June 2020
Shelton Harbor Sediment Cleanup Unit
Oakland Bay and Shelton Harbor Sediments Cleanup Site (Cleanup Site ID 13007)

ANCHOR QEA

Interim Action Operations, Maintenance, and Monitoring Plan

Prepared for Simpson Timber Company and the Washington State Department of Ecology

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TABLE OF CONTENTS

FIGURE

ABBREVIATIONS

AO	Agreed Order
BODR	*Shelton Harbor Interim Action Basis of Design Report*
BODR Addendum	*Shelton Harbor Interim Action Basis of Design Report Addendum No. 1*
CoC	chemical of concern
Ecology	Washington State Department of Ecology
IAP	*Shelton Harbor Interim Action Plan*
MTCA	Model Toxics Control Act
OMMP	*Interim Action Operations, Maintenance, and Monitoring Plan*
PAH	polycyclic aromatic hydrocarbon
QC	quality control
RI/FS Work Plan Addendum	*Remedial Action/Feasibility Study Work Plan Addendum No. 1*
SCU	sediment cleanup unit
Simpson	Simpson Timber Company
SMA	sediment management area
SMS	sediment management standard
SQAPP Addendum No. 2	*Sampling and Quality Assurance Project Plan Addendum No. 2*
SWAC	surface-weighted average concentration
USACE	U.S. Army Corps of Engineers
WAC	Washington Administrative Code

1 Introduction

This *Interim Action Operations, Maintenance, and Monitoring Plan* (OMMP) describes long-term monitoring and adaptive management of engineered caps in the Shelton Harbor sediment cleanup unit (SCU) to ensure their long-term integrity and protectiveness. This OMMP builds on the *Shelton Harbor Interim Action Basis of Design Report* (BODR; Anchor QEA 2018a) and *Shelton Harbor Interim Action Basis of Design Report Addendum No. 1* (BODR Addendum; Anchor QEA 2019a), which describe the approach and criteria for the engineering design of Interim Actions at the SCU, as set forth in the *Shelton Harbor Interim Action Plan* (IAP; Anchor QEA 2018b), and in accordance with the requirements of the Agreed Order (AO) No. DE 14091 between the Washington State Department of Ecology (Ecology) and Simpson Timber Company (Simpson), entered in July 2017. The actions described in this OMMP will be performed by Simpson under Ecology oversight, consistent with AO requirements.

Implementation of this OMMP will be performed consistent with the requirements of the Model Toxics Control Act (MTCA), Chapter 70.105D in the Revised Code of Washington, as administered by Ecology under the MTCA Cleanup Regulation, Chapter 173-340 of the Washington Administrative Code (WAC). Implementation of this OMMP will also comply with the Sediment Management Standards (SMS), WAC Chapter 173-204.

1.1 Purpose and Scope of the OMMP

As described in the BODR and BODR Addendum (Anchor QEA 2018a, 2019a), engineered caps have been placed over approximately 12 acres of the SCU. Engineered cap placement was conducted over two construction seasons, beginning in October 2018 and ending in September 2019. The extent of engineered caps successfully placed in sediment management areas (SMAs) within the SCU is shown in Figure B-1. Long-term monitoring of engineered caps in SMA-1, SMA-2, and SMA-3 will be performed to ensure their long-term integrity and protectiveness.

As described in more detail in Section 3, the long-term monitoring of engineered caps will primarily include physical survey methods (e.g., bathymetry) to monitor the integrity, surface elevation, and thickness of the caps, beginning in Year 1 following completion of construction. Post-construction cap monitoring will begin in 2020, continuing in Year 3 (2022) and Year 5 (2025), and then approximately every 5 years thereafter through 2035, as described in more detail herein. Focused follow-on chemical or biological monitoring may be performed in targeted cap areas identified by the physical surveys to further evaluate the protectiveness of the caps. Cap repairs will be performed as needed based on the results of the monitoring. The need for and scope/schedule of long-term cap monitoring and maintenance beyond 2035 will be developed as a collaborative effort between Simpson and Ecology based on the results of monitoring through 2035. Additional monitoring

events may be triggered by specific storm or seismic events (e.g., a wind event with a recurrence interval of 20 years or more or a seismic event of a magnitude greater than 5.5).

Long-term performance and confirmation monitoring activities will inform Ecology's 5-year reviews of the effectiveness of remedial actions within the SCU, consistent with MTCA and SMS requirements. Sampling events will be scheduled to facilitate Ecology's 5-year reviews, beginning in approximately 2025.

Subsequent sections of this OMMP describe post-construction environmental monitoring activities that will be performed within the SCU, including the details of post-construction monitoring and maintenance of capped areas to ensure the cap remains physically stable and chemically protective over time, as well as long-term surface sediment monitoring to verify that cleanup actions accelerate natural recovery processes. The overall objective of this OMMP is to confirm that remedial actions within the SCU achieve the performance standards specified in the IAP.

1.2 Organization of the OMMP

The remainder of this OMMP is organized as follows:

- Section 2 – Project Roles and Responsibilities
- Section 3 – Cap Monitoring and Potential Corrective Actions
- Section 4 – Reporting
- Section 5 – References

The *Sampling and Quality Assurance Project Plan Addendum No. 2* (SQAPP Addendum No. 2; Appendix A to the *Remedial Action/Feasibility Study Work Plan Addendum No. 1* [RI/FS Work Plan Addendum]; Anchor QEA 2020) specifies the procedures to ensure that sample collection, handling, and analysis as part of the OMMP will result in data of sufficient quality to evaluate the effectiveness of remedial actions within the SCU.

2 Project Roles and Responsibilities

2.1 Washington State Department of Ecology

Ecology is the regulatory authority and responsible agency for overseeing and authorizing remedial actions within the SCU. In this capacity, Ecology will review information described in this OMMP to ensure that the monitoring is conducted in a manner consistent with the stated objectives of the OMMP. Joyce Mercuri is the Ecology site manager, who will exercise project oversight for Ecology and coordinate with Simpson. Ecology will make final decisions to resolve unforeseen problems, which may change the project components or the manner in which the OMMP is undertaken.

2.2 Simpson Timber Company

The operation, maintenance, and monitoring work on this project will be managed by Simpson and executed by Simpson or by a designated representative. The project coordinator for Simpson is Greg Brunkhorst of Anchor QEA, LLC, who will be responsible for implementation of the OMMP, including required monitoring, sampling, testing, and reporting. Included within this responsibility will be the monitoring or quality control (QC) activities to ensure that activities described in this OMMP are conducted in accordance with the requirements described herein. These activities may also be assigned to other designees with the requisite expertise and experience.

3 Cap Monitoring and Potential Corrective Actions

Long-term cap monitoring will encompass two broad categories:

- Physical integrity performance monitoring (Section 3.1)
- Sediment quality confirmation monitoring (Section 3.2)

Physical integrity monitoring will be performed using a high-resolution hydrographic survey (i.e., multibeam bathymetric survey) conducted at the start of each OMMP monitoring event. The bathymetric survey data will be used to evaluate post-construction changes in cap thicknesses by comparing measured surface elevations of the cap with the final post-construction surveys presented in the Northern Shelton Harbor Interim Action: Water Quality Monitoring and Cap Construction Status (Season 1; Anchor QEA 2019b) and Shelton Harbor Interim Action: Season 2 Water Quality and Cap Thickness Monitoring Construction Completion (Anchor QEA 2019c) memoranda.[1] Based on a comparison of the survey results, cap areas of relatively greater erosion or settlement will be targeted as locations to conduct follow-on sediment quality monitoring, as needed. Visual inspections of the caps at low tide will also be conducted to further detail the physical integrity of the caps and locate potential follow-on sediment core sampling locations, as necessary.

Surface sediment quality monitoring will be conducted at designated sampling stations shown in Figure B-1. Additional surface sediment sampling stations may be selected following completion and interpretation of the hydrographic survey or follow-on sediment core sampling, as described in the following sections.

3.1 Physical Integrity Performance Monitoring

Bathymetric survey methods will be similar between the post-construction and each OMMP survey to allow detailed comparisons. Changes in bathymetry will be evaluated to identify areas of net settlement, erosion, or deposition relative to post-construction conditions. A potential cap area of concern for potential settlement or erosion will be identified when the apparent total cap thickness relative to as-built conditions is less than the minimum specification defined in the BODR and BODR Addendum (Anchor QEA 2018a, 2019a), depending on the specific cap area. A potential cap area of concern may trigger visual inspection of the cap surface (Section 3.1.2) or sediment sampling in that area to more accurately characterize (through coring or probing) the in-place cap layer thicknesses (Section 3.1.3).

[1] Baseline and OMMP event survey data will be maintained on Anchor QEA's redundant file server. A GIS map package file of the survey data can be made available upon request.

3.1.1 Bathymetric Survey Methods

Bathymetric surveying was used during construction to verify that the placed thicknesses of the engineered caps meet the requirements described in the BODR and BODR Addendum (Anchor QEA 2018a, 2019a). Multibeam bathymetric surveys will be performed as part of OMMP monitoring to identify changes in mudline elevations. Multibeam surveys will be conducted by a licensed surveyor and will meet or exceed the accuracy standards for a U.S. Army Corps of Engineers (USACE) navigation and dredging support survey as referenced in the USACE hydrographic survey manual, April 2004 revision (USACE 2004).

3.1.2 Visual Inspection Methods

Visual inspection will be performed to evaluate the integrity of caps if the bathymetry survey indicates areas of relatively greater erosion or settlement. Cap inspections may be performed at low tide for intertidal caps and by a diver for subtidal caps to further detail the physical integrity of the armored areas and toe of the armored slope. Inspections will include documentation of each of the following:

- Description of the cap surface conditions and subsurface probing
- Indications of settlement, seepage, or other unanticipated conditions
- Sediment core locations (these may also be identified as necessary to more accurately characterize the in-place layer thickness)

3.1.3 Sediment Coring Methods

Sediment cores may be performed at locations identified in the bathymetric surveys or inspections where possible cap settlement or erosion of cap thicknesses are below the BODR-defined cap design criteria (Anchor QEA 2018a). If necessary, cores will be advanced to a minimum depth of approximately 1 foot below the minimum required cap thickness. The cores will be visually inspected to determine the thicknesses of the cap material.

If the coring verifies the cap thickness specification in that area (e.g., reductions in cap surface elevations are primarily attributable to subgrade settlement), no further cap monitoring in that area will be required during that event. Conversely, if the coring reveals that cap thickness specifications in that area have not been maintained, additional contingency evaluations—including surface sediment chemical analyses or cap maintenance or repair—may be performed as appropriate, subject to Ecology approval (Section 3.3).

Detailed procedures for field sampling, location control, sample handling, and decontamination are provided in the SQAPP Addendum No. 2 (RI/FS Work Plan Addendum, Appendix A; Anchor QEA 2020). Detailed field and laboratory quality assurance and QC criteria, including method specifications, detection limits, accuracy, and precision requirements, are provided in the *Sampling*

and Quality Assurance Project Plan (Appendix A to the *Remedial Investigation/Feasibility Study Work Plan* [Anchor QEA 2017]).

3.2 Confirmation Monitoring at Cap Locations

As discussed in the previous sections, surface sediment (0- to 10-centimeter) quality monitoring will be conducted within each Interim Action area. One seven-point composite will be analyzed from SMA-1 with two discrete in situ tests or porewater hydrogen sulfide; one five-point composite from SMA-3; and one two-point composite will be analyzed within SMA-2, as depicted in Figure B-1. In SMA-1 and SMA-3, surface sediments composite samples will be tested for dioxins/furans and polycyclic aromatic hydrocarbons (PAHs). SMA-2 will also be tested for bulk sediment copper and tributyltin. In addition, if sufficient thickness (greater than 1 centimeter) is present, a depositional material sample will be collected from the surface of the SMA-1 and SMA-3 cap areas to characterize current depositional concentrations of chemicals of concern (CoCs; including dioxins/furans and PAHs). All sediment samples collected as part of the OMMP will be collected and analyzed in accordance with the SQAPP Addendum No. 2 (RI/FS Work Plan Addendum, Appendix A; Anchor QEA 2020).

Additional targeted surface sediment sampling may be performed following completion and interpretation of the bathymetric surveys and/or follow-on core sampling (Section 3.1). The decision on whether to collect and analyze additional surface grab samples or sediment core samples in these areas, along with the specific CoC analyses, will be made by Ecology in consultation with Simpson based on field observations.

If the CoC analyses confirm that cleanup standards are being maintained, then no further cap monitoring or repair in that area will be required during that event. Conversely, if the CoC analyses reveal that cleanup standards may be exceeded, further focused monitoring or cap maintenance or repair will be performed as appropriate (Section 3.3), subject to Ecology approval.

3.2.1 Sediment Sampling and Analysis Methods

Sediment sampling and analysis methods are presented in the SQAPP Addendum No. 2 (RI/FS Work Plan Addendum, Appendix A; Anchor QEA 2020).

3.3 Corrective Actions

In the event that physical cap monitoring reveals that maintenance is required, Simpson and Ecology will consult to determine appropriate technical deliverables and scope of maintenance action. In the event that monitoring indicates that remedial action performance standards may not be achieved across the appropriate point of compliance (i.e., as a surface-weighted average concentration [SWAC] across the entire SCU for dioxins/furans), Simpson will submit recommendations for further

monitoring or corrective actions to Ecology for review. CoC monitoring data collected across the SCU (see the RI/FS Work Plan Addendum; Anchor QEA 2020) will be used to calculate the SWAC.

If physical or chemical monitoring data reveal that cap performance standards are not being achieved, a response plan will be developed describing additional response actions to be taken to ensure cap protectiveness. In conjunction with Ecology, Simpson will evaluate the extent and significance of the exceedance. The need for additional response actions will take into consideration all monitoring results relative to an overall assessment of the successful performance of the remedial action. Through these discussions, an appropriate course of action will be developed and implemented, as necessary. The specific problem causing the need for a contingency will dictate which additional response actions may be most appropriate.

Possible additional response actions may include, but are not limited to, those listed for the following scenarios:

- Erosion of cap material
  - Perform additional monitoring to further assess erosion and to determine the extent, cause, and potential solution to the verified erosion.
  - Perform additional sediment quality sampling within those erosion areas where there may be a potential for underlying material to be exposed.
  - Discuss operations that might contribute to erosion and modifications to these operations that may be required to maintain remedy effectiveness.
  - Place additional material with less erosion potential to supplement caps.
- Sediment cleanup standard exceedance
  - Conduct confirmation biological sediment toxicity testing to confirm or refute the occurrence of adverse ecological impacts.
  - Conduct a source control evaluation in coordination with Ecology (as necessary).
  - Place additional capping material.

4 Reporting

Subsequent to each OMMP monitoring event described in the previous sections, Simpson will submit a detailed report to Ecology outlining the actions taken and the results, which will include survey maps and chemical analysis data. A recommendation for modifications to the scope of future monitoring efforts (e.g., reduction in the frequency of cap monitoring) or corrective actions will be described in detail if warranted.

5 References

Anchor QEA (Anchor QEA, LLC), 2017. *Remedial Investigation/Feasibility Study Work Plan*. Shelton Harbor Sediment Cleanup Unit, Oakland Bay and Shelton Harbor Sediments Cleanup Site (Cleanup Site ID 13007). Prepared for Simpson Timber Company and the Washington State Department of Ecology. July 2017.

Anchor QEA, 2018a. *Shelton Harbor Interim Action Basis of Design Report*. Shelton Harbor Sediment Cleanup Unit, Oakland Bay and Shelton Harbor Sediments Cleanup Site (Cleanup Site ID 13007). Prepared for Simpson Timber Company. September 2018.

Anchor QEA, 2018b. *Shelton Harbor Interim Action Plan*. Shelton Harbor Sediment Cleanup Unit, Oakland Bay and Shelton Harbor Sediments Cleanup Site (Cleanup Site ID 13007). Prepared for Simpson Timber Company and the Washington State Department of Ecology. January 2018.

Anchor QEA, 2019a. *Shelton Harbor Interim Action Basis of Design Report Addendum No 1*. Shelton Harbor Sediment Cleanup Unit, Oakland Bay and Shelton Harbor Sediments Cleanup Site (Cleanup Site ID 13007). Prepared for Simpson Timber Company. May 2019.

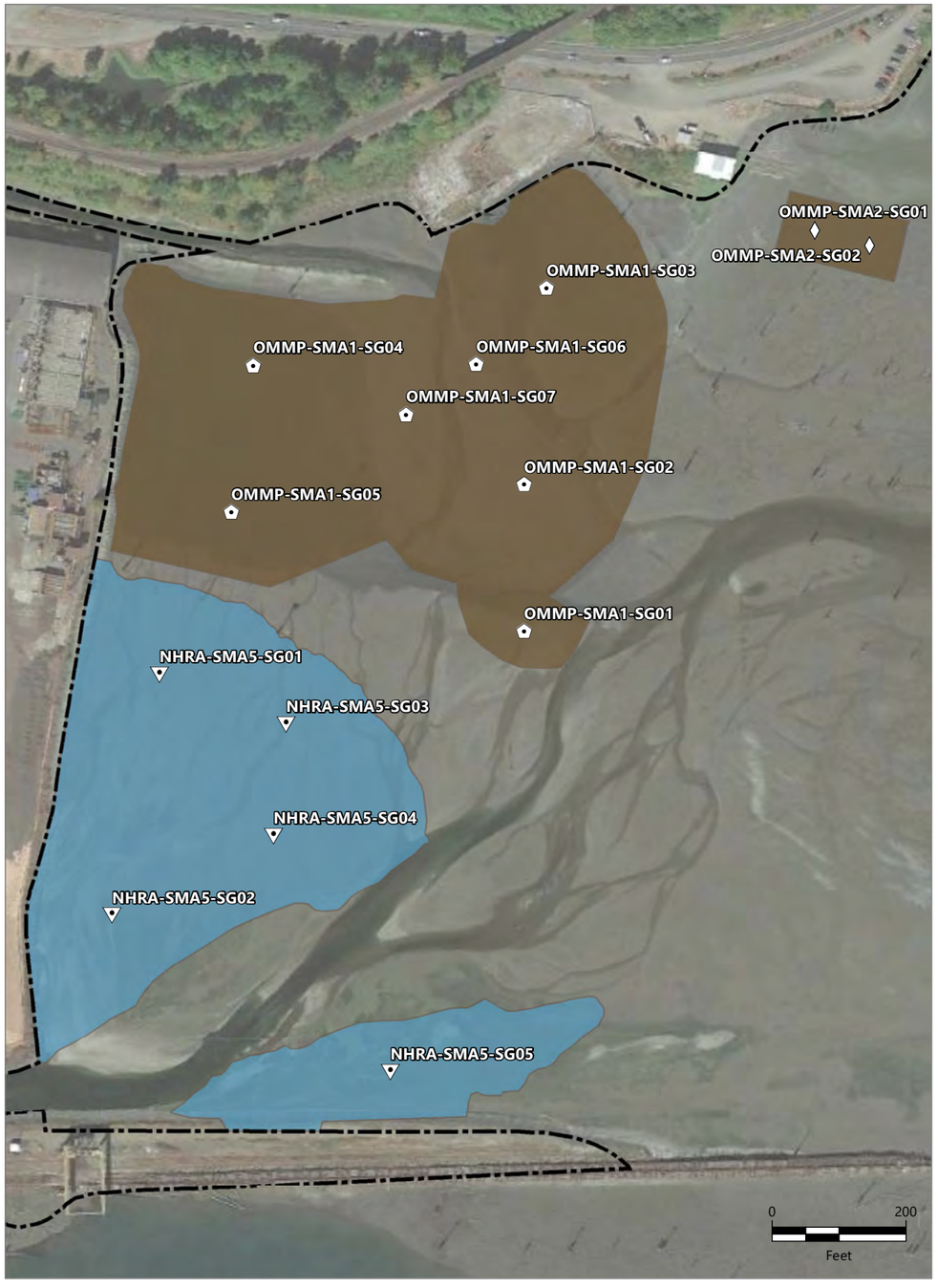
Anchor QEA, 2019b. Memorandum to: Joyce Mercuri, Washington State Department of Ecology. Regarding: Northern Shelton Harbor Interim Action: Water Quality Monitoring and Cap Construction Status. March 11, 2019.

Anchor QEA, 2019c. Memorandum to: Joyce Mercuri, Washington State Department of Ecology. Regarding: Shelton Harbor Interim Action: Season 2 Water Quality and Cap Thickness Monitoring. November 13, 2019.

Anchor QEA, 2020. *Remedial Investigation/Feasibility Study Work Plan Addendum No. 1*. Shelton Harbor Sediment Cleanup Unit, Oakland Bay and Shelton Harbor Sediments Cleanup Site (Cleanup Site ID 13007). Prepared for Simpson Timber Company, Manke Lumber Company, and the Washington State Department of Ecology. June 2020.

USACE (U.S. Army Corps of Engineers), 2004. *Engineering and Design: Hydrographic Surveying*. EM 1110-2-1003. April 2004.

Figure



Proposed Dioxin/Furan Sample Locations

- D/F and cPAH Composite Sample and Individual Porewater H_2S Samples: If depositional sediment present >1-cm sub sampling will be conducted (e.g., 0-2 and 0-10 cm sample intervals).
- D/F and cPAH Composite Sample: If depositional sediment present >1-cm sub sampling will be conducted (e.g., 0-2 and 0-10 cm sample intervals).
- D/F and cPAH Composite Test: 0-10 cm Sample Depth
- D/F, TBT, cPAH and Cu Composite Test: 0-10 cm Sample Depth
- Clinker Deposit
- Sediment Cleanup Unit Boundary
- Season 1 Capping Areas
- Season 2 Capping Area (SMA-3)
- Constructed Habitat Lobes

NOTES:
1. Background orthoimagery provided by Google Earth.
cm: centimeter
cPAH: carcinogenic polycyclic aromatic hydrocarbon
Cu: copper
D/F: dioxin/furan
H_2S: hydrogen sulfide
NHRA: Northern Habitat Restoration Area
OMMP: Operations, Maintenance, and Monitoring Plan
SMA: sediment management area
TBT: tributyltin

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ANCHOR QEA

Figure B-1
Shelton Harbor Interim Action Cap Monitoring Target Locations
Interim Action Operations, Maintenance, and Monitoring Plan
Oakland Bay and Shelton Harbor Sediments Cleanup Site