10 feet in height (in sloped areas) for the -33 Feet MLLW Alternative. The USACE has acquired dredged material placement rights for this site.

S11 – Site S11 is located in Reach 4 on the west bank of the SRDWSC from approximately RMs 22.4 to 25.0. Approximately 40 acres of the 184-acre site would be used for dredged material placement. To obtain the greatest capacity from this site, berms could be constructed up to 10 feet in height (in sloped areas). Dredged material placement rights for this site are not yet acquired.

S31 – S31 is located in Reaches 4 and 5, between the SRDWSC and its west levee (east Yolo Bypass levee) from approximately RMs 26.6 to 40.4. It is a long and narrow site. Approximately 382 acres of the 1,086-acre site would be used for dredged material placement. Constructed dikes (approximately 30 feet high) are located along three sides of S31, and the fourth side is the existing 25-foot-high SRDWSC levee. To obtain the greatest capacity from this site, berms could be constructed up to 9 feet in height (in sloped areas). S31 is currently used for placement of maintenance dredged material, as well as for agriculture between dredging cycles. The Port has acquired dredged material placement rights for this site.

S32 – Site S32 is located in Reaches 4 and 5, on the west bank of the SRDWSC from approximately RMs 31.6 to 35.2. Approximately 213 acres of the 243-acre site would be used for dredged material placement. To obtain the greatest capacity from this site, berms would need to be constructed up to a maximum of 6 feet in height (in sloped areas). S32 is bordered by agricultural fields and a residential neighborhood. Dredged material placement rights for this site are not yet acquired.

S4 – S4 is located in Reach 5 to the east of the SRDWSC at approximately RM 39.0. Approximately 111 acres of the 112-acre site would be used for dredged material placement. To obtain the greatest capacity from this site, berms could be constructed up to 11 feet in height (in sloped areas). S4 is bordered by agricultural fields and industrial complexes. Dredged material placement rights for this site are not yet acquired.

S1 – S1 is located in Reach 5 on the south bank of the SRDWSC at approximately RM 43.0. Approximately 79 acres of the 129-acre site would be used for dredged material placement. To obtain the greatest capacity from this site, berms could be constructed up to 10 feet in

height (in sloped areas). S1 is bordered by agricultural fields and industrial complexes. The Port has acquired dredged material placement rights for this site.

All of the fill material used to construct or raise existing containment berms will come from within the placement sites. This local use of fill material will minimize air quality impacts associated with trucking material from off-site sources, and will greatly reduce the cost to construct the earth berms. The berms will be designed and constructed in accordance with USACE guidance and specification standards to ensure that they will provide adequate containment of the dredged material and the associated slurry water. All earthwork associated with the construction of the containment berms will be performed during daylight hours. Each placement site will be filled until either the predetermined fill elevation is met or the dredged material slurry elevation is 1 foot below the berm elevation. A 1-foot minimum of freeboard will be maintained during filling operations to ensure containment berm integrity. The minimum residence time for the slurry water that will be discharged back into the Sacramento River will be determined by the Waste Discharge Requirement (WDR) permit to be issued by the Central Valley Regional Water Quality Control Board (RWQCB), and the physical characteristics of the dredged sediment. It is anticipated that the residence time for the slurry water within the site will increase as the site capacity decreases. As the placement site capacities decrease, it will become necessary for the dredging contractor to fill multiple sites simultaneously, or to alternate between sites, so that the schedule and a cost-effective production rate can be maintained.

2.3.4 Additional Placement Sites for Future Consideration

Since completion of the Placement Site Report (Appendix H), an additional potential beneficial reuse opportunity was identified at an upland site located adjacent to S16 (to the west and north). This option was not identified in the Placement Site Report because commercially held property was not investigated. The site owners propose to use dredged material for construction and/or levee reinforcement. A description of baseline conditions, effects analyses, and other environmental documentation specific to this site and consistent with the level of detail presented for the other placement sites in this document is underway. Information that will be included in the Final SEIS/SEIR for this site will include vegetation mapping, Endangered Species Act (ESA) evaluations, geotechnical investigations, and inclusion in a revised Coordination Act Report and Biological Assessment. The site is approximately 43 acres in size, has a potential capacity of 1,000,000 to 3,000,000 cy, and would not require the construction of containment berms. It is expected that the potential for occurrence of sensitive species is similar to that of S16 and that, as with the other sites, sensitive habitats would be avoided to the maximum extent practicable. Since the site has been used as a borrow site, it is expected that the bulk of the site is composed of non-native

grassland or is unvegetated. Further, it is possible that if this site is used, dredged material placement at sites S16, S19, and S14 would be reduced or eliminated.