FINAL

Lower Duwamish Waterway Group

Port of Seattle / City of Seattle / King County / The Boeing Company

SUPPLEMENT TO THE QUALITY ASSURANCE PROJECT PLAN ADDENDUM: PRE-DESIGN SURVEYS OF THE LOWER DUWAMISH WATERWAY UPPER REACH

FINAL

Prepared for:

The U.S. Environmental Protection Agency
Region 10
Seattle, WA

September 22, 2022

Prepared by:

ANCHOR QEA

1201 3rd Avenue • Suite 2600
Seattle, Washington • 98101

in association with

Wind Ward environmental LLC

200 West Mercer Street • Suite 401
Seattle, Washington • 981199

FINAL

TITLE AND APPROVAL PAGE

SUPPLEMENTAL TO THE QUALITY ASSURANCE PROJECT PLAN ADDENDUM:

PRE-DESIGN SURVEYS OF THE LOWER DUWAMISH WATERWAY UPPER REACH

DocuSigned by:
Tom Wang
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9/22/2022
Date

Tom Wang
Anchor QEA, LLC, Project Manager

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Jo Miller
EFD4E3D43F9348D...

9/26/2022
Date

Jo Miller
True North Land Surveying, Inc., Project Manager

ELLEN HALE Digitally signed by ELLEN HALE
Date: 2022.09.27 11:47:32 -07'00'

Date

Elly Hale
EPA Project Manager

Don Matheny Digitally signed by Matheny, Don
Date: 2022.09.26 14:25:22 -07'00'

Date

Don Matheny
EPA QA/QC Manager

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FIGURES

1 Introduction

This document is a supplement to the addendum to the quality assurance project plan (QAPP) for pre-design surveys in the upper reach of the Lower Duwamish Waterway (LDW) for the Phase III pre-design investigation (PDI) (referred to herein as the Supplement to the Survey QAPP Addendum). It describes the methods and quality control (QC) for conducting a topographic survey for selected bank areas of the LDW upper reach, between river miles 3.0 and 5.0, consistent with the LDW Fourth Amendment of the Administrative Order on Consent (EPA 2018).

During the preliminary (30%) remedial design, data gaps between the previous bathymetric and topographic survey in areas of proposed remedial construction were identified (Anchor QEA and Windward 2022a). The topographic surveys covered by this document will augment data collected from the bathymetric surveying conducted in 2019 and 2020 and the topographic surveying conducted in 2021. The areas with data gaps are generally where the bank elevation was too high to collect data with bathymetric surveying and were inaccessible to the land surveyors in 2021. In some cases, the distance between bathymetric and topographic surveys is small enough to not be considered a data gap (e.g., Area 27; see Map 2-5g of the Preliminary (30%) Remedial Design Basis of Design Report [Anchor QEA and Windward 2022a]). In addition to topographic surveying, the surveyors will also collect precise locations and invert elevations of outfalls that may be within remedial action areas. Areas where additional data are needed to guide remedial construction are identified in Figures 1 through 7.

Topographic survey methods and procedures are included in the Quality Assurance Project Plan Addendum: Pre-Design Surveys of the Lower Duwamish Waterway Upper Reach (Anchor QEA and Windward 2021; referred to in this document as the Survey QAPP Addendum). This Supplement to the Survey QAPP addendum provides details for only those sections of the Survey QAPP Addendum that have changed.

EPA guidance for QAPPs was followed in the preparation of this addendum (EPA 2002). This document includes changes to the following sections of the Survey QAPP Addendum:

- Section 2 – Project Management and Data Quality Objectives
  - Only subsections 2.3 and 2.4 have changes
- Section 3 – Data Generation and Acquisition
  - Only subsections 3.2.2 and 3.2.3 have changes

- Section 6 – References

There are no changes to Sections 4 and 5 of the Survey QAPP Addendum so they have been omitted from this report.

2 Project Management and Data Quality Objectives

2.3 Project Description

Land surveying will be performed on foot or from small boats in selected locations where remedial construction is planned and there are data gaps between the bathymetric and topographic surveys conducted to date. These areas were defined in the PDI Data Evaluation Report (Anchor QEA and Windward 2022b) and include RAL exceedance areas 13, 18, 19, 22, 24, 33, and 34 (Figures 1 through 7). Elevation data will be obtained to refine contours from the limits obtained by the bathymetric survey to limits required for RD as shown on the figures. The proposed survey will also obtain precise locations, invert elevations, and diameters of outfall pipes in the areas where remedial construction is planned. The survey scope for each area is identified on the figures with callouts that direct the reader to a supporting text box on the figure. Horizontal and vertical positioning accuracy for elevation data and outfall location data are described in Table 2 of the Survey QAPP Addendum.

2.4 Data Quality Objectives and Criteria

The data quality objective (DQO) for the supplemental topographic surveying has been identified as DQO 11 in the Draft Quality Assurance Project Plan Addendum for the Lower Duwamish Waterway Upper Reach: Pre-Design Investigation Phase III (Anchor QEA and Windward 2022c). Additionally, DQO 4 from the Survey QAPP Addendum applies to locating outfalls.

3 Data Generation and Acquisition

3.2 Survey Methods

3.2.2 Topographic Data Acquisition

The surveys will obtain elevation data and details of bank features that may impact the design and construction of remedial actions. Where possible, topographic data will be collected by surveyors on foot during low tide. For areas inaccessible to surveyors on foot, surveyors will work at rising or higher tides from a small boat and data will be collected through the water column.

3.2.3 Survey Schedule

It is anticipated that the topographic survey will be conducted in October 2022, and field work is expected to require up to 10 days, subject to factors such as tide conditions.

6 References

Anchor QEA and Windward. 2021. *Lower Duwamish Waterway Quality Assurance Project Plan Addendum: Pre-Design Surveys of the Lower Duwamish Waterway Upper Reach*. Prepared for the Lower Duwamish Waterway Group. June 2021.

Anchor QEA and Windward. 2022a. *Preliminary (30%) Remedial Design Basis of Design Report for the Lower Duwamish Waterway Upper Reach*. Submitted to EPA. August 2022.

Anchor QEA and Windward Environmental, 2022b. *Pre-Design Investigation Data Evaluation Report*. Final. Submitted to EPA July 15, 2022.

Anchor QEA and Windward. 2022c. *Draft Quality Assurance Project Plan Addendum for the Lower Duwamish Waterway Upper Reach: Pre-Design Investigation Phase III*. Prepared for the Lower Duwamish Waterway Group. September 2022.

EPA (U.S. Environmental Protection Agency), 2002. *Guidance for Quality Assurance Project Plans*. Office of Environmental Information. EPA/240/R-02/009. December 2002.

EPA, 2018. Fourth Amendment of the *Administrative Order on Consent/or Remedial Investigation/Feasibility Study*, U.S. EPA, Region 10 Docket No. CERCLA 10-2001-0055, Ecology Docket No 00TCPNR-1895 (12/20/2000). July 2018.

Figures

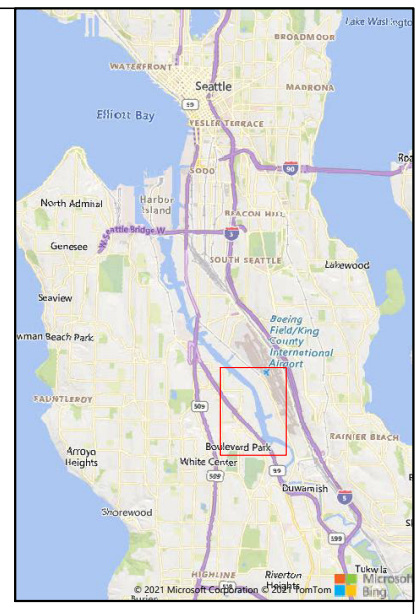

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Figure 2
Figure 3
Figure 4
Figure 5
Figure 6
Figure 7

Source: Topographic survey by True North Land Surveying, Inc. performed between June 30, 2021 and August 10, 2021. Bathymetric survey by Northwest Hydro performed between April 18, 2019 and May 15, 2019. Additional survey by Northwest Hydro performed June 2020. Composite data updated December 23, 2020. LiDAR survey from Puget Sound LiDAR Consortium dated 2016.
Horizontal Datum: Washington State Plane, North Zone, North American Datum of 1983/91, U.S. Survey Feet; WSDOT MON GP17005-176 & GP17005-181
Vertical Datum: Mean Lower Low Water (MLLW), MLLW Converted from NAD88 (NAVD88 + 2.34' to MLLW)

Legend:

- Federal Navigation Channel
- 250+00 Channel Centerline
- LDW Upper Reach Approximate Boundary
- Topographic Survey Area
- Figure Extents

N

0 700 Feet

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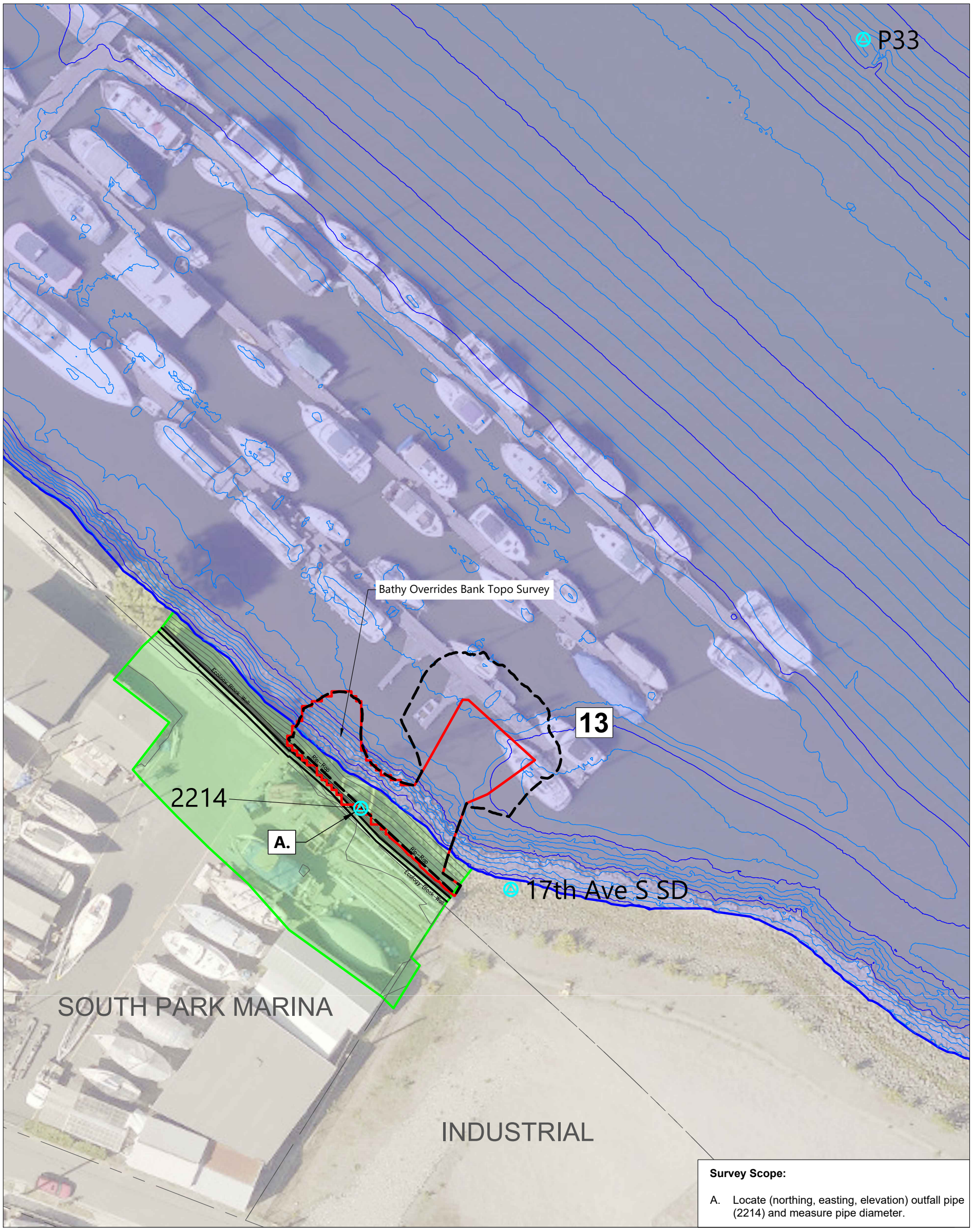
Figure 1
Phase III PDI Topographic Survey Overview

Supplement to the Quality Assurance Project Plan
Addendum: Pre-Design Surveys of the Lower Duwamish Waterway Upper Reach

SEPTEMBER 22, 2022

Sep 22, 2022 2:35pm jbigsby K:\Projects\0067-King County\LDW Upper Reach Engineering Services\0067-WK-011 QAPPA Survey Merge w RAA Boundaries - Overview.dwg Figure 1



Survey Scope:

A. Locate (northing, easting, elevation) outfall pipe (2214) and measure pipe diameter.

Source: Topographic survey by True North Land Surveying, Inc. performed between June 30, 2021 and August 10, 2021. Bathymetric survey by Northwest Hydro performed between April 18, 2019 and May 15, 2019. Additional survey by Northwest Hydro performed June 2020. Composite data updated December 23, 2020. LiDAR survey from Puget Sound LiDAR Consortium dated 2016.
Horizontal Datum: Washington State Plane, North Zone, North American Datum of 1983/91, U.S. Survey Feet; WSDOT MON GP17005-176 & GP17005-181
Vertical Datum: Mean Lower Low Water (MLLW), MLLW Converted from NAD88 (NAVD88 + 2.34' to MLLW)

Legend:

- 2019/2020 Northwest Hydro Bathymetric Survey Extent
- 2021 True North Bank Topographic Survey Extent (Not Shown where Bathymetric Survey Overrides Topo)
- Bathymetric Survey Contours (1' & 5' Intervals)
- Topographic Survey Contours (1' & 5' Intervals)
- 30% Remedial Action Area
- RAL Exceedance Area
- Active Outfall Pipe

N

0 40

Feet

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Figure 2
Additional Topographic Survey at RAL Exceedance Area 13

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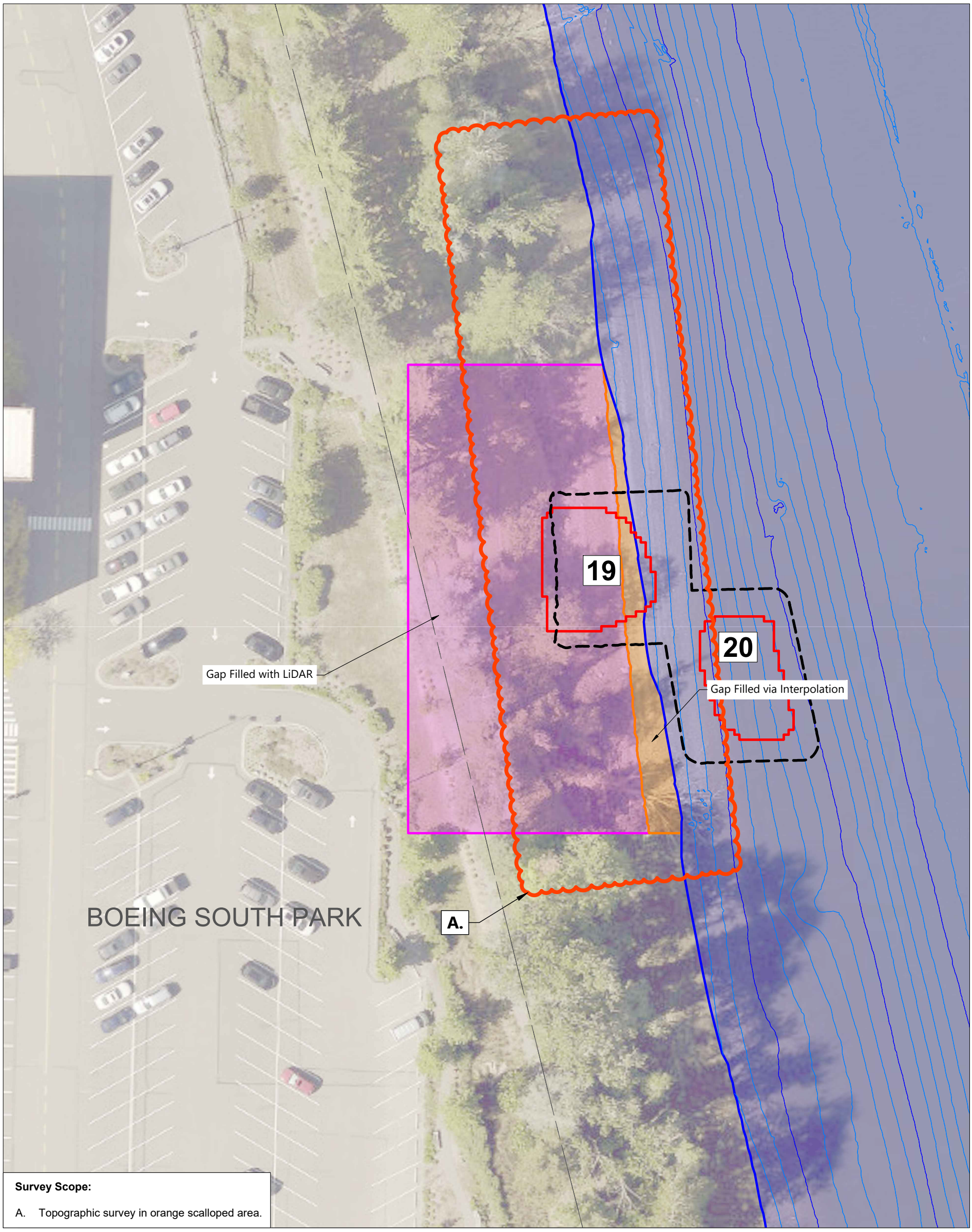
Addendum: Pre-Design Surveys of the Lower Duwamish Waterway Upper Reach

SEPTEMBER 22, 2022

Sep 22, 2022 2:36pm jbigsby K:\Projects\0067-King County\LDW Upper Reach Engineering Services\0067-WK-012 QAPPA Bathy Bank Topo Merge W RAA Boundaries.dwg Figure 2



Survey Scope:

A. Topographic survey in orange scalloped area.

Source: Topographic survey by True North Land Surveying, Inc. performed between June 30, 2021 and August 10, 2021. Bathymetric survey by Northwest Hydro performed between April 18, 2019 and May 15, 2019. Additional survey by Northwest Hydro performed June 2020. Composite data updated December 23 ,2020. LiDAR survey from Puget Sound LiDAR Consortium dated 2016.
Horizontal Datum: Washington State Plane, North Zone, North American Datum of 1983/91, U.S. Survey Feet; WSDOT MON GP17005-176 & GP17005-181
Vertical Datum: Mean Lower Low Water (MLLW), MLLW Converted from NAD88 (NAVD88 + 2.34' to MLLW)

Legend:

- 2019/2020 Northwest Hydro Bathymetric Survey Extent
- 2016 Puget Sound LiDAR Consortium Survey LiDAR Data (Used to Fill in Gap between Bathymetric and Topographic Surveys)
- Data Gap Filled via Interpolation
- Bathymetric Survey Contours (1' & 5' Intervals)
- 30% Remedial Action Area
- RAL Exceedance Area
- Approximate Phase III PDI Survey Limits

N

0 40

Feet

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Figure 3
Additional Topographic Survey at RAL Exceedance Area 19/20

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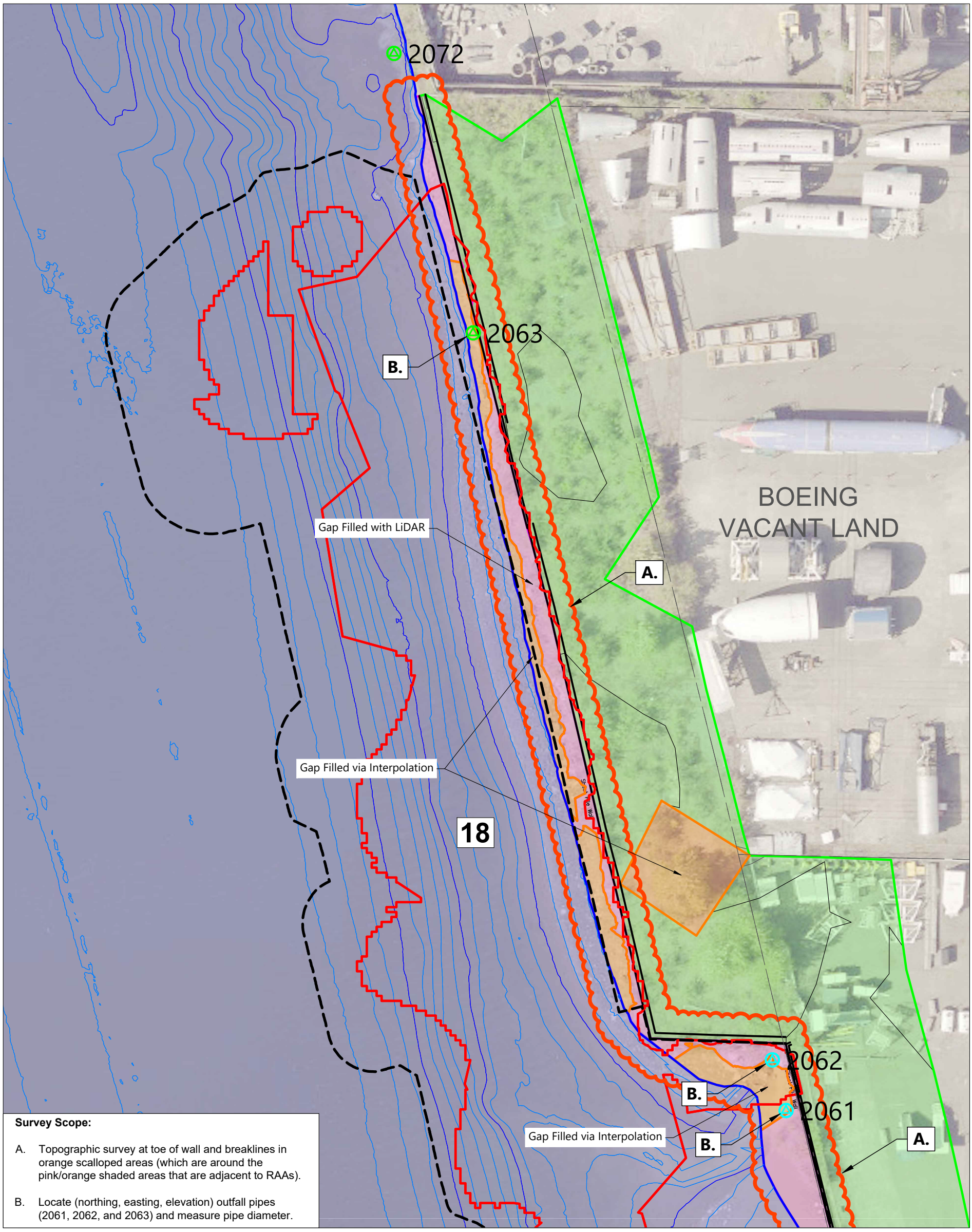
SEPTEMBER 22, 2022

Sep 22, 2022 2:37pm lbigsby K:\Projects\0067-King County\LDW Upper Reach Engineering Services\0067-WK-012 QAPPA Bathy Bank Topo Merge W RAA Boundaries.dwg Figure 3



Source: Topographic survey by True North Land Surveying, Inc. performed between June 30, 2021 and August 10, 2021. Bathymetric survey by Northwest Hydro performed between April 18, 2019 and May 15, 2019. Additional survey by Northwest Hydro performed June 2020. Composite data updated December 23, 2020. LiDAR survey from Puget Sound LiDAR Consortium dated 2016.
Horizontal Datum: Washington State Plane, North Zone, North American Datum of 1983/91, U.S. Survey Feet; WSDOT MON GP17005-176 & GP17005-181
Vertical Datum: Mean Lower Low Water (MLLW), MLLW Converted from NAD88 (NAVD88 + 2.34' to MLLW)

Legend:

- 2019/2020 Northwest Hydro Bathymetric Survey Extent
- 2021 True North Bank Topographic Survey Extent (Not Shown where Bathymetric Survey Overrides Topo)
- 2016 Puget Sound LiDAR Consortium Survey LiDAR Data (Used to Fill in Gap between Bathymetric and Topographic Surveys)
- Data Gap Filled via Interpolation
- Bathymetric Survey Contours (1' & 5' Intervals)
- Topographic Survey Contours (1' & 5' Intervals)
- 30% Remedial Action Area
- RAL Exceedance Area
- Active Outfall Pipe
- Abandoned/Inactive Outfall Pipe
- Approximate Phase III PDI Survey Limits

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Feet

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Figure 4
Additional Topographic Survey at RAL Exceedance Area 18

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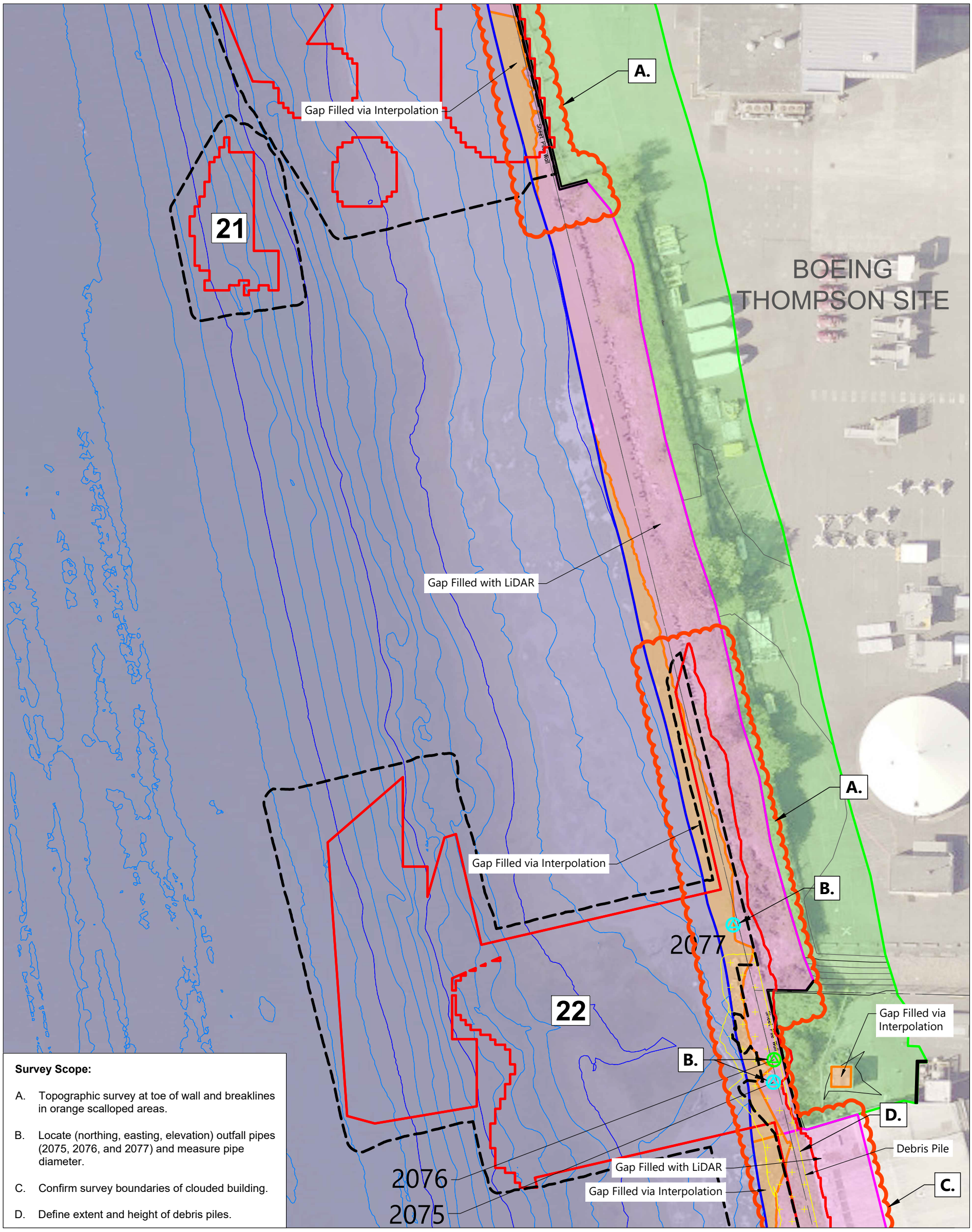
Addendum: Pre-Design Surveys of the Lower Duwamish Waterway Upper Reach
SEPTEMBER 22, 2022



Survey Scope:

A. Topographic survey at toe of wall and breaklines in orange scalloped areas.

B. Locate (northing, easting, elevation) outfall pipes (2075, 2076, and 2077) and measure pipe diameter.

C. Confirm survey boundaries of clouded building.

D. Define extent and height of debris piles.

Source: Topographic survey by True North Land Surveying, Inc. performed between June 30, 2021 and August 10, 2021. Bathymetric survey by Northwest Hydro performed between April 18, 2019 and May 15, 2019. Additional survey by Northwest Hydro performed June 2020. Composite data updated December 23, 2020. LiDAR survey from Puget Sound LiDAR Consortium dated 2016.
Horizontal Datum: Washington State Plane, North Zone, North American Datum of 1983/91, U.S. Survey Feet; WSDOT MON GP17005-176 & GP17005-181
Vertical Datum: Mean Lower Low Water (MLLW), MLLW Converted from NAD88 (NAVD88 + 2.34' to MLLW)

Legend:

- 2019/2020 Northwest Hydro Bathymetric Survey Extent
- 2021 True North Bank Topographic Survey Extent (Not Shown where Bathymetric Survey Overrides Topo)
- 2016 Puget Sound LiDAR Consortium Survey LiDAR Data (Used to Fill in Gap between Bathymetric and Topographic Surveys)
- Data Gap Filled via Interpolation
- Bathymetric Survey Contours (1' & 5' Intervals)
- Topographic Survey Contours (1' & 5' Intervals)
- 30% Remedial Action Area
- Debris Pile
- RAL Exceedance Area
- Active Outfall Pipe
- Abandoned/Inactive Outfall Pipe
- Approximate Phase III PDI Survey Limits

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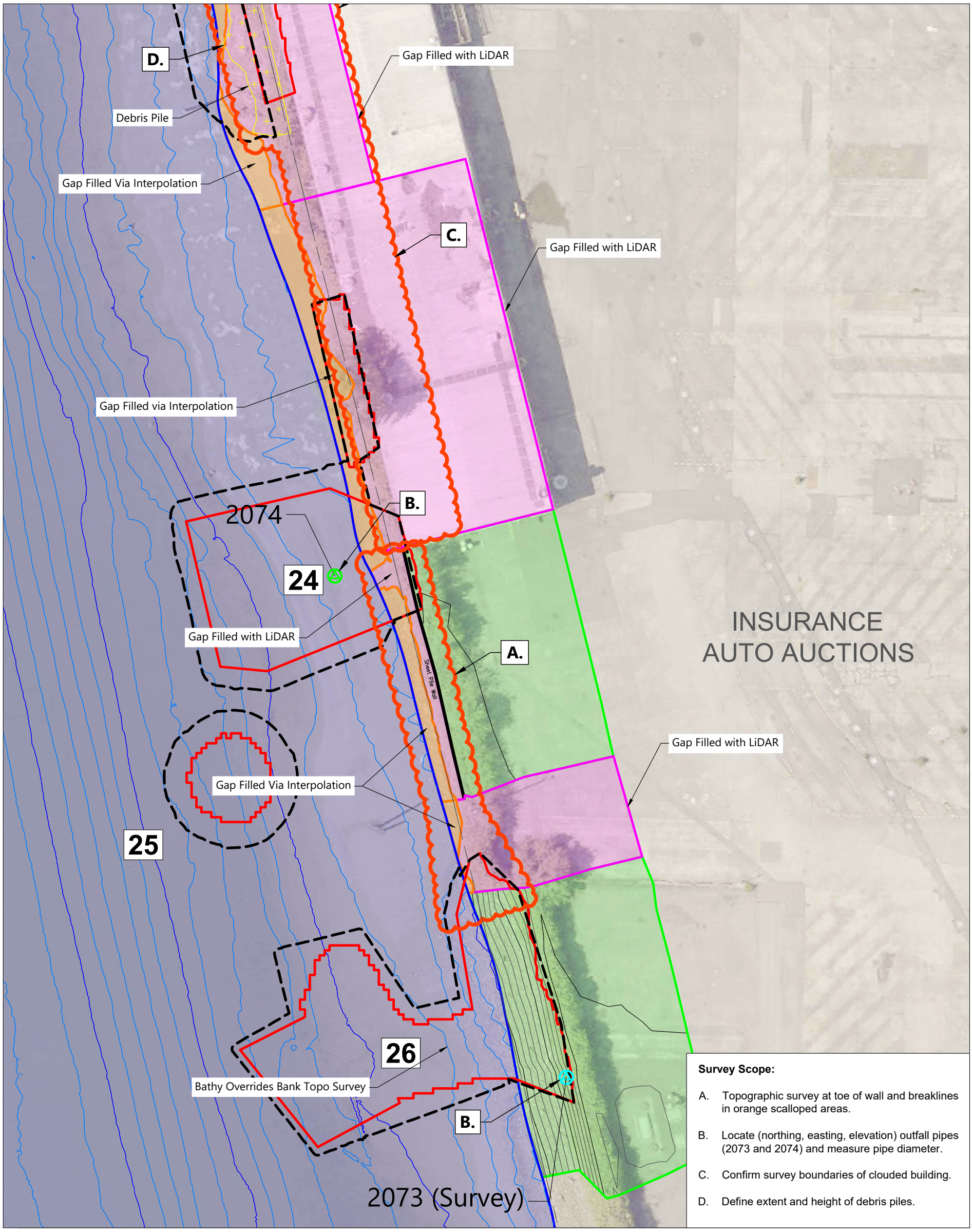
Figure 5
Additional Topographic Survey at RAL Exceedance Areas 18 and 22

Supplement to the Quality Assurance Project Plan
Addendum: Pre-Design Surveys of the Lower Duwamish Waterway Upper Reach
SEPTEMBER 22, 2022

Sep 22, 2022 2:39pm jbigsby K:\Projects\0067-King County\LDW Upper Reach Engineering Services\0067-WK-012 QAPPA Bathy Bank Topo Merge W RAA Boundaries.dwg Figure 5



Survey Scope:

A. Topographic survey at toe of wall and breaklines in orange scalloped areas.

B. Locate (northing, easting, elevation) outfall pipes (2073 and 2074) and measure pipe diameter.

C. Confirm survey boundaries of clouded building.

D. Define extent and height of debris piles.

Source: Topographic survey by True North Land Surveying, Inc. performed between June 30, 2021 and August 10, 2021. Bathymetric survey by Northwest Hydro performed between April 18, 2019 and May 15, 2019. Additional survey by Northwest Hydro performed June 2020. Composite data updated December 23, 2020. LiDAR survey from Puget Sound LiDAR Consortium dated 2016.
Horizontal Datum: Washington State Plane, North Zone, North American Datum of 1983/91, U.S. Survey Feet; WSDOT MON GP17005-176 & GP17005-181
Vertical Datum: Mean Lower Low Water (MLLW), MLLW Converted from NAD88 (NAVD88 + 2.34' to MLLW)

Legend:

- 2019/2020 Northwest Hydro Bathymetric Survey Extent
- 2021 True North Bank Topographic Survey Extent (Not Shown where Bathymetric Survey Overrides Topo)
- 2016 Puget Sound LiDAR Consortium Survey LiDAR Data (Used to Fill in Gap between Bathymetric and Topographic Surveys)
- Data Gap Filled via Interpolation
- Bathymetric Survey Contours (1' & 5' Intervals)
- Topographic Survey Contours (1' & 5' Intervals)
- 30% Remedial Action Area
- Debris Pile
- RAL Exceedance Area
- Active Outfall Pipe
- Abandoned/Inactive Outfall Pipe
- Approximate Phase III PDI Survey Limits

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Feet

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Figure 6
Additional Topographic Survey at RAL Exceedance Areas 22 and 24

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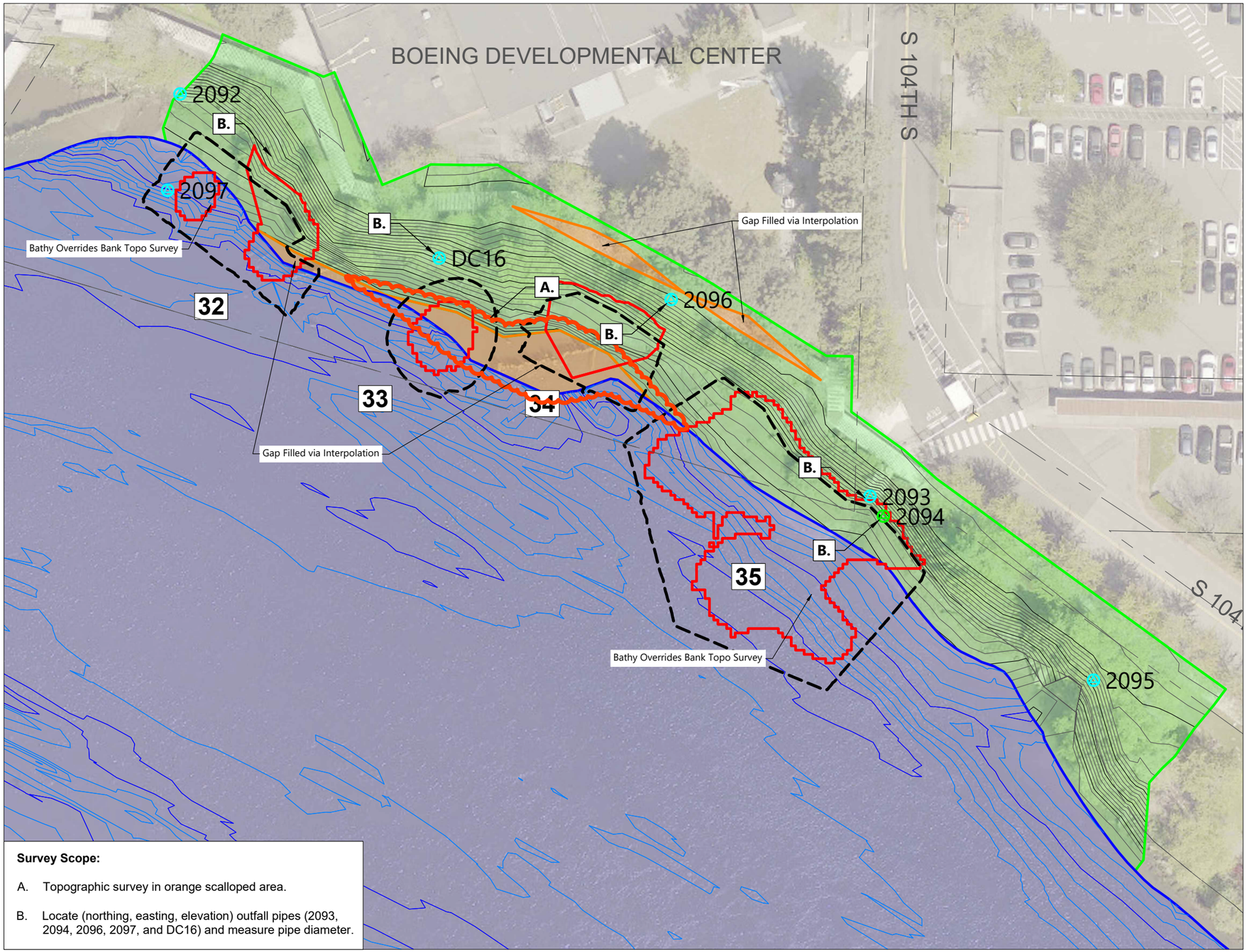
Addendum: Pre-Design Surveys of the Lower Duwamish Waterway Upper Reach

SEPTEMBER 22, 2022

Sep 22, 2022 2:39pm jbigsby K:\Projects\0067-King County\LDW Upper Reach Engineering Services\0067-WK-012 QAPPA Bathy Bank Topo Merge W RAA Boundaries.dwg Figure 6



Survey Scope:

A. Topographic survey in orange scalloped area.

B. Locate (northing, easting, elevation) outfall pipes (2093, 2094, 2096, 2097, and DC16) and measure pipe diameter.

Legend:

- 2019/2020 Northwest Hydro Bathymetric Survey Extent
- 2021 True North Bank Topographic Survey Extent (Not Shown where Bathymetric Survey Overrides Topo)
- Data Gap Filled via Interpolation
- Bathymetric Survey Contours (1' & 5' Intervals)
- Topographic Survey Contours (1' & 5' Intervals)
- 30% Remedial Action Area
- RAL Exceedance Area
- Active Outfall Pipe
- Abandoned/Inactive Outfall Pipe
- Approximate Phase III PDI Survey Limits

Source: Topographic survey by True North Land Surveying, Inc. performed between June 30, 2021 and August 10, 2021. Bathymetric survey by Northwest Hydro performed between April 18, 2019 and May 15, 2019. Additional survey by Northwest Hydro performed June 2020. Composite data updated December 23, 2020. LiDAR survey from Puget Sound LiDAR Consortium dated 2016.
Horizontal Datum: Washington State Plane, North Zone, North American Datum of 1983/91, U.S. Survey Feet; WSDOT MON GP17005-176 & GP17005-181
Vertical Datum: Mean Lower Low Water (MLLW), MLLW Converted from NAD88 (NAVD88 + 2.34' to MLLW)

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Feet

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Figure 7
Additional Topographic Survey at RAL Exceedance Areas 33 and 34

Supplement to the Quality Assurance Project Plan
Addendum: Pre-Design Surveys of the Lower Duwamish Waterway Upper Reach

SEPTEMBER 22, 2022

Updated Health and Safety Plan

By their signature, the undersigned certify that this Health and Safety Plan (HASP) is approved and that it will be used to govern health and safety aspects of fieldwork described in the Quality Assurance Project Plan to which it is attached.

Thomas Wang

September 29, 2022

Tom Wang
Anchor QEA, LLC, Project Manager

Date

September 29, 2022

Tim Shaner
Anchor QEA, LLC, Health and Safety Program Lead

Date

September 29, 2022

Jo Miller
True North Land Surveying, Inc., Field Operations Manager/Health and Safety Officer

Date

ACRONYMS

CFR	Code of Federal Regulations
CPR	cardiopulmonary resuscitation
EPA	U.S. Environmental Protection Agency
FOM	Field Operations Manager
HASP	Health and Safety Plan
HAZMAT	hazardous materials
HAZWOPER	Hazardous Waste Operations and Emergency Response
HSM	Health and Safety Manager
HSO	Health and Safety Officer
HSPL	Health and Safety Program Lead
LDW	Lower Duwamish Waterway
MHHW	mean higher high water
OSHA	Occupational Safety and Health Administration
PFD	personal flotation device
PM	Project Manager
PPE	personal protective equipment
True North	True North Land Surveying, Inc.
USCG	U.S. Coast Guard
VHF	very high frequency

A.1.0 Introduction

This Health and Safety Plan (HASP) presents health and safety requirements and procedures that will be followed by personnel during survey work activities in the Lower Duwamish Waterway (LDW) (the site). This HASP was developed in accordance with Title 29 of the Code of Federal Regulations (CFR), Part 1910.120(b), and will be used in conjunction with applicable Health and Safety Programs. See Section A.1.1 for HASP modification procedures.

The provisions of this HASP are mandatory for all personnel assigned to the project. A copy of this HASP must be always maintained on site and available for employee review. Personnel assigned to work at the project site will be required to read this plan and must sign the HASP Acknowledgement Form (Attachment A.1) to confirm that they understand and agree to abide by the provisions of this HASP. During site work, this HASP will be implemented by the True North Land Surveying, Inc. (True North) Field Operations Manager (FOM), who is also the designated site Health and Safety Officer (HSO), in cooperation with the corporate Health and Safety Manager (HSM).

The objectives of this HASP are to identify potential physical, chemical, and biological hazards associated with field activities; establish safe working conditions and protective measures to control those hazards; define emergency procedures; and describe the responsibilities, training requirements, and medical monitoring requirements for site personnel.

Issuance of this approved HASP documents that the workplace has been evaluated for hazards. A hazard assessment was performed, and the adequacy of the personal protective equipment (PPE) selected was evaluated as required by 29 CFR 1910.132(d)—Personal Protective Equipment, General Requirements (General Industry); 29 CFR 1910.134—Respiratory Protection; 29 CFR 1926.28—Personal Protective Equipment (Construction Industry); and 29 CFR 1926.55—Gases, Vapors, Fumes, Dusts and Mist, and is duly noted by the signature(s) and date appearing on the certification page of this document.

A.1.1 Health and Safety Plan Modifications

This HASP will be modified by amendment, if necessary, to address changing field conditions or additional work tasks not already described in this document. Modifications will be proposed by the FOM/HSO using the Modification to Health and Safety Plan form included as Attachment A.2. Modifications will be reviewed by the HSM or authorized representative and approved by the Project Manager (PM).

The field team has the responsibility to immediately report any potentially unsafe or hazardous conditions to the FOM/HSO, and all members of the field team have STOP WORK AUTHORITY—the authority to stop or suspend work if conditions arise that pose an unacceptable health and safety risk

to the field team or environment, or if conditions arise that warrant modifications to this HASP. It is critical that all field team members proactively communicate with the FOM/HSO to identify potential unsafe conditions.

A.2.0 Site Description and Project Scope

The surveying area is in the LDW (see Figure 1 in the attached QAPP). The area is affected by tidal fluctuations. The QAPP to which this HASP is attached provides details of the topographic survey. The survey will be conducted by personnel walking on and adjacent to the banks of the LDW carrying handheld surveying equipment as described in the QAPP. The duration of the survey is expected to range between 40 and 60 days.

A.3.0 Health and Safety Personnel

Key health and safety personnel and their responsibilities are described below. These individuals are responsible for the implementation of this HASP.

Anchor QEA Project Manager: The PM has overall responsibility for the successful outcome of the project. The PM will ensure that adequate resources and budget are provided for the health and safety staff to carry out their responsibilities during fieldwork. The PM, in consultation with the HSM, makes final decisions concerning implementation of the HASP.

True North Field Operations Manager/Health and Safety Officer: The True North FOM and HSO will be the same person. The FOM/HSO will direct field surveying activities, coordinate the technical components of the field program with health and safety components, and ensure that work is performed according to the Survey QAPP addendum. True North will be supported by Gravity Marine Consulting, which will provide a boat and captain to transport the survey crew to the specific work sites.

The FOM/HSO will implement this HASP at the work location and will be responsible for all health and safety activities and the delegation of duties to a health and safety technician in the field, if appropriate. The FOM/HSO also has stop-work authority, to be used if there is an imminent safety hazard or potentially dangerous situation. The FOM/HSO or her designee shall be present during surveying operations.

Anchor QEA Corporate Health and Safety Program Lead: The HSPL has overall responsibility for preparation, approval, and revisions of this HASP. The HSPL will not necessarily be present during fieldwork, but will be readily available, if required, for consultation regarding health and safety issues during fieldwork.

Field Crew: All field crew members must be familiar with and comply with the information in this HASP. They also have the responsibility to report any potentially unsafe or hazardous conditions to the FOM/HSO immediately.

A.4.0 Hazard Evaluation and Control Measures

This section covers potential physical and chemical hazards that may be associated with the proposed project activities and presents control measures for addressing these hazards. The activity hazard analysis, Section A.4.3, lists the potential hazards associated with each site activity and the recommended site control to be used to minimize each potential hazard.

Confined space entry will not be necessary for this project. Therefore, hazards associated with this activity are not discussed in this HASP.

A.4.1 Physical Hazards

For this project, it is anticipated that physical hazards will present a greater risk of injury than chemical hazards. Physical hazards are identified and discussed below.

A.4.1.1 Slips, Trips, and Falls

As with all fieldwork sites, caution should be exercised to prevent slips on slick surfaces. In particular, surveying requires careful attention to minimize the risk of falling down. Topographic surveying work is expected to be performed on the banks, but if a boat or other floating platform is used, care will be taken to minimize the risk of falling overboard. The same care should be used in rainy conditions or on the shoreline where slick rocks are found. Slips will be minimized by wearing boots with good tread, made of material that does not become overly slippery when wet.

Trips are always a hazard on the uneven deck of a boat or uneven surfaces, in a cluttered work area, or in the intertidal zone where uneven substrate is common. Personnel will keep work areas as free as possible from items that interfere with walking.

Falls may be avoided by working as far from exposed edges as possible, by erecting railings, and by using fall protection when working on elevated platforms. For this project, no work is anticipated that would present a fall hazard. Some of the surveying may be performed from a boat. As with any work from a floating platform, there is a chance of falling overboard. Personal flotation devices (PFDs) will be worn while working on deck or working from an open boat. PFDs need not be worn while working inside an enclosed cabin, but must be readily available when going on deck from the cabin area. An individual in the water shall be considered a "person overboard" and appropriate rescue actions shall be taken immediately to prevent hypothermia. PFDs will be worn while working within 10 feet of the water's edge or on banks.

A.4.1.2 Manual Lifting

Equipment must be lifted and carried. Back strain can result if lifting is done improperly. During any manual handling tasks, personnel should lift with the load supported by their legs and not their backs. For heavy loads, an adequate number of people will be used, or if possible, a mechanical lifting/handling device will be used.

A.4.1.3 Heat Stress, Hypothermia, or Frostbite

The work crew and other personnel shall have adequate clothing and foul-weather gear in their possession prior to beginning work. Hypothermia is a potentially hazardous condition.

Hypothermia is characterized by pain in the extremities and loss of manual dexterity, with severe, uncontrollable shivering, and an inability to maintain the level of activity. Symptoms include excessive fatigue, drowsiness, irritability, or euphoria. Severe hypothermia includes clouded consciousness, low blood pressure, pupil dilation, cessation of shivering, unconsciousness, and possible death.

Move the individual to a warm, dry place. If the individual's clothing is wet, remove it and replace it with dry clothing. Keep the individual warm. Rewarming the individual should be gradual to avoid stroke symptoms. Dehydration, or the loss of body fluids, may result in a cold injury due to a significant change in blood flow to the extremities. If the individual is conscious and alert, warm sweet liquids should be provided. Coffee and other caffeinated liquids should be avoided because of diuretic and circulatory effects. Extremities affected by frostbite should be gradually warmed and returned to normal temperature. Moist compresses should be applied; begin with lukewarm compresses and slowly increase the temperature as changes in skin temperature are detected. Keep the individual warm and calm and move to a medical facility as soon as possible.

A.4.1.4 Weather

In general, field team members will be equipped for the normal range of weather conditions. Work shall be preceded by an evaluation of weather reports and conditions by the FOM/HSO and vessel pilot to ascertain that safe working conditions exist and safe refuge of personnel is assured. An alternate safe harbor shall be designated for emergency situations. Field personnel shall maintain monitoring of the local area weather broadcasts or other readily available weather forecasting services. Some conditions that might force work stoppage are electrical storms, high winds, or high waves resulting from winds.

A.4.1.5 Boating Operations

The following precautions shall be taken when conducting boating trailer and launch activities. These procedures are provided as a reference; Gravity Marine Consulting will follow their own internal boating safety procedures and consider the procedures below.

- Follow the trailer and boat manufacturers' instructions for securing the boat to the trailer.
- Follow the trailer manufacturer's instructions for securing the trailer to the towing vehicle.
- Prohibit site personnel from moving into trailer/vehicle pinch points without advising the vehicle operator.
- Use experienced operators when backing trailers on boat ramps.
- Wear proper work gloves when the possibility of pinching or other injury may be caused by moving or handling large or heavy objects.
- Maintain all equipment in a safe condition.
- Launch boats one at a time to avoid collisions.
- Use a spotter for vehicles backing boats to the launch area.
- Understand and review hand signals.
- Wear boots with non-slip soles when launching boats.
- Wear USCG-approved PFDs when working within 10 feet of the water.
- Keep ropes and lines coiled and stowed to eliminate trip hazards.
- Maintain three-point contact on dock/pier or boat ladders.
- Verify that drain plugs are in place.

The following precautions shall be followed when conducting boating operations:

- Maintain a current boater's license(s) as required.
- Wear USCG-approved PFDs for work activities within 10 feet of the water.
- Obtain and review information regarding dams that may be present in work areas, particularly with regard to "no boating" zones and safety buoys, cables, and warning signage.
- Maintain boat anchorage devices commensurate with anticipated currents, distance to shore, and water depths.
- Provide a floating ring buoy in the immediate boat launch/landing areas with at least 60 feet (18.3 meters) of line for a vessel less than 65 feet (19.8 meters) in length, or 90 feet (27.4 meters) of line for a vessel 65 feet (19.8 meters) or greater in length (see https://www.law.cornell.edu/cfr/text/46/117.70 for more information).
- Step into the center of the boat.
- Keep your weight low when moving on the boat.
- Move slowly and deliberately.
- Steer directly across other boat wakes at a 90-degree angle to avoid capsizing.
- Steer the boat facing forward.

- Watch for floating objects in the water.
- Right-of-way is yielded to vessels on your boat's right, or starboard, and vessels with limited ability to maneuver such as any wind-propelled vessel.

The following precautions shall be followed when working on a boat:

- Observe proper lifting techniques.
- Wear USCG-approved PFDs for work activities within 10 feet of the water.

The safety-related items listed in Table A-1 shall be available when conducting boating operations.

Table A-1
Safety equipment specific to in-water work

Additional Safety Equipment for Sampling Vessel per U.S. Coast Guard Requirements
• Proper vessel registration, numbering, and documentation (registered with state, certificate of vessel registration number displayed, and carrying a valid certificate of number) • USCG-approved personal flotation devices (PFDs; or life jackets) for every person on the sampling vessel (Type I, II, III, or V are required). High-visibility required by Anchor QEA. • Appropriate, non-expired, visual distress devices for day and night use from the following: – Three hand-held red flares (day and night), or – One hand-held red flare and two parachute flares (day and night), or – One hand-held orange smoke signal, two floating orange smoke signals (day), and one electric distress light (night only) • Alternate means of propulsion (oars or paddles) • Dewatering device (pump or bailer) • Properly maintained and inspected USCG-approved fire extinguishers (no fixed system = (2) B-1 or (1) B-2 type extinguishers; fixed system = (1) B-1 type extinguisher) • Proper ventilation of gasoline-powered vessels • Sound-producing device (whistle, bell, or horn) • VHF 2-way radio • Proper navigational light display • Throwable life ring with attached line (any vessel larger than 16 feet is required to carry one Type IV [throwable] PFD)

Additional Safety Equipment for Sampling Vessel per U.S. Coast Guard Requirements	
Additional USCG Recommended Equipment Includes:	
• Extra visual distress signals • Primary and spare anchor • Heaving line • Fenders • First aid kit • Flashlight • Mirror • Searchlight • Sunburn lotion • Tool kit • Spare fuel	• Boat hook • Spare propeller • Mooring line • Food and water • Binoculars • Spare batteries • Sunglasses • Marine hardware • Extra clothing • Spare parts • Pertinent navigational chart(s) and compass

A.4.1.6 Working in a Roadway

These procedures are provided as reference; TN will follow their own internal safety procedures for working in a roadway and consider the procedures below:

- Plan and conduct work in a manner that traffic may be continuously observed. This may require having a spotter equipped with a noise-making device such as an air horn or a whistle, as appropriate.
- Wear a high-visibility traffic vest and hardhat when a vehicle hazard exists. Include lighted elements when possible in high-hazard environments.
- Use cones, flag-mounted cones, caution tape, and/or barricades.
- Protect the work area with a vehicle or piece of heavy equipment if this does not pose an additional hazard. The vehicle should have a strobe light and operating headlights or running lights (if equipped).

A.4.2 Chemical Hazards

The Record of Decision identified polychlorinated biphenyl compounds, carcinogenic polycyclic aromatic compounds, arsenic, and dioxins/furans are contaminants of concern in sediments below mean higher high water (MHHW). Direct contact with contaminated sediment may occur while working on exposed banks below the MHHW elevation.

A.4.2.1 Exposure Routes

Possible routes of exposure to the chemicals potentially encountered on this project include inhalation, dermal contact, and ingestion of dust, mist, gas, vapor, or liquid. Exposure will be minimized by using safe work practices and by wearing the appropriate PPE. A further discussion of PPE requirements is presented in Section A.7.0.

Inhalation

Inhalation of particulates, dust, mist, gas, or vapor during field activities is possible. Chemicals of concern at this site are not volatile and strongly adsorb to sediment, so the principal route of inhalation exposure is through contaminated particulate or dust. Wet sediment should generate little dust, but dried sediment may present a hazard of inhalation. Care should be taken when working in areas with contaminated sediment, generally below MHHW in the work areas, and when decontaminating personal protective equipment and survey equipment that has been in contact with sediment.

Dermal Contact

Dermal contact with potentially contaminated soil, sediment, or groundwater during field activities is possible. Direct contact will be minimized by using appropriate PPE and decontamination procedures.

Ingestion

Direct ingestion of contaminants can occur by inhaling airborne dust, mist, or vapors, or by swallowing contaminants trapped in the upper respiratory tract. Indirect ingestion can occur by introducing the contaminants into the mouth by way of food, tobacco, fingers, or other carriers. Although ingestion of contaminants can occur, proper hygiene, decontamination, and contamination reduction procedures should reduce the probability of this route of exposure.

Chemicals of Concern Profile

Table A-2 provides a summary profile for the chemicals of concern for this project. This profile is based on recent site history and site characterization information. For more detailed and specific information, always refer to the Safety Data Sheet.

Table A-2
Chemicals of Concern

Chemical	Exposure Routes	Symptoms	Target Organs	OEL (STEL)	Odor Threshold (ppm)	LEL (%)	Ionization Energy (eV)
PCBs (Chlorodiphenyls) (42% Cl / 53469-21-9) (54% Cl / 11097-69-1)	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, chloracne; liver damage; reproductive effects Potential occupational carcinogen	Skin, eyes, liver, reproductive system	0.001 mg/m^3 TWA8 Skin IDLH / Ca – 5 mg/m^3	N/A	N/A	N/A
Polycyclic aromatic hydrocarbons (PAHs) – as coal tar pitch volatiles. (Includes benzo(a)pyrene, chrysene, phenanthrene, fluoranthene, pyrene, acenaphthene, methylnaphthalenes, and anthracene)	Skin, eye, inhalation, and ingestion hazard	Direct contact or exposure to the vapors may be irritating to the eyes. Direct contact can be highly irritating to the skin and can cause dermatitis. Exposure to high vapor concentrations may cause headaches, nausea, vomiting, and other symptoms. Includes human carcinogens. Exposure to all routes should be carefully controlled to levels as low as possible. Confirmed animal carcinogen.	Respiratory system, skin, bladder, kidneys	0.2 mg/m^3 TWA8 0.1 mg/m^3 TWA8 (Cyclohexane-extractable fraction) IDLH / Ca – 80 mg/m^3	Varies	N/A	N/A
Dioxins/Furans (as 2,3,7,8-Tetrachloro-dibenzo-p-dioxin) - TCDD	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes; allergic dermatitis, chloracne; porphyria; gastrointestinal disturbance; possible reproductive, teratogenic effects; In Animals: liver, kidney damage; hemorrhage Potential occupational carcinogen	Eyes, skin, liver, kidneys, reproductive system	Lowest Feasible Concentration (LFC) Proposed OEL of 0.2 ng/m^3 Skin IDLH / Ca - LFC	N/A	N/A	N/A
Hydrogen Sulfide (H2S) (7783-06-04) 1 ppm = 1.40 mg/m3	Inhalation, skin and/or eye contact	Irritation eyes, respiratory system; apnea, coma, convulsions; conjunctivitis, eye pain, lacrimation (discharge of tears), photophobia (abnormal visual intolerance to light), corneal vesiculation; dizziness, headache, lassitude (weakness, exhaustion), irritability, insomnia; gastrointestinal disturbance; liquid: frostbite	Eyes, respiratory system, central nervous system	1 ppm TWA8 (5 ppm) C – 10 ppm (10-min over an 8-hr shift) IDLH - 100 ppm	0.03 ppm	4.0	10.46
Arsenic, and inorganic compounds as (7440-38-2)	Inhalation, skin absorption, skin and/or eye contact, ingestion	Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, resp irritation, hyperpigmentation of skin Potential occupational carcinogen	Liver, kidneys, skin, lungs, lymphatic system	Ceiling limit of 0.002 mg/m^3 [15-Minute] IDLH / Ca – 5 mg/m^3	N/A	N/A	N/A
Barium and soluble compounds, as Ba, including Barium chloride (7440-39-3) (10361-37-2)	Inhalation, skin and/or eye contact	irritation eyes, skin, upper respiratory system; skin burns; gastroenteritis; muscle spasm; slow pulse, extrasystoles (heart contractions); hypokalemia (deficiency of potassium in the bloodstream).	Eyes, skin, respiratory system, heart, central nervous system	0.5 mg/m^3 TWA8 IDLH – 50 mg/m^3	N/A	N/A	N/A
Cadmium and compounds, as Cd (7440-43-9)	inhalation, ingestion	Pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of the sense of smell), emphysema, proteinuria, mild anemia Potential occupational carcinogen	respiratory system, kidneys, prostate, blood, prostatic & lung cancer	0.005 mg/m^3 TWA8 IDLH / Ca – 9 mg/m^3	N/A	N/A	N/A

Chemical	Exposure Routes	Symptoms	Target Organs	OEL (STEL)	Odor Threshold (ppm)	LEL (%)	Ionization Energy (eV)
Chromium (II) inorganic compounds, as Cr	Inhalation, ingestion, skin and/or eye contact	Irritation eyes; sensitization dermatitis	Eyes, skin	0.5 mg/m^3 TWA_8 IDLH – 250 mg/m^3	N/A	N/A	N/A
Chromium (III) inorganic compounds, as Cr (7440-47-3)	Inhalation, ingestion, skin and/or eye contact	Irritation eyes; sensitization dermatitis	Eyes, skin	0.5 mg/m^3 TWA_8 (total dust) 0.003 mg/m^3 TWA_8 (inhalable fraction) IDLH – 25 mg/m^3	N/A	N/A	N/A
Chromium (VI) inorganic compounds, as Cr (18540-29-9) (1333-82-0 as CrO3)	Inhalation, ingestion, skin and/or eye contact	Irritation respiratory system; nasal septum perforation; liver, kidney damage; leukocytosis (increased blood leukocytes), leukopenia (reduced blood leukocytes), eosinophilia; eye injury, conjunctivitis; skin ulcer, sensitization dermatitis Potential occupational carcinogen	Blood, respiratory system, liver, kidneys, eyes, skin, lung cancer	0.0002 mg/m^3 TWA_8 IDLH / Ca – 15 mg/m^3	N/A	N/A	N/A
Lead and inorganic compounds, as Pb (7439-92-1)	Inhalation, ingestion, skin and/or eye contact	Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension	Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival (gum) tissue	0.05 mg/m^3 TWA_8 IDLH – 100 mg/m^3	N/A	N/A	N/A
Mercury, elemental and inorganic compounds, as Hg (7439-97-6)	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis (inflammation of mucous membranes of the mouth), salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria (abnormal quantities of protein in the urine)	Eyes, skin, respiratory system, central nervous system, kidneys	0.025 mg/m^3 TWA_8 C– 0.1 mg/m^3 Skin IDLH – 10 mg/m^3	N/A	N/A	N/A
Selenium compounds, as Se (7782-49-2)	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat; visual disturbance; headache; chills, fever; dyspnea (breathing difficulty), bronchitis; metallic taste, garlic breath, gastrointestinal disturbance; dermatitis; eye, skin burns; In Animals: anemia; liver necrosis, cirrhosis; kidney, spleen damage	Eyes, skin, respiratory system, liver, kidneys, blood, spleen	0.2 mg/m^3 TWA_8 IDLH – 1 mg/m^3	N/A	N/A	N/A
Silver metal, and soluble compounds, as Ag (7440-22-4)	Inhalation, ingestion, skin and/or eye contact	Blue-gray eyes, nasal septum, throat, skin; irritation, ulceration skin; gastrointestinal disturbance	Nasal septum, skin, eyes	0.01 mg/m^3 TWA_8 IDLH – 10 mg/m^3	N/A	N/A	N/A

TWA_8 – 8-hour time weighted average
Skin – OEL based primarily on skin exposure hazard
C – Ceiling Limit
Ca – potential or confirmed human carcinogen
IDLH – Immediately Dangerous to Life or Health
LFC – Lowest Feasible Concentration
OEL– Occupational Exposure Limit
STEL– Short Term Exposure Limit
LEL– Lower Explosive Limit

A.4.3 Activity Hazard Analysis

The activity hazard analysis summarizes the field activities to be performed during the project, outlines the hazards associated with each activity, and presents controls that can reduce or eliminate the risk of the hazard occurring. Table A-3 presents the activity hazard analysis for conducting the topographic survey.

Table A-3
Activity Hazard Analysis

Required PPE: ANSI/ASTM compliant hard hat (if overhead hazards), high-visibility vest, safety glasses, safety shoes or boots, a face covering if the community level is high, and the following as needed for hazards present: safety goggles, dust masks, gloves, hearing protection (if noise is 85 decibels or above), chaps, foul weather gear, PFD if on a boat or within 10 feet of water's edge on banks.[1]			
Work Activity	**Potential Hazards**	**Preventive or Corrective Measures**	**Inspection Requirements**
Outdoor, physical activity and surveying	Slips, trips, and falls	• Avoid walking while writing or texting—maintain a heads-up posture. • Be aware of potentially slippery surfaces and tripping hazards. Use handrails where available. Wear footwear that has sufficient traction. • Maintain good housekeeping practices. Clean up all spills immediately. • Be aware of weather effects on the work area, including wet and/or frozen ground. • Jumping, running, and horseplay are prohibited. • Keep all areas clean and free of debris to prevent any trips and falls. • Be aware of and limit loose clothing or untied shoelaces that may contribute to slips, trip, and falls. • Notify the field team members of any unsafe conditions.	• Routinely inspect work area for unsafe conditions.

Required PPE: ANSI/ASTM compliant hard hat (if overhead hazards), high-visibility vest, safety glasses, safety shoes or boots, a face covering if the community level is high, and the following as needed for hazards present: safety goggles, dust masks, gloves, hearing protection (if noise is 85 decibels or above), chaps, foul weather gear, PFD if on a boat or within 10 feet of water's edge on banks.[1]			
Work Activity	**Potential Hazards**	**Preventive or Corrective Measures**	**Inspection Requirements**
Outdoor, physical activity and surveying (continued)	Heat stress	• Adjust work schedules, as necessary, to avoid the hottest part of the day. • Take rest breaks as warranted. • Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods. • Maintain body fluids at normal levels. • Train workers to recognize the symptoms of heat-related illness.	• Review weather forecast prior to field work. • Monitor workers' physical conditions. • Monitor outside temperature versus worker activity.
	Cold stress	• Provide shelter (enclosed, heated environment) to protect personnel during rest periods. • Educate workers to recognize the symptoms of frostbite and hypothermia. • Use appropriate cold-weather gear, up to and including Mustang-type bib coveralls or jacket/bib combinations. • Consider additional precautions if working near water in cold weather. • Have a dry change of clothing available. • Train workers to recognize the symptoms of cold-related illness.	• Review weather forecast prior to field work. • Monitor workers' physical conditions and PPE. • Monitor outside and water temperature versus worker activity and PPE.
	Rain or snow	• Wear appropriate PPE (rain gear).	• Review weather forecast prior to field work. • Inspect PPE daily prior to use.

Required PPE: ANSI/ASTM compliant hard hat (if overhead hazards), high-visibility vest, safety glasses, safety shoes or boots, a face covering if the community level is high, and the following as needed for hazards present: safety goggles, dust masks, gloves, hearing protection (if noise is 85 decibels or above), chaps, foul weather gear, PFD if on a boat or within 10 feet of water's edge on banks.[1]			
Work Activity	**Potential Hazards**	**Preventive or Corrective Measures**	**Inspection Requirements**
Outdoor, physical activity and surveying (continued)		• Be aware of slip hazards, puddles, and electrical hazards when working in wet conditions. • If extremely cold conditions are forecast, consider additional precautions or postponing work activity.	• Routinely inspect work area for deteriorating conditions.
	Sunshine	• Have sunscreen available for ultraviolet protection. • Have abundant water available to prevent dehydration. • Consider wearing wide-brimmed headwear and light-colored, lightweight, sun-blocking clothing.	• Ensure that sunscreen and water are available.
	Lightning	• Do not begin or continue work until lightning subsides for at least 30 minutes. Disconnect and do not use or touch electronic equipment. • Immediately head for shore if on the water and lightning is observed. If not able to get to shore, disconnect and do not use or touch the major electronic equipment, including the radio, throughout the duration of the storm.	• Obtain weather forecast and updates as needed.
	High winds	• Wear goggles or safety glasses if dust or debris are visible.	• Review weather forecast prior to field work. • Ensure that goggles or safety glasses are available.
	Biological hazards (flora [e.g., poison ivy and poison oak]	• Be aware of likely biological hazards in the work area.	• Ensure that insect repellent is available.

Required PPE: ANSI/ASTM compliant hard hat (if overhead hazards), high-visibility vest, safety glasses, safety shoes or boots, a face covering if the community level is high, and the following as needed for hazards present: safety goggles, dust masks, gloves, hearing protection (if noise is 85 decibels or above), chaps, foul weather gear, PFD if on a boat or within 10 feet of water's edge on banks.[1]			
Work Activity	**Potential Hazards**	**Preventive or Corrective Measures**	**Inspection Requirements**
Outdoor, physical activity and surveying (continued)	and fauna [e.g., ticks, bees, spiders, mosquitoes, and snakes])	• Wear appropriate clothing (i.e., hat, long-sleeve shirt, long pants, leather gloves, boots, and Tyvek coveralls, as appropriate), and apply insect repellant. • Wear hand and arm protection when clearing plants or debris from the work area. • Be aware of potential wildlife and defensive behavior (e.g., nesting birds, or animals with young).	• Inspect clothing and skin for insects (e.g., ticks) after working in insect-prone areas.
	Noise exposure	• Wear hearing protection in high noise environments or when working around heavy machinery or equipment (action level of 85 decibels averaged over an 8-hour day).	• Ensure that hearing protection is available.
	SARS-CoV-2 virus (COVID-19)	Follow all basic L&I requirements and guidance for preventing COVID-19. • Keep workers known or suspected to have COVID-19 from working around others by following appropriate isolation or quarantine guidance, as outlined by the Washington State Department of Health. • Provide hand washing facilities and supplies, and regularly clean and sanitize surfaces.	• Confirm by observation that work conforms to preventive measures.

Required PPE: ANSI/ASTM compliant hard hat (if overhead hazards), high-visibility vest, safety glasses, safety shoes or boots, a face covering if the community level is high, and the following as needed for hazards present: safety goggles, dust masks, gloves, hearing protection (if noise is 85 decibels or above), chaps, foul weather gear, PFD if on a boat or within 10 feet of water's edge on banks.[1]			
Work Activity	**Potential Hazards**	**Preventive or Corrective Measures**	**Inspection Requirements**
		• Educate workers about COVID-19 prevention in the language they understand best. • Provide written notice of potential COVID-19 exposure within one business day to all workers, as well as the employers of any subcontracted workers who were at the same work site as the person who tested positive (without disclosing the person's identity). • Report COVID-19 outbreaks to L&I within one business day if they involve 10 or more workers at a workplace or job site with more than 50 workers. • Allow workers to voluntarily wear masks (respirators, medical procedure masks, or cloth face coverings) PPE as long as it does not create a safety or security issue.	
	Physical injury from moving heavy equipment	Follow procedures outlined in Section A.4.1.5 for safely launching a boat from a trailer.	• Confirm by observation that work conforms to preventive measures.

Required PPE: ANSI/ASTM compliant hard hat (if overhead hazards), high-visibility vest, safety glasses, safety shoes or boots, a face covering if the community level is high, and the following as needed for hazards present: safety goggles, dust masks, gloves, hearing protection (if noise is 85 decibels or above), chaps, foul weather gear, PFD if on a boat or within 10 feet of water's edge on banks.[1]			
Work Activity	**Potential Hazards**	**Preventive or Corrective Measures**	**Inspection Requirements**
	Falling overboard	Use care in boarding/departing from vessel. Wear PFD when on deck. Follow safe work practices related to vessel operations specified in Section A.6.0.	• Confirm by observation that work conforms to preventive measures.

Note:
1. https://pdhonline.com/courses/l101/02_surveys.pdf

A.5.0 Work Zones and Shipboard Access Control

Direct contact with contaminated media may occur below MHHW; however, no physical sample collection or processing will occur. The only designated contaminated work zone is below MHHW and will require minimal decontamination upon exit. Any security or access control problems will be reported to the property owner or appropriate authorities. When accessing other property through access agreements, HASP requirements will be coordinated with those owners and any other HASPs that may be applicable on that site.

Security and control of access to the boat will be the responsibility of the FOM/HSO and boat captain. Boat access will be granted only to necessary project personnel and authorized visitors. Visitors will be provided a copy of the HASP, a briefing on the project and related health and safety requirements, and an opportunity to ask questions about the HASP, and they will be required to sign the acknowledgement in Attachment A.1.

A.6.0 Safe Work Practices

Due to the nature of the topographic survey, safe work practices are primarily related to slips, trips, and falls. Some operations may be performed from a boat or other floating platform, which would introduce additional potential hazards. All employees actively working on projects involving vessel operations will be thoroughly trained in the applicable safety, underway, docking, fueling, and various necessary operational procedures. The minimum responsibilities of the field crew members are as follows:

1. Do not climb over or under obstacles of questionable stability.
2. Work only in well-lighted spaces.
3. Make eye contact with equipment operators when moving within the range of their equipment.
4. Be aware of the movements of equipment when not in the operator's range of vision.
5. Get immediate first aid for all cuts, scratches, abrasions, or other minor injuries.
6. Always use the buddy system.
7. Be alert to your own and other workers' physical condition.
8. Have contact information for the client or owner while on site. If unauthorized personnel or a homeless encampment is encountered during work, the individuals should not be disturbed, the field crew should leave the area, contact the client or owner, and notify the PM or field lead.
9. Report all accidents, no matter how minor, to the FOM/HSO.
10. Do not do anything dangerous or unwise even if ordered by a supervisor.

The following safety rules are specific to on-water operations:

1. During all vessel operations the boat captain is in charge and takes full responsibility for safe operation of the vessel.
2. All vessel operators shall have adequate knowledge of the US Coast Guard (USCG) regulations, "Rules of The Road" and shall be approved for vessel operation by the FOM.
3. Vessels over 20 feet shall be inspected annually by a qualified marine surveyor to ensure structural integrity and safe operating conditions exist. Records of inspections shall be maintained on the vessel for vessels over 20 feet and shall be available to the designated authority.
4. When the vessel is brought onto a job site, it shall be inspected and tested by the vessel crew and determined to be in safe operating condition prior to the initiation of prescribed work.
5. Any vessel found to be in an unsafe condition shall be taken out of service and its use prohibited until the specified unsafe conditions have been corrected.
6. Prior to vessel departure from the dock, all onboard personnel shall be familiar with their duties and responsibilities in the event of an emergency, and the location of the vessel's emergency first-aid and firefighting equipment, as verbally communicated by a qualified member of the vessel crew.
7. All vessels shall be equipped with a PFD for each person onboard, a VHF marine radio and all USCG required safety equipment.
8. Navigation lights, radar systems, radios, depth sounders, and other navigational equipment shall be operated, inspected, and recorded each week and prior to each job by qualified personnel to ensure their proper operation.
9. A detailed daily work schedule that includes the approximate times, site locations, access points and other pertinent information necessary to locate crew members in the event of emergency, will be filed with the local field office or appropriate shore-side personnel.
10. Prior to departure from the dock, the vessel's fuel capacity will be checked to ensure adequate fuel is available to complete the day's work and maintain sufficient fuel reserves to allow for a reasonable margin of safety.
11. Fuel used on the outbound trip to assigned work areas shall not exceed one-third of the total fuel reserves. The pilot shall monitor fuel consumption throughout the work day and begin the inbound transit when remaining fuel reserves approach 150% of the fuel quantity used during the outbound transit.
12. Coast Guard approved PFDs shall be worn by all personnel when on deck or in an open vessel, regardless of other safety devices utilized. All safety devices must be inspected for defects prior to each use and those found to be defective replaced immediately. PFDs need not be worn while working inside an enclosed cabin, but must be readily available when going on deck from the cabin area.

13. Additional emergency/rescue equipment onboard vessels will include, but not be limited to, throw rings, throw ropes, dye markers, strobes, flares, boat hooks, and other safety equipment required by the USCG.
14. Vessel fuel valves shall be in the closed position when shutting down boat operations for the night or more than 8 hours.
15. Smoking shall be prohibited on the boat at all times and/or within 20 feet of fuel tanks.
16. A minimum of one 10-pound A-B-C fire extinguisher will be properly certified, maintained, and located conspicuously onboard all motor-driven vessels.
17. Work areas and access-ways shall be kept clean and clear of obstructions at all times.
18. A proper watch shall be maintained in order to avoid other vessels, floating debris, deadheads, and other obstructions.
19. When conducting night operations or working in reduced visibility, proper navigation lights shall be displayed, a safe speed (as warranted by the conditions) shall not be exceeded, and a proper watch shall be posted.

A.7.0 Personal Protective Equipment and Safety Equipment

Appropriate PPE will be worn as protection against potential hazards. Specific PPE is outlined in the activity hazard analysis. In addition to PPE that will be worn by personnel, basic emergency and first aid equipment will also be provided. Equipment for the field team will include the following:

1. A copy of this HASP
2. First aid kit adequate for the number of personnel

The FOM/HSO will ensure that the safety equipment is utilized. Equipment will be checked daily to ensure its readiness for use.

A.8.0 Monitoring Procedures for Site Activities

For this project, the monitoring program will consist of all workers monitoring themselves and their co-workers for signs that might indicate physical stress or illness. All personnel will be instructed to look for and inform each other of any deleterious changes in their physical or mental condition during the performance of all field activities. Examples of such changes are as follows:

1. Headaches
2. Dizziness
3. Nausea
4. Symptoms of heat stress
5. Blurred vision
6. Cramps
7. Irritation of eyes, skin, or respiratory system

8. Changes in complexion or skin color
9. Changes in apparent motor coordination
10. Increased frequency of minor mistakes
11. Excessive salivation or changes in papillary response
12. Changes in speech ability or speech pattern
13. Shivering
14. Blue lips or fingernails

If any of these conditions develop, work shall be halted immediately and the affected person(s) evaluated. If further assistance is needed, personnel at the local hospital will be notified, and an ambulance will be summoned if the condition is thought to be serious. If the condition is the direct result of sample collection or handling activities, procedures will be modified to address the problem.

A.9.0 Decontamination

Surveyors will work in potentially contaminated areas below MHHW. At a minimum, boots and equipment that contact contaminated sediment will require decontamination before leaving contaminated areas. Decontamination stations will be set up at top of bank (if access is from land) or adjacent to the boat (if access is from water) to clean boots, equipment, and any other contaminated gear and avoid tracking contamination into clean areas. The following measures will be observed to prevent or minimize exposure to potentially contaminated materials:

- Do not walk through spilled materials.
- Do not handle, touch, or smell environmental media directly.
- Make sure PPE has no cuts or tears prior to use.
- Protect and cover any skin injuries.
- Stay upwind of airborne dusts and vapors.
- Do not eat, drink, chew tobacco, or smoke in the work zones.

A.9.1 Decontamination Equipment

All equipment taken into potentially contaminated areas will be visually inspected and, if necessary, decontaminated prior to leaving the area. Rinsate from all decontamination activities will be collected for proper disposal. Decontamination of equipment and tools will take place within the contamination reduction zone.

The following supplies will be available to perform decontamination activities:

- Wash and rinse buckets
- Tap water and phosphate-free detergent
- Scrub brushes

- Distilled/deionized water
- Pressure washer/steam cleaner, if appropriate
- Paper towels and plastic garbage bags

A.9.2 Personnel Decontamination

The FOM will verify that all site personnel are familiar with personnel decontamination procedures as listed below. All personnel wearing PPE in a contaminated work area must undergo decontamination, as appropriate, prior to entering the Safe Zone. Personnel will perform the following decontamination procedures:

- Wash and rinse outer gloves and boots in portable buckets to remove gross contamination.
- If suit is heavily soiled, rinse it off.
- Remove outer gloves; inspect and discard if damaged. Leave inner gloves on. Personnel will remove their outer garment and gloves, dispose of them, and properly label container or drum. Personnel will then decontaminate, as appropriate, their hard hats and boots with an aqueous solution of detergent or other appropriate cleaning solution. These items then will be hand-carried to the next station. Remove inner gloves.
- Thoroughly wash hands and face if they came into contact with sediment before leaving an area with contamination.

A.9.3 Non-Disposable Personal Protective Equipment

Non-disposable PPE may include boots and gloves. When decontaminating boots and gloves, observe the following practices and procedures:

- Decontaminate the boots or gloves outside with a solution of detergent and water; rinse with water prior to leaving the site.
- Protect the boots or gloves from exposure by covering with disposable covers such as plastic to minimize required decontamination activities.

A.9.4 Emergency Personnel Decontamination

Personnel with medical problems or injuries may also require decontamination. There is the possibility that the decontamination may aggravate or cause more serious health effects. If prompt lifesaving, first aid, and medical treatment are required, decontamination procedures will be omitted. In either case, a member of the site management team will accompany contaminated personnel to the medical facility to advise on matters involving decontamination.

A.10.0 Disposal of Contaminated Materials

Contaminated materials must be contained and characterized for proper disposal. Anchor QEA will provide decontamination equipment and remove residue from decontamination.

A.11.0 Training Requirements

Project-specific training is described in Section 2.5 of the QAPP. Because of the potential contact with contaminated media when working below MHHW elevation, HAZWOPER training is required for surveying personnel. At least one member of the field team must have first-aid and cardiopulmonary resuscitation (CPR) training. Documentation of which individuals possess first-aid and CPR training will be kept in the project health and safety files.

A.12.0 Medical Surveillance

A medical surveillance program conforming to the provisions of 29 CFR 1910§120(f) is not necessary for field team members because they do not meet any of the four criteria outlined in the regulations for implementation of a medical surveillance program:

- Employees who are or may be exposed to hazardous substances or health hazards at or above permissible exposure levels for 30 days or more per year (1910.120(f)(2)(l))
- Employees who must wear a respirator for 30 days or more per year (1910.120(f)(2)(ii))
- Employees who are injured or become ill due to possible overexposures involving hazardous substances or health hazards from an emergency response or hazardous waste operation (1910.120(f)(2)(iii))
- Employees who are members of HAZMAT teams (1910.120(f)(2)(iv))

As described in Section A.8, employees will monitor themselves and each other of any deleterious changes in their physical or mental condition during the performance of all field activities.

Specific attention will be given to the requirement to screen all workers at the beginning of their shifts by taking their temperatures and asking them if they have a fever, cough, shortness of breath, fatigue, muscle aches, or new loss of taste or smell. Thermometers used shall be 'no touch' or 'no contact' models to the greatest extent possible. If a 'no touch' or 'no contact' thermometer is not available, the thermometer will be properly sanitized between each use. Any worker with a temperature of 100.4°F or higher will be considered to have a fever and will be sent home.

As described in Section A.8, employees will monitor themselves and each other for any deleterious changes in their physical or mental conditions during the performance of all field activities.

Regarding monitoring exposures to the SARS-CoV-2 (COVID-19) virus, there are three possible scenarios:

- Primary exposure: When an employee has tested positive for the virus
- Secondary exposure: When an employee has had close contact with someone diagnosed with or presumed to have COVID-19 within two days of the onset of symptoms or positive test, whichever comes first

- Tertiary exposure: When an employee has had close contact with a secondary exposure or was in the same general work area with a confirmed or presumed case but there was not close contact

The FC/HSO (or designee) will also act as the on-site COVID-19 Supervisor, and shall monitor the health of employees and enforce the measures established to minimize exposure to the SARS-CoV-2 virus. Workers are expected to inform the FC/HSO if they develop symptoms of or have been exposed to anyone with COVID-19.

A12.1 COVID-19 Primary Exposure

If an employee has tested positive for COVID-19, the FC/HSO will immediately take the following actions:

- The employee will be immediately sent away for isolation (, until cleared by the third party healthcare provider) if they are at the site.
- The employee's steps will be traced to identify work areas with which the individual may have been in contact.
- All identified areas will be quarantined and marked as off limits to all site personnel, until a decontamination/disinfection process following CDC guidelines has been implemented.
- Employees who have been in direct/close contact (within 6 feet for 15 minutes or greater during a 24-hour period) with the infected individual will be asked to quarantine for 14 days or until released by the third party healthcare provider

A12.2 COVID-19 Secondary Exposure

If an employee has had direct/close contact with someone who has been diagnosed with COVID-19 within the two days prior to symptoms or a positive test, whichever comes first, the FC/HSO will immediately take the following actions:

- Immediately send the employee home until released by the third party healthcare provider.
- Consult with the Washington State Department of Health for additional guidance if the employee is diagnosed with COVID-19 and has been instructed to self-quarantine.
- Inform the CHSMs and PMs immediately.
- Continue cleaning common touch areas with recommended disinfectants.
- Follow primary exposure scenario (Section A.12.1) if an employee is confirmed as positive for COVID-19.

A12.3 COVID-19 Tertiary Exposure

It is more difficult to manage tertiary exposure because there is innately less control in a situation wherein an employee may have had close contact with a secondary exposure, or has been in the

general area with a confirmed or presumed case with no close contact. The FC/HSO will request that all site workers provide any relevant exposure information. If an employee is believed to have been subject to tertiary exposure, take the following actions:

- Consult with the Washington State Department of Health for additional guidance if the acquaintance who is diagnosed with or screened for COVID 19 has been instructed to self-quarantine.
- Inform the CHSMs and PMs immediately.
- Follow up with the field team after test results for the potentially exposed employee have been received.
- Continue cleaning common touch areas with recommended disinfectants.
- Follow secondary exposure scenario (Section A.12.2) if the acquaintance is confirmed as positive for COVID-19.

A.13.0 Reporting and Record Keeping

Each member of the field crew will sign the HASP review form (see Attachment A.1). If necessary, accident/incident report forms will be completed by the FOM/HSO.

The FOM/HSO or a designee will note health- and safety-related details of the project in the field logbook and record. The logbook must be bound, and the pages must be numbered consecutively. Entries will be made with indelible ink. At a minimum, each day's entries must include the following information:

1. Project name or location
2. Names of all personnel onboard
3. Weather conditions
4. Type of fieldwork being performed

The person maintaining the entries will initial and date the bottom of each completed page. Blank space at the bottom of an incompletely filled page will be lined out. Each day's entries will begin on the first blank page after the previous work day's entries.

A.14.0 Emergency Response Plan

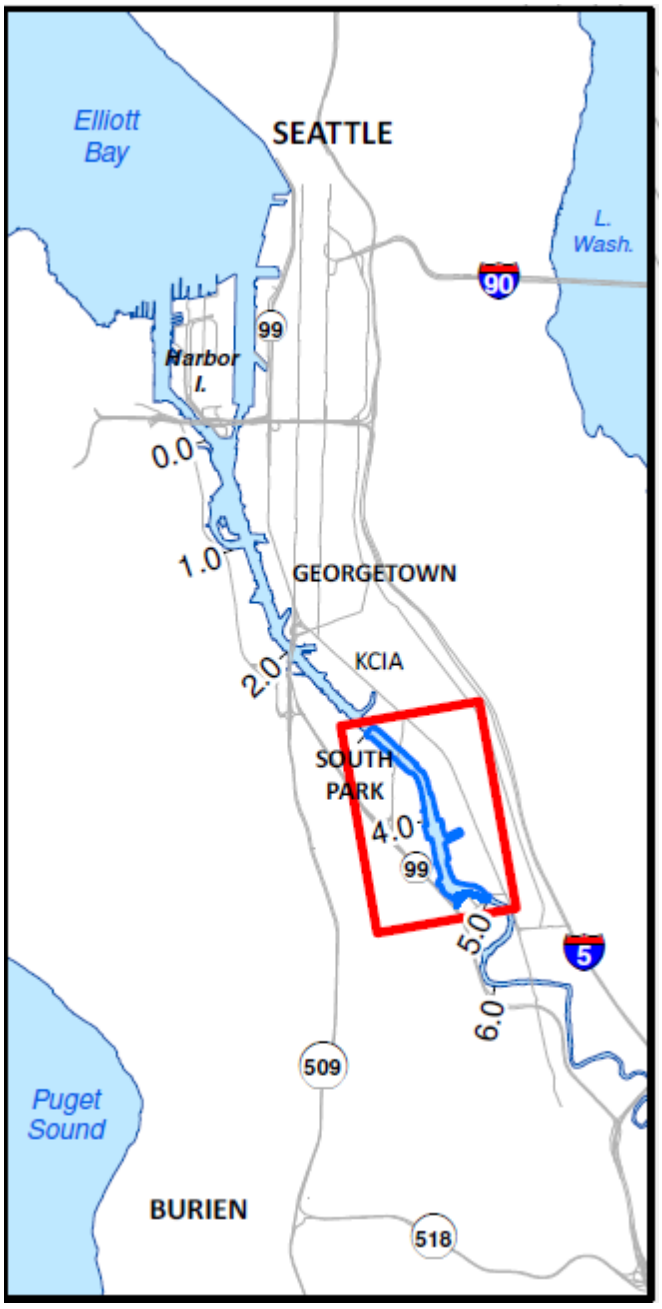
As a result of the hazards and the conditions under which operations will be conducted, the potential exists for an emergency situation to occur. Emergencies may include personal injury, fire, or explosion. Occupational Safety and Health Administration (OSHA) regulations require that an emergency response plan be available for use to guide actions in emergency situations.

The local fire department and ambulance service can provide timely response. Field personnel will be responsible for identifying an emergency situation, providing first aid if applicable, notifying the appropriate personnel or agency, and evacuating any hazardous area.

The following sections identify the onboard individual(s) who should be notified in case of emergency, provide a list of emergency telephone numbers, offer guidance for particular types of emergencies, and provide directions and a map for getting from any surveying location to a hospital.

Site Map

Figure A
General Site Location Overview



Category	Information
Possible Chemicals of Concern	Polychlorinated biphenyl compounds, carcinogenic polycyclic aromatic hydrocarbons, arsenic, dioxins/furans in sediment below MHHW
Minimum Level of Protection	Level D
Site Location	Lower Duwamish Waterway upper reach (between river miles 3.0 and 5.0)

A.14.1 Pre-Emergency Preparation

Before the start of field activities, the FOM/HSO will ensure that preparation has been made in anticipation of emergencies. Preparatory actions include the following:

1. Meeting with the FOM/HSO and equipment handlers concerning the emergency procedures in the event that a person is injured
2. A training session given by the FOM/HSO informing all field personnel of emergency procedures, locations of emergency equipment and their use, and proper evacuation procedures
3. A training session given by senior staff operating field equipment, to apprise field personnel of operating procedures and specific risks associated with that equipment
4. Ensuring that field personnel are aware of the existence of the emergency response plan in the HASP and ensuring that a copy of the HASP accompanies the field team

A.14.2 Project Emergency Coordinator

The FOM/HSO will serve as the Project Emergency Coordinator in the event of an emergency. He will designate his replacement for times when he is not onboard or is not serving as the Project Emergency Coordinator. The designation will be noted in the logbook. The Project Emergency Coordinator will be notified immediately when an emergency is recognized. The Project Emergency Coordinator will be responsible for evaluating the emergency situation, notifying the appropriate emergency response units, coordinating access with those units, and directing interim actions onboard before the arrival of emergency response units. The Project Emergency Coordinator will notify the HSM and the PM as soon as possible after initiating an emergency response action. The PM will have responsibility for notifying the client.

A.14.3 Emergency Response Contacts

All onboard personnel must know whom to notify in the event of an emergency situation, even though the FOM/HSO has primary responsibility for notification. Table A-4 lists the names and phone numbers for emergency response services and individuals.

Table A-4
Emergency Response Contacts

Contact	Telephone Number
Emergency Numbers	
Ambulance	911
Police	911
Fire	911
Harborview Medical Center	(206) 323-3074
Emergency Responders	
U.S. Coast Guard	
Emergency General information	(206) 286-5400 (206) 442-5295 UHF Channel 16
National Response Center	(800) 424-8802
EPA	(908) 321-6660
Washington State Department of Ecology – Northwest Region Spill Response (24-hour emergency line)	(206) 649-7000
Emergency Contacts	
King County Project Representative	
Bryahna Davis	(206) 263-2540 (office)
Project Manager	
Tom Wang	(206) 903-3314 (office) (206) 465-0900 (cell)
Corporate Health and Safety Director	
David Templeton	(206) 903-3312 (office) (206) 910-4279 (cell)
Health and Safety Program Lead	
Tim Shaner	(251) 375-5282 (Office) (251) 281-3386 (Cell)
Field Operations Manager/Field Health and Safety Officer	Site cellular telephone:
Jo Miller	(206) 332-0800 (Office) (253) 344-9069 (Cell)

A.14.4 Recognition of Emergency Situations

Emergency situations will generally be recognizable by observation. An injury or illness will be considered an emergency if it requires treatment by a medical professional and cannot be treated with simple first-aid techniques.

A.14.5 Emergency Procedures Related to Vessel Operations

In deteriorating weather/sea conditions, radio the field office or U.S. Coast Guard (USCG) with your location, direction of travel, and approximate speed before a dangerous situation can develop. In an emergency, contact the USCG on VHF channel 16. Emergency VHF radio broadcasts should be proceeded by "Pan-Pan, Pan-Pan, Pan-Pan" for non-life-threatening emergencies and "Mayday, Mayday, Mayday" for life-threatening situations. Be prepared to provide your vessel name, location, and the nature of the emergency. Don life jackets and/or survival suits, take necessary measures to prevent hypothermia, and wait for the search and rescue.

A.14.6 Fire

Field personnel will attempt to control only small fires, should they occur. If an explosion appears likely, personnel will follow evacuation procedures specified during the training session. If a fire cannot be controlled with a fire extinguisher on board that is part of the required safety equipment, personnel will either withdraw from the vicinity of the fire or evacuate the boat as specified in the training session.

A.14.7 Personal Injury

In the event of serious personal injury, including unconsciousness, possibility of broken bones, severe bleeding or blood loss, burns, shock, or trauma, the first responder will immediately do the following:

1. Administer first aid, if qualified.
2. If not qualified, seek out an individual who is qualified to administer first aid, if time and conditions permit.
3. Notify the Project Emergency Coordinator of the incident, the name of the individual, the location, and the nature of the injury.
4. The Project Emergency Coordinator will immediately do the following:
    a. Notify the boat captain and the appropriate emergency response organization.
    b. Assist the injured individual.
    c. Follow the emergency procedures for retrieving or disposing equipment reviewed in the training session and leave the site en route to the predetermined land-based emergency pick-up.
    d. Designate someone to accompany the injured individual to the hospital.

e. If a life-threatening emergency occurs, i.e., injury where death is imminent without immediate treatment, the FOM/HSO or boat captain will call 911 and arrange to meet the Medic One unit at the nearest accessible dock. Otherwise, for emergency injuries that are not life threatening (i.e., sprains, minor lacerations, etc.) the Project Emergency Coordinator will follow the procedures outlined above and proceed to the Harbor Island Marina or to an alternative location of his choice if that would be more expedient.
f. Notify the HSM and the PM.

If the Project Emergency Coordinator determines that emergency response is not necessary, he or she may direct someone to transport the individual by vehicle to the nearest hospital. Directions and a map showing the route to the hospital are in Section A.14.10.

If a worker leaves the boat to seek medical attention, another worker should accompany them to the hospital. When in doubt about the severity of an injury or exposure, always seek medical attention as a conservative approach, and notify the Project Emergency Coordinator.

The Project Emergency Coordinator will have responsibility for completing all accident/incident field reports, OSHA Form 200s, and other required follow-up forms.

A.14.8 Overt Personal Exposure or Injury

No overt exposure to toxic materials is expected to occur. Accordingly, no emergency procedures related to such exposure are required for this project.

A.14.9 Spills and Spill Containment

No bulk chemicals or other materials subject to spillage are expected to be used during this project. Accordingly, no spill containment procedure is required for this project.

A.14.10 Emergency Route to the Hospital

The name, address, and telephone number of the hospital that will be used to provide medical care is as follows:

Harborview Medical Center
325 - 9th Ave.
Seattle, WA
(206) 323-3074

From Areas 7 or 12, directions to Harborview Medical Center (Figure B) are as follows:

1. Drive north on 14th Avenue S across the South Park Bridge.
2. Turn left on E Marginal Way S.
3. Turn right on S Michigan Street.
4. Look for entrance ramps to I-5 Northbound (left turn).
5. Head north on I-5.
6. Take the James Street exit.
7. Turn right on James Street to 9th Avenue.
8. Turn right on 9th Avenue.
9. Emergency entrance will be two blocks south on the right.

From Areas 18, 23, 27, 30, 31, 32, 34, or 37, directions to Harborview Medical Center (Figure B) are as follows:

1. Exit property and turn left on E Marginal Way S.
2. Turn right on Corson Avenue S.
3. Turn right on S Bailey St (get into one of the two left turn lanes).
4. Turn left onto Carleton Avenue S (get in one of the two left lanes for I-5 Northbound).
5. Look for entrance ramps to I-5 Northbound (left turn).
6. Head north on I-5.
7. Take the James Street exit.
8. Turn right on James Street to 9th Avenue.
9. Turn right on 9th Avenue.
10. Emergency entrance will be two blocks south on the right.

From Areas 35 or 36, directions to Harborview Medical Center (Figure C) are as follows:

1. Drive north on W Marginal Way S.
2. Turn right onto 14 Avenue S.
3. Turn left on E Marginal Way S.
4. Turn right on S Michigan Street.
5. Look for entrance ramps to I-5 Northbound (left turn).
6. Head north on I-5.
7. Take the James Street exit.
8. Turn right on James Street to 9th Avenue.
9. Turn right on 9th Avenue.
10. Emergency entrance will be two blocks south on the right.

If working from a boat, directions from the Duwamish River Boat Ramp to Harborview Medical Center (Figure D) are as follows:

1. Dock the vessel at the 1st Avenue S boat launch (Duwamish River Boat Ramp).
2. Drive east on S River Street.
3. Turn left on 4th Avenue S.
4. Turn left on E Marginal Way S.
5. Turn right on S Michigan Street.
6. Look for entrance ramps to I-5 Northbound (left turn).
7. Head north on I-5.
8. Take the James Street exit.
9. Turn right on James Street to 9th Avenue.
10. Turn right on 9th Avenue.
11. Emergency entrance will be two blocks south on the right.

Figure B
Hospital Route Map if Working from Land in all Areas Except 35 and 36

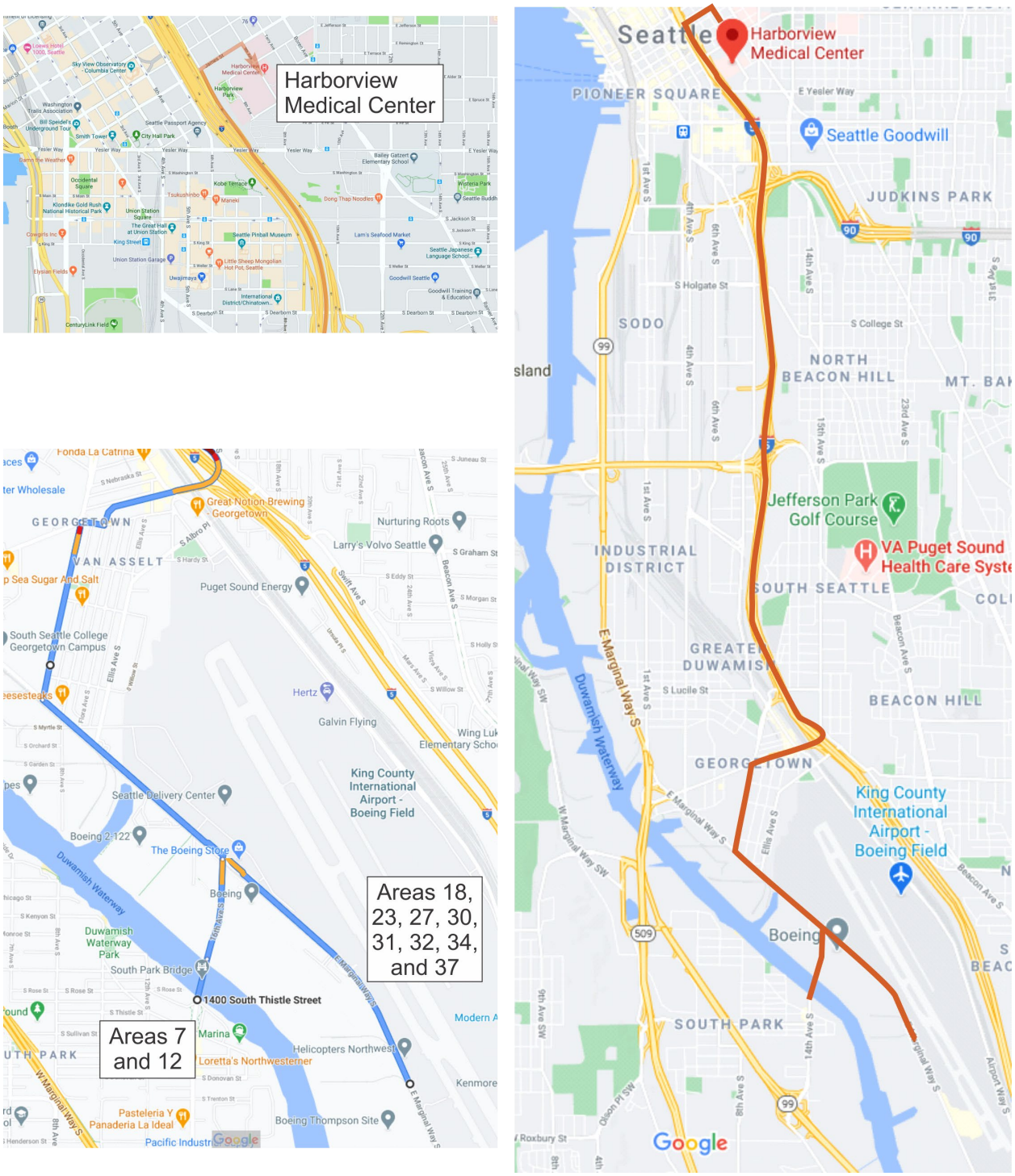
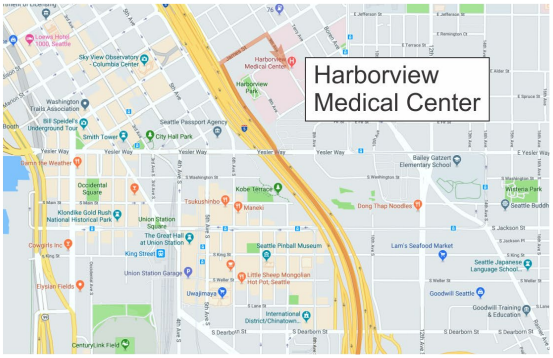
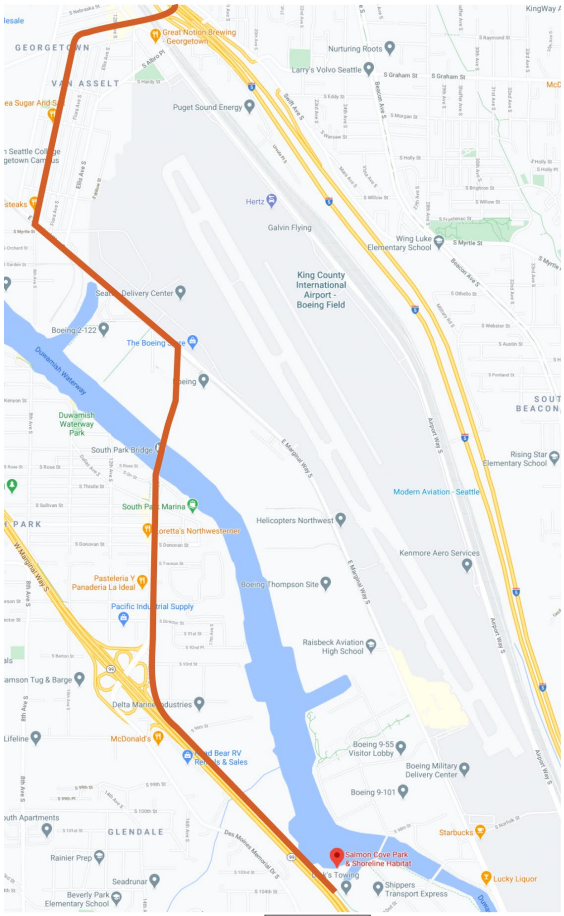


Figure C
Hospital Route Map if Working from Land in Areas 35 or 36





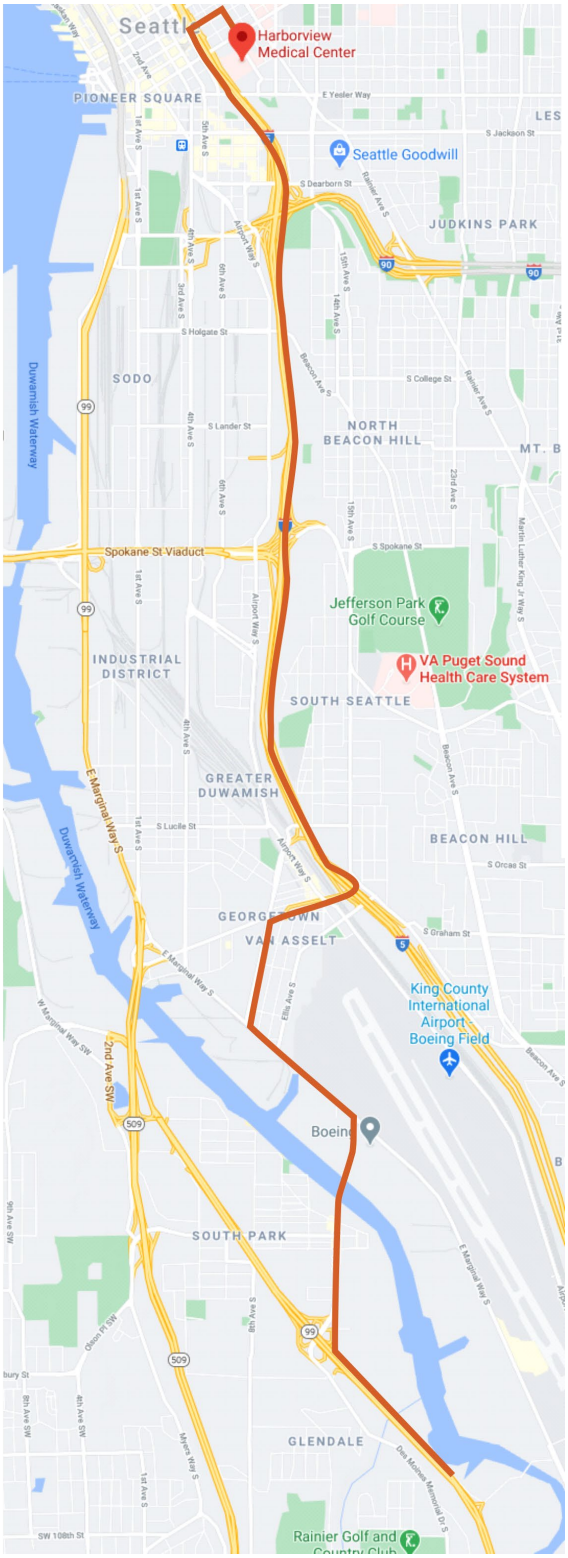
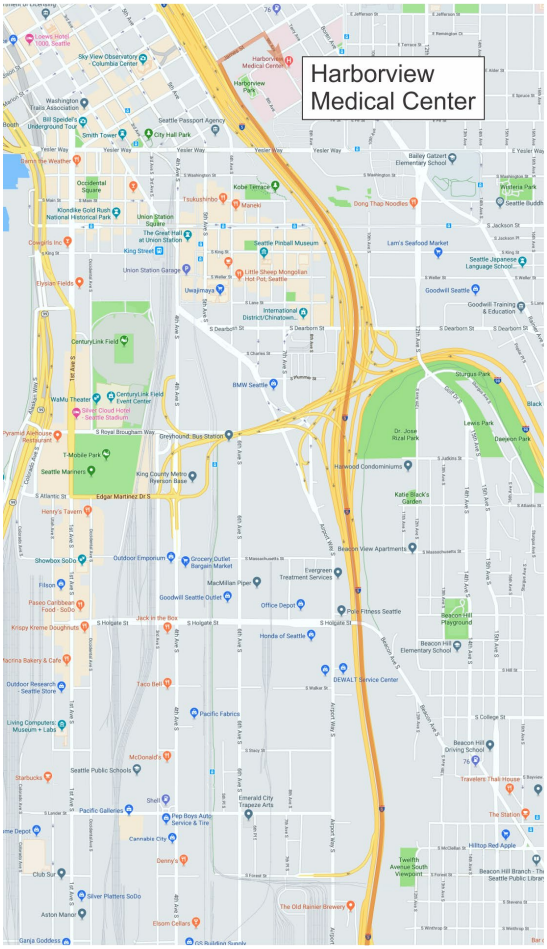
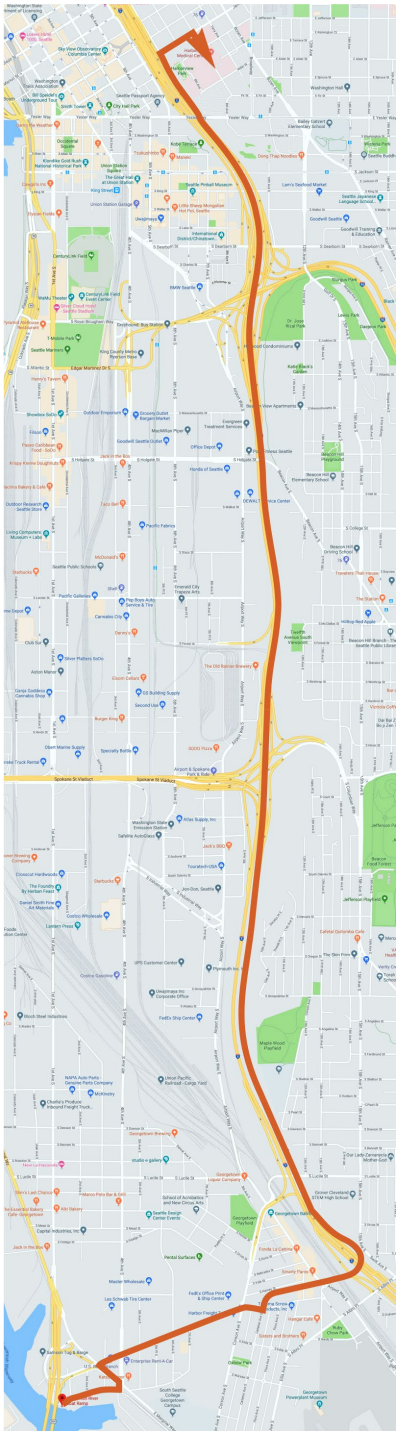


Figure D
Hospital Route Map if Working from Boat





FINAL

Modifications to Health and Safety Plan

Modification to Health and Safety Plan

Date: September 29, 2022

Project No: 180067-02.03

Project Name: Lower Duwamish Waterway Upper Reach Phase III Topographic Data Gaps Survey

Modification: The following updates are being made to the Health and Safety Plan (HASP).

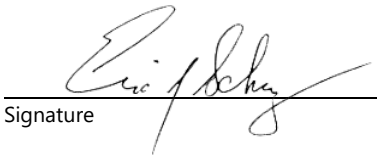
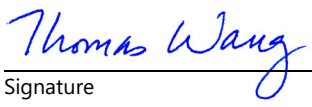
Updates made to the plan are as follows.

- Updated Table A-3 to reflect current COVID-19 procedures and protective measures.
- Updated COVID-19 information in §A.12.0 to reflect current guidance and procedures.

Site Personnel Briefed

Name:	Gravity Marine Consulting	**Date:**	
Name:	True North Land Surveying	**Date:**	
Name:		**Date:**	
Name:		**Date:**	
Name:		**Date:**	
Name:		**Date:**	
Name:		**Date:**	
Name:		**Date:**	
Name:		**Date:**	
Name:		**Date:**	
Name:		**Date:**	

Approvals

Field Lead:	Rick Schwarz Printed Name	 Signature	Sept 29, 2022 Date
Project Manager:	Tom Wang Printed Name	 Signature	Sept 29, 2022 Date

Responsibility is taken, not given. Take responsibility for safety.

Attachment A.1
HASP Acknowledgement Form

Attachment A.1. HASP Acknowledgement Form

I have read a copy of the Health and Safety Plan, which covers field activities that will be conducted to investigate potentially contaminated areas in the LDW. I understand the health and safety requirements of the project, which are detailed in this Health and Safety Plan.

Signature	Date
Signature	Date
Signature	Date
Signature	Date
Signature	Date
Signature	Date
Signature	Date
Signature	Date
Signature	Date
Signature	Date

Attachment A.2
Modification to Health and Safety Plan Form

Modification to Health and Safety Plan

Date: _____

Project No: _____

Project Name: _____

Modification: _____

_____

_____

_____

_____

Reason for Modification: _____

_____

_____

_____

_____

_____

Site Personnel Briefed

Name: _____ **Date:** _____

Name: _____ **Date:** _____

Name: _____ **Date:** _____

Name: _____ **Date:** _____

Name: _____ **Date:** _____

Name: _____ **Date:** _____

Name: _____ **Date:** _____

Name: _____ **Date:** _____

Name: _____ **Date:** _____

Name: _____ **Date:** _____

Approvals

Field Lead: _____ _____ _____
Printed Name | Signature | Date

Project Manager: _____ _____ _____
Printed Name | Signature | Date

PLAYING IT SAFE