

MEMORANDUM

To: Peter Striplin, Washington State Department of Ecology
Date: June 19, 2013

From: Joy Dunay, Anchor QEA, LLC
Dan Berlin, Anchor QEA, LLC
Project: 130166-01.01

Cc: Alex Smith, Port of Olympia

Re: Budd Inlet Sediment Site Catch Basin Sampling – Addendum 1 to the Sampling and Analysis Plan and Quality Assurance Project Plan
Agreed Order No. DE 6083

This memorandum provides the sample design for the collection of catch basin solids in the vicinity of the Port of Olympia (Port) Study Area within Budd Inlet. This sampling is intended to support investigation into potential ongoing sources, as required in the Washington State Department of Ecology (Ecology)-approved Investigation Work Plan (Work Plan; Anchor QEA 2012) submitted in October 2012, which the Port prepared pursuant to Amendment No. 1 to Agreed Order No. DE 6083.

As indicated in the Work Plan, testing of potential sources will be prioritized based on the results of surface sediment samples collected near outfalls. This memorandum includes the rationale for the sample design, methods and procedures for the collection of field samples, and sampling schedule. Other project elements, including project management and responsibilities, sample handling, chemical testing, and quality assurance requirements, will be in compliance with the Ecology-approved Sampling Analysis Plan and Quality Assurance Project Plan (SAP/QAPP; Anchor QEA 2013) submitted in February 2013.

BACKGROUND

Sixty surface sediment grab samples and 50 subsurface sediment cores were collected in the vicinity of the Study Area in early 2013 to characterize the nature and extent of contamination and support identification of potential ongoing sources of contamination to the Study Area. Initial testing results have been received for surface sediment and subsurface sediment, but additional subsurface sediment samples archived at the time of sampling are

currently being analyzed to delineate the vertical extent of contamination. Five additional surface sediment samples were collected in May near outfalls south of the Study Area based on initial testing results (Figure 1a). A summary of the nature and extent of characterization results will be presented in an Investigation Report upon completion of all sampling and analysis activities, as required in the Work Plan (Anchor QEA 2012).

Figures 1a through 1g present all surface grab sample locations, including the recent 2013 locations. Contaminants measured above the Sediment Cleanup Objective (SCO) or Cleanup Screening Level (CSL) are listed by each location, and concentrations of dioxin/furan (D/F) are also provided for each location, reported as toxic equivalency (TEQ) using the World Health Organization Human and Mammalian toxic equivalency factors (van den Berg, et al. 2006). Total D/F, measured in nanograms per kilogram (ng/kg)-TEQ (parts per trillion TEQ), was calculated by summing detected congeners, along with undetected congeners at zero and estimated maximum possible concentration (EMPC) included. As shown in Figures 1a through 1g, elevated D/F in surface sediment are present in localized areas in both the East Bay and West Bay, which may indicate ongoing D/F inputs to Budd Inlet. Catch basin sampling is proposed near areas with elevated D/F TEQs to investigate these potential ongoing sources. Additional sampling and testing of additional contaminants is not proposed at this time due to the low frequency of exceedances in surface sediment within the Study Area.

SAMPLE DESIGN

Nine potential source areas have been identified that contribute to drainage areas associated with elevated D/F concentrations in surface sediment. D/F sampling will consist of accumulated solids from catch basins that are part of the City of Olympia's (City's) or the Port's stormwater systems. Figures 2a through 2e present the potential source areas that will have proposed catch basin sampling. Table 1 presents the proposed catch basin samples from each potential source area, the testing parameters, and the rationale for each sampling location. The exact catch basin to be sampled will be determined after site reconnaissance based on accessibility and the presence of accumulated solids. The preferred sampling location will be a catch basin near the outfall and on the main stormwater line such that collected solids are representative of the entire system.

Catch basin samples will be analyzed for D/F, total organic carbon (TOC), total solids, and grain size, if enough material allows. A subset of samples may be analyzed for additional parameters if there is indication of their presence (i.e., odor or sheen), or if other data indicate the potential presence of other parameters.

SAMPLE COLLECTION AND PROCESSING

The initial step will be to perform a site reconnaissance and determine which catch basins could potentially be sampled. For City stormwater systems, it is expected that a City representative will be present to assist with catch basin access. This will include opening catch basin covers and probing the bottom of the catch basin with a clean stainless steel rod to approximate the accumulated volume of solids. After completion of site reconnaissance, grab samples will be collected during a separate field event from up to eleven catch basins as indicated in Table 1. A stainless steel tool (i.e., spoon) attached to a telescoping rod, if necessary, will be used to obtain solids from the catch basin. Samples will be collected if there is enough accumulated solid material to analyze for D/F, TOC, and total solids (approximately 50 grams). Solids will only be sampled if sufficient solids have accumulated. Side walls of the catch basin or pipe will not be sampled, in an effort to collect recently accumulated material.

For each catch basin sample location, the following information will be recorded on the field log (Attachment 1):

- Location description (identification tag or street information)
- Photograph of catch basin location
- Type of material present (e.g., sediment, debris)
- Approximate vertical depth of accumulated material
- Odor (e.g., hydrogen sulfide, petroleum)

The following sequence of protocols will be used to process the solids samples:

1. **Sample Logging:** Record the solids sample description in the field log (Attachment 1).
 2. **Remove Debris:** Debris and materials in the sample more than 2 inches in diameter will not be subsampled into sample containers.
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3. **Homogenize Grab:** Place the solids into a single decontaminated stainless steel bowl and homogenize until uniform color and texture is achieved.
4. **Fill Sample Containers:** Using a decontaminated stainless steel spoon, fill pre-labeled, laboratory-provided decontaminated sample containers for laboratory analysis.

Each sample will be assigned a unique alphanumeric identifier (ID) by the project ID (POBI), location ID (East or West Bay; EB or WB), catch basin ID and collection date in YYYYMMDD format. The sample identification nomenclature of a solids sample collected on June 1, 2013 at Catch Basin 01 in the West Bay is POBI-WB-CB01-20130601.

One field duplicate will be collected if sufficient material is available. All available sediment collected from the catch basins will be submitted for analysis to the designated analytical laboratory. Sample transport and custody procedures, chemical and physical testing, and quality assurance requirements will adhere to the procedures identified in the SAP/QAPP (Anchor QEA 2013).

SAMPLING SCHEDULE

Site reconnaissance activities will occur as soon as possible. The Port will coordinate with the City regarding accessibility and the exact schedule, based on the expectation that a representative from the City will accompany the sampling team. Sampling is anticipated to occur within 2 weeks of site reconnaissance.

REFERENCES

- Anchor QEA, 2012. Budd Inlet Sediment Site Work Plan. Prepared by Anchor QEA for Port of Olympia. In progress. October 2012.
- Anchor QEA, 2013. *Sampling Analysis Plan and Quality Assurance Project Plan Budd Inlet Sediment Site*. Prepared for the Washington State Department of Ecology. February
- van den Berg, M., L.S. Birnbaum, M. Denison, M. De Vito, W. Farland, M. Feeley, H. Fiedler, H. Hakansson, A. Hanberg, L. Haws, M. Rose, S. Safe, D. Schrenk, C. Tohyama, A. Trischer, J. Tuomisto, M. Tysklind, N. Walker, and R.E. Peterson, 2006. The 2005 World Health Organization re-evaluation of human and mammalian toxic
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equivalency factors for dioxins and dioxin-like compounds. *Toxicol Sci*
93(2):223-241.

TABLES

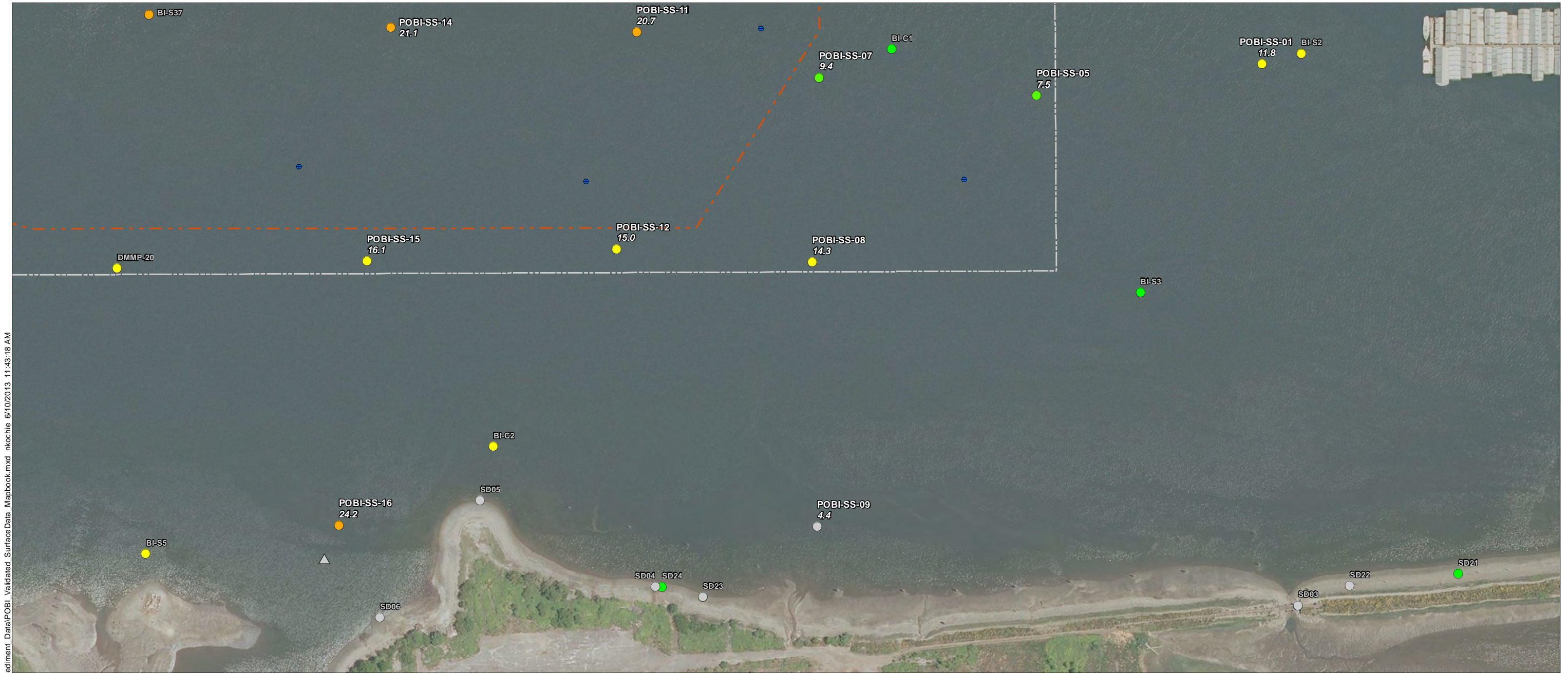
**Table 1
Catch Basin Solids Sample Design**

| Location ID ¹ | Sample ID ² | Sample Location Description | Collection Method | Sample Type | Purpose | Analyses |
|--------------------------|------------------------|---|-------------------|-------------|--|--|
| POBI-WB | POBI-WB-CB01 | West Bay upland of the Martin Marina outfalls | Manual grab | Solids | Source investigations upland of elevated dioxin/furans in surface sediment | Dioxin/furans, TS,TOC, and grain size (volume dependent) |
| | POBI-WB-CB02 | West Bay upland of the Fiddlehead Marina outfalls | | | | |
| | POBI-WB-CB03 | | | | | |
| | POBI-WB-CB04 | West Bay upland of the West Bay Park outfalls | | | | |
| | POBI-WB-CB05 | West Bay upland of the Hardel Plywood outfalls | | | | |
| POBI-EB | POBI-EB-CB01 | East Bay near Swantown Marina | | | | |
| | POBI-EB-CB02 | East Bay near residential area | | | | |
| | POBI-EB-CB03 | East Bay near East Bay Redevelopment Site | | | | |
| | POBI-EB-CB04 | | | | | |
| | POBI-EB-CB05 | East Bay near Moxlie/Indian Creek Watershed | | | | |
| | POBI-EB-CB06 | | | | | |

Notes:

- 1 Exact sampling locations will be selected after site reconnaissance; WB and EB represent West Bay and East Bay.
- 2 If additional catch basins are sampled the Sample ID will be sequential (e.i., POBI-EB-CB-07) and the location information will be recorded on the field log.

FIGURES



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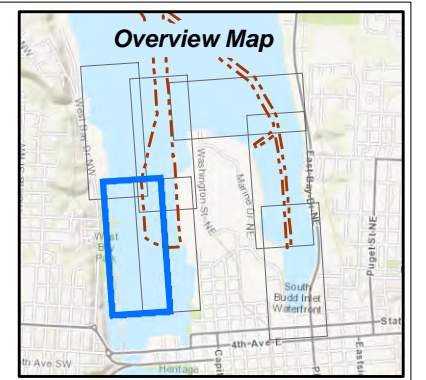
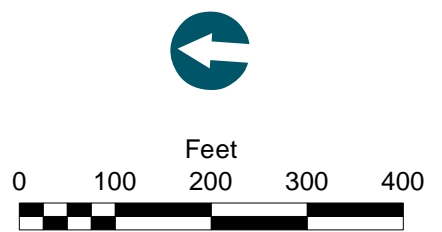
Dioxin/Furan TEQ Conc.
(ng/kg Dry Weight)

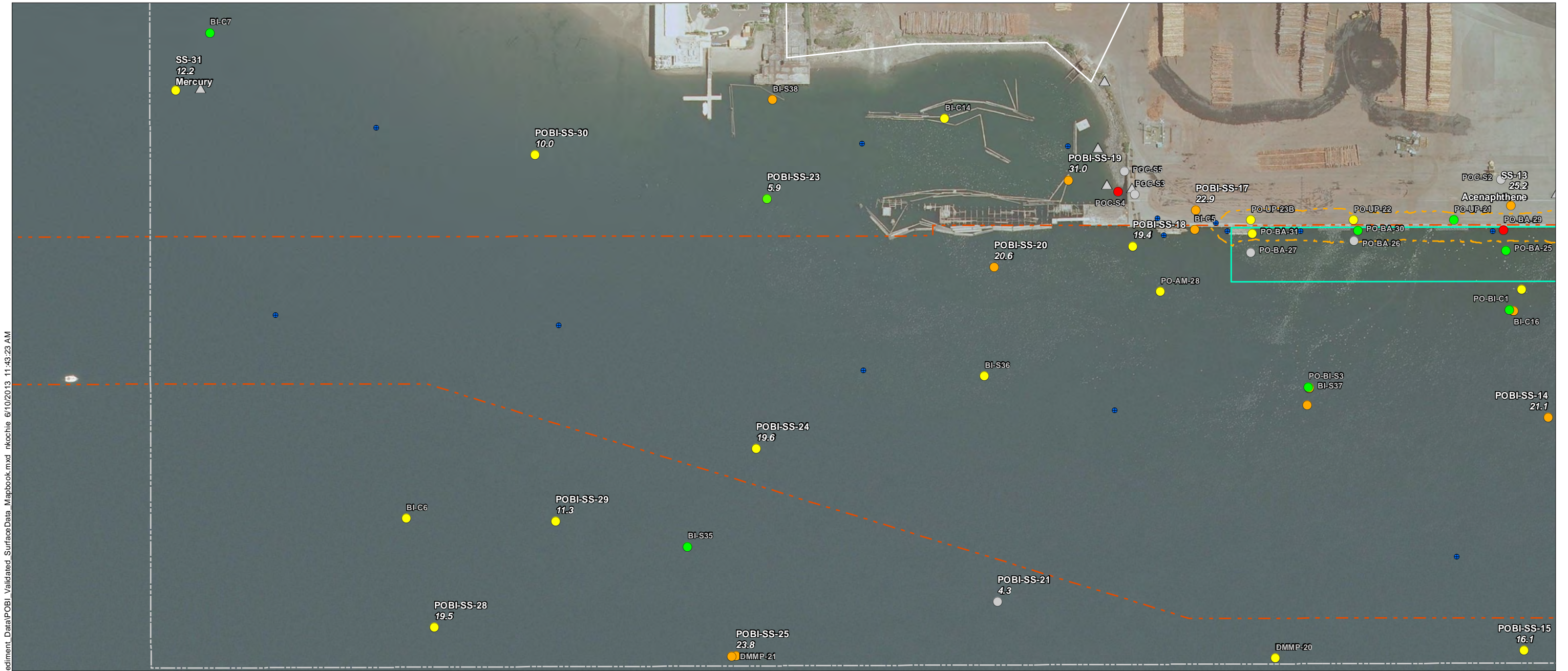
- < 5
- 5 - 10
- 10 - 20
- 20 - 40
- > 40

- Sediment Core Location
- Supplemental Surface Grab Locations
- Federal Navigation Channel
- Study Area
- Berth Area Boundary
- 2013/2014 Dredge Area
- ▲ Outfall

NOTES:

- Total Dioxin/Furan TEQ Concentrations, (2005-Mammal, U = 0, EMPC included).
- Only laboratory analyzed core sample results are shown. For some core locations, archive samples extend to deeper depths than are indicated by the core representations on this map.
- Background imagery provided by ESRI online services.





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Dioxin/Furan TEQ Conc. (ng/kg Dry Weight)

- < 5
- 5 - 10
- 10 - 20
- 20 - 40
- > 40

● Sediment Core Location

● Supplemental Surface Grab Locations

--- Federal Navigation Channel

--- Study Area

--- Berth Area Boundary

--- 2013/2014 Dredge Area

▲ Outfall

NOTES:

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- Background imagery provided by ESRI online services.

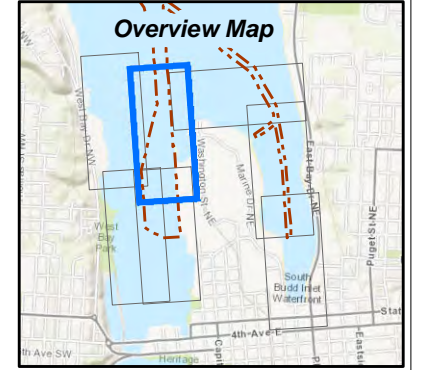
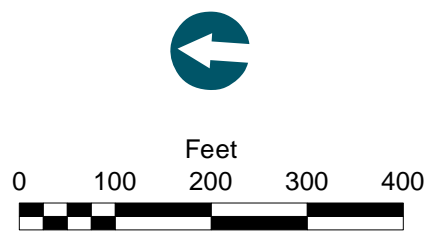
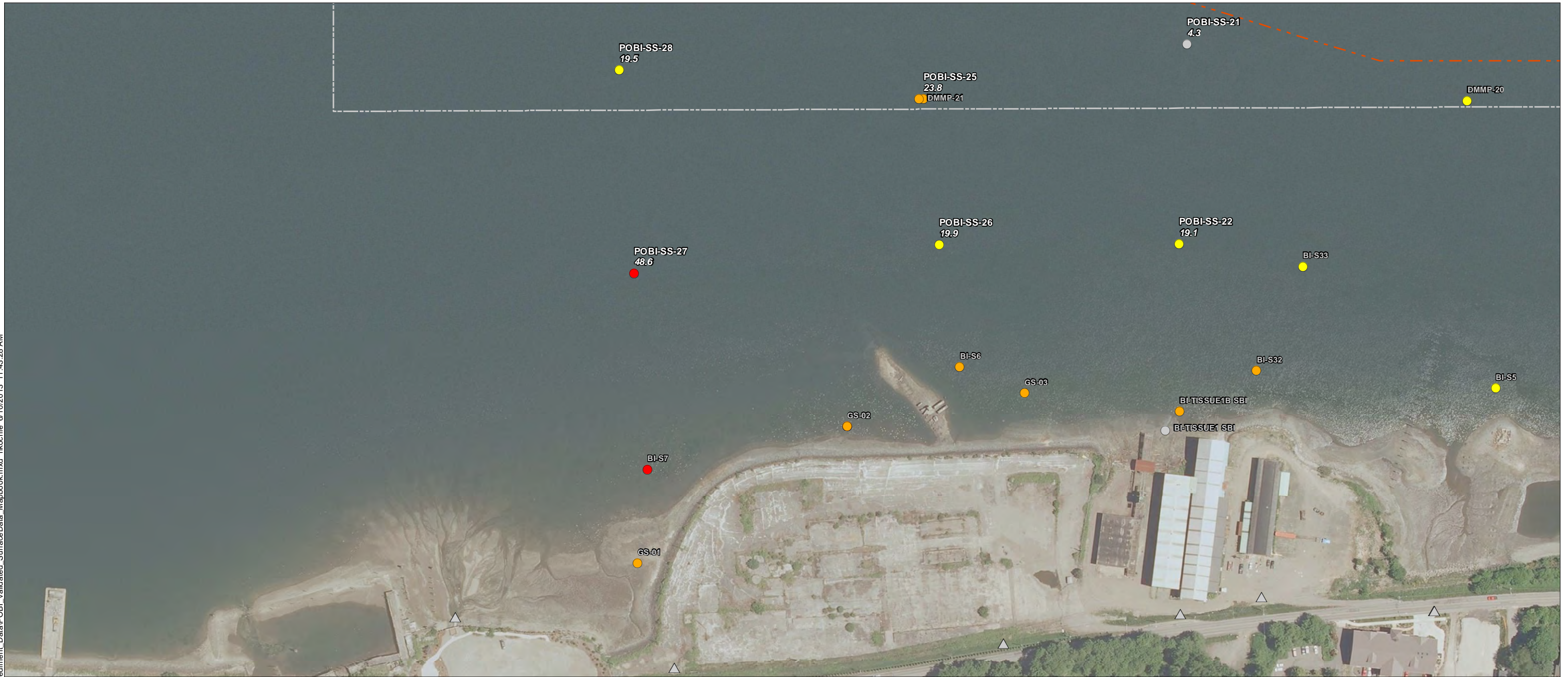


Figure 1c
 Surface Sediment Sample Locations and Chemistry Results
 Budd Inlet Sediment Site Catch Basin Sampling
 Addendum 1 to the SAP/QAPP

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Dioxin/Furan TEQ Conc. (ng/kg Dry Weight)

- < 5
- 5 - 10
- 10 - 20
- 20 - 40
- > 40

- Sediment Core Location
- Supplemental Surface Grab Locations
- ▭ Federal Navigation Channel
- ▭ Study Area
- Berth Area Boundary
- 2013/2014 Dredge Area
- ▲ Outfall

NOTES:

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- Only laboratory analyzed core sample results are shown. For some core locations, archive samples extend to deeper depths than are indicated by the core representations on this map.
- Background imagery provided by ESRI online services.

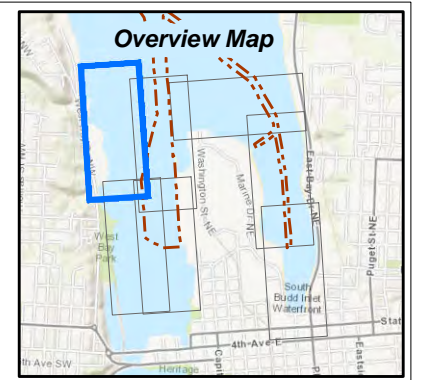
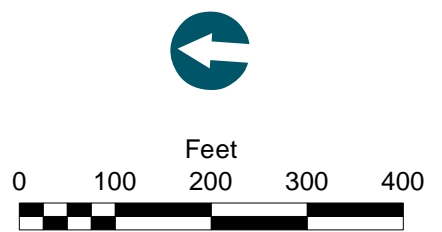
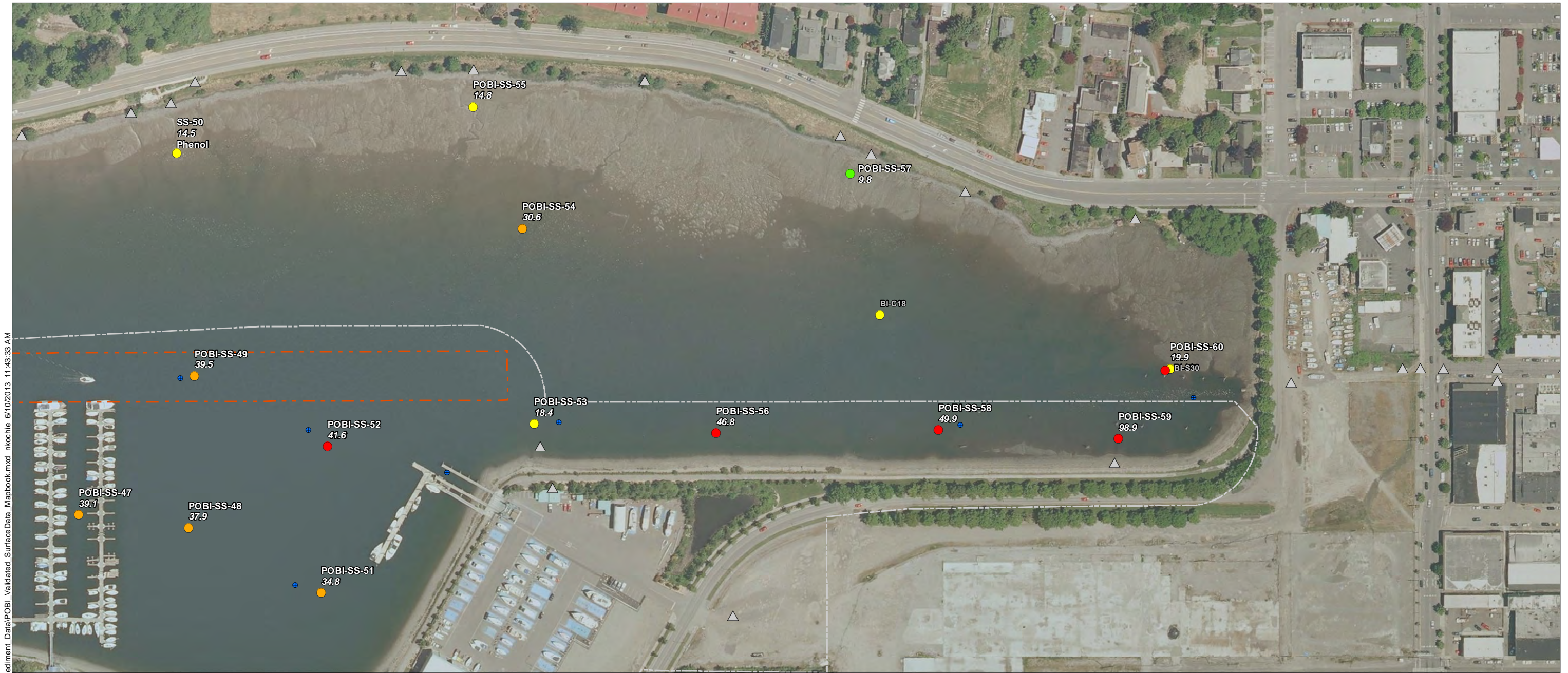


Figure 1d
Surface Sediment Sample Locations and Chemistry Results
Budd Inlet Sediment Site Catch Basin Sampling
Addendum 1 to the SAP/QAPP



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Dioxin/Furan TEQ Conc. (ng/kg Dry Weight)

- < 5
- 5 - 10
- 10 - 20
- 20 - 40
- > 40

- Sediment Core Location
- Supplemental Surface Grab Locations
- Federal Navigation Channel
- Study Area
- Berth Area Boundary
- 2013/2014 Dredge Area
- ▲ Outfall

NOTES:

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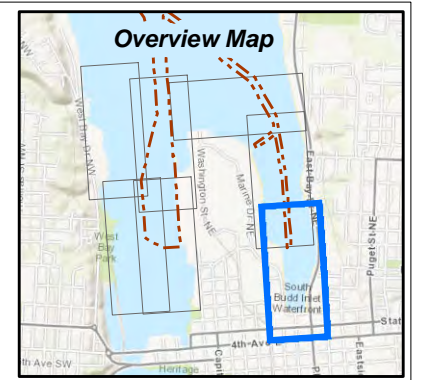
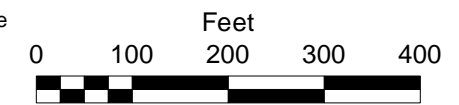


Figure 1e
 Surface Sediment Sample Locations and Chemistry Results
 Budd Inlet Sediment Site Catch Basin Sampling
 Addendum 1 to the SAP/QAPP



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Dioxin/Furan TEQ Conc. (ng/kg Dry Weight)

- < 5
- 5 - 10
- 10 - 20
- 20 - 40
- > 40

Legend:

- Sediment Core Location
- Supplemental Surface Grab Locations
- Federal Navigation Channel
- Study Area
- Berth Area Boundary
- 2013/2014 Dredge Area
- ▲ Outfall

NOTES:

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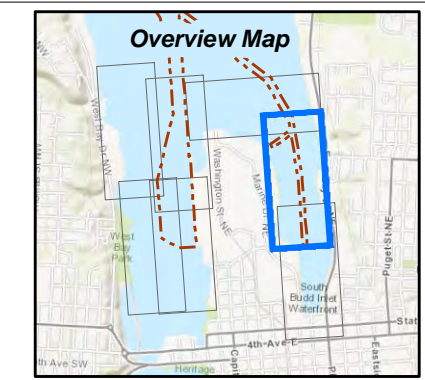
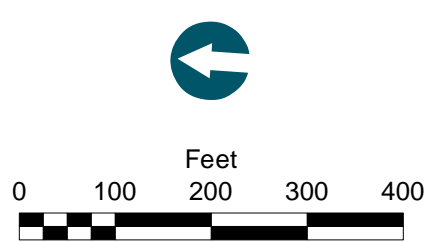
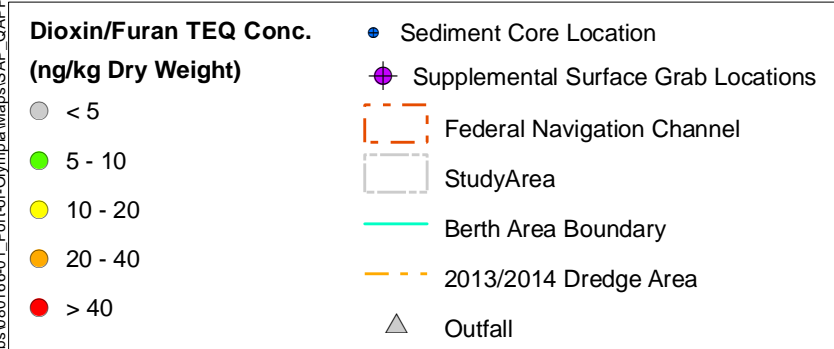
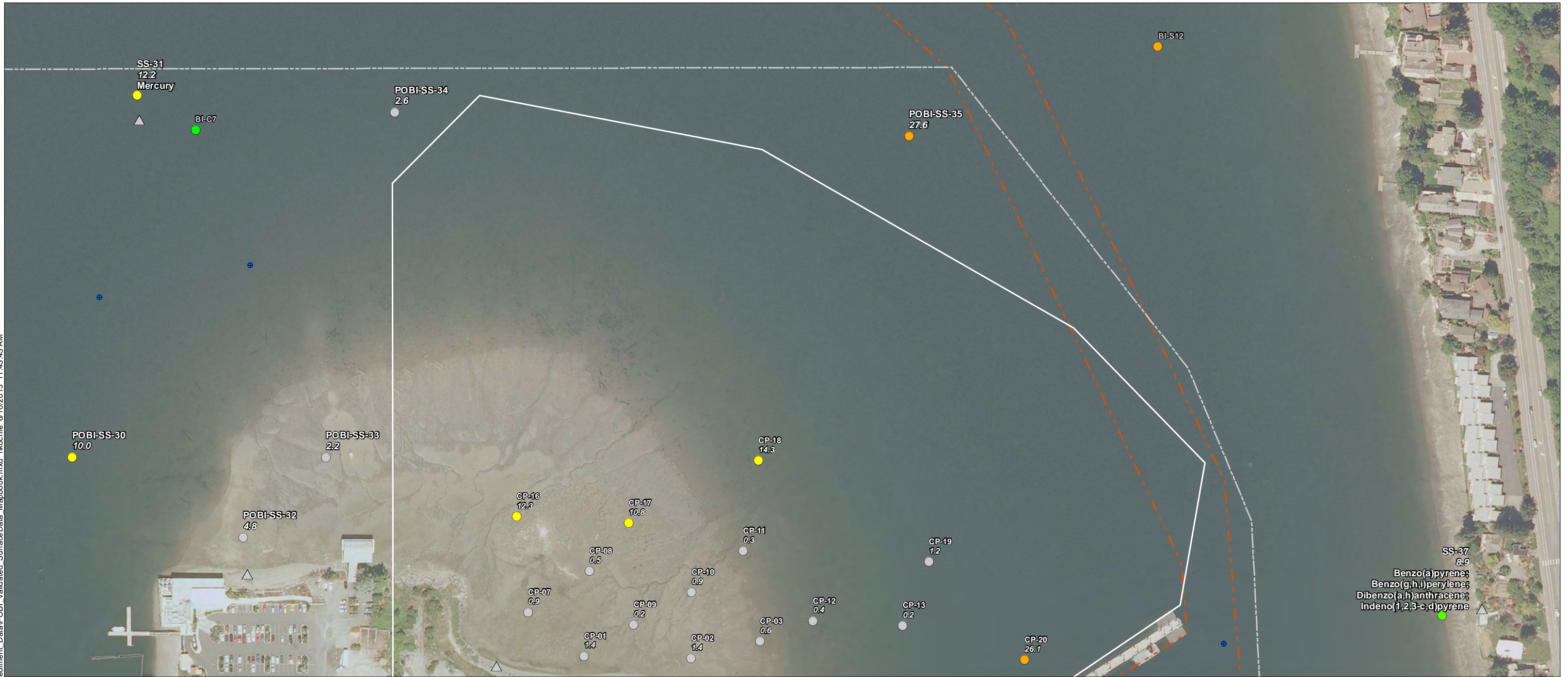


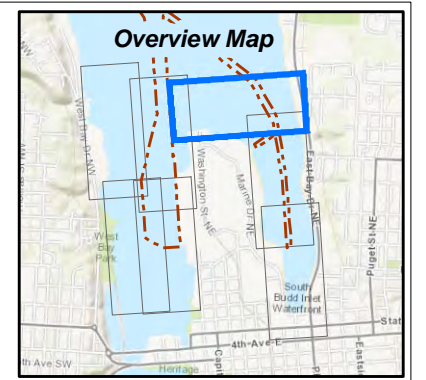
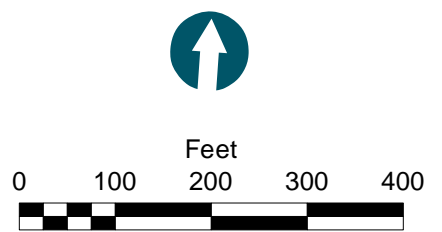
Figure 1f
Surface Sediment Sample Locations and Chemistry Results
Budd Inlet Sediment Site Catch Basin Sampling
Addendum 1 to the SAP/QAPP

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NOTES:

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- Background imagery provided by ESRI online services.



SS-37
8.9
Benzo(a)pyrene;
Benzo(g,h,i)perylene;
Dibenzo(a,h)anthracene;
Indeno(1,2,3-c,d)pyrene



Figure 1g
Surface Sediment Sample Locations and Chemistry Results
Budd Inlet Sediment Site Catch Basin Sampling
Addendum 1 to the SAP/QAPP



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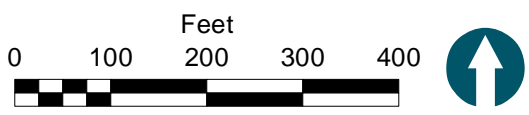


Figure 2a
Proposed Catch Basin Sampling Areas
Budd Inlet Sediment Site Catch Basin Sampling
Addendum 1 to the SAP/QAPP



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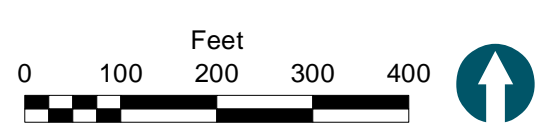
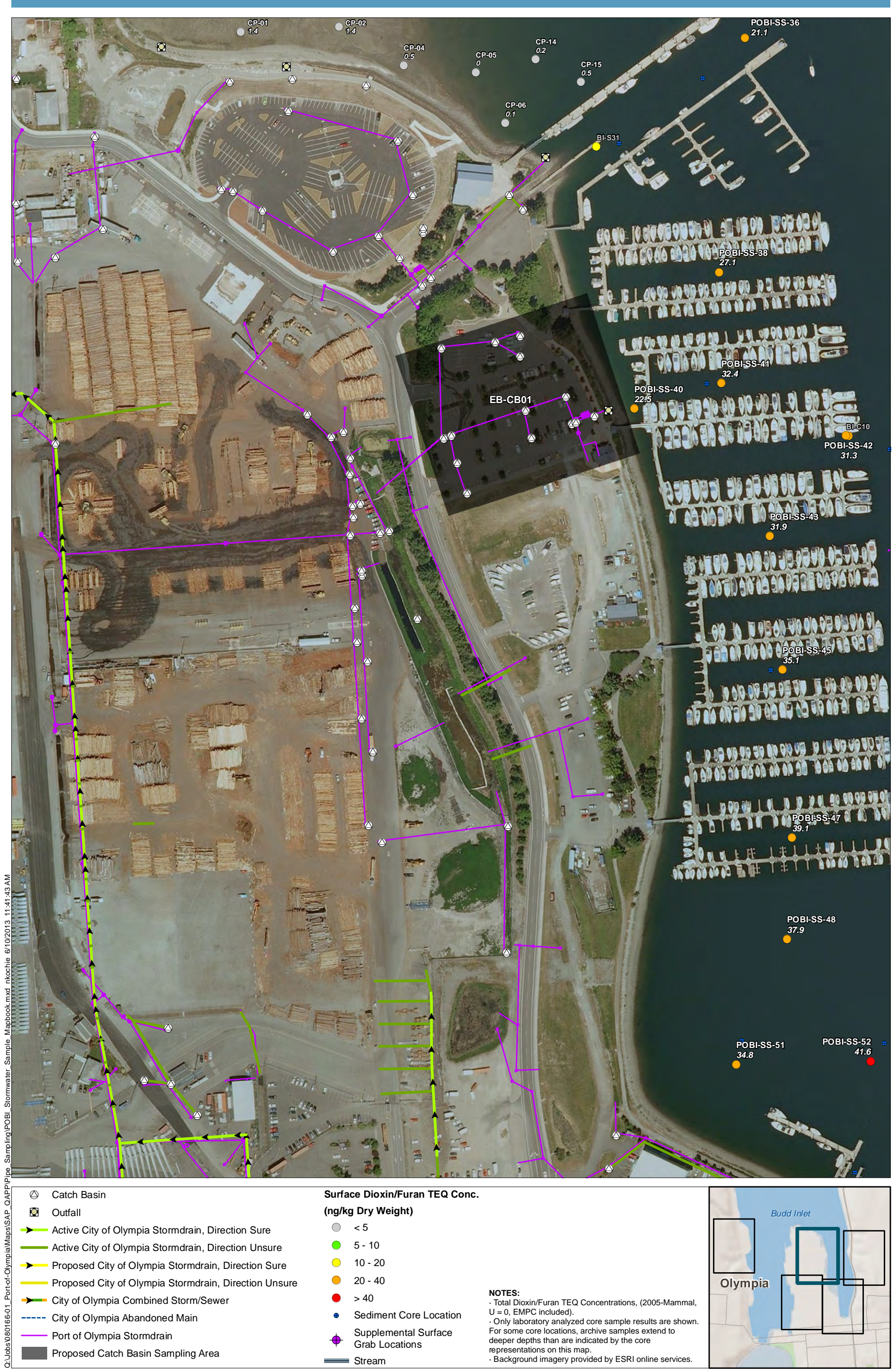


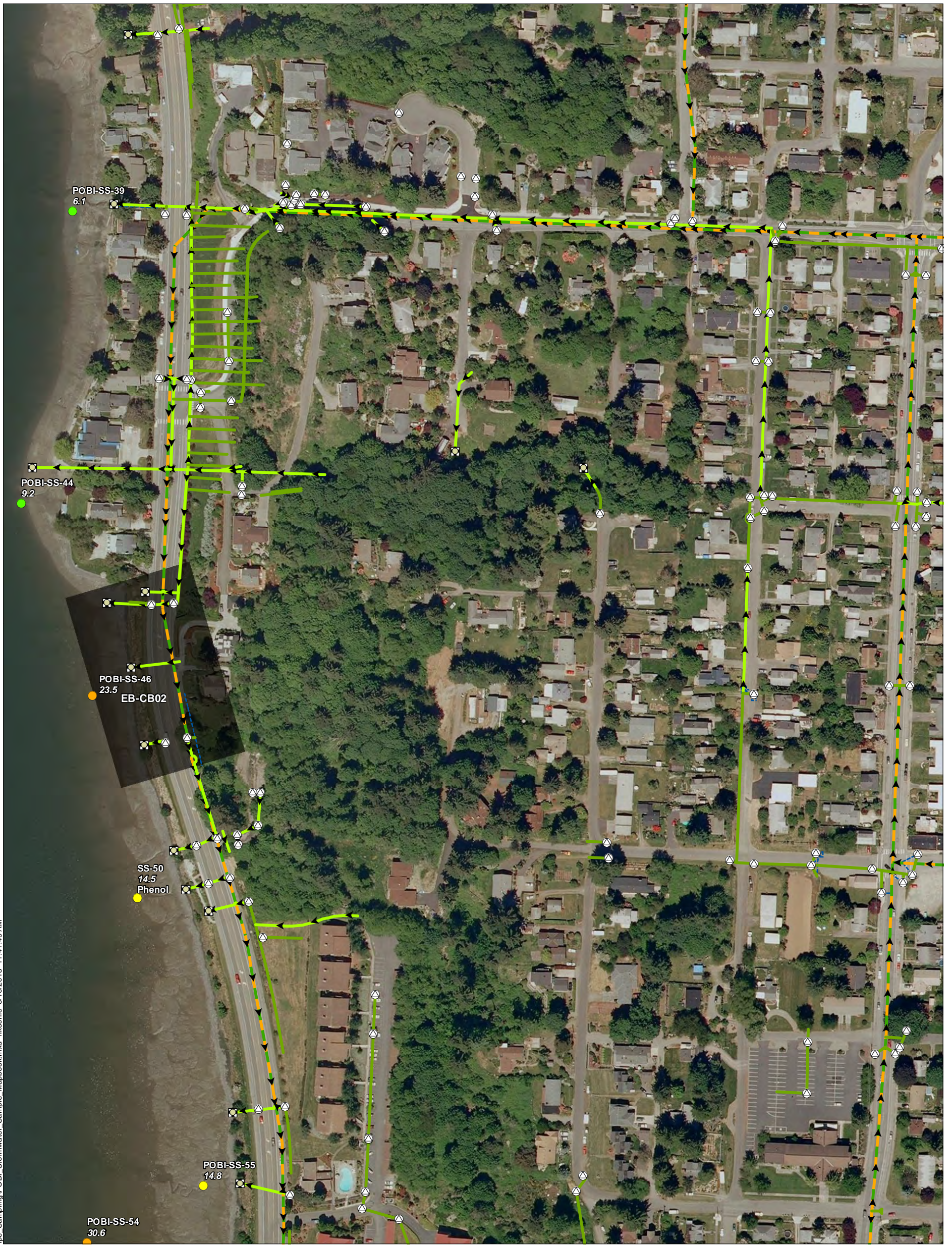
Figure 2b
Proposed Catch Basin Sampling Areas
Budd Inlet Sediment Site Catch Basin Sampling
Addendum 1 to the SAP/QAPP



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Figure 2c
 Proposed Catch Basin Sampling Areas
 Budd Inlet Sediment Site Catch Basin Sampling
 Addendum 1 to the SAP/QAPP

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- Catch Basin
- Outfall
- Active City of Olympia Stormdrain, Direction Sure
- Active City of Olympia Stormdrain, Direction Unsure
- Proposed City of Olympia Stormdrain, Direction Sure
- Proposed City of Olympia Stormdrain, Direction Unsure
- City of Olympia Combined Storm/Sewer
- City of Olympia Abandoned Main
- Port of Olympia Stormdrain
- Proposed Catch Basin Sampling Area

- Surface Dioxin/Furan TEQ Conc. (ng/kg Dry Weight)**
- < 5
 - 5 - 10
 - 10 - 20
 - 20 - 40
 - > 40
 - Sediment Core Location
 - Supplemental Surface Grab Locations
 - Stream

NOTES:

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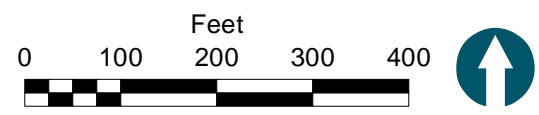
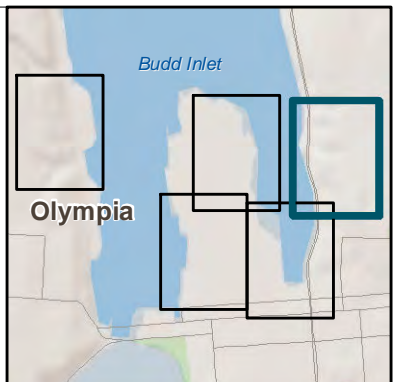


Figure 2d
Proposed Catch Basin Sampling Areas
Budd Inlet Sediment Site Catch Basin Sampling
Addendum 1 to the SAP/QAPP

ATTACHMENT 1 – FIELD LOGS
