APPENDIX B
404(b)(1) ALTERNATIVES ANALYSIS (2011)

SECTION 404(b)(1) EVALUATION

SACRAMENTO RIVER DEEP WATER SHIP CHANNEL

February 2011

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LIST OF ACRONYMS AND ABBREVIATIONS

µg/kg	micrograms per kilogram
BMP	best management practice
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CWA	Clean Water Act
cy	cubic yards
dBA	A-weighted decibel
Delta	California's Sacramento-San Joaquin River Delta
DI-WET	Deionized Water-Waste Extraction Test
DO	dissolved oxygen
DPF	diesel particulate filter
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
ESA	Endangered Species Act
km	kilometer
LASH	Lighter Aboard Ships
LEDPA	Least Environmentally Damaging Practicable Alternative
LRR	Limited Reevaluation Report
MET	modified elutriate test
mg/L	milligrams per liter
MLLW	mean lower low water
NEPA	National Environmental Policy Act
NOI	Notice of Intent
NOP	Notice of Preparation
NTU	Nephelometeric Turbidity Unit
PG&E	Pacific Gas and Energy
Port	Port of West Sacramento
PRG	preliminary remediation goal
psu	practical salinity units
Pub. L.	Public Law
RHA	Rivers and Harbors Act
RM	river mile

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RWQCB	Regional Water Quality Control Board
SAS	Special Aquatic Site
SCR	selective catalytic reduction
SEIS/SEIR	Supplemental Environmental Impact Statement/Subsequent Environmental Impact Report
SR	State Route
SRDWSC	Sacramento River Deep Water Ship Channel
TMDL	total maximum daily load
TSS	total suspended solids
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WDR	Waste Discharge Requirements

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1 INTRODUCTION

The Port of West Sacramento (Port) originally served the agricultural industry, particularly imports and exports of commodities including rice, fertilizer, grains, and lumber. The Port has expanded its business to include additional commodities such as cement and "green" commodities, including biofuels and wood pellets. Due to the current channel configuration, vessels laden with some cargos must "light-load" (travel less than fully loaded with the desired amount of cargo) to safely navigate the Sacramento River Deep Water Ship Channel (SRDWSC) with sufficient under-keel clearance. Light-loading increases the cost of transportation and the cost of the shipped products, which is passed on to the consumer. In addition, the existing widths of sections of the SRDWSC can make navigating to the Port difficult, particularly in inclement weather.

To improve economies of scale and overall navigation safety, the Port and U.S. Army Corps of Engineers (USACE) propose deepening the channel to -35 feet mean lower low water (MLLW) and selective widening of portions of the SRDWSC. This project was partially completed in 1990, but was suspended due to lack of funding. Because a significant amount of time has passed since the initial Environmental Impact Statement/Environmental Impact Report (EIS/EIR) was completed for the Proposed Project, USACE and the Port completed the Draft Supplemental Environmental Impact Statement/Subsequent Environmental Impact Report (SEIS/SEIR) to reanalyze the potential effects pursuant to the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA).

This document presents the Clean Water Act (CWA) Section 404(b)(1) analysis for deepening the SRDWSC. With regard to the CWA Section 404, the basic project purpose, as previously approved by Congress, is safe and efficient commercial marine navigation, which is a water-dependent purpose. The overall purpose of the proposed project is to resume deepening of the SRDWSC to its Congressionally authorized depth to realize increased economic benefits associated with a reduced transportation cost of moving goods to the Port, and provide safe navigation for commercial marine traffic. The factual determinations and findings discussed in this report support the determination that discharges of dredged material in the selected placement sites are the Least Environmentally Damaging Practicable Alternative (LEDPA).

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2 PROJECT DESCRIPTION

The Channel Deepening to -35 Feet MLLW and Selective Widening Alternative (Proposed Project) involves reinitiating the previously approved dredging from river miles (RMs) 0.0 to 35.0 and completing the construction that was suspended. Maintenance dredging of RMs 35.0 to 43.4 will also be conducted as part of the Proposed Project. The total volume of dredged material is estimated to be approximately 10 million cubic yards (cy) including a 2-foot overdepth allowance, or 8.1 million cy including only 1 foot of paid overdepth. Dredged material is proposed to be placed at upland sites along the SRDWSC. The methodology for selecting the dredged material placement sites is discussed in Section 2.4.1 of this document. An extensive search was conducted of potential beneficial use opportunities in California's Sacramento-San Joaquin River Delta (Delta); as a result, ten dredged material placement sites are proposed to either permanently accommodate or temporarily stockpile dredged material for later beneficial reuse. The man-made portion of the SRDWSC requires armoring in shallow water bank areas, which would continue to be conducted in the same manner under all alternatives. Typically, rock placement only occurs between approximately -1 to -2 feet MLLW on an infrequent, as-needed basis.

The USACE and the Port are pursuing 6-month work windows for the Proposed Project. Assuming these windows are obtained, the Proposed Project could be constructed in approximately 4 years. With a 35-foot-deep SRDWSC under the Proposed Project, 100 vessels would carry the same amount of cargo as approximately 143 vessels under Future without Project Conditions. As part of the Proposed Project, at least two gas pipelines (Lines 130 and 114) would be in conflict with the proposed depth and require replacement. It is possible that another gas pipeline (Line 400) could also require replacement; Pacific Gas and Energy (PG&E) and USACE are conducting surveys to identify whether replacement would be necessary. PG&E will ultimately be responsible for relocating these utility lines.

2.1 Location and General Description

The 43.4-mile-long SRDWSC (Figure 1) is located in the Delta and comprises an approximately 17-mile section of the Sacramento River (from New York Slough to 2 miles north of Rio Vista) and the entire length of the 29-mile navigation channel (from 2 miles north of Rio Vista to the Port). The upper 25 miles of the navigation channel is man-made,

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and the 8.4 miles of the navigation channel nearest the Port comprise the portion that was previously dredged to -35 feet MLLW. For the purposes of the Draft SEIS/SEIR, the SRDWSC is divided into five reaches. The geographic boundaries of each reach are detailed in Table 1.

Table 1
Study Area Reach Extents

Reach	Begins at RM, Station	Ends at RM, Station	Description of Reach Extents
Reach 1	RM -2.4, -126+72	RM 4.0, 211+20	Begins at New York Slough and the Stockton Deep Water Ship Channel and ends northeast of Sherman Lake (Sherman Island)
Reach 2	RM 4.0, 211+20	RM 14.4, 761+25	Begins northeast of Sherman Lake (Sherman Island) and ends just north of the SRDWSC's confluence with the Sacramento River
Reach 3	RM 14.4, 761+25	RM 18.6, 983+98	Begins north of the confluence of the Sacramento River and ends at the southern extent of the man-made portion of the navigation channel
Reach 4	RM 18.6, 983+98	RM 35.0, 1848+00	Begins at the southern end of the man-made portion of the navigation channel and ends at the southern end of the previously deepened portion of the navigation channel
Reach 5	RM 35.0, 1848+00	RM 43.4, 2290+33	Begins at the southern end of the previously deepened portion of the navigation channel and ends east of the Port's turning basin

The scope of analysis for the Proposed Project includes the Port, the proposed dredging footprint (for deepening and widening activities) within the SRDWSC, and the proposed dredged material placement sites. The study area for the Proposed Project is defined as all areas within the scope of analysis.

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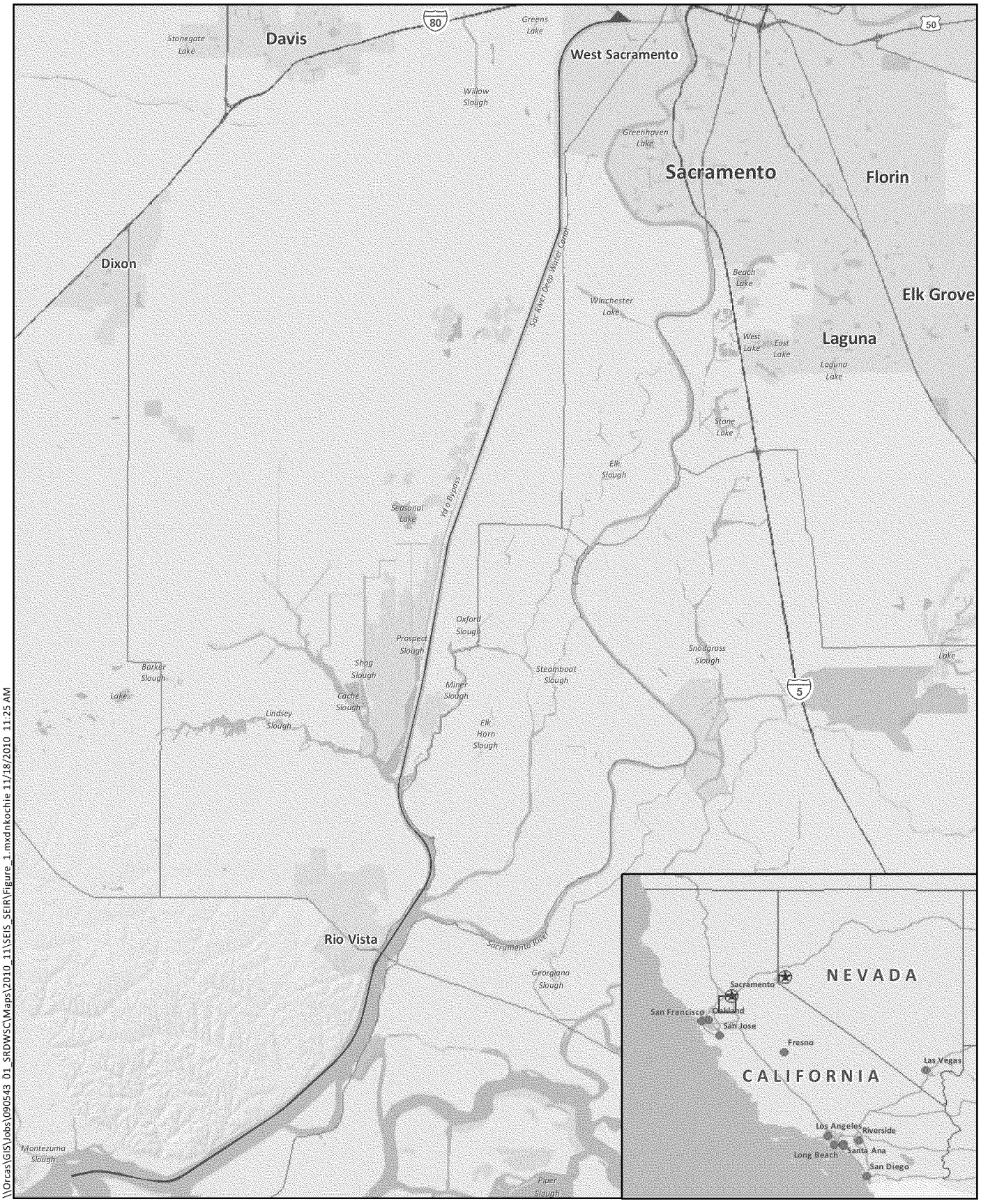

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ESRI Data and Maps [DVD]. (2009). Redlands, CA: Environmental Systems Research Institute.

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Sacramento River Deep Water Ship Channel

Figure 1
SRDWSC Vicinity Map
SEIS/SEIR
Sacramento River Deep Water Ship Channel

2.2 Authority and Purpose

Construction of the SRDWSC was initially authorized by the Rivers and Harbors Act (RHA) of 1946 (Public Law [Pub. L.] 525, 79th Congress, 2nd Session). The USACE originally constructed the SRDWSC in 1963 to a depth of 30 feet MLLW and, in 1969, Congress authorized funds to study deepening the SRDWSC from -30 to -35 feet MLLW. In 1980, USACE completed the Sacramento River Deep Water Ship Channel, California: Feasibility Report and Environmental Impact Statement for Navigation and Related Purposes (EIS; USACE 1980). Construction was not initiated at that time because of the expense. The original SRDWSC deepening project was scaled back in the extent of widening to reduce cost and, in 1986, USACE completed a General Design Memorandum and Final Supplemental Environmental Impact Statement (USACE 1986).

Deepening the SRDWSC to a depth of 35 feet was authorized in the Supplemental Appropriations Act of 1985 (Pub. L. 99-88) and under Section 202(a) of the Water Resources and Development Act of 1986 (Pub. L. 99–662, 100 Stat. 4092). The USACE initiated construction to deepen the channel to -35 feet MLLW in 1989, completing dredging from RMs 35.0 to 43.4. The deepening work was suspended in 1990 at the request of the Port due to funding constraints and now-resolved issues pertaining to utility relocations. In 1998, Congress directed USACE to prepare a Limited Reevaluation Report (LRR) for the remaining portions of the deepening project. The USACE issued the Notice of Intent (NOI) and Notice of Preparation (NOP) for a joint SEIS/SEIR to re-evaluate the SRDWSC project on June 17, 2008 (USACE 2008a). The LRR was developed in conjunction with the Draft SEIS/SEIR to document USACE's re-evaluation of the deepening project.

2.3 Alternatives Considered

Section 404(b)(1) guidelines require that "except as provided under section 404(b)(2), no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences." The guidelines consider an alternative practicable "if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes."

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The following alternatives were considered but were eliminated from co-equal analysis in the Draft SEIS/SEIR:

1. Intermodal Transportation Alternative, involving the movement of freight using multiple modes of transportation (rail, ship, and truck), without any handling of the freight itself when changing modes. In order for this to be a reasonable alternative to ongoing shipping practices, USACE estimates a 100-fold increase in traffic on the SRDWSC would need to occur; thus, it would only be reasonable or viable if use of the SRDWSC was foreclosed due to either navigation hazards or traffic issues. 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. Increased Use of Lighter Aboard Ships (LASH) Alternative, involving carrying cargo aboard ships in lighters or barges, which may be loaded at ports with LASH facilities. 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.
3. Locks Alternative, involving the constructing a system of approximately 60 hydraulic locks to control water levels in the SRDWSC. To construct this alternative, a significant amount of permanent fill below MLLW would be required. In comparison, the alternatives evaluated in the SEIS/SEIR would not result in any permanent fill below MLLW. 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.
4. Channel Deepening to Depths Shallower than -33 Feet MLLW or Deeper than -35 Feet MLLW and Selective Widening Alternative, involving deepening the SRDWSC to depths shallower than -33 feet MLLW (i.e., -31 and -32 feet MLLW) or deeper than -35 feet MLLW. The results of USACE's cost/benefit analyses for dredging to depths of 31 or 32 feet indicate that transportation cost savings for this alternative would not be optimized; therefore, the alternative would not achieve the project purpose and

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need. Depths deeper than -35 feet MLLW were ruled out because they are neither federally authorized nor desired by the non-federal sponsor.

The USACE and the Port evaluated the Proposed Project and Channel Deepening to -33 Feet MLLW and Selective Widening Alternative (-33 Feet MLLW Alternative) in the Draft SEIS/SEIR. Impacts of the Proposed Project and -33 Feet MLLW Alternative were compared to the environmental baseline.

The -33 Feet MLLW Alternative involves deepening the SRDWSC to a depth of 33 feet within the same dredging footprint as the Proposed Project. It also includes maintenance dredging of the SRDWSC within the northernmost 8 miles of the channel nearest the Port. The total dredged material volume for this alternative is anticipated to be 4 million cy with a 1-foot overdepth or 5.2 million cy with a 2-foot overdepth (approximately half the volume of the Proposed Project). The -33 Feet MLLW Alternative also includes the upland placement of material dredged from the SRDWSC. For this alternative, seven dredged material placement sites would be used to either permanently accommodate or temporarily stockpile dredged material. Assuming that 6-month work windows are obtained, the -33 Feet MLLW Alternative could be constructed in approximately 2 to 3 years. Under this alternative, 114 vessels would carry the same amount of cargo as 143 vessels under Future without Project Conditions. The -33 Feet MLLW Alternative would require the same utility lines to be relocated as the Proposed Project.

2.4 Description of Dredged Material and Placement Site Selection Process

2.4.1 Description of Dredged Material

Sections 3.4 of this document and 3.1.3 of the Draft SEIS/SEIR discuss baseline information on sediment quality and contaminant concerns. Sediment testing was performed on samples collected from the SRDWSC in support of the 1980 EIS, 1986 Supplemental EIS, several maintenance dredging events between 2000 and 2007, and the SEIS/SEIR in February 2009. Sediment chemistry results were compared to their corresponding criteria (Central Valley RWQCB 2001) established in Waste Discharge Requirement (WDR) No. 5-01-116 issued by the Central Valley Regional Water Quality Control Board (RWQCB).

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The Proposed Project is expected to expose sediments between -35 and -37 feet MLLW. Results from the 2009 sediment cores collected for planning purposes indicated that for the Proposed Project's anticipated post-dredge (i.e., discrete) sample results, only two metals exceeded sediment quality criteria that were not exceeded in corresponding samples analyzed in previous sampling events: the lead concentration at RM 23.0 exceeded the sediment maximum value from previous maintenance dredging material evaluations, and the mercury concentration at RM 31.0 exceeded the WDR criteria. As detailed in Appendix L of the Draft SEIS/SEIR, a review of the literature indicates that these levels of lead and mercury are well below levels shown to cause detrimental effects on aquatic organisms, indicating that the newly exposed surface after dredging would not likely cause any additional risk over baseline conditions. Discrete samples were not collected in the -33 to -35 feet MLLW range (which would be impacted by the -33 Feet MLLW Alternative); however, baseline sediment quality for these depths is anticipated to be similar to that of the -35 to -37 feet MLLW range.

2.4.2 Dredged Material Placement Sites Screening Process

Construction of the Proposed Project or the -33 Feet MLLW Alternative would be accomplished via hydraulic dredging. The discharge pipe from the dredge would be placed in a series of dredged material placement sites lining the banks of the SRDWSC. Placement sites were identified through a screening process designed to avoid and minimize project impacts to waters of the United States. Hydraulic placement of dredged material into one placement site along the SRDWSC represents a discharge of dredged material requiring Clean Water Act (CWA) Section 404(b)(1) analysis.

The process of selecting potential dredged material placement sites is described in Section 2.3 of the Draft SEIS/SEIR. A range of dredged material placement site options were identified and then screened, emphasizing avoidance and minimization of impacts and beneficial reuse[1] where practicable. The Placement and Beneficial Use Sites for the Sacramento River Deep Water Ship Channel (hereafter referred to as the "Placement Site Report;" included as Appendix G to the Draft SEIS/SEIR) documents the options for placement of dredged

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

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material in the vicinity of the SRDWSC, including stockpile and beneficial reuse options. The Placement Site 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. The identified sites were then categorized and iteratively screened according to the following three criteria designed to inform this 404(b)(1) evaluation:

- Tier 1: Cost, practicability, and logistical constraints of the sites including limitations on dredge access, requirements for booster pumps, and impacts to land uses
- Tier 2: Impacts to prime farmland and further logistical considerations relative to dredging equipment (technology)
- Tier 3: Site capacity limitations

Table 2 shows the results of evaluating all 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 2
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)*			

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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
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)*			
S11	* *	*	* *	* *	* *
S13	* *	*(River Rd)*			
S14	* *	*	* *	* *	* *
S16	* *	*	* *	* *	* *
S19	* *	*	* *	* *	* *
S20[2]	* *	*	* *	* *	* *
S31	* *	*	* *	* *	* *
S31a	* *	*	* *	* *	* *
S32-1	* *	*	* *	* *	* *
S32-2	* *	*	* *	* *	* *
S32-3	* *	*	* *	* *	* *
S32-4	* *	*	* *	* *	* *
S32-5	* *	*	* *	* *	* *
S32-6	* *	*	* *	* *	* *
S35	* *	*	* *	* *	* *
S35a	* *	*	* *	* *	* *
S4	* *	*	* *	* *	* *
S7	* *	*	*	* *	*
S9	* *	*	*	* *	*
SL	* *	*	* *	*	*

[2] 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.

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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
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					
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					

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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
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					
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					

Tier 3 criteria focus on potential site capacities for potential placement sites that met Tier 2 criteria, relative to reach-specific dredging volume estimates. Due to the presence of sensitive habitat and the closer proximity of other placement sites, sites GI-P1, SX-P1, VS-P1, and VS-PR1 were deemed unnecessary and eliminated from further evaluation.

The placement site screening analysis identified ten sites that are practicable in terms of cost, logistics, and technology for evaluation in the Draft SEIS/SEIR (Table 3). These ten sites were further screened using the results of habitat and vegetation surveys completed by USACE (2008b and 2010), which identified sensitive habitat areas including wetlands,

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riparian areas, and oak woodlands. The USACE 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 these sensitive habitat areas. The usable portions of each placement site are detailed in Table 3.

Table 3
Proposed Dredged Material Placement Site Details

Site Name	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	Reaches 1 and 2	281	60	GreenPort Energy Park	Stockpile	No[a]
S20	Reaches 1 and 2	91	23	DWR	Placement and Reuse	Yes[b]
S19	Reach 2	173	172	D.I. Aggregate Management, LLC	Stockpile	Yes
S16	Reach 2	136	61	USACE	Stockpile	Yes
S14	Reach 3	91	19	USACE	Stockpile	Yes
S11	Reach 4	184	40	Port and Private	Stockpile	No[a]
S31	Reaches 4 and 5	1,086	382	Port	Stockpile	Yes
S32	Reaches 4 and 5	243	213	Port and Private	Stockpile	No[a]
S4	Reach 5	112	111	Private	Stockpile	No[a]
S1	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.

2.5 Summary of Proposed Mitigation Measures

Table 4 identifies all the mitigation measures that are introduced in Section 3 of the Draft SEIS/SEIR.

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Table 4
Summary of Proposed Mitigation Measures

Water Quality Mitigation Measures	
WQ-MM-1	Implement standard construction best management practices (BMPs) and requirements of the WDR including: – Do not allow concentrations of dissolved oxygen (DO) to fall below 5.0 milligrams per liter (mg/L) – Do not allow the release of oils, grease, waxes, or other materials that could form a visible film or coating on the water surface or on the stream bottom, or create a nuisance or adversely affect beneficial uses – Do not allow fungi, slime, or other objectionable growths, or aesthetically undesirable discoloration – Do not allow turbidity to exceed the following limitations: Where undisturbed turbidity is greater than 100 Nephelometeric Turbidity Units (NTU), increases shall not exceed 10% Where undisturbed turbidity is between 0 and 50 NTU, increases shall not exceed 20% Where undisturbed turbidity is between 50 and 100 NTU, increases shall not exceed 10 NTU – Specify a rapid turnaround time for the total suspended solids (TSS) laboratory analysis – Implement a solid debris management plan
Aquatic Species and Habitat Mitigation Measures	
ASH-MM-1	Submerge the cutterhead within the substrate to the maximum extent practicable when the dredge pumps are engaged, and utilize a slow rotational speed, where feasible. When cleaning the pipeline, the cutterhead will be no greater than 3 feet from the floor of the SRDWSC. Pipeline clearing will be kept to the minimum amount necessary.
ASH-MM-2	Conduct entrainment monitoring on a certain percentage of sediment dredged from the SRDWSC. Adaptively manage construction such that dredging ceases should entrainment of listed species reach the number of individuals set for in any incidental take statement/permit. The percentage of dredged material that must be monitored and the number of take allowed will be determined during the formal state and federal ESA consultation processes.
ASH-MM-3	Constrain all dredging operations and placement of dredged material to applicable environmental work windows or other windows designated through agency consultation.
ASH-MM-4	Limit speeds for construction vessels (i.e., dredges, tugs, and scow/tug combinations) to 2 knots or less when approaching or operating in the dredging locations. Smaller support vessels carrying personnel and/or supplies to the dredging location would be limited to 5 knots or less. Limiting vessel speeds in the dredging location would minimize the likelihood of propeller strikes and other vessel collisions, as well as propwash entrainment of fish that may be in the study area.
Terrestrial Species and Habitat Mitigation Measures	
TSH-MM-1	Special status species surveys shall be completed by a qualified, USFWS-approved biologist within 14 days prior to both dredged material placement and placement site preparation. The survey areas will include all portions of the placement sites within 500 feet of the usable portion of placement sites. This will include a survey for nests and other breeding habitats (i.e., rodent burrows, etc.) as well as unique habitat features required by special status species potentially occurring within the placement site (i.e., elderberry plants, vernal pools, etc.). If

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	special status species, nests, or unique habitat features are encountered, avoidance and/or relocation parameters shall be established and implemented, to be determined through consultation with USFWS. This may include establishing exclusionary and buffer zones within the placement site, trapping and relocating individuals, or temporal restrictions (i.e., avoiding construction during the breeding season). In addition, a qualified biologist (monitor) would be onsite prior to dredged material placement to determine appropriate dredge pipeline placement, and to conduct pre-placement surveys for any potential sightings of protected species within 500 feet of the identified placement area. In general, preferred locations would be areas away from riparian and wetland vegetation in locations that have angular revetment slopes of 3:1 or greater.
TSH-MM-2	Develop the construction schedule and sequencing so that both dredged material placement and placement site preparation occurs outside the breeding season for bird species protected by the ESA or MBTA that are identified as potentially occurring within the placement sites, to the extent possible. If construction activities are scheduled to occur during the breeding season, within 14 days prior to construction, a qualified, USFWS-approved biologist shall complete a survey of all potential nesting habitat within 500 feet of: 1) the usable portion of placement sites; and 2) the proposed dredge pipeline placement area. If active nests are found during pre-construction surveys, consultation with USFWS shall occur to determine potential project impacts (including noise impacts) and the appropriate course of action. This could potentially include establishing buffer zones, relocating individuals and nests, temporal restrictions (i.e., rescheduling construction activities), and/or restrictions on placement of the dredge pipeline.
TSH-MM-3	A pre-construction special status plant species survey shall be completed by a qualified, USFWS-approved biologist. The survey area will include all portions of the placement sites within 500 feet of the designated usable area. The survey will focus on identifying individuals or populations of CNPS listed plant species identified within this document as potentially occurring within each placement site. The survey shall be conducted during the flowering period for each species potentially occurring within each placement site. If encountered, individuals or populations shall be avoided to the maximum degree possible. In the event that avoidance is not possible, consultation with USFWS shall occur to determine the appropriate course of action. This could potentially include removing and transplanting individuals, contributing to mitigation banks, or other actions deemed appropriate by USFWS.
TSH-MM-4	Implement the wetland preservation project on Prospect Island as described in Section 2.2.2.3 of the Draft SEIS/SEIR.
TSH-MM-5	Within 14 days prior to placement site preparation, a pre-construction tree survey shall be completed by a qualified biologist. The survey area will include the usable portion of dredged material placement sites. The survey will identify any trees protected from removal or disturbance by local ordinances applicable within the geographical area of the placement site. If encountered, protected trees shall be avoided, and a 100-foot buffer shall be established around the dripline of the tree for the duration of construction. If disturbance to protected trees is unavoidable, consultation with the city or county agency responsible for administering the tree ordinance, as well as with CDFG, if applicable, shall occur to develop appropriate mitigation measures. These measures may include in-kind planting of additional trees or preserving existing trees, or other avoidance methods if buffers would be ineffective (i.e., if dredge slurry could not be prevented from entering these areas) or infeasible. This could potentially include the construction of berms around trees.
Land Use Mitigation Measures	
LU-MM-1	Avoid and minimize irretrievable conversions of unique farmland, farmland of statewide

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	importance, grazing land, farmland of local importance, and Williamson Act contracted land.
LU-MM-2	Payment of in-lieu fees for mitigation of converted unique farmland, farmland of statewide importance, grazing land, and farmland of local importance.
LU-MM-3	Provide buffers between incompatible land uses.
LU-MM-4	Develop and implement a 20-year Plan for the ongoing maintenance of the SRDWSC and long-term management of the dredged material placement sites reflective of conditions after deepening the SRDWSC; this plan will address the nature of planned future dredged material reuse, consequential conversions of placement site land to non-agricultural uses, and steps for compliance with applicable zoning requirements.
LU-MM-5	For any identified impact to property under Williamson Act contract, USACE and the Port would work with the landowner to exercise the cancellation or a non-renewal option.
Air Quality Mitigation Measures	
AQ-MM-1	Apply soil stabilizers to inactive areas.
AQ-MM-2	Replace ground cover in disturbed areas.
AQ-MM-3	Water exposed surfaces three times daily.
AQ-MM-4	Reduce speed on unpaved roads to less than 15 mph.
AQ-MM-5	Utilize diesel particulate filter (DPF) on land-side off-road construction equipment.
AQ-MM-6	Utilize selective catalytic reduction (SCR) on dredging equipment.
Noise Mitigation Measures	
N-MM-1	Equip construction engines with sound reducing mufflers, install supplemental noise shielding around engines and pumps, or install intake silencers that would potentially reduce noise emissions by 5 to 10 dBA (USEPA 1971).
N-MM-2	Turn off construction equipment when not in use for long periods.
N-MM-3	Require Construction Contractor to maintain all equipment and train their equipment operators to reduce noise levels.
N-MM-4	Locate stationary equipment away from receiving properties to decrease noise, as much as feasible.
N-MM-5	Obtain a noise permit from the City of Rio Vista for dredging operations to occur between 5 p.m. and 7 a.m. and on Sundays within the city limits.
Cultural and Historic Resources Mitigation Measures	
CHR-MM-1	Develop a plan with protocols for onsite archaeological monitoring and for response actions in the event that cultural or historic resources are encountered during construction.
Recreation Mitigation Measures	
R-MM-1	Observe all standard U.S. Coast Guard practices for navigation safety and communications, including publications of Notices to All Mariners.
R-MM-2	Establish a construction exclusion zone around dredging operations to be maintained at all times by the Construction Contractor and light dredging equipment at night to prevent collisions.

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3 FACTUAL DETERMINATIONS

3.1 Geology

Section 3.1.1 of the Draft SEIS/SEIR evaluated the impacts of the Proposed Project on the geology of the SRDWSC. Over the past 15 years, an average of approximately 190,000 cy of dredged material was placed in upland sites S1, S14, S16, S19, S20, and S31 per maintenance dredging event and did not resulted in destabilizing any levees or berms. As part of the Proposed Project, the height of existing berms would need to be raised or new berms would need to be constructed surrounding the proposed dredged material placement sites to accommodate the capacity needs associated with the Proposed Project. The Proposed Project would also significantly increase the amount of material that would be placed at sites previously used for placement of maintenance dredging material. The total estimated volume of dredged material to be placed in the ten identified placement sites by the Proposed Project is approximately 10 million cy (including a 2-foot overdepth).

3.1.1 Actions Taken to Avoid and Minimize Impacts

The USACE has taken a number of actions to avoid and minimize impacts, including the placement site screening process described in Section 2.4.2 of this document. Within selected sites, to ensure berm stability, USACE would proportionately increase berm thickness with berm height. The USACE has determined proposed site-specific berm heights that would be structurally stable based on the geotechnical investigations completed to date, while providing necessary capacity, as shown in Table 5. Placement of pipes for conveyance of the dredged material slurry would also be specified to ensure that berm and levee stability is not compromised. Thus, construction of the Proposed Project is expected to have no impact on the stability of berms or levees in the region.

Table 5
Proposed Placement Site Maximum Berm Heights

Reach	Placement Site	Site Capacity (cy)	Maximum Berm Height (feet) -33 Feet MLLW Alternative	Maximum Berm Height (feet) Proposed Project
1	S35	365,000	3	8
2	S20	407,000	14	14
	S19	2,620,000	17	21
	S16	474,000	22	22

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Reach	Placement Site	Site Capacity (cy)	Maximum Berm Height (feet) -33 Feet MLLW Alternative	Maximum Berm Height (feet) Proposed Project
3	S14	349,000	10	17
4	S11	447,000	N/A	10
	S32	173,000	N/A	6
	S31	4,000,000	9	9
5	S4	1,616,000	N/A	11
	S1	659,000	10	10

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

The dredged material placement sites would also be used in various combinations under both Future without Project Conditions and for construction of the -33 Feet MLLW Alternative.

3.2 Hydrology, Hydraulics, Sedimentation, and Sediment Transport

Impacts of dredging and the placement of dredged material on hydrology and hydraulics were discussed in Section 3.1.2 of the Draft SEIS/SEIR. Construction of the Proposed Project or the -33 Feet MLLW Alternative is expected to have no impact on the footings of the State Route (SR) 12/Rio Vista Bridge or to the levees protecting Prospect and Ryer Islands due to enhanced scour. There would similarly be no impacts to shoreline erosion rates due to increased vessel wake forces.

The Proposed Project is expected to increase future maintenance dredging volumes by approximately 10% as compared to Future without Project Conditions (Andes 2010). This would result in an equivalent increase of future ongoing discharges into sites currently used for placement of maintenance dredging material. Based on the historical average of 190,000 cy per maintenance dredging event, maintenance dredging volumes after deepening the SRDWSC to a depth of 35 feet are thus predicted to increase by a maximum of 19,000 cy (10%), resulting in an estimated maximum annual volume of approximately 209,000 cy. This increase in maintenance dredging volume represents a minor, incremental increase over baseline conditions. Maintenance dredging after construction of the -33 Feet MLLW Alternative would be even lower.

3.2.1 Salinity (X2)

As described in Section 3.1.2. of the Draft SEIS/SEIR, the UnTRIM three-dimensional

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hydrodynamic model for the San Francisco and Delta system was used to model X2 distances within the San Francisco Bay and Delta system under a critical water year flow condition (i.e. severe drought). Impacts would be even less during a typical water year. A summary of the effects is presented below:

- There are no significant effects on water surface elevations or tidal flows for Year 0 or Year 50 conditions.
- There are no impacts on salinity when X2 is less than 75 kilometers (km) from the Golden Gate Bridge.
- Minor salinity increases are predicted from September through mid-January when X2 is between Collinsville and Rio Vista.
- Salinity increases of up to 0.15 practical salinity units (psu) are predicted during some periods (i.e., September through January) for Year 0 and Year 50 conditions for the Proposed Project.
- The median change in X2 for Year 0 is 0.11 km and for Year 50 is 0.17 km.
- There are no quantitatively different effects of the Proposed Project for Year 0 and Year 50.

The modeling results show that the effects of the Proposed Project related to aquatic organisms experiencing fluctuating X2 levels—as well as the measure of salinity intrusion into the Delta water supply—are small and considered minor. Impacts under the -33 Feet MLLW Alternative would be even lower.

3.2.2 Actions Taken to Avoid and Minimize Impacts

No mitigation measures were proposed in Section 3.1.2 of the Draft SEIS/SEIR. While construction of the Proposed Project would increase the future maintenance dredging volume by approximately 10%, and thereby increase future discharges of dredged material in placement sites, this volume increase is considered negligible when compared to overall volumes and site capacities.

3.3 Water Quality

Section 3.1.4 of the Draft SEIS/SEIR evaluated the impacts of the Proposed Project on water quality.

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3.3.1 Water Quality Parameters

Discharges of dredged material into proposed placement sites, and resulting effluent returning to the SRDWSC, may result in short-term, adverse impacts to water quality. Impacts may be localized elevated levels of turbidity, short-term localized decreases in dissolved oxygen (DO), and increases in nutrients due to resuspension of sediment and sediment-bound organic material. These impacts would be temporary and generally confined to the dredging area, and water quality would return to baseline conditions following construction.

3.3.2 Constituents of Concern

As discussed in Section 3.1.4.1 of the Draft SEIS/SEIR, dredged material elutriate testing was used to evaluate chemical concentrations in effluent runoff from dredged material during maintenance dredging performed from 2001 to 2007. Five of nine metals (arsenic, cadmium, copper, lead, and mercury) tested in the modified elutriate test (MET) analysis showed exceedances of the WDR criteria in at least one sample. Of those metals, only mean and median concentrations of mercury exceeded the WDR criteria. Total maximum daily loads (TMDLs) are established in the Delta for cadmium, copper, and zinc. Of 30 samples tested, two cadmium, five copper, and one zinc result exceeded the TMDL. Evaluation of a mixing zone extending 1,000 feet upstream and 300 feet downstream of a given dredging location and not occupying more than 50% of the cross section of the SRDWSC showed that concentrations would not exceed the WDR criteria.

Deionized water waste extraction tests (DI-WETs) were performed on dredged material during maintenance operations between 2001 and 2007. Seven of nine metals (arsenic, total chromium, copper, lead, mercury, nickel, and zinc) tested in the DI-WET exceeded WDR criteria in at least one sample. DI-WET mean and median concentrations for copper, lead, and mercury also exceeded the WDR criteria. Of 30 samples, TMDLs for cadmium, copper, and zinc were also exceeded in 3, 12, and 11 samples, respectively. When factoring in natural attenuation, the Central Valley RWQCB found no unacceptable risk, and issued a permit to dredge each year.

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Sediment cores were taken at each RM within the channel in 2009. A total of 44 sediment composite samples were created from these cores. METs and DI-WETs were performed on the composite samples to represent elutriate concentrations during dredging to the Proposed Project depth. MET results indicated the following:

- Ammonia and biochemical oxygen demand concentrations were higher than that of corresponding site water in 39 and 32 samples, respectively.
- Chloride, total dissolved solids, and conductivity results exceeded the corresponding WDR criteria in 15, 20, and 20 samples, respectively.
- Arsenic, copper, and selenium concentrations exceeded the maximum values from previous studies and/or the corresponding WDR criteria in two, three, and eight samples, respectively.
- Barium concentrations exceeded the criteria from the Central Valley Basin Plan in 21 samples.
- Lead and mercury concentrations exceeded the corresponding WDR criteria in two and 12 samples, respectively.
- Benzo(a)pyrene, benzo(b)fluoranthene, chrysene, indeno(1,2,3-c,d)pyrene, and oil and grease concentrations exceeded the corresponding WDR criteria in six, five, four, six, and 31 samples, respectively.

DI-WET results indicated that arsenic, copper, and lead concentrations exceeded the corresponding WDR criteria in eight, 17, and six samples, respectively.

3.3.2.1 Methylmercury

As discussed in Section 3.1.4.1 of the Draft SEIS/SEIR, methylmercury production during dredging and disposal is a concern both for the Proposed Project and dredging in the region in general. Currently, the relationship between mercury in sediments and methylmercury production in dredged material placement sites is poorly understood, and further work on the relationship between dredging and methylation is underway. The results of these studies will likely be available in spring 2011. Following coordination with the Central Valley RWQCB, USACE will use the results of these studies to develop avoidance and minimization measures to address potential methylmercury production.

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3.3.3 Mixing Zone Determinations

The Central Valley RWQCB adopted WDR General Order No. 5-01-116 in 2001 for maintenance dredging of the SRDWSC. The WDR allows the use of a "mixing zone" to determine compliance with discharge requirements. The mixing zone is defined as a volume of receiving water that is allocated for mixing with a wastewater discharge where water quality objectives and criteria may be exceeded without causing adverse effects to the overall waterbody. The mixing zone requirements in the WDR include a length of 300 feet and a maximum cross-section of 50% of the receiving waters, as well as other limitations and prohibitions on discharges (Central Valley RWQCB 2001). The Central Valley RWQCB considers the mixing zone when evaluating the results of elutriate testing and determining if discharges of constituents of concern would violate any water quality standards.

3.3.4 Actions Taken to Avoid and Minimize Impacts

Dredging and the discharge of large volumes of effluent from placement sites could result in short-term, localized increases in turbidity and dissolved concentrations of constituents of concern, as well as localized changes in DO and nutrient concentrations. However, these increases would be short-term, rapidly returning to baseline conditions, and would not violate WDR standards based on information gathered from past maintenance dredging episodes. Dredged material elutriate testing indicates that dredging and dredged material placement operations could have an impact on groundwater quality from leaching of contaminants. However, despite these exceedances, the Central Valley RWQCB factored in natural attenuation, found no unacceptable risk, and issued a permit to dredge each year.

The USACE's maintenance dredging activities are required to monitor turbidity, DO, temperature, and pH according to the monitoring and reporting requirements set forth in the WDR. With the implementation of the mitigation and monitoring detailed in Section 2.5 of this document, there would be short-term, less than significant impacts to water quality under the Proposed Project.

The -33 Feet MLLW Alternative may reduce the duration of impacts due to smaller dredging volumes; however, the aforementioned short-term, localized impacts due to changes in dissolved concentrations of constituents of concern, turbidity, nutrients, and DO would still

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occur, and the localized impacts at the point of discharge would be similar to the Proposed Project.

3.4 Sediment Quality and Contaminants

Section 3.1.3 of the Draft SEIS/SEIR evaluated the impacts of the Proposed Project due to sediment quality and contaminant concerns. Sediment testing was performed on samples collected from the SRDWSC in support of the 1980 EIS, 1986 Supplemental EIS, several maintenance dredging events between 2000 and 2007, and the SEIS/SEIR in February 2009. Sediment chemistry results were compared to their corresponding criteria established in WDR No. 5-01-116 issued by the Central Valley RWQCB (2001).

As described in detail in Section 3.1.3.4 of the Draft SEIS/SEIR, the Proposed Project is expected to expose sediments between -35 and -37 feet MLLW. Results from the 2009 sediment cores collected for planning purposes indicated that for the Proposed Project's anticipated post-dredge (i.e., discrete) sample results, only two metals exceeded sediment quality criteria that were not exceeded in corresponding samples analyzed in previous sampling events: the lead concentration at RM 23.0 exceeded the sediment maximum value from previous maintenance dredging material evaluations, and the mercury concentration at RM 31.0 exceeded the WDR criteria. As detailed in Appendix L of the Draft SEIS/SEIR, a review of the literature indicates that these levels of lead and mercury are well below levels shown to cause detrimental effects on aquatic organisms, indicating that the newly exposed surface after dredging would not likely cause any additional risk over baseline conditions. Results for the -33 Feet MLLW Alternative are expected to be similar, although no discrete samples were collected in the -33 to -35 feet MLLW range.

To evaluate the potential effects of placing any sediment-associated contaminants at the proposed dredged material placement sites, analytical results of composite samples were compared to WDR criteria (based on U.S. Environmental Protection Agency [USEPA] preliminary remediation goals [PRGs] for ecological or residential use). One composite sample collected between RMs 16.0 and 18.0 had benzo(a)pyrene concentrations at 133 micrograms per kilogram (μg/kg), which is above the WDR criteria of 62 μg/kg. These WDR criteria exceedances of metals were found to be relatively minor when factoring in natural

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attenuation. Accordingly, the Central Valley RWQCB approved placement of these materials during maintenance dredging events from 2000 through 2009. It is assumed that future maintenance dredging material with similar documented exceedances would continue to be placed in dredged material placement sites, and that exceedances of benzo(a)pyrene in material proposed for placement under the Proposed Project or -33 Feet MLLW would be similarly less than significant when compared to the environmental baseline.

3.4.1 Actions Taken to Avoid and Minimize Impacts

No mitigation measures were proposed in Section 3.1.3 of the Draft SEIS/SEIR because impacts would be similar less than significant impacts as compared to the environmental baseline.

3.5 Terrestrial Ecosystem Determinations

Section 3.2.2 of the Draft SEIS/SEIR evaluated the impacts of the Proposed Project on terrestrial species and habitat. Surveys were conducted to evaluate potential impacts of dredged material placement on sensitive habitat types that exist within the ten proposed placement sites as part of a sequenced search to identify appropriate placement site options. Following the identification of suitable placement sites and their useable portions, a determination of impacts on potential special status species was completed.

3.5.1 Effects on Threatened/Endangered Terrestrial Species

Section 3.2.2.4 of the Draft SEIS/SEIR summarizes the potential effects of the Proposed Project and alternatives on state and federally listed endangered and threatened species arising from the proposed discharge of dredged material in the ten proposed placement sites. Several federal and state Endangered Species Act (ESA) listed species of flora and fauna and/or their habitat are potentially present in the sites, including Swainson's hawk (Buteo swainsoni), giant garter snake (Thamnophis gigas), valley elderberry longhorn beetle (Desmocerus californicus dimorphus), California tiger salamander (Ambystoma californiense), bank swallow (Riparia riparia), California black rail (Laterallus jamaicensis coturniculus), western yellow-billed cuckoo (Coccyzus americanus occidentalis), and salt marsh harvest mouse (Reithrodontomys raviventris).

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As previously described in Section 2.4.1 of this document, USACE and the Port conducted a thorough, iterative screening process to identify the ten proposed placement sites and avoid impacts due to discharges of fill to the maximum extent practicable when considering logistical and other constraints on site use. Placement of dredged material in the resulting ten sites could result in loss of habitat, disturbance of species during foraging and nesting periods, and potentially even take of individuals of the species during site preparation (e.g., mechanical clearing and berm construction impacts to the giant garter snake). Several mitigation measures described in Section 2.5 are proposed to further minimize and compensate these effects, including pre-construction surveys, schedule and sequencing measures, and mitigation for permanent habitat impacts at Prospect Island. The -33 Feet MLLW Alternative would result in similar impacts, although only seven of the sites would be used (S4, S11, and S32 would not be required).

While undertaking no action (Future without Project Conditions) or constructing the -33 Feet MLLW Alternative would reduce impacts to listed terrestrial species by reducing the number of placement sites and/or the frequency and duration of use of the sites, these alternatives would not achieve the project objectives because the benefits of the widening and deepening to -35 feet MLLW would not be accomplished. Furthermore, six of the ten sites would continue to experience similar impacts under Future without Project Conditions due to their ongoing use for maintenance dredging, and seven of the ten sites would be used and experience similar impacts under the -33 Feet MLLW Alternative.

3.5.2 Effects on Other Terrestrial Species

In addition to the ESA-listed species mentioned above, a number of non-listed sensitive species and their habitats also may occur in the ten proposed dredged material placement sites. These include tri-colored blackbird (Agelaius tricolor), great blue heron (Ardea herodias), burrowing owl (Athene cunicularia), Suisun song sparrow (Melospiza melodia maxillaries), white-tailed kite (Elanus leucurus), purple martin (Progne subis), yellow-headed blackbird (Xanthocephalus xanthocephalus), American badger (Taxidea taxus), western pond turtle (Emys marmorata), western red bat (Lasiurus blossevillii), Delta tule pea (Lathyrus jepsonii var. jepsonii), Heckard's peppergrass (Lepidium latipes var. heckardii), Mason's lilaeopsis (Lilaeopsis masonii), and San Joaquin spearscale (Atriplex joaquiniana).

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As discussed in Section 3.5.1 of this document, placement of dredged material in the ten sites could result in loss of habitat, disturbance of species during foraging and nesting periods, and potentially even take of individuals of the species during site preparation. Impacts to non-ESA listed sensitive species were considered at the population level, and no significant impacts were determined to exist due to construction of the Proposed Project. The mitigation measures described in Section 2.5 are proposed to further minimize and compensate these effects, including pre-construction surveys and consultations, schedule and sequencing measures, and mitigation for permanent habitat impacts at Prospect Island. The -33 Feet MLLW Alternative would result in similar impacts, although only seven of the sites would be used (S4, S11, and S32 would not be required).

3.5.3 Actions Taken to Avoid and Minimize Impacts

As described in 2.4.1 of this document, USACE and the Port conducted a thorough, iterative screening process to identify dredged material placement sites, and thereby avoid and minimize impacts to the maximum extent practicable. The USACE and the Port will implement mitigation measures TSH-MM-1 through TSH-MM-5 as described in Section 2.5 of this document, which will reduce all residual impacts to less than significant.

3.6 Aquatic Ecosystem Determinations

Section 3.2.1 of the Draft SEIS/SEIR evaluated the impacts of the Proposed Project on aquatic species and habitat. The analysis included potential impacts to aquatic species as a result of hydraulic dredging, as well as potential impacts to waters and wetlands from placement of dredged material.

3.6.1 Effects on Aquatic Habitats

As presented in the Draft SEIS/SEIR, USACE and the Port conducted a thorough on-site avoidance of wetlands to reduce impacts to these special aquatic sites. Table 6 shows anticipated impacts to wetland habitat resulting from proposed discharges of fill under the Proposed Project. The Proposed Project would impact 1.33 acres of wetland at site S31. This wetland impact is the only proposed impact to a Special Aquatic Site (SAS). Site S31 is a previously existing placement site and would continue to be used for maintenance dredging

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under Future without Project Conditions; therefore, there is no incremental difference in SAS impacts between the Proposed Project, the -33 Feet MLLW Alternative, and baseline conditions. Mitigation for these 1.33 acres of impact would be provided at the proposed Prospect Island site, described in Section 2.1.2.3 of the Draft SEIS/SEIR.

Table 6
Summary of Impacted Wetlands in Usable Portions of Placement Sites

Site Number	Site Area (acres)[a]	Usable Area (acres)	Area Requiring Mitigation (acres)[b]	Area of Non-Sensitive Habitat Impacted (acres)[c]	Area of Wetland Impacted (acres)
S1	129.00	79.00	0	79.00	0
S4	111.90	111.29	0	111.29	0
S11	183.62	40.30	0	40.00	0
S14	91.00	18.80	0	18.19	0
S16	136.12	61.28	0	61.28	0
S19	173.15	172.41	0	170.64	0
S20	91.18	23.49	0	23.49	0
S31	1,086.03	381.88	1.33	373.76	1.33
S32	243.21	212.68	0	212.31	0
S35	280.93	60.14	0	60.14	0

Notes:

a All area calculations were completed in the "NAD_1983_UTM_Zone_10N" coordinate system because the habitat mapping was completed in this (UTM) coordinate system, due to the habitat extent covering several State Plane Zones

b Habitat types identified according to the definitions from the Holland Natural Communities of California (Holland 1986)

c Includes "cultivated field," "non-native grassland," "unvegetated," and drainage ditches

3.6.2 Effects on Threatened/Endangered Fish and Aquatic Species

As discussed in Section 3.2.1.4 of the Draft SEIS/SEIR, entrainment in dredging equipment is not expected to result in any residual significant impacts to listed sturgeon, salmonids, or mid-water fishes. While the Proposed Project and the -33 Feet MLLW Alternative would result in incrementally increased potential for entrainment in dredging equipment, past entrainment studies have proven that entrainment was generally not observed as an issue for the listed species discussed in the Draft SEIS/SEIR. In addition, implementation of the proposed mitigation measures will further reduce impacts to below significance.

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Construction of the Proposed Project or the -33 Feet MLLW Alternative is also anticipated to reduce potential impacts to listed species from vessel strikes or propeller wash entrainment as compared to Future without Project Conditions because the number of commercial vessels on the SRDWSC would decrease. Construction of the Proposed Project or the -33 Feet MLLW Alternative would temporarily increase turbidity and remove delta smelt (Hypomesus transpacificus) critical habitat. These impacts to delta smelt critical habitat are potentially significant compared to baseline conditions.

3.6.3 Effects on Other Aquatic Species

Dredging and the discharge of dredged material as part of construction of the Proposed Project are not anticipated to result in any residual significant impacts on non-listed fish species. As discussed in Section 3.2.1.4 of the Draft SEIS/SEIR, entrainment in dredging equipment is not expected to produce any residual significant impacts to sturgeon, salmonids, groundfish, or mid-water fish species. Continued implementation of the proposed mitigation measures will further reduce impacts to below significance. Construction of the Proposed Project or -33 Feet MLLW Alternative is also anticipated to reduce potential impacts to non-listed species from vessel strikes or propeller wash entrainment because the number of commercial vessels on the SRDWSC would decrease.

3.6.4 Actions Taken to Avoid and Minimize Impacts

The USACE and the Port's placement site screening process and further identification of placement site "usable portions" results in the Proposed Project almost entirely avoiding waters and wetlands. As detailed in Section 2.5 of this document, the Proposed Project includes mitigation measure TSH-MM-4, which requires wetland preservation on Prospect Island to mitigate for the remaining unavoidable impacts to wetlands at S31. With implementation of this mitigation measure, impacts of the Proposed Project on wetlands would be residually less than significant as compared to the environmental baseline.

As detailed in Section 2.5 of this document, USACE and the Port have proposed implementation of avoidance and minimization measures addressing cutterhead positioning, entrainment monitoring, adherence to environmental work windows where feasible,

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construction vessel speed limits, and water quality monitoring. The Proposed Project and the -33 Feet MLLW Alternative would result in a benefit to vessel strike mortality by reducing the number of commercial vessels on the SRDWSC. These measures reduce all impacts to below significance, except for the potential temporary loss of 1,160 acres of delta smelt critical habitat. The USACE and the Port are currently in early coordination with the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG) regarding potential effects to delta smelt critical habitat. As part of the coordination and subsequent Section 7 consultation, mitigation and compensation measures will be developed and will be incorporated into the Proposed Project to reduce this impact to below significance.

3.7 Potential Effects on Human Use Characteristics

Potential impacts of the Proposed Project and alternatives to human use were described in Section 3.3 of the Draft SEIS/SEIR. Impacts to utilities, aesthetics, cultural and historic resources, recreation, commercial fisheries, marine navigation, environmental justice, and hazardous, toxic, or radioactive waste issues are not discussed in this 404(b)(1) analysis because there are no potential incremental effects related to these topics resulting from the placement of dredged material in the proposed placement sites. Land use, air quality, and noise impacts are discussed below.

3.7.1 Land Use

Land use impacts were described in Section 3.3.1 of the Draft SEIS/SEIR. Use of the ten proposed dredged material placement sites under the Proposed Project would involve the construction or raising of levees and modifications to existing land uses. The Proposed Project would not impact prime farmland; however, it could result in impacts to designated unique farmland, farmland of state-wide importance, grazing land, farmland of local importance, and Williamson Act-contracted land. Impacts to the six existing sites (S1, S14, S16, S19, S20, and S31) under Future without Project Conditions would result in similar impacts, with the exception that only S32 has farmland of state-wide importance within the site boundary. Construction of the -33 Feet MLLW Alternative would eliminate use of S32 as a dredged material placement site. Whether or not the Proposed Project would result in the irretrievable conversion of any of these farmland designations will depend upon the

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long-term management of each site and whether they will be made available for agricultural use in the near future.

3.7.1.1 Actions Taken to Avoid and Minimize Impacts

As described in 2.4.1 of this document, USACE and the Port conducted a thorough, iterative screening process to identify dredged material placement sites, and thereby avoid and minimize impacts to land use issues. The USACE and the Port have developed a number of mitigation measures to further avoid and reduce irretrievable commitments of farmland on the final proposed list of ten sites. These measures are also described in Section 2.5 of this document. Among these measures is the development and implementation of a 20-year Plan for the ongoing maintenance of the SRDWSC and long-term management of the dredged material placement sites reflective of conditions after deepening the SRDWSC to a depth of 35 feet. This plan will address the nature of USACE and the Port's planned future dredged material reuse, consequential conversions of placement site land to non-agricultural uses, and steps for compliance with applicable zoning requirements.

With the exception of potential impacts to farmland of state-wide importance at S32, construction of the Proposed Project would entail similar, less than significant impacts as compared to the environmental baseline. Implementing the mitigation measures described in Section 2.5 of this document would reduce the impacts to less than significant.

3.7.2 Air Quality

Air quality issues are discussed in Section 3.3.3 of the Draft SEIS/SEIR. Dredging and the discharge of dredged material into the proposed placement sites would not result in any significant construction air emissions impacts after implementation of the proposed air quality mitigation measures as described in the Draft SEIS/SEIR. Thus, while construction of the Proposed Project or the -33 Feet MLLW Alternative would entail construction emissions for longer periods in consecutive years than those from maintenance dredging under Future without Project Conditions, no construction air quality thresholds would be violated.

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3.7.2.1 Actions Taken to Avoid and Minimize Impacts

Section 2.5 describes the proposed mitigation measures, which include measures designed to reduce fugitive dust emissions, stabilize graded slopes, reduced idling and speeds of construction equipment, and use of diesel particulate filter (DPF) and selective catalytic reduction (SCR) technology on construction and dredging equipment. Implementing the mitigation measures would reduce all construction emissions-related impacts to below significance.

3.7.3 Noise

Potential noise-related impacts due to construction of the Proposed Project or alternatives are discussed in Section 3.3.4 of the Draft SEIS/SEIR. Dredging and the discharge of dredged material would result in localized noise impacts. A Practical Spreading Model was utilized, combined with potential noise emissions identified based upon literature, to determine potential noise impacts of the Proposed Project. Noise generated from a typical hydraulic dredge plant is generally between 60 and 80 A-weighted decibels (dBA) at 50 feet from the source (USEPA 2004). The estimated worst-case scenario noise level for the construction equipment proposed for the construction of the sites (at the source) includes dump trucks (76 dBA) and backhoes (78 dBA) for a combined noise of 80 dBA (FHWA 2006). Due to the slow speed of the dredging units and the stationary nature of the dredged material placement sites, both sources were considered point and expected to attenuate at a rate of 6 dB per doubling of distance. Further information on methodology and results is contained in the Draft SEIS/SEIR.

During construction of the Proposed Project, sensitive receptors could experience exterior noise levels that exceed local regulatory noise levels on a temporary basis, primarily during the evening, due to the dredging activities. Noise impacts to Contra Costa County and the City of Pittsburg in the vicinity of Reach 1 were assessed, but no sensitive receptors are located within the study area; therefore, they are not included in this analysis. A school located south of S1, recreational areas near S14, a park near S16 (due to utility relocations), and residences near S19 and S32 (due to utility relocations) are also susceptible to noise exceedances and were assessed under this evaluation. Furthermore, within the City of Rio Vista, it is unlawful to emit construction equipment noise within residential zones or within

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a radius of 500 feet between 7 p.m. and 7 a.m. on weekdays and anytime on Sundays (Rio Vista Municipal Code 17.52.030 – Construction Equipment Noise) without a permit. Consequently, a permit is required for the Proposed Project.

As described in Section 3.3.4.4 of the Draft SEIS/SEIR, based on the model, noise associated with dredging operations alone is anticipated to attenuate to the regulated daytime exterior noise level of 60 dB at approximately 533 feet (0.10 miles) from the source. Construction at dredged material placement sites is anticipated to attenuate to the regulated daytime exterior noise level at the same distances. When combined, the noise effects are anticipated to attenuate to the regulated levels at 800 feet (0.15 miles) for daytime conditions, 1,600 feet (0.30 miles) during early evening, and 3,200 feet (0.60 miles) during evening. These impacts were considered temporary and less than significant. Furthermore, USACE and the Port have proposed several mitigation measures, described in Section 2.5.

3.7.3.1 Actions Taken to Avoid and Minimize Impacts

In order to further reduce noise-related impacts of the Proposed Project, a number of noise-related mitigation measures are proposed, including use of mufflers, noise shielding, and intake silencers on construction equipment; limitations on idling and staging of equipment; and the requirement to obtain a noise ordinance variance (permit) from the City of Rio Vista.

As compared to Future without Project Conditions, construction of the Proposed Project, including discharges of dredged material in placement sites, includes intermittent noise impacts over a larger area and for longer durations than would be experienced under Future without Project Conditions. Construction of the -33 Feet MLLW Alternative would reduce the overall construction duration and consequently the number of intermittent noise-related construction impacts as compared to the Proposed Project, although these temporary impacts would still be greater than Future without Project Conditions. Implementing the above mitigation measures would further reduce all construction noise-related impacts to below significance.

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3.8 Determination of Cumulative and Indirect Effects on the Aquatic Ecosystem

Cumulative and indirect effects are discussed in detail in Sections 4.5 and 4.6, respectively, of the Draft SEIS/SEIR. The following sections summarize potential cumulative and indirect effects on the aquatic ecosystem resulting from proposed dredging and discharges of dredged material into the proposed placement sites.

3.8.1 Summary of Cumulative Effects on the Aquatic Ecosystem

3.8.1.1 Future Maintenance Dredging and Bank Stabilization Activities

Maintenance dredging and dredged material placement activities are ongoing activities that have occurred in the past and will continue in the future. Construction of the Proposed Project would increase the side slope of the SRDWSC, as explained in Section 3.1.2 and Appendices J and K of the Draft SEIS/SEIR. This, combined with the potential for sea levels to rise up to 2 feet over the next 50 years as described in Section 3.1.2.4 of the Draft SEIS/SEIR, would likely result in an approximately 10% increase in the sedimentation rate and, consequently, an increase of 10% in maintenance dredging volumes in the future.

Based on historic maintenance dredging volumes averaging 190,000 cy annually and the predicted minor increases in sedimentation, an average of approximately 209,000 cy of material would need to be dredged from the SRDWSC for maintenance purposes annually under the Proposed Project. Under the -33 Feet MLLW Alternative, the average volume is expected to be less than that of the Proposed Project but more than under Future without Project Conditions. Placement of maintenance dredging material would occur at any of the ten dredged material placement sites proposed as part of the Proposed Project or the seven dredged material placement sites proposed as part of the -33 Feet MLLW Alternative. While the Proposed Project and -33 Feet MLLW Alternative would result in short-term dredging and use of the dredged material placement sites, these impacts would be consistent with those of past and future maintenance dredging activities under Future without Project Conditions on downstream water quality. As previously discussed, while the volumes discharged under the Proposed Project or -33 Feet MLLW Alternative are larger than Future without Project Conditions, localized impacts to water quality at the dredging and discharge site would be consistent.

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The USACE and the Port are preparing a draft 20-year Plan for the ongoing navigational maintenance of the SRDWSC and long-term maintenance of the dredged material placement sites. The plan would take into consideration the remaining capacities of the placement sites after construction, and identify methods for recovering capacity at sites proposed for maintenance dredging use in the future. Therefore, with implementation of the 20-year Plan, the cumulative increase in sedimentation would be less than significant.

Impacts due to bank stabilization activities (e.g., maintenance of armor and placement of fill) would be consistent with those of Future without Project Conditions, where these activities occur an average of once every 5 years. In addition, regardless of whether the Proposed Project or -33 Feet MLLW Alternative are constructed, bank stabilization activities would continue to occur on the SRDWSC under Future without Project Conditions at current frequencies and durations. As such, any potential impacts due to bank stabilization activities are considered cumulatively less than significant.

3.8.1.2 Cumulative Effects on Terrestrial or Aquatic Organisms

The only residual potentially significant cumulative impact of the Proposed Project on state or federally listed threatened or endangered species is associated with loss of delta smelt critical habitat. The USACE and the Port are currently in early coordination with USFWS and CDFG regarding potential effects to delta smelt critical habitat. As part of the coordination and subsequent Section 7 consultation, mitigation and compensation measures will be developed and will be incorporated into the proposed project to reduce this impact to below significance.

All other impacts to listed terrestrial or aquatic species are less than significant as compared to Future without Project Conditions, which represents a continuation of present maintenance and operational practices on the SRDWSC. As previously discussed, USACE and the Port undertook a sequenced, iterative process to avoid and minimize placement site impacts to the maximum extent practicable, and remaining impacts are mitigated through surveys and consultation, and the Prospect Island mitigation program. As such, there would be no other cumulatively significant impacts on terrestrial or aquatic species when

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considering past and future maintenance and operations on the SRDWSC in combination with the Proposed Project.

3.8.1.3 Indirect Effects

Indirect effects are generally defined as effects that are upstream or downstream from the direct effects of a project, in space or in time. Indirect impacts of deepening and widening the SRDWSC include potential sea level rise and salinity impacts, increased bank erosion/sedimentation rates, and impacts on downstream water quality during construction. These impacts are related to construction activities, but would occur downstream in space and over time. Indirect effects are compared to similar effects under baseline scenarios to determine significance.

Sea level rise and subsequent impacts on saltwater intrusion would occur in the SRDWSC regardless of the construction of the Proposed Project or -33 Feet MLLW Alternative. Under Future without Project Conditions, it is estimated sea levels may rise by as much as 2 feet over the next 50 years. At Year 0 under the Proposed Project, the X2 change would be larger than 1 km for approximately 50 days as compared to Future without Project Conditions. Similarly, at Year 50, the X2 change would be larger than 1 km for approximately 23 days as compared to Future without Project Conditions. Due to the minor shift in the X2 as compared to the environmental baseline (where sea level rise and thus shifts in the X2 would occur regardless of deepening or widening the SRDWSC), the indirect impacts of the Proposed Project or -33 Feet MLLW Alternative on saltwater intrusion would be less than significant.

Under Future without Project Conditions, annual maintenance dredging activities would occur within a window of approximately 1.5 months. Construction would take 4.5 months longer per year over a period of 4 years for the Proposed Project and over 2 to 3 years for the -33 Feet MLLW Alternative. During these periods, dredging activities could potentially indirectly impact downstream water quality. While water quality impacts would be longer during the construction years as compared to the environmental baseline, they would be mitigated as outlined in WQ-MM-1. Due to the temporary nature of the impacts and after inclusion of mitigation, the potential indirect impacts of the Proposed Project or -33 Feet

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MLLW Alternative on downstream water quality would be less than significant.

3.9 Determination of Least Environmentally Damaging Practicable Alternative

Although undertaking no action or constructing the -33 Feet MLLW Alternative would result in incrementally reduced impacts to certain resources as compared to the Proposed Project, these alternatives would not achieve the project objective because the benefits of the widening and deepening to -35 feet MLLW as previously authorized would not be accomplished. The incremental decrease in impacts from placement of dredged material in selected placement sites (associated with a reduction in volume) under the -33 Feet MLLW Alternative is negligible when considering the lost economic benefit of reduced draft and width along the SRDWSC. Only the Proposed Project achieves the overall project purpose and desired National Economic Development benefit of realizing increased economic benefits associated with a reduced transportation cost of moving goods to the Port, and providing safe navigation for commercial marine traffic, at previously approved levels.

As previously discussed, the USACE has avoided and minimized impacts resulting from discharges of fill in selected placement sites through a careful and thorough placement site selection process. Sites were selected to emphasize avoidance of impacts and to maximize beneficial reuse, where feasible. Where residual impacts to the aquatic environment remain due to hydraulic discharge of dredged material, these impacts are mitigated to below significance through the proposed mitigation program. For these reasons, the Proposed Project (resumption of the previously authorized project) is the LEDPA.

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4 FINDINGS

4.1 Alternatives Test

☐ Yes ☐ No a. Based on the discussion above, are there available, practicable alternatives having less adverse impact on the aquatic ecosystem?

☐ Yes ☐ No b. Based on the discussion above, if the project is in a special aquatic site and is not water-dependent, has the applicant clearly demonstrated that there are no practicable alternative sites available?

4.2 Special Restrictions

Will the project:

☐ Yes ☐ No a. violate state water quality standards?

☐ Yes ☐ No b. violate toxic effluent standards (under Section 307 of the Act)?

☐ Yes ☐ No c. jeopardize endangered or threatened species or their critical habitat?

☐ Yes ☐ No d. violate standards set by the Department of Commerce to protect marine sanctuaries?

☐ Yes ☐ No e. Evaluation of the information above indicates that the proposed discharge material meets testing exclusions criteria for the following reason(s):

- ☐ based on the above information, the material is not a carrier of contaminants
- ☐ the levels of contamination are substantially similar at the extraction and disposal sites and the discharge is not likely to result in degradation of the disposal site and pollutants will not be transported to less contaminated areas
- ☐ acceptable constraints are available and will be implemented to reduce contamination to acceptable

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levels within the disposal site and prevent contaminants from being transported beyond the boundaries of the disposal site

4.3 Other Restrictions

Will the discharge contribute to significant degradation of "waters of the U.S." through adverse impacts to:

☐ Yes ☐ No a. human health or welfare, through pollution of municipal water supplies, fish, shellfish, wildlife, and special aquatic sites?

☐ Yes ☐ No b. life states of aquatic life and other wildlife?

☐ Yes ☐ No c. diversity, productivity, and stability of the aquatic ecosystem, such as the loss of fish or wildlife habitat, or loss of the capacity of wetland to assimilate nutrients, purify water or reduce wave energy?

☐ Yes ☐ No d. recreational, aesthetic, and economic values?

4.4 Actions to Minimize Potential Adverse Impacts (Mitigations)

☐ Yes ☐ No Will all appropriate and practicable steps (40 CFR 23.70-77) be taken to minimize the potential adverse impacts of the discharge on the aquatic ecosystem?

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