Appendix F2

Evaluation of Dredged Material Disposal Options

EVALUATION OF DREDGED MATERIAL DISPOSAL OPTIONS: BERTHS 226-236 [EVERPORT] CONTAINER TERMINAL IMPROVEMENTS PROJECT

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FINAL REPORT

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INTRODUCTION

This evaluation is prepared in accordance with 40 CFR 227 (Criteria for the Evaluation of Permit Applications for Ocean Dumping of Materials) and the Los Angeles Region Contaminated Sediments Task Force (LARCSTF) guidance for evaluation of sediment management alternatives (LARCSTF 2005). The Berths 226–236 (Everport) Container Terminal Improvements Project (proposed Project) includes improvements to and expansion of the existing Everport Container Terminal currently in operation at Berths 226–236 on Terminal Island in the Port of Los Angeles (Figure 1). The Port of Los Angeles is evaluating the proposed Project and five alternatives to the proposed Project in an Environmental Impact Statement/Environmental Impact Report (EIS/EIR). The purpose of this document is to evaluate the feasibility and environmental effects of available disposal options for dredged materials generated by the proposed Project or a Project alternative.

Figure 1. Project Area in Los Angeles Harbor.

The proposed Project would include:

- Dredging 30,000 cubic yards (cy) of sediment at Berths 226–229 to a design depth of -53 feet mean lower low water (MLLW) plus two feet of overdepth tolerance (for a total depth of -55 feet MLLW) to accommodate larger ships;

- Dredging of 8,000 cy of sediment at Berths 230–232 to a design depth of -47 feet MLLW plus two feet of overdepth tolerance (for a total depth of -49 feet MLLW) to accommodate larger ships;

- Disposal of approximately 38,000 cy of dredged material.

Two of the Project alternatives include similar dredging quantities, two alternatives include no dredging, and one alternative evaluates a reduced dredging plan whereby dredging would not take place at Berths 230–232. The dredged material disposal options evaluated in this report would also apply to the Project alternatives. Following is a summary comparing the proposed Project and Project alternatives as it relates to the proposed dredging and other project components.

Project/Alternative	**Dredging**	**Other Project Components**
Proposed Project	Berths 226–229 and 230–232	23.5 acres of backlands
Alternative 1 - No Federal Action	None	23.5 acres of backlands
Alternative 2 - No Project	None	Continued operations
Alternative 3 - Reduced Project: Reduced Wharf Improvements	Only at Berths 226–229	Backland improvements
Alternative 4 - Reduced Project: No Backland Improvements	Berths 226–229 and 230–232	No backland improvements
Alternative 5 - Expanded On-Dock Railyard	Berths 226–229 and 230–232	23.5 acres of backlands and additional on-dock rail capacity

This report evaluates disposal of dredged material at an approved upland landfill facility, beneficial reuse (including a portion that may be beneficially reused as construction fill at the 23.5-acre backland expansion areas, or placed in the Berths 243-245 confined disposal facility [CDF]), or disposal of all the dredged material at the LA-2 Ocean Dredged Material Disposal Site (LA-2), or a combination of the two.

REGULATORY PROCESS AND SEDIMENT TESTING REQUIREMENTS

The proposed Project would generate approximately 38,000 cy of dredged material. The LAHD proposes to dispose of this material at LA-2.[1] The transport and disposal of dredged material at LA-2 is regulated by the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (USEPA) pursuant to section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1972 (33 U.S.C. 1413). Section 102 of the MPRSA authorizes the USEPA to evaluate impacts and designate ocean disposal sites, and to promulgate environmental criteria for all ocean disposal permit actions, and to retain review authority over the MPRSA section 103 permits issued by the USACE. Disposal of dredged material at LA-2 is authorized only if the dredged material does not exceed the annual permitted volume and sediment quality requirements for this site, the disposal is separately approved by USEPA, and if beneficial reuse is unavailable or impracticable.

The LARCSTF developed a decision tree for evaluating and selecting appropriate dredged material disposal options for both contaminated sediments and those deemed suitable for unconfined aquatic disposal. The decision tree (shown in Figure 2) is contained in the LARCSTF Long Term Management Strategy (LARCSTF 2005). It was developed in an effort to achieve the highest and best use of dredged materials, and it established a goal of 100 percent beneficial reuse of contaminated dredged material (i.e., dredged material deemed un-suitable for unconfined aquatic disposal by the LARCSTF). Therefore, confined aquatic disposal (CAD) is the last option for contaminated sediments, and ocean disposal is the last option for material deemed suitable for unconfined aquatic disposal.

[1]The LA-2 ocean disposal site was designated by the USEPA in 1991 with a 200,000 cy annual disposal capacity evaluated in the EIS. In 2005, the annual disposal capacity of LA-2 was increased to one million cy per year (USEPA and USACE 2005).

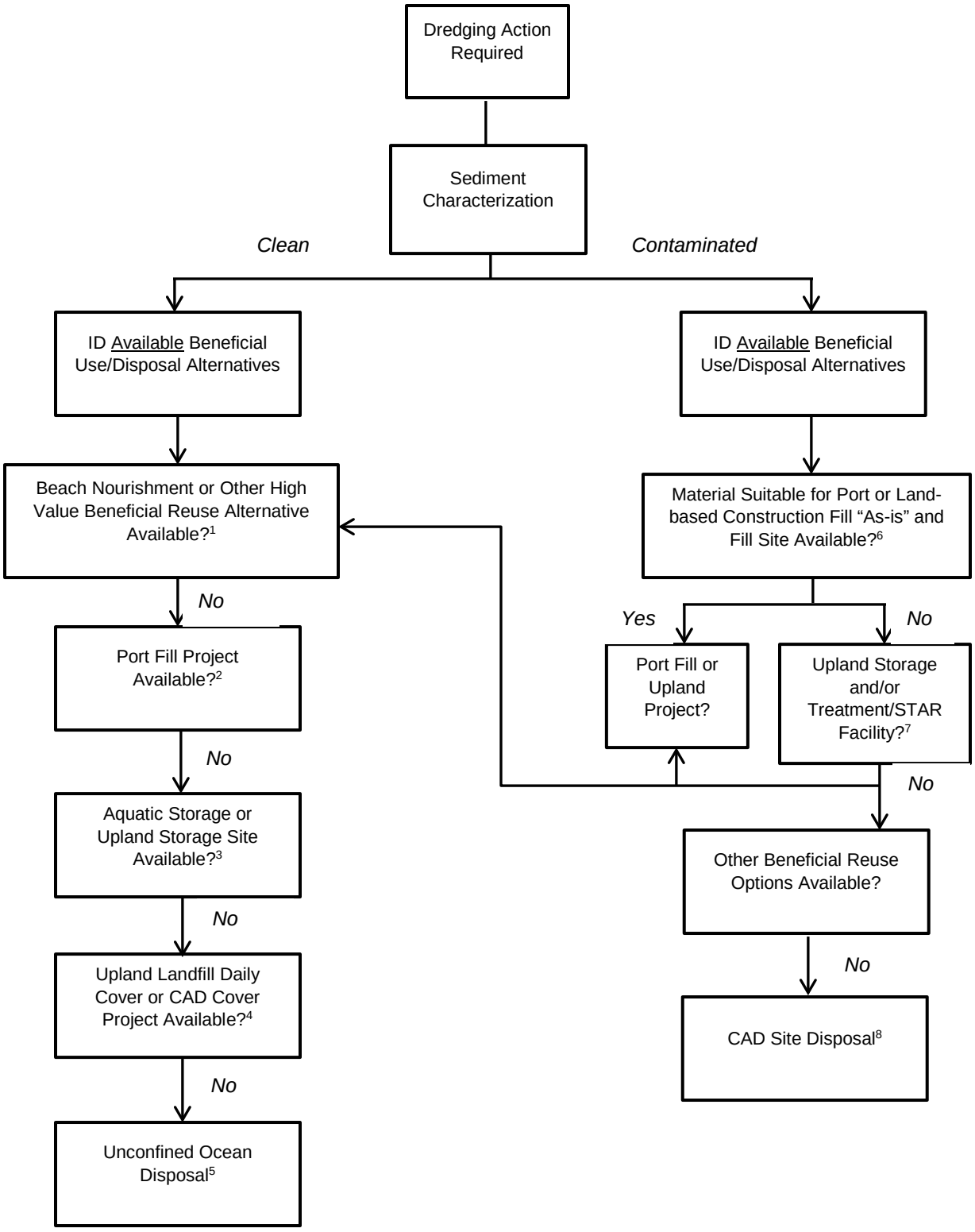

Figure 2. Decision tree for sediment disposal options (LARCSTF 2005). Footnotes on following page.

Footnotes for Figure 2:

1. Assumes that materials are chemically suitable and physically compatible for specific beneficial use alternative.
2. Assumes no near term sources of contaminated material (including material stored at treatment, storage or reprocessing [TSR] sites) suitable for constructed fill which would be precluded from inclusion in the Port fill by these clean materials. Contaminated materials suitable for construction fill have priority over clean material.
3. Storage for future beneficial reuse at a designated unconfined aquatic disposal site or upland site. Storage sites managed to prevent contamination of clean stored material.
4. Use of contaminated materials for upland daily cover has priority over use of clean material.
5. Assumes no less environmentally damaging practicable alternative, including other beneficial uses, are available.
6. Assumes coordination of dredge and fill schedules.
7. TSR site provides storage until constructed fill project becomes available, or treatment to transform material to be suitable for constructed fill.
8. Assumes no documented near term need for fill material (i.e., schedule dredging activity to coincide with fill project); assumes no available TSR capacity; assume no other practicable beneficial reuse opportunities available.

Note: STAR (Storage, treatment, and reuse).

SEDIMENT CHARACTERISTICS AT THE PROPOSED DREDGE SITES

To establish suitability for unconfined aquatic disposal, sediment samples were collected and tested in accordance with procedures outlined in the USEPA and USACE (1991) Ocean Testing Manual (OTM) "*Evaluation of Dredged Material Proposed for Ocean Disposal*" (Ramboll Environ 2015). The sediment analysis also included additional tests such as toxicity characteristic leaching procedure (TCLP) and elutriate testing conducted in accordance with procedures outlined in the USEPA and USACE (1998) Inland Testing Manual (ITM) "*Evaluation of Dredged Materials Proposed for Discharge in Waters of the U.S*." and the Upland Testing Manual (USACE 2003).

For purposes of testing, the proposed Project's dredge footprint was divided into two Dredged Material Management Units (DMMUs): DMMU-1 extended from Berths 229–232 and DMMU-2 extended from Berths 226–228. These two DMMUs have different target depths: -47 feet MLLW at DMMU-1 and -53 feet MLLW at DMMU-2. Results from all phases of the sediment suitability study, including sediment analysis, elutriate analysis, solid phase testing, and suspended particle phase testing indicated sediments from both DMMUs were suitable for unconfined aquatic disposal. Results of the bioaccumulation potential analyses indicated that the mean concentrations of total polychlorinated biphenyls (PCBs) in tissues from *Neanthes virens* and *Macoma nasuta* exposed to sediments from DMMU-1 and DMMU-2 were significantly elevated compared to their respective LA-2 reference samples. However, a screening level risk assessment determined there is little to no risk to human health from placement of dredged sediments at LA-2. On August 26, 2015, members of the LARCSTF agreed with the results and conclusions of the sediment suitability study, but requested additional information on the suitability of sediments from DMMU-1 for beach nourishment based on the high sand content noted in the composite sample grain size analysis. Additional grain size analysis of individual cores in DMMU-1 determined the material was too fine (not enough sand content) for use as beach nourishment. In response to these findings on September 23, 2015, members of the LARCSTF agreed that the sediments were not suitable for beach nourishment and affirmed the sediments from DMMU-1 and DMMU-2 are suitable for disposal at LA-2.

SEDIMENT DISPOSAL ALTERNATIVES EVALUATION

The following sediment disposal options are evaluated below:

- Beach nourishment;
- Port fill project
- Aquatic storage or upland storage;
- Upland landfill daily cover or CAD cover; and
- Disposal at LA-2.

Under each of these options dredged sediments would be transported by barge to the disposal site or to an upland storage site prior to hauling. A typical barge or scow has a capacity of approximately 2,000 cubic yards; which would require approximately19 barge trips to haul the approximately 38,000 cy of dredged material to LA-2. A typical haul truck has a capacity of approximately 20 cubic yards; therefore, hauling 38,000 cy of dredge material to an upland landfill or other upland site is expected to require approximately 1,900 round trips.

Beach Nourishment

Dredged material used for beach nourishment must be determined to be physically compatible (i.e., similar grain size) as the receiving beach. Based on grain size analyses of the Everport sediments, the LARCSTF concurred that sediments in the DMMUs did not have a high enough sand content for beach nourishment.

Port Fill Project

Dredged sediments were evaluated by a geotechnical engineer for suitability for structural fill at the 23.5-acre backland expansion area at the proposed Project site. However, due to the relatively low sand content in the material, it was determined that this was not a feasible disposal option. The Port of Los Angeles has used the Berth 243–245 confined disposal facility (CDF) for sediment disposal. This site was previously used for the Port of Los Angeles Channel Deepening Project (USACE Permit No. SPL-2008-00662-AOA). However, it is reserved primarily for sediments deemed unsuitable for unconfined aquatic disposal (e.g., contaminated sediments).

Aquatic Storage and Upland Storage

Dredged sediment may be stored or stockpiled on a temporary basis at aquatic sites awaiting further transfer to end-use destinations, provided contaminant concentrations are below regulatory thresholds (LARCSTF 2005). Temporary aquatic storage or stockpiling would be subject to regulatory requirements similar to those for permanent aquatic disposal, with emphasis on short-term impacts due to double handling. Bathymetric mapping of aquatic storage or stockpile site(s) would be required so as to prevent the creation of navigational hazards. The Port of Los Angeles created an aquatic storage site adjacent to Pier 400 to accommodate dredged material from the Main Channel Deepening Project. However, this site lacks sufficient capacity to accept additional dredged materials.

Dredged sediment may also be temporarily stockpiled at approved upland sites for dewatering prior to transfer to end-use destinations (LARCSTF 2005). The Anchorage Road Soil Storage Site was used by the Port of Los Angeles as an upland storage site for dredged materials, however, the site reached its capacity in 2011, and there are no other upland sites available in the Port at this time for temporary storage of dredged sediment.

Upland Landfill Daily Cover or CAD Cover

There are no confined aquatic disposal (CAD) sites in the Port that could accept dredged sediment from the Everport Container Terminal as clean cover material. A particular concern regarding the use of marine sediment at upland landfills is the water and salt content in the sediment. Landfills require sediment to pass the paint filter test to limit water content to 12 to 15 percent. The Los Angeles Regional Water Quality Control Board (LARWQCB) has no stated limits for chlorides in sediment, but does regulate salt concentration in waters entering groundwater (USACE 1997). Requirements for dewatering and chloride reduction tend to limit the viability of disposing of dredged marine sediment at landfills, especially when large quantities of dredged sediment are involved.

In addition to constraints related to chloride content of materials disposed at upland landfills, few active landfills in the region are within economical transport distance from the proposed dredging areas. Transfer of sediment from the seafloor to a barge, then from a barge to a storage and dewatering/processing site, and then to a truck for transport to an upland landfill increases costs due to double- or triple-handling, and associated impacts to air quality and traffic (compared to aquatic disposal options).

In May 2015, a representative from the Chiquita Canyon Landfill (Castaic, CA) confirmed they might be able to accept marine sediment/dredge material (sand and silt), but the material must meet moisture criteria (no free liquids and less than 50 percent moisture content). The representative indicated this landfill has accepted similar materials from the Ports of Los Angeles and Long Beach in the past. If the sediments can be used as landfill cover, Chiquita Canyon landfill disposal costs would be approximately $22-23/ton, excluding transport via haul trucks. The Otay Landfill (San Diego County) and La Paz Landfill (Arizona) could also conditionally accept marine sediments, and the cost estimates range from $19-23/ton excluding transport. Due to moisture and constituent limits, the dredge material would likely require intermediate treatment processing; however, this would not guarantee that the acceptance criteria would be met.

Table 1 shows the anticipated emissions associated with the disposal of the dredge material at a landfill, compared to the emissions associated with ocean disposal.

Table 1: Comparison of Emissions from Upland Disposal of Dredge Materials and Ocean Disposal (Total Emissions)										
	PM_{10}	**$PM_{2.5}$**	**DPM**	**NOx**	**SOx**	**CO**	**HC**	**CO_2**	**N_2O**	**CH_4**
Emissions from Ocean Disposal (tons)	0.1	0.1	0.1	5.1	0.01	3.5	0.4	751	0.01	0.02
Emissions from Upland Disposal (tons)	0.4	0.2	0.2	7.4	0.02	3.1	0.6	2,059	0.01	0.04
Net (tons) of Upland Disposal Emission minus Ocean Disposal Emissions	*0.2*	*0.1*	*<0.1*	*2.3*	*0.01*	*-0.4*	*0.2*	*1,308*	*<-0.01*	*0.02*

Note: All disposal of Project-related dredged material is assumed to occur in one year.

Legend: PM = particulate matter; DPM = diesel particulate matter; NOx = nitrogen oxides; SOx = sulfur oxides; CO = carbon monoxide; HC = hydrocarbons; CO_2 = carbon dioxide; N_2O = nitrous oxide; and CH_4 = methane.

On balance, the upland disposal options would result in greater total emissions of air pollutants than ocean disposal at LA-2. Air quality is a particularly important consideration in this region because, with respect to General Conformity, it is an extreme non-attainment for ozone (and precursors NOx and Reactive Organic Gases/Volatile Organic Compounds [VOCs]). As such, the applicability threshold is only 10 tons per year of either NOx or VOC. Upland disposal would generate approximately 50 percent more NOx emissions than ocean disposal, and would generate approximately 75 percent of the General Conformity applicability threshold emissions. The total NOx emissions from the Federal Action do exceed the applicability thresholds for both disposal options, with upland disposal clearly generating the highest annual NOx emissions from the Federal Action. The dredged material disposal activity represents almost 50 percent of the entire Federal Action NOx emissions under either disposal option.

In addition, as discussed above, the disposal of dredge materials at an upland disposal location would result in increased traffic impacts. If the material is taken without processing to a facility, it could require a more distant facility such as Kettlemen City, which has more liberal acceptance criteria. Disposal of the dredge material at an upland facility would result in additional traffic impact associated with the approximately 1,900 truck trips. The upland disposal option could result in up to approximately 760,000 vehicle miles traveled from haul trips between the Port area and the upland facility (such as Kettleman City), which would not be required by ocean disposal.

The approximate cost of disposing of the dredge materials at a Class III landfill was compared with the costs of ocean disposal. Under an ocean disposal option (to LA-2), 19 round trips via scow would be required, at an

estimate of $20 per cy, for an estimated cost of approximately $40,000 per scow trip. The total cost for the disposal of the dredge material at LA-2 would be approximately $760,000.

As discussed above, Class III landfill disposal of the dredge material would require double handing of the sediments, dewatering/processing, and transport to the landfill. The cost of disposing of the dredge material at an upland landfill would also include the landfill fees, which are estimated to be $22/ton based on discussions with landfill operators (see above). In comparison, hauling the dredge material to an upland disposal facility is expected to cost at least $1.59 million, based on recent engineering estimates of haul and disposal costs ($48 per cubic yard). This cost estimate does not include costs associated with dredge material processing and double handling of materials that may be required to meet disposal facility acceptance criteria.

As can be seen, the costs of upland disposal are more than double the cost of ocean disposal at LA-2, and would result in greater environmental impact (traffic and air quality). Based on this, upland disposal is not considered to be feasible or practicable for this project, and would result in substantially greater impact in a severely impacted area.

Another potential use of the dredge sediments would be cover for a confined aquatic disposal cell; however, no such sites are available in the Port area.

Disposal at LA-2

The LA-2 ocean disposal site is a USEPA-designated site that is currently managed at an annual disposal capacity of 765,000 cubic meters (1,000,000 cy) for the ocean disposal of dredged material from the Los Angeles and Orange County region. The site is located in approximately 110-340 meters (360–1,115 feet) of water, and it is approximately 11 kilometers (5.9 nautical miles) offshore from the entrance to the Port of Los Angeles in federal waters. The site has a radius of 915 meters (3,000 feet), and it straddles the continental shelf, margin, and upper wall of the San Pedro Sea Valley. When USEPA originally designated LA-2 as a disposal site in 1991, it evaluated the past history of disposal at the site up to that time, and it was initially managed at an annual disposal capacity of 153,000 cubic meters (200,000 cy).

NEED FOR OCEAN DISPOSAL

40 CFR 227 Subpart C identifies the criteria for evaluating the need for ocean disposal and alternatives to ocean disposal. The need for ocean disposal is determined by evaluation of the following factors, which are briefly addressed.

227.15(a) *Degree of treatment useful and feasible for the waste to be dumped, and whether or not the material has been or will be treated to this degree before dumping.*

The Sampling and Analysis Report for Berths 226–232 determined that the chemical properties, toxicity, bioaccumulation potential, and potential risk to human health of the dredged material were evaluated, and the sediments were suitable for unconfined aquatic disposal (Ramboll Environ 2015). On August 26, 2015, the LARCSTF agencies unanimously agreed that the material is suitable for ocean disposal.

227.15(b) *Raw materials and manufacturing or other processes resulting in the waste, and whether or not these materials or processes are essential to the provision of the applicant's goods or services, or if other less polluting materials or processes could be used.*

The sediments proposed for ocean disposal are not the result of manufacturing or other processes. Therefore, this factor is not relevant to the proposed Project or Project alternative.

227.15(c) *The relative environmental risks, impact, and cost for ocean dumping as opposed to other feasible alternatives, including but not limited to: land fill, well injection, incineration, spread of material over open ground, recycling material for reuse, additional treatments of intermediate or final waste streams, and storage.*

The environmental impacts of ocean disposal at LA-2 were considered during the site designation process, and re-evaluated at an increased disposal volume (USEPA and USACE 2005). Upland disposal within the Port area was not considered a feasible alternative for sediments dredged from the proposed Project site due to the lack of availability of disposal sites and the physical characteristics of the sediments (not suitable for use as construction material). The sediments were also unacceptable for landfill disposal without processing (there is no guarantee that processing will allow the criteria to be met). Well injection, incineration, and spreading over open ground have not historically been used for sediment disposal, and there are no available projects where these methods could be used. Upland fill, temporary storage, and beach nourishment are discussed in *Sediment Disposal Alternatives*, and were also found to be infeasible and, in the case of upland disposal, more environmentally damaging.

227.15(d) *Irreversible or irretrievable consequences of the use of alternatives to ocean dumping.*

The irreversible or irretrievable consequence of the alternatives to ocean dumping for the proposed project include the energy resources used to dredge, transport, and dispose of the material at the alternative disposal site, and the economic costs associated with the disposal options. There would also be air quality and traffic impacts associated with the dredging and transportation of sediments to an upland storage and/or disposal site.

IMPACTS OF OCEAN DISPOSAL

The environmental impacts from ocean disposal at LA-2 were considered during the site designation process, and re-evaluated at an increased disposal volume (USEPA and USACE 2005). Impacts to water quality, sediment quality, and biological resources were considered “not significant.” The continued use of the site, including disposal of sediments from the Everport Container Terminal, is unlikely to interfere with other ocean uses, such as shipping, fishing, recreation, and oil and gas development. Based on the results of the sediment characterization study, the sediments to be dredged from the proposed Project site are suitable for disposal at LA-2. The testing also confirmed there would be little to no risk of bioaccumulation or risk to humans from ocean disposal.

Impacts to Aesthetic, Recreational, and Economic Values

The environmental impacts from ocean disposal at LA-2 were considered during the site designation process, and re-evaluated at an increased disposal volume (USEPA and USACE 2005). Dredged material disposal activities have occurred at LA-2 since the late 1970s. The continued use of the site is unlikely to interfere with other ocean uses, such as shipping, fishing, and recreation. The disposal of sediments from the Everport Container Terminal would not result in an unacceptable aesthetic nuisance in recreational areas, nor contain pathogenic organisms that may cause a public health hazard, either directly or through contamination of fisheries or shell fisheries. The disposal of materials considered hazardous is prohibited at LA-2. The dredged material would not contain chemical constituents that may affect humans directly, or that may bioaccumulate or persist, and subsequently have an adverse effect on humans directly or through food chain interactions (Ramboll Environ 2015).

Impacts to Other Ocean Uses

Disposal of dredged material from the Everport Container Terminal at LA-2 may result in minor interferences with commercial shipping, pleasure, and fishing vessels due to disposal barge traffic. No significant effects on commercial shipping, pleasure, or fishing vessels from the transportation of dredged material to LA-2 by tugs and barges are expected. The site is not located within an active oil or natural gas tract, and disposal operations are not anticipated to adversely affect nearby oil and gas development activities or tracts, or other socioeconomic resources. Recreational activities at beaches or in nearshore areas include surf fishing, surfing, diving, sunbathing, beachcombing, swimming, snorkeling, sightseeing, and picnicking; these activities would not be adversely affected by disposal of dredge material at LA-2 due to the distance of LA-2 offshore. There would be short-term impacts to water quality in the immediate vicinity of LA-2 following the disposal of dredged material. However, the LA-2 site boundary is more than 8.5 kilometers (4.6 nautical miles) from the nearest mainland coast, in federal waters. Consequently, no impacts to aesthetics or beach visitors are expected due to disposal of Everport sediments at LA-2. In addition, disposal at LA-2 would not interfere with any known scientific studies or research projects in the vicinity of the dredge and disposal sites.

CONCLUSIONS

The sediments at the proposed Everport Container Terminal were tested to determine suitability for unconfined aquatic disposal and were found suitable for ocean disposal by the LARCSTF. The LARCSTF decision tree for evaluating and selecting appropriate sediment disposal alternatives identifies ocean disposal as a final option in an effort to achieve 100 percent beneficial reuse of contaminated dredged material. The feasibility of the reuse options was investigated, and based on this analysis, the proposed disposal of approximately 38,000 cy of dredged material at LA-2 is the only disposal option that is both feasible and practicable.

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