1.0 Introduction

In order to maintain accessibility to its boat launching facilities, the Port San Luis Harbor District must periodically dredge the approaches to its Mobile Hoist Pier and Sport Launch. Dredging activities, and the subsequent deposition of the dredge spoils, are regulated by the U. S. Army Corps of Engineers (ACOE) as specified in Dredging Permit #200201383-LM, and by the California Coastal Commission (CCC) as set forth in Coastal Development Permit No. 3-08-038.

In February of 2019, Port San Luis Harbor District (the Port) submitted a sampling and analysis plan (SAP) for the testing of sediments to be collected from the Port San Luis dredge site to the California Coastal Commission (CCC). The SAP was assembled in accordance with the U. S. Environmental Protection Agency (EPA) 1998 "Evaluation of Dredged Material Proposed for Discharge in the Waters of the U.S. – Testing Manual (Inland Testing Manual)" (EPA 1998). In February 2019, the SAP was approved by the CCC and sediment samples were collected from sampling areas identified in the approved SAP. These sampling areas were the two proposed dredge areas and the two disposal sites currently intended for use by the Port. The samples were submitted for chemical and physical analysis in accordance with the SAP. This report documents the collection and analysis of those samples. Results of the analyses are summarized in the report and all laboratory reports are included in the appendices.

2.0 Project Description

Port San Luis Harbor District (the Port) proposes to dredge bottom sediments from two locations – the basins adjacent to the Mobile Hoist Pier and the Sport Launch (referred to as the Trailer Boat Launch in some of the past documents submitted to the ACOE) down to a depth of –10 feet below Mean Lower Low Water (MLLW). These areas are indicated in **Figure 1** in relation to the dredge areas and the six dredge spoil disposal sites approved in ACOE Dredging Permit #200201383-LM and the previous CDP permit. It should be noted that although the permitted dredge area encompasses 32 acres, at the present time and for the foreseeable future dredging will be limited to the smaller areas adjacent to the Sport Launch and the Mobile Hoist Pier.

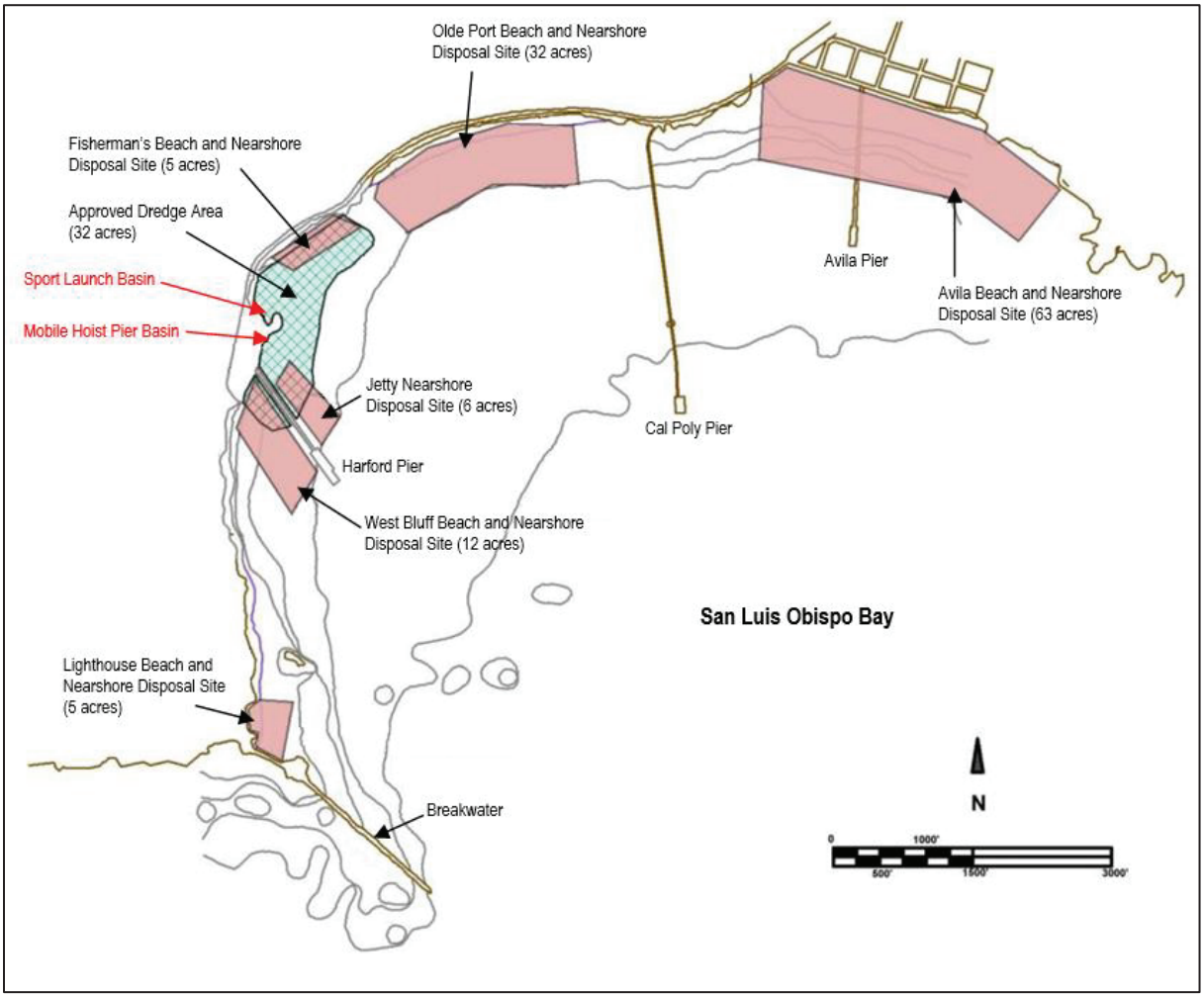

Figure 1. Intended dredging locations (Sport Launch basin and Mobile Hoist Pier basin) in relation to the previously approved dredge area and dredge disposal sites for Port San Luis Harbor District in San Luis Obispo Bay.

According to the existing ACOE permit and the previous CDP permit, the maximum dredge depth permitted is 10 feet below MLLW, with an additional foot to allow for over-dredging. Sand in the vicinity of Mobile Hoist Pier will be removed to the maximum depth allowed. Dredging in the vicinity of the Sport Launch, however, is limited by the nature of the bottom substrate. An underlying rocky bottom limits dredging in the area immediately adjacent to the Sport Launch to about 5 to 7 feet below MLLW. The depth to which dredgeable material can be found increases as one moves away from the Sport Launch, and dredging will extend to the maximum depth of 10 feet below MLLW where it can be achieved.

The Port anticipates that the volume of sediment to be removed annually from the entire dredge area will not exceed the maximum 250,000 cubic yards of material currently allowed by their ACOE dredge permit. Over the past five years (2014 through 2018) the average annual volume of material removed during maintenance dredging has been 17,549 cubic yards (**Table 1**). The Port anticipates that a similar volume of material will be removed annually for the foreseeable future.

Dredged material may be used for beach nourishment at any of the six sites shown in **Figure 1** according to the existing ACOE permit and the previous CDP permit. Fisherman's Beach is currently being used exclusively for beach nourishment. West Bluff Beach is also under consideration by the Port as a potential alternative site. The Port does not anticipate using any of the other four sites in the foreseeable future.

3.0 Site History

Port San Luis Harbor is a small craft harbor located in the lee of Point San Luis about 8 miles southwest of the city of San Luis Obispo, California. The harbor is protected by a rock rubble breakwater that extends southeast from Point San Luis for a distance of about 2,000 feet. While the point and breakwater provide adequate protection from the majority of the predominantly northwesterly swells, the high-energy nature of the ocean along this section of coastline can still produce significant water movement within the harbor. This is most notable during southerly and southwesterly swells, or during the larger northwesterly swells generated by winter storms. Wave action, combined with non-wave driven currents, is responsible for the transport of sand and other suspended particles from San Luis Creek and the outer coastal areas into the quieter waters of the harbor where they are deposited. Sand deposited in the lee of the breakwater is later transported within the harbor and contributes to the shoaling in areas like the Mobile Hoist Pier and the Sport Launch basins. This ongoing process necessitates the periodic dredging of these areas to allow their continued access by boats.

The volume of material dredged from the Sport Launch and Mobile Hoist Pier basins during the period from 1994 through the present is shown in **Table 1**.

Table 1. Recent dredge activity at Port San Luis, California.

Period of Dredge Activity	Sport Launch Dredge Vol. (yds^3)	Mobile Hoist Pier Dredge Vol. (yds^3)	Total Dredge Vol. (yds^3)
03/03-05/03	10,560	7,995	18,555
03/04-05/04	7,507	4,620	12,127
03/05-05/05	8,032	5,115	13,147
03/06-08/06	17,605	6,551	24,156
03/07-08/07	15,012	6,930	21,942
03/08-07/08	9,660	8,085	17,745
03/09-06/09	11,655	6,335	17,990
03/10-10/10	21,175	18,673	39,848
03/11-05/11	11,565	6,139	17,704
03/12-06/12	19,682	10,287	29,969
03/13-09/13	23,800	22,050	45,850
03/14-06/14	11,699	6,414	18,113
03/15-07/15	10,999	6,674	17,673
03/16-06/16	8,505	5,395	13,900
03/17-08/17	17,579	5,549	23,127
03/18-06/18	9,383	5,549	14,931

5.0 Methods

Two sediment sampling stations (PSL-1 and PSL-2) were established within the PSL dredge zone as shown in **Figure 2**. The locations of the sampling stations were chosen to place them adjacent to the principal storm drains that discharge into the dredge area. Proximity of the sampling stations to these discharge points should maximize the probability of sampling any potential contaminants that have accumulated in the sediments from land-based sources. The locations of areas of potential pollutant contact are also shown in **Figure 2**, as is the direction of runoff, runoff discharge points and the positions of the sediment sampling stations relative to the discharge points. Each of the stations specified has been sampled at least four times previously during the period from 1996 through 2013.

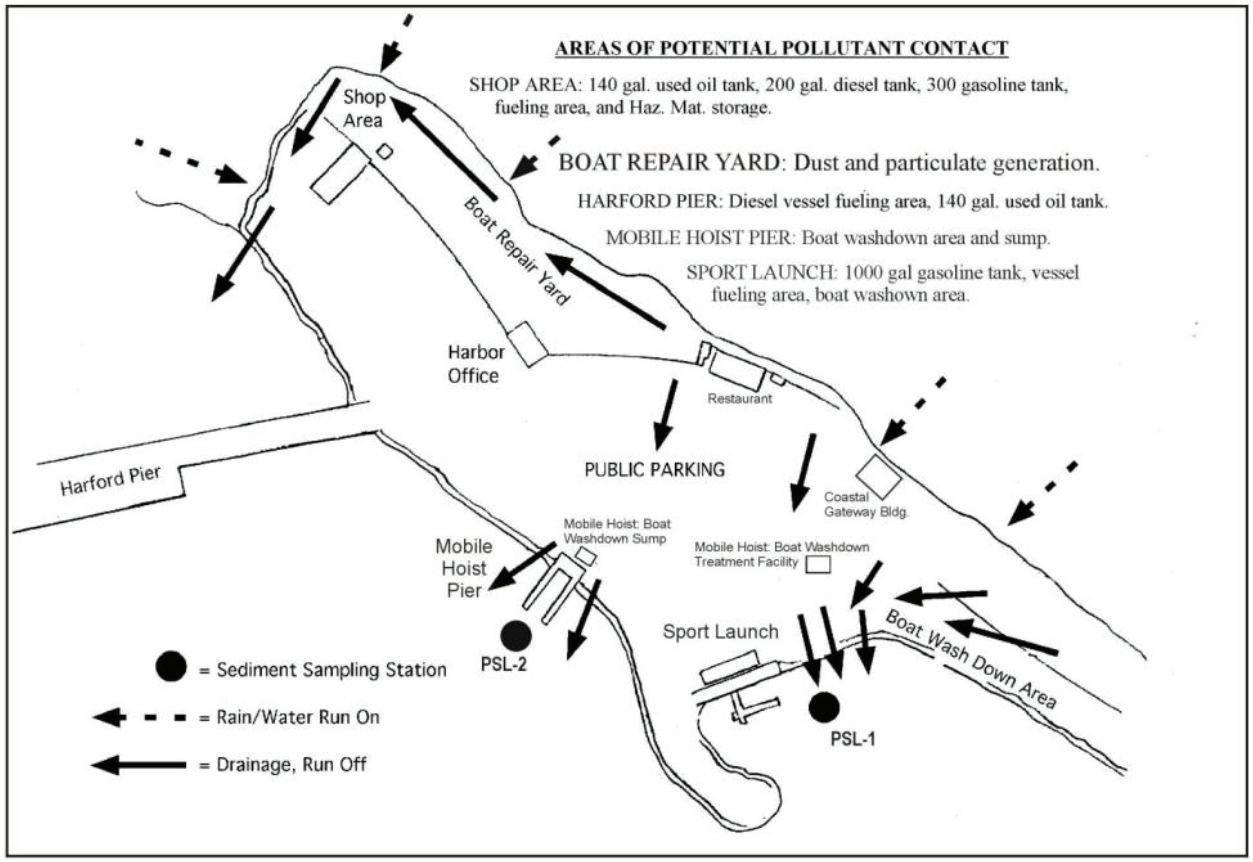

Figure 2. Port San Luis drainage, potential sediment contaminants, and sediment sampling sites.

To accurately characterize the sediments at each of the sampling stations, three individual cores were collected along a line running perpendicular to the shoreline and proceeding down the natural slope of the bottom as shown in **Figure 3**. Individual cores were capped and extruded, then combined to produce a composite sample representative of the mixed material that will be deposited on the beach by the dredge. All sediment samples were collected using a diver-operated coring device. The device utilizes a 2-inch diameter stainless steel tube with a

removable plastic liner. Each individual core was driven into the sediment achieving a nominal core length of 3 feet. The composited samples cover the entire depth range of the area to be dredged, extending down to 11 feet below MLLW. Information from the core samples is summarized in **Table 2**. The locations of the individual cores are shown in.

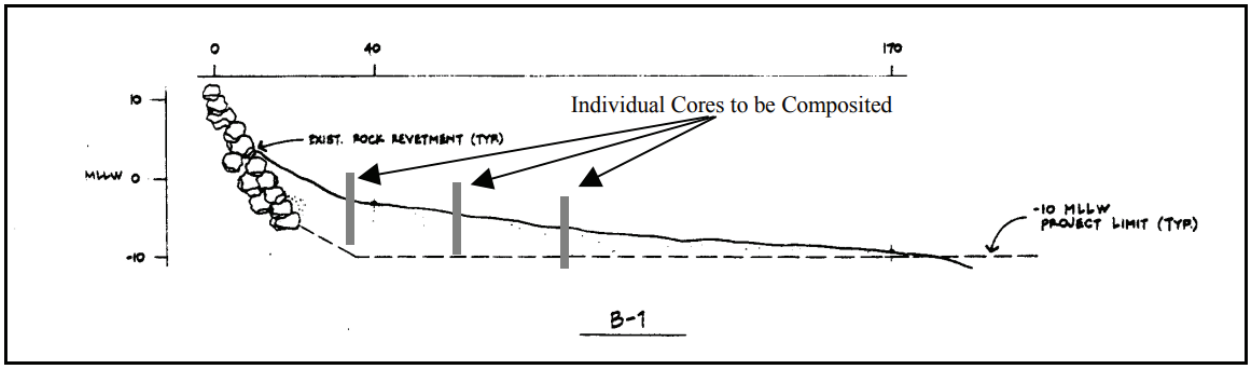

Figure 3. Profile of core sampling technique.

Table 2. Field data for core samples taken at Port San Luis Harbor on February 12, 2019.

Station	Time (PDT)	Water Depth (ft)	Depth of Core (ft)	Tide (ft MLLW)	Tide adjusted core depth (ft MLLW)	Composite Core Depths (ft MLLW)
PSL-1a	0810	4.9	3.0	1.9	-3.0 to -6.0	-3 to -10.5
PSL-1b	0820	8.0	3.0	1.8	-6.2 to -9.2	
PSL-1c	0835	9.2	3.0	1.7	-7.5 to -10.5	
PSL-2a	0900	5.5	3.0	1.6	-3.9 to -6.9	-3.9 to -11.0
PSL-2b	0915	7.2	3.0	1.5	-5.7 to -8.7	
PSL-2c	0924	9.5	3.0	1.5	-8.0 to -11.0	

For the purpose of subsequent physical and chemical analyses, three sub-samples were taken from each composite sample. One subsample was used for chemical analyses, another for particle grain size analysis, and a third sample was archived. The chemical constituents that were tested are shown in **Table 3**. The methods used for chemical analyses and the acceptable detection limits for these tests are specified in the EPA's 1995 "QA/QC Guidance for Sampling and Analysis of Sediments, Water and Tissues for Dredged Material Evaluations – Chemical Evaluations" (EPA 1995) and is cited by the "Inland Testing Manual" (EPA 1998) as the source of this information. In some cases, newer or revised methods of analysis have been substituted based on laboratory recommendations.

Table 3. Chemical constituents tested and methods of analysis for sediment samples.

Chemical Constituent	EPA Method
Metals	
Arsenic (As)	EPA 3050 / EPA 200.7
Cadmium (Cd)	EPA 3050 / EPA 200.7
Chromium (Cr)	EPA 3050 / EPA 200.7
Copper (Cu)	EPA 3050 / EPA 200.7
Lead (Pb)	EPA 3050 / EPA 200.7
Mercury (Hg)	EPA 7471 / EPA 245.1
Nickel (Ni)	EPA 3050 / EPA 200.7
Selenium (Se)	EPA 3050 / EPA 200.7
Silver (Ag)	EPA 3050 / EPA 200.7
Zinc (Zn)	EPA 3050 / EPA 200.7
Total sulfides	EPA 9034
Organo-chlorine pesticides	EPA 8081
Non-polar oil and grease	EPA 1664B
Oil and grease	EPA 1664M
Polynuclear Aromatic Hydrocarbons (PAH)	EPA 8270C

Samples taken for particle grain size analysis only, were collected from the two sites that are currently being used for dredge disposal. Samples from Fisherman's Beach, and West Bluff Beach disposal sites were collected from approximately 3 feet above MLLW elevation (**Figure 4**). The two resultant samples were analyzed for grain size distribution to determine their compatibility with sediments collected from the dredge area sampling stations. Current ACOE guidance requires that the percentage of dredge area and disposal site sediments that are retained by a #200 sieve be within 10% of each other to be considered compatible.

Figure 4. Locations of sediment cores taken for Dredge Site samples and grab samples taken for Disposal Site sampling.

6.0 Results

Potential contaminants were tested at the Sport Launch and Mobile Hoist Pier locations where dredging is anticipated to occur. These two locations were also sampled in 2013 as part of the previous permit renewal for the same chemical parameters. The results of the chemical and particle size analyses performed on the sediment samples collected from Port San Luis on February 12, 2019 are shown in **Table 4**. Copies of the chemical analysis data sheets supplied by FGL Laboratories are included in Appendix A.

Table 4. Results of laboratory analysis of chemical constituents and Effects Range Low (ERL) guidelines for metals (Long et al. 1995). Results below the ERL are indicated in green; above the ERL indicated in red.

Chemical Constituent	Detection limit* (mg/kg)	Sport Launch (mg/kg)	Mobile Hoist (mg/kg)	ERL (mg/kg)
Metals				
Arsenic (As)	0.5	2.6	2.4	**8.2**
Cadmium (Cd)	0.3	ND	ND	**1.2**
Chromium (Cr)	0.5	16.1	14.0	**81**
Copper (Cu)	0.5	4	4.5	**34**
Lead (Pb)	1	3	2	**46.7**
Mercury (Hg)	0.03	ND	ND	**0.15**
Nickel (Ni)	0.5	13.3	11.4	**20.9**
Selenium (Se)	0.5	ND	ND	
Silver (Ag)	0.5	ND	ND	**1.0**
Zinc (Zn)	1	14	14	**150**
Total sulfides	20*	ND	ND	
Organo-chlorine pesticides	0.021–0.43	ND	ND	
Non-polar oil and grease	500	ND	ND	
Oil and grease	500	ND	ND	
Polynuclear Aromatic Hydrocarbons (PAH)	0.07	ND	ND	

ND = none detected

* See appendices. Detection limits vary by parameter and test. Either, PQL, MDL, or MRL

Grain size analysis was completed for four locations; both dredge sample sites and two beach disposal sites. These four locations were also sampled on October 11, 2013 as part of the previous permit renewal. The results of the grain size analysis for these sites are shown in **Table 5** alongside the previous results for October 2013. The gravel fraction is the proportion of sediment retained by a #8 US Standard sieve. The sand fraction is the proportion of sediment passing through a #8 and retained by a #200 US Standard sieve. The silt-and-clay fraction is the proportion of sediment passing through a #200 US Standard sieve. The grain analysis indicates that all four locations mainly consisted of sandy material and had comparable percentages of fine sediments as required by ACOE guidance. Copies of the particle size analysis data sheets supplied by Earth Systems Pacific are included in Appendix B.

Table 5. Grain size analysis for 2019 and 2013 at four locations.

	2019			2013		
Site	Gravel	Sand	Silt and Clay	Gravel	Sand	Silt and Clay
Sport Launch	0.0%	97.1%	2.9%	1.0%	94.9%	4.1%
Mobile Hoist Pier	0.0%	97.3%	2.7%	0.0%	96.7%	3.3%
Fisherman's Beach	0.0%	98.9%	1.1%	0.0%	98.0%	2%
West Bluff Beach	1.0%	98.2%	0.8%	6.0%	92.6%	1.4%