APPENDIX C
REMEDIATION MONITORING PLAN
SAN DIEGO SHIPYARD SEDIMENT SITE

Cleanup and Abatement Order No. R9-2012-0024

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TABLE OF CONTENTS

List of Tables

List of Figures

LIST OF ACRONYMS AND ABBREVIATIONS

µ	microgram
Basin Plan	*Water Quality Control Plan for San Diego Basin*
BG	background station
BMP	best management practice
CAO	Cleanup and Abatement Order
cm	centimeter
CNN	Compliance Station Nearshore, North
CNS	Compliance Station Nearshore, South
CON	Compliance Station Offshore, North
COS	Compliance Station Offshore, South
CUT	Cleanup Action Team
DCR	Design Criteria Report
EWN	Early Warning Station, North
EWS	Early Warning Station, South
DGPS	differential global positioning system
DO	dissolved oxygen
EIR	Environmental Impact Report
HPAH	high-molecular weight polycyclic aromatic hydrocarbon
kg	kilogram
L	liter
mg	milligram
MMRP	Mitigation Monitoring and Reporting Program
NTU	nephelometric turbidity unit
Ocean Plan	*Water Quality Control Plan for Ocean Waters of California*
QAPP	Quality Assurance Project Plan
PCB	polychlorinated biphenyl
pH	hydrogen ion concentration
RAP	Remedial Action Plan
RMP	Remediation Monitoring Plan
SAP	Sampling and Analysis Plan
SMU	sediment management unit

Shipyard Sediment Site	San Diego Shipyard Sediment Site
Water Board	San Diego Regional Water Quality Control Board

1 INTRODUCTION

This Remediation Monitoring Plan (RMP) is one component of the Remedial Action Plan (RAP) for the San Diego Shipyard Sediment Site (Shipyard Sediment Site). This document describes provisions for water quality and sediment monitoring sufficient to demonstrate that implementation of the remedial action does not result in violations of water quality standards and that target cleanup levels are achieved by the work. Consistent with Directive B.1.l of Cleanup and Abatement Order No. R9-2012-0024 (CAO; Water Board 2012a) and Section 34.1 of the Technical Report (Water Board 2012b), this RMP includes discussion of the following key remedial monitoring elements:

- Water quality monitoring
- Sediment monitoring
- Disposal monitoring

In addition, information is provided on biological monitoring, which may be needed during the project. Table 1 notes all CAO requirements that this document fulfills.

Table 1
Elements Required by the CAO

Required Element	Completed	Location within RMP
Remedial Monitoring Plan (B.1.l)		
I. Water quality monitoring	✓	Section 2
II. Sediment monitoring	✓	Section 3
III. Disposal monitoring consistent with Section 34.1 of the Technical Report	✓	Section 5

The RMP is organized as follows:

- **Section 1.** Introduction
- **Section 2.** Water Quality Monitoring
- **Section 3.** Sediment Monitoring
- **Section 4.** Biological Monitoring
- **Section 5.** Disposal Monitoring
- **Section 6.** Reporting

The information contained in this RMP is supplemented by the description of sampling and analysis procedural details provided in the Sampling and Analysis Plan (SAP; Appendix D). Procedures for air quality monitoring are not included in this RMP, as they are not a requirement of the Mitigation Monitoring and Reporting Program (MMRP) of the Environmental Impact Report (EIR; Water Board 2012c).

1.1 Objectives of the Remediation Monitoring Plan

Monitoring during remediation activities, as stipulated by the CAO, will be documented to ensure that following cleanup objectives are achieved:

- Water quality standards are met outside the construction area (as determined by water quality monitoring and in compliance with the Section 401 Water Quality Certification).
- Dredging successfully achieves target cleanup levels within the remedial footprint (as determined by sediment monitoring).
- Sensitive biological resources, such as eelgrass, marine mammals and sea turtles, are protected (as determined by biological monitoring).
- Sediment is characterized appropriately for disposal throughout the construction process (as determined by disposal monitoring).

1.2 Monitoring Responsibilities

Monitoring activities will be the responsibility of the Project Team, who will be acting in coordination with Cleanup Action Team (CUT). Certain aspects of monitoring activities, however, may be performed by the contractor but overseen by the Project Team to ensure that the contractor's construction and monitoring work is completed as stipulated by project permits, approvals, and contract documents.

2 WATER QUALITY MONITORING

Required Element	Completed
Remedial Monitoring Plan (B.1.l)	
I. Water quality monitoring	✓
II. Sediment monitoring	
III. Disposal monitoring consistent with Section 34.1 of the Technical Report	

Water quality will be monitored during all marine construction activities, including dredging, placement of rock for the protection of marine structures and slopes, remediation of underpier areas, and placement of clean cover. The objectives of the water quality monitoring program are as follows:

- Ensure that water quality conditions are within the prescribed limits of relevant regulatory requirements as defined in this document and the Section 401 Water Quality Certification.
- Designate water quality monitoring procedures.
- Plan appropriate project best management practices (BMPs) to avoid and minimize project impacts to the extent practicable.
- Describe corrective actions to be taken should water quality exceedances occur.
- Document the results of water quality monitoring.

By collecting water quality samples at a prescribed frequency throughout marine construction activities, short-term water quality impacts from construction activities can be monitored to allow for corrective actions or procedure modifications to meet water quality criteria.

The monitoring program has been developed to ensure full compliance with the *Water Quality Control Plan for San Diego Basin* (Basin Plan; Water Board 1994) and the *Water Quality Control Plan for Ocean Waters of California* (Ocean Plan; SWRCB 2005). In addition, this RMP has been developed to address substantive anticipated requirements of the Section 401 Water Quality Certification associated with implementation of the remedial action. The Section 401 Water Quality Certification may modify or provide additional requirements not included in this RMP.

2.1 General Water Quality Protection Measures

Several BMPs can be used by the contractor to meet contract and permit requirements for minimizing resuspension, spillage, and misplacement of sediment during dredging and material placement activities. A list of BMPs that will be employed by the contractor,

including operational controls and silt curtain deployment is presented in Section 5.1.2.3 of the Quality Assurance Project Plan (QAPP; Appendix B).

2.2 Water Quality Monitoring Program

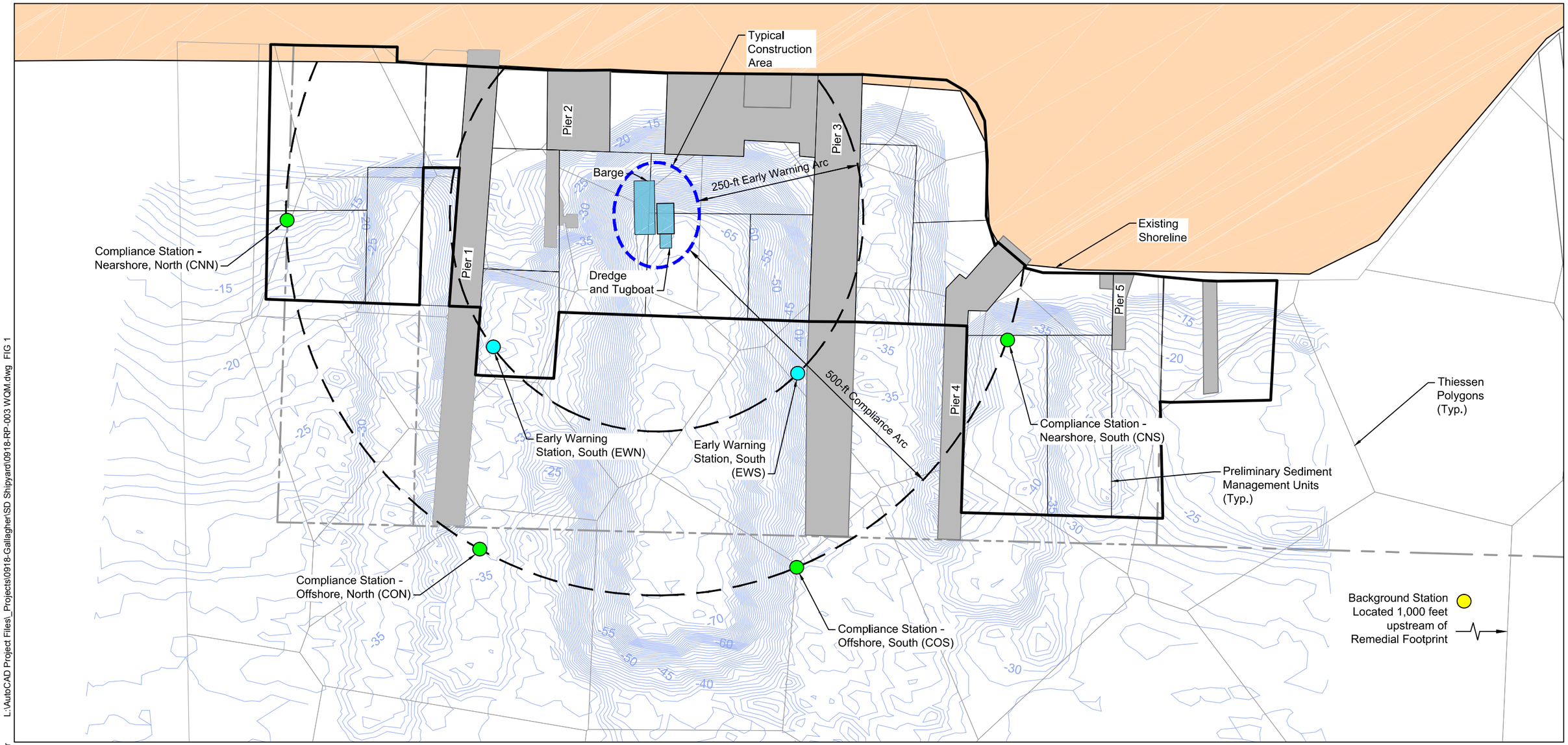
The objective of water quality monitoring is to confirm that water quality criteria are met or to identify corrective actions that may be implemented following temporary exceedances of water quality standards during any construction activity that may affect the water column. This monitoring program was designed to meet the objectives in the EIR (Water Board 2012c) and the associated MMRP (Section 7 of the EIR). Figure 1 depicts the water quality monitoring plan.

The water quality monitoring program, including monitoring parameters, monitoring locations and depths, field procedures, compliance criteria, potential response actions, and monitoring personnel and responsibilities, is described below.

2.2.1 Monitoring Parameters

The following parameters will be monitored outside the construction area during removal action construction activities:

- Visual parameters
  - No floating particulates, suspended materials, grease, or oil
  - No significant discoloration of the water surface
- Field parameters
  - Turbidity (in nephelometric turbidity units [NTU])
  - Dissolved oxygen (DO; in milligrams per liter [mg/L])
  - Hydrogen ion concentration (pH)



L:\AutoCAD Project Files_Projects\0918-Gallagher\SD Shipyard\0918-RP-003 WQM.dwg FIG 1

Sep 07, 2012 8:47am mpratschner

SOURCE: Contours from Southwest Marine survey dated January 2012. Sampling locations from Exponent 2003. Shoreline from SAN GIS.
HORIZONTAL DATUM: California State Plane, NAD83, Zone 6, U.S. Feet.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

- Background Station
- Compliance Station
- Early Warning Station
- Lease Line
- Remedial Footprint
- -20 Existing Bathymetry

0 150
Scale in Feet

San Diego Shipyard Sediment Site Group

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Figure 1
Typical Water Quality Monitoring Plan
San Diego Shipyard Sediment Site

2.2.2 Monitoring Locations and Depths

During each monitoring event, water quality parameters including turbidity, DO, and pH will be measured at seven stations, as shown on Figure 1. All water quality parameter measurements will be monitored on two arcs (early warning and compliance). Two early warning and four compliance stations will be spaced evenly along the arcs to capture all tidal and current conditions.

Monitored water quality measurements will be compared to "ambient" background measurements outside the construction area, including San Diego Bay conditions and effects of non-remedial shipyard activities. The location of the background station will remain the same for all monitoring events.

In accordance with the Technical Report (Water Board 2012b), water quality measurements will be collected from a depth of 10 feet below the water surface.

Station descriptions are as follows:

- **Compliance Stations.** Four compliance stations are located 500 feet from the construction area. Two compliance stations (Compliance Station Nearshore, North [CNN] and Compliance Station Nearshore, South [CNS]) are located on the North and South sides of the 500-foot compliance arc at approximately the same distance from shore as the construction activity. Two additional compliance stations (Compliance Station Offshore, North [CON] and Compliance Station Offshore, South [COS]) are located on the North and South sides of the 500-foot compliance arc offshore from the construction activity. The compliance stations should be adjusted in the field to better target a visible turbidity plume, if a visible plume is observed.
- **Early Warning Station**. Two early warning stations are located 250 feet from the construction area. The North and South early warning stations (Early Warning Station, North [EWN] and Early Warning Station, South [EWS]) will be spaced evenly along the north and south sides of the 250-foot early warning arc. The objective of the early warning stations is to become quickly aware of potential water quality impacts at the construction work area and to be able to adjust dredging operations or BMPs before an exceedance occurs at the compliance station. The early warning stations should be adjusted in the field to better target a visible turbidity

plume, if a visible plume is observed.

- **Background Station**. The background station (BG) is located 1,000 feet from the remedial footprint in the direction of the head of the bay and beyond the influence of construction activities. The background station will be monitored during every event, because the turbidity criterion is based on an acceptably small increase in the vicinity of the construction activity relative to ambient background levels.

Water quality will be monitored 10 feet below the surface at each of the stations.

2.2.3 Monitoring Frequency

Consistent with Mitigation Measure 4.2.1 of the MMRP (Water Board 2012c), turbidity and other water quality conditions (DO and pH) will be monitored by the contractor using an automatic system throughout dredging operations to provide real-time feedback to the dredge operator. The automatic system will include threshold alarms to alert the dredge operator and/or other appropriate personnel recognize that one or more water quality criteria have been exceeded.

The automatic system will be supplemented by a robust system of manual water quality monitoring that will be conducted by Project Team field representatives. During dredging, samples will be collected once daily after dredging operations have been underway for a minimum of 1 hour. A reference (BG) station and outside the influence of dredging will also be sampled at similar depths and frequency for comparison to the samples collected from the dredge area.

Manual water quality parameters (i.e., turbidity, DO, and pH) will be measured daily at the start of dredging operations. In accordance with Section 34.1.1 of the Technical Report (Water Board 2012b), sampling will be reduced to weekly sampling if no water quality exceedances are observed after 3 consecutive days of monitoring. During weekly water column monitoring (after 3 consecutive days without an exceedance), all water quality parameters will be measured during one monitoring event per week. Consistent with the requirements of the Technical Report, monitoring frequency will return to daily if a significant change in operations occurs (i.e., switching from dredging to material placement or debris removal) or an exceedance of the criterion presented in Section 2.2.4 is observed.

Monitoring frequency can again be reduced to weekly if 3 consecutive days of monitoring show there are no exceedances. Figure 2 provides a decision flow chart summarizing monitoring frequency requirements.

2.2.4 Compliance Criteria

The water quality criteria that will be applied to this project are provided in the subsections below and are summarized in Table 2. The point of compliance with these criteria will be located 500 feet from the edge of the construction area. The construction area is defined as the area(s) occupied by the dredging barge(s), the sediment scow(s), sand and rock placement equipment, demolition work equipment, silt curtains, and other work.

Table 2
Water Quality Compliance Criteria

Parameter	Compliance Boundary Standard
Visual	• No significant floating particulates, suspended materials, grease, or oil shall be visible • No aesthetically undesirable discoloration of the water surface
Turbidity	• No more than 20 percent above background turbidity levels when background less than 50 NTU • No more than 10 NTU above background when background between 50 and 100 NTU • No more than 10 percent above background turbidity levels when background greater than 100 NTU
DO	• Not depressed more than 10 percent below the background DO levels
pH	• No more than 0.2 above or below background levels • Within limits of 6.0 and 9.0 at all times

Notes:
Table taken from Basin Plan (Water Board 1994).

2.2.4.1 Visual

No visible floating particulates, suspended materials, grease, or oil sheens shall be determined to be emanating from the construction area. No distressed or dying fish shall occur as a result of construction activities.

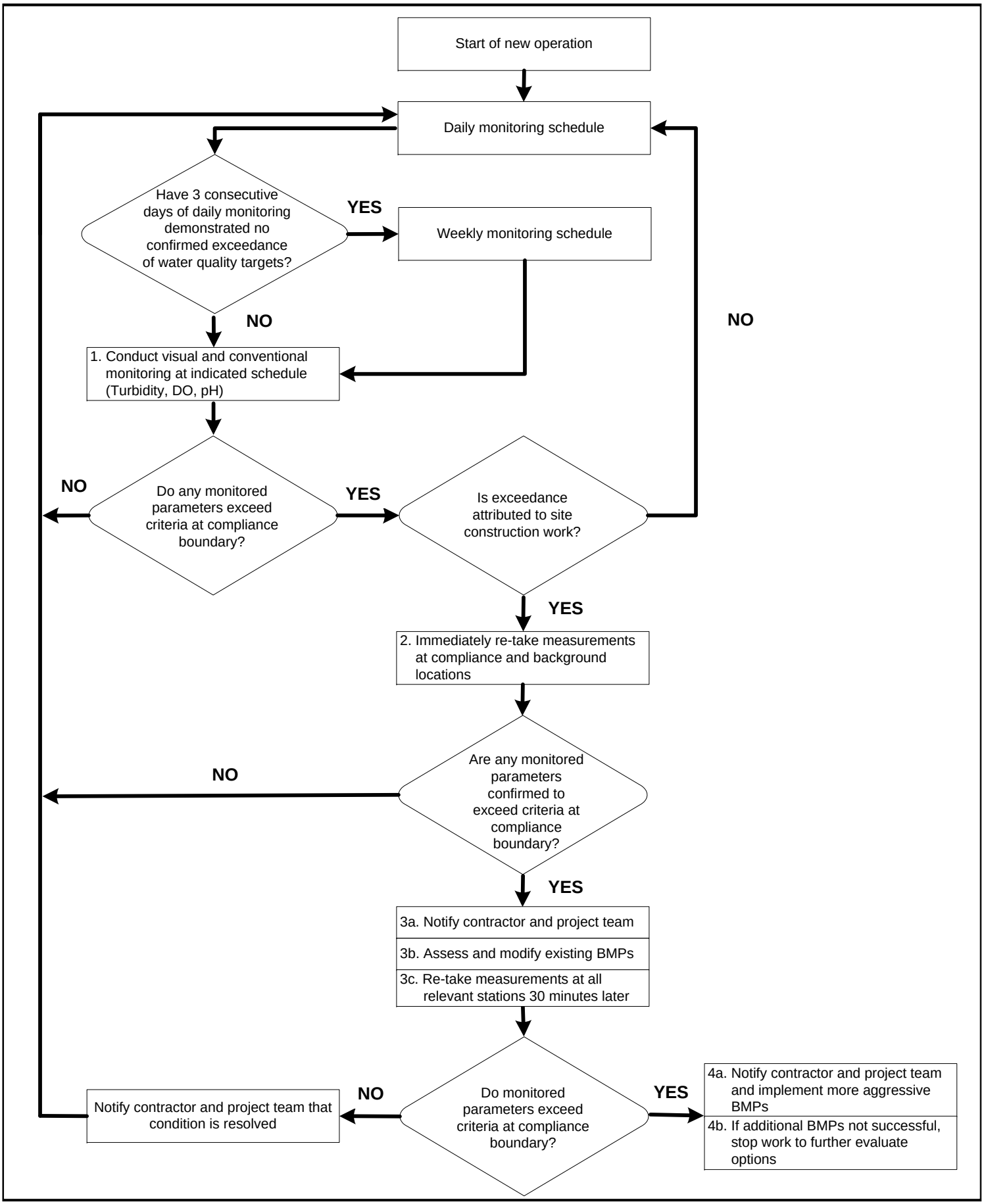

Figure 2

Water Quality Contingency Response Action Decision Flow Chart
San Diego Shipyard Sediment Site

2.2.4.2 Turbidity

At the point of compliance (i.e., 500 feet from the edge of the construction area), turbidity shall not have a 20 percent increase over background levels when background turbidity is less than 50 NTU. When background turbidity is between 50 and 100 NTU, turbidity shall not exceed 10 NTU over background at the compliance boundary. If background turbidity is greater than 100 NTU, turbidity at the point of compliance shall not have a 10 percent increase over background levels.

2.2.4.3 Dissolved Oxygen

At the point of compliance, DO shall not have a 10-percent decrease from background DO levels.

2.2.4.4 Hydrogen Ion Concentration

At the point of compliance, pH shall not be 0.2 above or below background levels. pH shall not be lower than 6 and shall not be higher than 9 at any time.

2.2.5 Field Procedures

2.2.5.1 Methods and Equipment

Water quality parameters (turbidity, DO, and pH) will be measure using a multi-parameter instrument capable of in situ monitoring and profiling with internal data logging capabilities. The instrument must be capable of in situ sampling of depth, pH, DO, temperature, and turbidity. The YSI Model 6820 V2 Sonde, or comparable instrument, outfitted with appropriate sensors to meet sampling needs is suggested for this effort.

2.2.5.2 Sample Location and Depth Control

A laser range finder and/or differential global positioning system (DGPS) will be used to locate and establish station locations. Location control data will be documented on a water quality monitoring form.

2.2.5.3 Station Identification

All stations will be properly identified on a water quality monitoring form, and consistently applied from one monitoring event to the next. Station names will use the following identification scheme consisting of nine alphanumeric characters (see Figure 1):

A-BB-YYMMDD

Which:

A used to identify the construction activity being monitored:

- D = Dredging
- P = Material Placement
- R = Debris Removal

BB used to identify the water quality monitoring location:

- BG = Background Station
- EWN = Early Warning Station, North
- EWS = Early Warning Station, South
- CNN = Compliance Nearshore Station, North
- CNS = Compliance Nearshore Station, South
- CON = Compliance Offshore Station, North
- COS = Compliance Offshore Station, South

YYMMDD used to identify the monitoring date:

- YY = The last two digits of the year of collection
- MM = The month of collection
- DD = The date of collection

For example, following this identification scheme, "D-CNS-131018" represents field monitoring during dredging at the Compliance Nearshore Station, South on October 18, 2013.

2.2.5.4 Field Documentation

Water quality measurement data that are automatically recorded will include date, time, turbidity, DO, and pH measurements.

Documentation of visual water quality monitoring will include the following:

- Location of observations
- Date and time
- Relevant description of observation(s)
- Tidal phase (flood, ebb, and slack)
- Predominant direction of current
- Weather and wind conditions

Any instances of apparent water quality exceedances or alarms will be brought to the attention of the Project Coordinator.

2.2.5.5 Water Quality Field Equipment Calibration and Maintenance

Monitoring equipment will undergo routine and ongoing calibration according to the manufacturer's instructions prior to use in the field. Instruments and equipment will be tested and inspected before each monitoring event. Any field equipment that is faulty or not functioning properly will not be used for monitoring.

2.2.6 Potential Response Actions

In the event of that the monitoring crew reports an exceedance of a visual or conventional water quality parameter, the contractor shall immediately notify the Project Team and begin to implement additional or enhanced operational or engineering BMPs. The QAPP (Appendix B) provides a standard list of construction BMPs to protect water quality. Additional operational modifications are provided in the following subsections.

2.2.6.1 Response(s) to Visual Monitoring

If visual monitoring indicates potential exceedance of water quality criteria during the removal action (i.e., visible turbidity attributed to construction activities), preventative and/or corrective actions will be followed as described below.

2.2.6.2 Exceedance of Water Quality Parameters

If conventional parameters (turbidity, DO, and/or pH) are exceeded at the compliance boundary during construction activities, the following contingency actions will be implemented (see Figure 2):

1. Evaluate the concurrent measurements at background and compliance monitoring stations and supporting visual evidence to determine whether the exceedance is caused by construction activities or by other ambient conditions in the bay (e.g., wind waves, boat wakes, barge/ship traffic, and storm inflow).
2. Immediately re-take measurements at background and compliance stations.
3. If the exceedance is confirmed, immediately notify the contractor and the Project Team. The contractor will be directed to immediately modify operations or implement additional BMPs to mitigate the exceedance (see QAPP [Appendix B] for list of construction BMPs to protect water quality and Section 2.2.6.3 for a list of additional modifications to operations).
4. Re-evaluate field measurements at all relevant stations 30 minutes later, after additional BMPs or operational modifications are implemented.
5. The contractor shall take actions to mitigate the exceedance. If the water quality exceedance continues to persist, even with additional BMPs or operational modifications, a path forward will be discussed with the Project Team. The path forward could include some or all of the following:
    - Implement more aggressive BMPs or operational modifications.
    - If additional measures are not successful at controlling the water quality exceedance, stop work to further assess the source of the exceedance, identify effective mitigation measures, and allow the water column to recover.

2.2.6.3 Operational Modifications

In addition to the standard BMPs listed in the QAPP (Appendix B), the following operational modifications can be implemented individually or in combination as part of the response to a confirmed water quality exceedance:

- Adjust the sequence and/or speed of dredging and disposal operations.
- Reposition dredge operations in such a way as to ensure future exceedances do not occur.

- Fix, maintain, and/or upgrade floating silt curtains.
- Modify, either on a temporary or permanent basis, dredge equipment (such as the dredging bucket size or type).

2.2.6.4 Discharge of Oil, Fuel, or Chemicals

In the event of a discharge of oil, fuel, or chemicals into the bay, the source of the spill or leak shall be identified and controlled, and cleanup efforts shall begin immediately. The contractor shall immediately notify Project Team emergency response personnel, who will make all appropriate regulatory notifications in accordance with site emergency notification procedures. Cleanup shall include appropriate disposal of any spilled material and cleanup material.

2.2.7 Monitoring Personnel and Responsibilities

Key monitoring personnel required to implement this RMP includes the following Project Team representatives:

- Water quality field leader
- Monitoring crew

Persons fulfilling these roles will be designated at least 1 week prior to the start of monitoring activities, and contact information will be provided to the Water Board at that time. All monitoring personnel will be experienced in the collection and measurement of water quality parameters.

2.2.7.1 Project Team Responsibilities

The Project Team will be responsible for:

- Reviewing field reports to verify that appropriate field methods and quality control procedures are being implemented in accordance with the procedures specified in this RMP
- Coordinating with the contractor to ensure appropriate construction BMPs are implemented and to strategize ways to add BMPs or enhance the effectiveness of existing BMPs as necessary to mitigate unacceptable water quality effects
- Submitting records to regulatory agencies as required by permits

3 SEDIMENT MONITORING

Required Element	Completed
Remedial Monitoring Plan (B.1.l)	
I. Water quality monitoring	
II. Sediment monitoring	✓
III. Disposal monitoring consistent with Section 34.1 of the Technical Report	

Prior to initiation of a sediment monitoring program in areas where the dredge contractor believes it has completed the work, a post-remedial bathymetric survey will be performed to verify that the dredge contractor has reached the target dredge depths and extents to accomplish full removal of chemically impacted sediment. This section also details the collection and evaluation of the new sediment surface.

3.1 Confirmation Sampling Objectives

The objective of sediment monitoring is to determine if cleanup activities have met the cleanup objectives prior to the demobilization from the construction area.

3.2 Sediment Monitoring Approach

The sediment monitoring program was designed to follow the requirements specified in Section 34.1.2 of the Technical Report (Water Board 2012b), as summarized here:

- Confirmation sediment sampling will consist of core sediment sample collection in each polygon.
- Sediment core samples will be analyzed for chemical constituents within a depth horizon that represents the first undisturbed depth beneath the dredge depth. Sample cores will be just deep enough to collect sufficient sample for analysis. This depth is estimated to be 30 centimeters (cm) below the residual layer.

Section 2.2 of the RAP identifies 23 Thiessen polygons targeted for remediation. These areas are referred to as "footprint polygons" in the Technical Report (Water Board 2012b). The RAP stipulates that one or more confirmational sediment core samples will be collected from each footprint polygon targeted for dredging (Figures 3 and 4).

North Shipyard Area

See Note 1

Pier 2

Pier 5
- To be removed prior to remedial action

Timber Pier
- To be demolished prior to remedial action

SDG&E Parcel

Pier 1

Pier 3

Pier 4
- To be removed prior to remedial action

Preliminary Arrangement of Sediment Management Units (SMUs) - Subject to Refinement

SMU Below Overwater Structure

Remedial Footprint

Leasehold Lines

Thiessen Polygon Boundary

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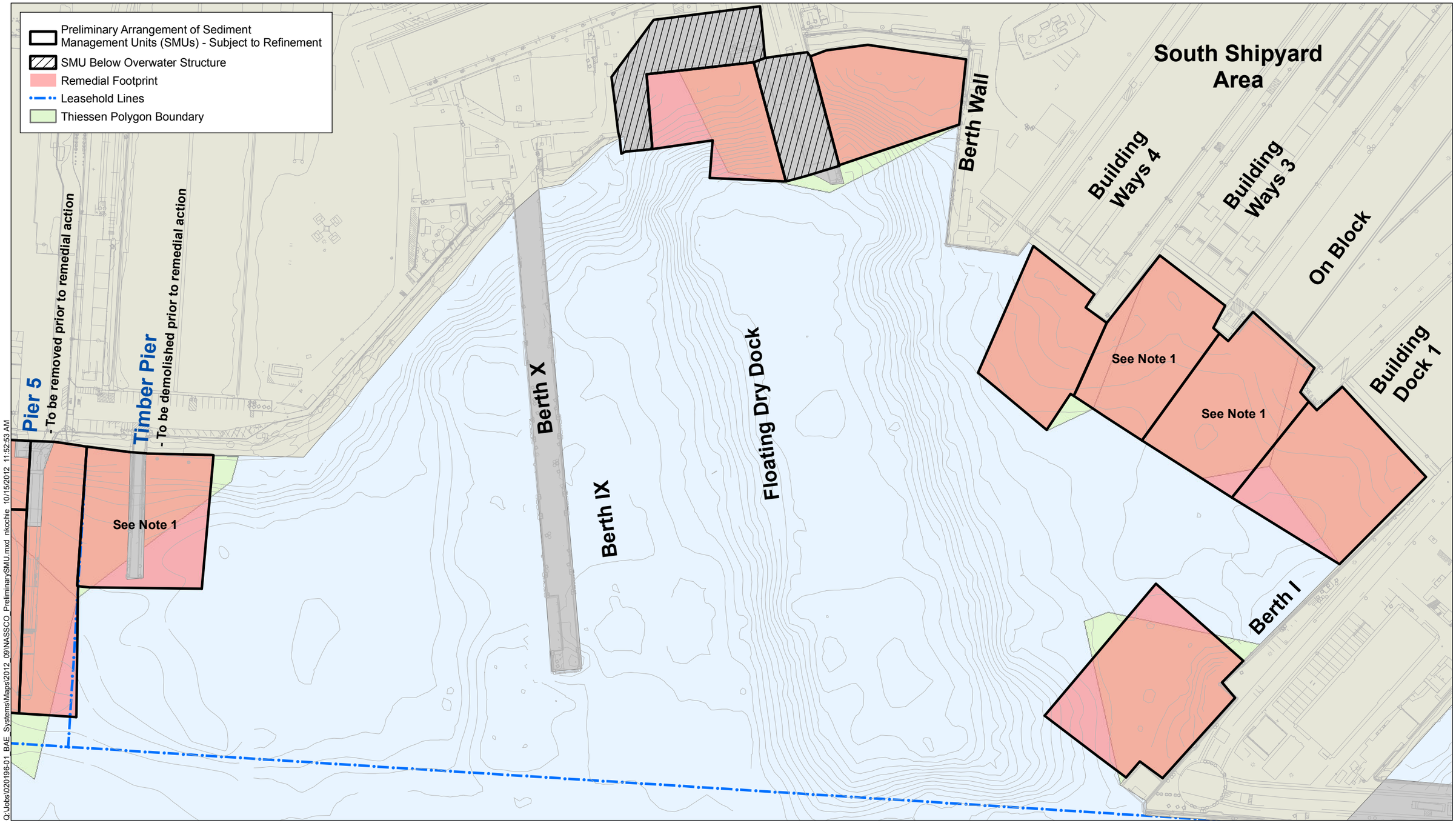
0 125 250 Feet

NOTE:
1. Final sample distribution will ensure a minimum of one confirmation sediment sample will be collected from each footprint polygon targeted for dredging as well as from each SMU. In cases where SMU and polygon boundaries are not equivalent, collection of multiple confirmation samples within a given SMU or polygon may be necessary to meet this objective.

Figure 3
North Shipyard Area Remedial Footprint and SMUs
San Diego Shipyard Sediment Site



San Diego Shipyard Sediment Site Group

ANCHOR QEA

Feet
0 125 250

NOTE:
1. Final sample distribution will ensure a minimum of one confirmation sediment sample will be collected from each footprint polygon targeted for dredging as well as from each SMU. In cases where SMU and polygon boundaries are not equivalent, collection of multiple confirmation samples within a given SMU or polygon may be necessary to meet this objective.

Figure 4
South Shipyard Area Remedial Footprint and SMUs
San Diego Shipyard Sediment Site

The final dredge design, when completed, will subdivide the entire remedial footprint into a series of sediment management units (SMUs) with distinct physical characteristics and dredge depths (see Design Criteria Report [DCR; Appendix A] for further information on the steps that will be taken to develop a final dredge area and SMU design). SMUs will be of similar or smaller size as the footprint polygons and will used for evaluating successful attainment of cleanup goals, because they will correspond with dredge and material placement areas.

Although confirmational sediment sampling will be conducted and evaluated on a SMU-by-SMU basis, the locations of confirmational sediment cores will be selected to adequately represent each footprint polygon targeted for remediation. SMUs shown on Figures 3 and 4 are preliminary and will be finalized in the final dredge design.

For purposes of determining whether the targeted contamination has been removed, the 30-cm interval below the residual (top 5 cm) horizon from the sediment core will be analyzed for the contaminants of concern. The Technical Report indicates that the first undisturbed depth beneath the dredge depth starts at a minimum of 5 cm (Section 34.1.2 of the EIR; Water Board 2012c) below the sediment surface. The top 5 cm is likely suggested because this layer may represent the thin surface layer of unconsolidated residual sediment that is anticipated to remain in place after dredging has been completed. The subsurface samples are important as they will indicate the contaminant level in the undredged materials and will be representative of actual post-dredging bottom conditions. Modifications to intervals to be analyzed for contaminants of concern may be proposed, however, if the residual layer is found to vary from the 5-cm layer previously discussed.

The 30-cm interval below the residual layer represents the approximate minimum sample volume required to analyze for the chemical parameters described in Section 3.3.2, assuming a 4-inch core diameter. However, a core sampling contractor has not been selected and a longer sample interval may be required if a smaller diameter core tube is used by the selected contractor.

3.3 Methods, Locations, and Timing

A brief summary of the monitoring methods, locations, and timing is provided in the following subsections and more detailed procedures for sediment core sampling are provided in the SAP (Appendix D) for this work. Detailed field and laboratory quality assurance and quality control criteria, including method specifications, detection limits, accuracy and precision requirements, are provided in the Post-Remedial Monitoring Plan (Exponent 2012).

3.3.1 Sediment Sampling Methods

The confirmational subsurface sediment samples will be collected using a vibracore coring device or similar deployed from a winch line on a sampling vessel. Cores will be advanced a minimum of 35 cm or until refusal. The target depth will be determined after the core sampling contractor, and the core diameter, has been determined. Bay Point Formation contact will be confirmed by the field geologist.

3.3.2 Sediment Sample Locations

Confirmational sediment sampling will consist of collecting one or more sediment core samples in each of the SMUs shown in Figures 3 and 4. As previously noted, the locations of confirmational sediment cores will be selected within each SMU shown on Figures 3 and 4 to adequately represent each footprint polygon targeted for remediation. Every footprint polygon will contain at least one confirmational sediment core location. Once SMUs have been finalized, confirmational sediment sample locations will be designated.

A sample representing the upper 5-cm-thick residual layer will be archived and, consistent with the post-remedial program requirements, may be used to determine the need for a clean sand cover. In such cases, the contractor may be asked to use a digging bucket to confirm the contact with the Bay Point Formation.

If no sample of the subsurface depth horizon can be collected, because sample equipment cannot penetrate a hard substrate (i.e., the Bay Point Formation), the residual layer (if any) will also be archived and may be used to determine the need for a clean sand cover.

3.3.3 Chemical Analytical Parameters

A sample representing the upper 5-cm-thick residual layer will be archived and, consistent with the post-remedial program requirements and best dredge practices, may be used to determine the need for a clean sand cover. The subsurface depth horizon (approximately 5 to 35 cm) samples will be analyzed for and compared to the post-remedial dredge area concentrations described in Section 3.4.

3.3.4 Monitoring Timing

All confirmational sediment sampling is estimated to occur within 24 to 48 hours after dredging has been completed within a SMU and bathymetric surveys have confirmed the target dredge depths have been achieved. This timeframe is needed to allow dredge residuals (sediment suspended during dredging) sufficient time to settle and, should additional remedial activities be required, ensure that the test results are received prior to the contractor demobilizing from the construction area.

3.4 Performance Standards for Dredging

The contractor will be required to remove sediments to depths and extents shown on the contract documents, which will be verified through bathymetric surveys as indicated in the QAPP (Appendix B). Once it has been adequately demonstrated that the required dredging depths have been achieved, the effectiveness of sediment removal will be determined for each SMU by evaluating the sediment quality of the post-dredge subsurface within that SMU, as previously described.

The Project Team will conduct post-remedial confirmational sampling to determine if cleanup levels are achieved or if further cleanup activities are required as described in Section 3.5. If concentrations of primary contaminants of concern in the subsurface depth horizon (approximately 5 to 35 cm) for a given SMU are greater than 120 percent of post-remedial dredge area concentrations (Table 3) after completion of initial dredging, the potential response actions described in Section 3.5 will be evaluated.

Table 3
Post-Remedial Dredge Area Concentrations

Chemical	Units (dry weight)	Post-Remedial Dredge Area Concentrations	120 Percent of Post-Remedial Dredge Area Concentrations
Copper	mg/kg	121	145
Mercury	mg/kg	0.57	0.68
Tributyltin	µg/kg	22	26
HPAH[1]	µg/kg	663	796
Total PCB Congeners[2]	µg/kg	84	101

Notes:
Table taken from CAO (Water Board 2012a).
µg/kg = micrograms per kilogram
HPAHs = high-molecular weight polycyclic aromatic hydrocarbons
mg/kg = milligrams per kilogram
PCBs = polychlorinated biphenyls

1 HPAHs = sum of six PAHs: Fluoranthene, Perylene, Benzo(a)anthracene, Chrysene, Benzo(a)pyrene, and Dibenzo(a,h)anthracene.

2 Total PCBs = sum of 41 congeners: 18, 28, 37, 44, 49, 52, 66, 70, 74, 77, 81, 87, 99, 101, 105, 110, 114, 118, 119, 123, 126, 128, 138, 149, 151, 153, 156, 157, 158, 167, 168, 169, 170, 177, 180, 183, 187, 189, 194, 201, and 206.

3.5 Potential Response Actions: Sediment Monitoring

A decision matrix for interpreting the results of the confirmation subsurface sediment monitoring is provided in Table 4 and a decision flow chart is provided as Figure 5. The threshold for additional action (including additional sampling, additional dredging, clean sand placement, etc.) is a subsurface depth horizon (approximately 5 to 35 cm) chemical concentration greater than 120 percent of the post-remedial dredge area concentration in any SMU (see Table 4).

Table 4
Confirmational Sample Remedial Action Decision Matrix

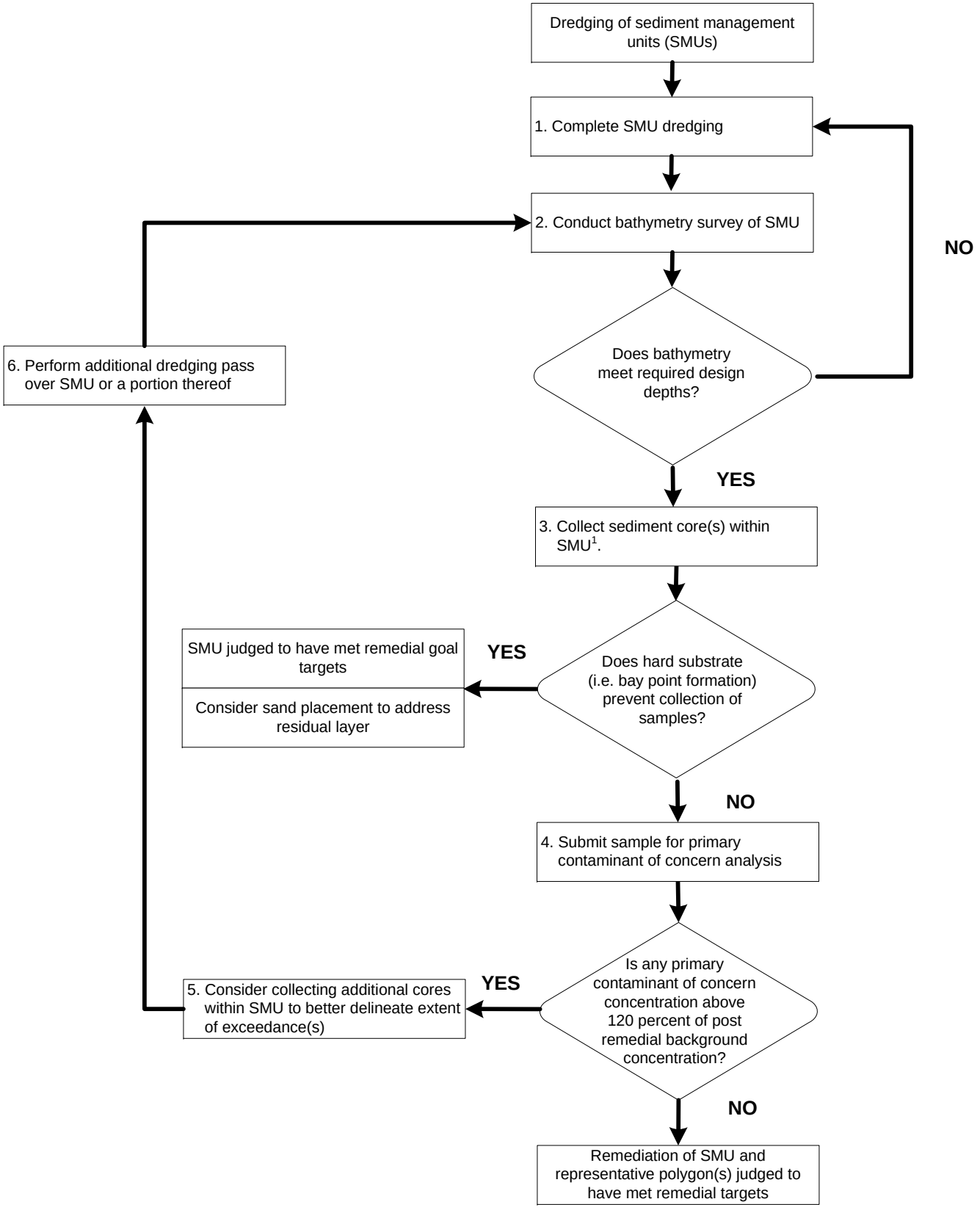
Sediment Chemistry	Sediment Condition	Remedial Action
Undisturbed subsurface sample is less than 120 percent of the post-remedial dredge area concentration (see Table 3)	**SMU Cleanup Complete** Concentrations of all primary COCs within each SMU are below the cleanup levels.	• No further remedial action; dredging activities are complete in this SMU. • Sand cover may be applied as a biologically restorative layer.
Undisturbed subsurface sample exceeds 120 percent post-remedial dredge area concentration (see Table 3)	**Subsurface Contamination Indicated within the SMU** Further testing and/or remedial actions may be required.	• If subsurface concentrations within a SMU are confirmed to be greater than post-remedial dredge area concentrations, then remedial actions may include: – Additional analysis of discrete archived samples if multiple samples collected within SMU and/or additional sample collection to better define extent of exceedance(s) – Additional dredging – Placement of clean sand (if additional dredging is determined to be inefficient or infeasible)

If all SMU concentrations are less than 120 percent of the post remedial dredge area concentration, SMU cleanup is complete and no further action is required, through a sand cover may be applied to provide restorative layer for biological growth. If SMU concentrations are greater than the threshold, further testing and/or remedial actions will be required as in the following subsections.

3.5.1 Sediment Monitoring Exceedance

If the subsurface concentrations within a SMU are confirmed to be greater than 120 percent of the post-remedial dredge area concentrations, the following additional remedial actions will be evaluated:

- Additional dredging of SMU
- Obtaining and analyzing additional samples from within the SMU
- Clean sand placement



Notes:

[1]One or more sediment core samples will be collected from each footprint polygon targeted for dredging. The final location of each sediment core will be adjusted within the footprint polygon targeted for dredging to best represent each SMU.

San Diego Shipyard Sediment Site Group

ANCHOR QEA

Figure 5

Sediment Monitoring Response Decision Flow Chart

San Diego Shipyard Sediment Site

4 BIOLOGICAL MONITORING

As required by MMRP (Water Board 2012c) mitigation measures, the following biological monitoring measures will be implemented:

- A pre- and post-remedial eelgrass survey will be performed per the Southern California Eelgrass Mitigation Policy. If impacts are noted, mitigation measures will be implemented in accordance with resource agency requirements.
- Eelgrass beds will be identified and marked prior to construction by a biologist to protect sea turtles.
- Measures (e.g., speed restrictions and off-limit areas) will be implemented on construction equipment and operations to ensure eelgrass beds are not impacted as a result of the construction activities.
- Construction activities will be temporarily stopped if a sea turtle or marine mammal is sighted within 100 meters of the construction area.

In addition, the contract documents are anticipated to limit construction activities, such that they are performed only during the open environmental windows for California least tern and Endangered Species Act monitoring is not anticipated to be required. If construction activities extend into the least tern window, the appropriate Endangered Species Act monitoring requirements per the EIR (Water Board 2012c) will be implemented.

5 DISPOSAL MONITORING

Required Element	Completed
Remedial Monitoring Plan (B.1.l)	
I. Water quality monitoring	
II. Sediment monitoring	
III. Disposal monitoring consistent with Section 34.1 of the Technical Report	✓

Prior to sediments leaving the offloading site, the contractor will be required to demonstrate all sediments have passed the paint filter test to ensure that sediments have been sufficiently dewatered and do not contain free liquids. At the contractor's discretion, and as approved by the Project Team, an additive may be mixed in with the sediment to bind available water and decrease the dewatering time.

The contractor will also be required to perform additional analytical testing of stockpiled sediment as dictated by landfill acceptance criteria, to demonstrate and document the material's suitability for disposal at selected landfill(s). Specific requirements for waste characterization at the disposal site will be developed after one or more disposal facilities have been identified. Specific testing requirements will be based on the Waste Discharge Requirements of the disposal facilities because each disposal facility has specific testing requirements that are often volume and analyte specific. For example, local landfills (such as the Otay Landfill in Chula Vista) require test results from 75 samples to fully represent the planned volume of sediment for disposal (143,400 cubic yards), with each sample obtained by vibracoring to the projected dredge depth.

Because open-ocean disposal is not planned; therefore, no biological or bioassay testing is anticipated.

6 REPORTING

6.1 Weekly Reports

As required by the MMRP (Water Board 2012c), the Project Team will prepare and submit weekly water quality monitoring reports, which provide results from each week's water quality monitoring activities, and will compile the results into a summary table with a comparison to water quality compliance criteria.

6.2 Quarterly Reports

As required by the CAO, the Project Team will prepare and submit quarterly progress reports, which describe all actions taken toward achieving compliance with the CAO as well as results of any sampling, testing, analyses, data collection, or other evaluations. Quarterly reports will be submitted by or before the 15th of March, June, September, and December of each year following the CAO's effective date. Each quarterly report will summarize current schedule and any delays or modifications to that schedule.

7 REFERENCES

Exponent, 2012. *Post-Remediation Monitoring Plan, San Diego Shipyard Sediment Site*. Prepared for the Regional Water Quality Control Board. June 2012.

SWRCB (State Water Resources Control Board), 2005. *Water Quality Control Plan Ocean Waters of California*.

Water Board (Regional Water Quality Control Board), 1994. *Water Quality Control Plan for San Diego Basin.* California Regional Water Quality Control Board, Region 9, San Diego, California.

Water Board, 2012a. Cleanup and Abatement Order No. R9-2012-0024 for the Shipyard Sediment Site. March 14, 2012.

Water Board, 2012b. *Technical Report for Cleanup and Abatement Order No. R9-2012-0024 for the Shipyard Sediment Site, San Diego Bay, San Diego, CA.* March 14, 2012.

Water Board, 2012c. *Final Environmental Impact Report*. March 14, 2012.