EAST WATERWAY OPERABLE UNIT
SUPPLEMENTAL REMEDIAL INVESTIGATION/
FEASIBILITY STUDY
MAP FOLIO
FINAL

For submittal to:

The US Environmental Protection Agency
Region 10
Seattle, WA

September 2012

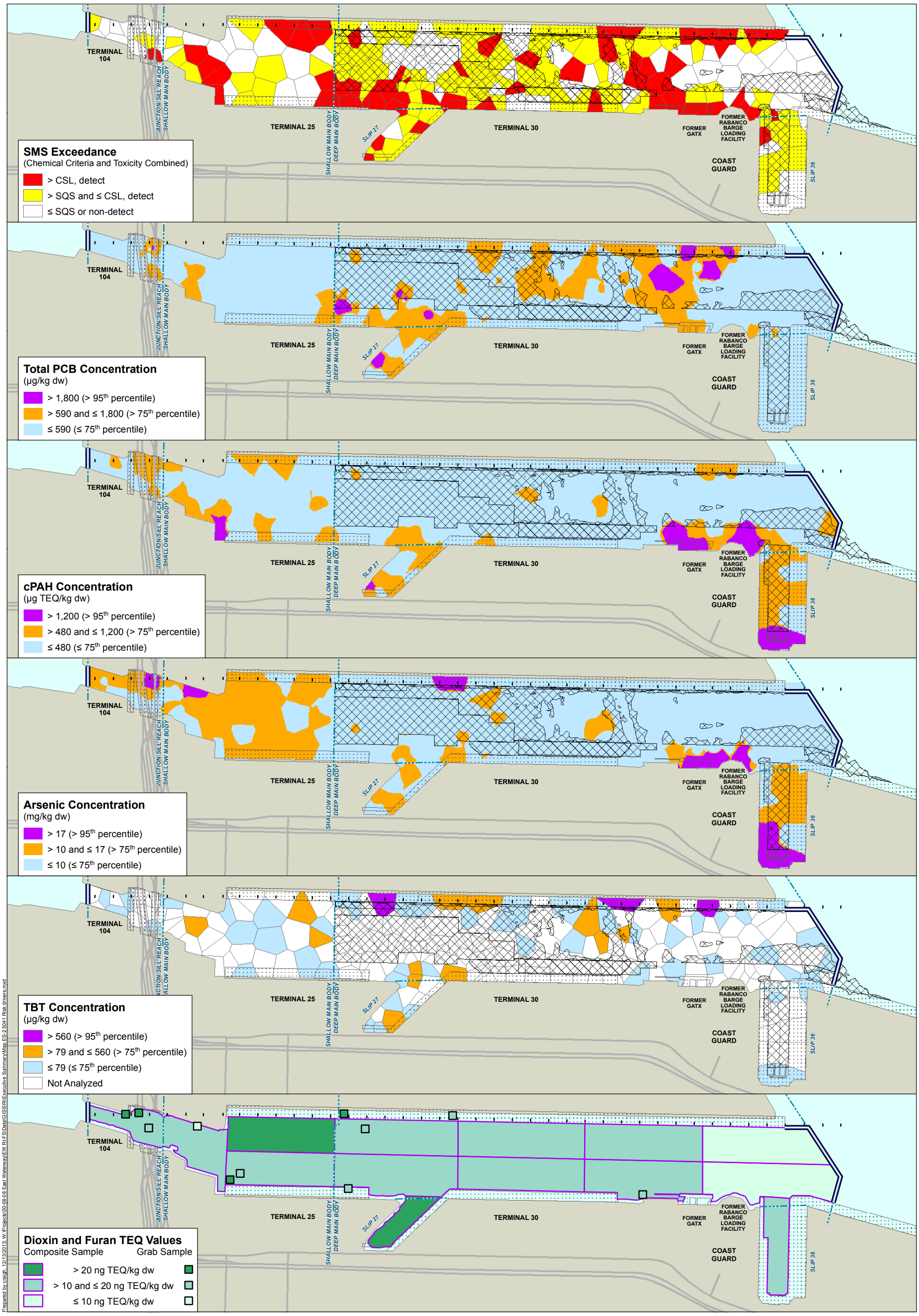
Prepared by: Windward environmental LLC

200 West Mercer Street, Suite 401 • Seattle, Washington • 98119

East Waterway Study Area
Dock/Pier/Bridge

Map ES-1
Location of the East Waterway Study Area
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by cralph, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Executive Summary\Map ES-1 3755 General Location and Vicinity Map.mxd

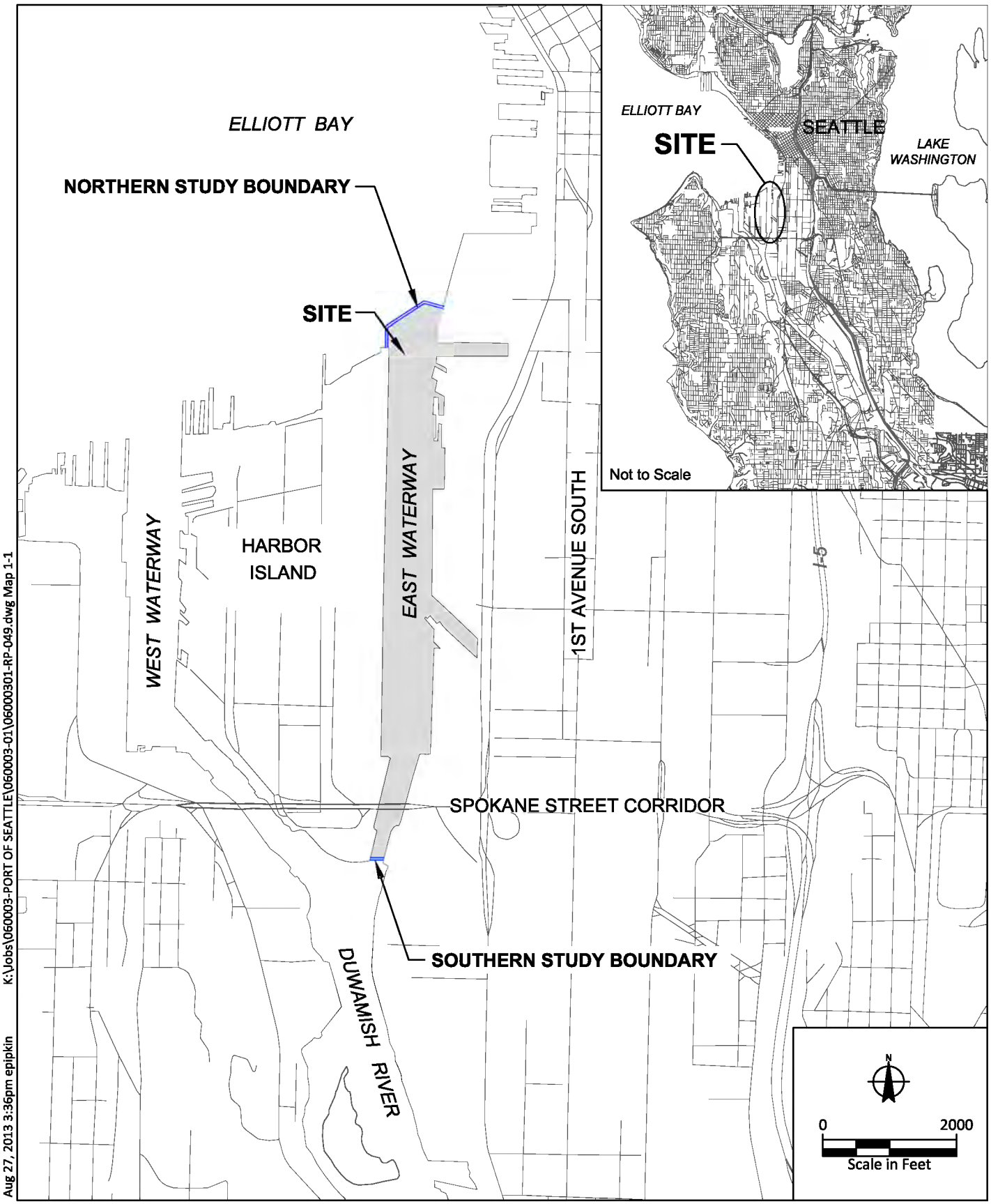


Area Dredged in the Last 11 Years
Dock/Pier/Bridge
Road
East Waterway Study Area Boundary

0 600
Scale in feet

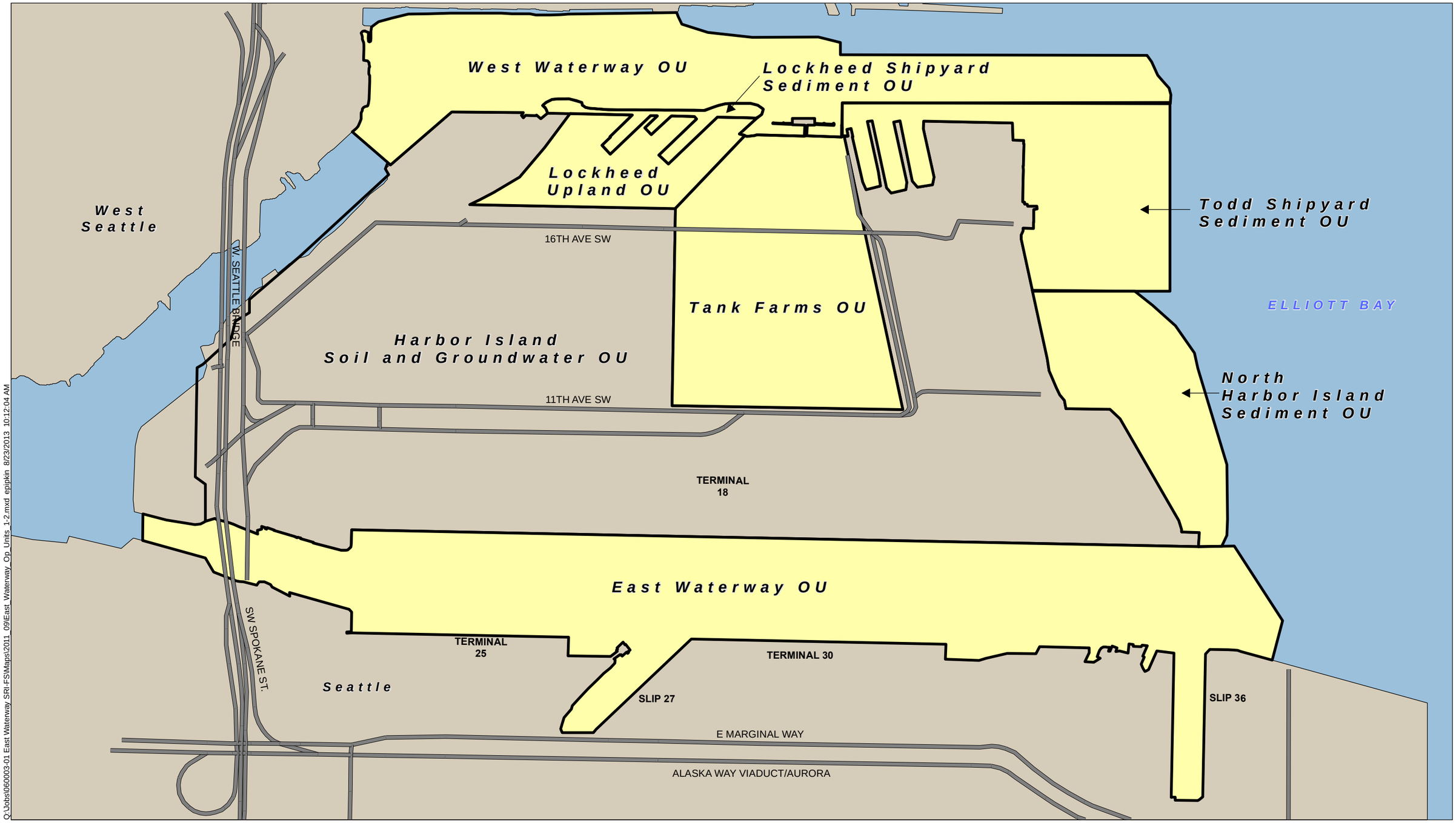
Map ES-2
Surface Sediment Patterns of Select Contaminants
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Executive Summary\Map ES-2 5041 Risk drivers.mxd



Aug 27, 2013 3:36pm epipkin K:\Jobs\060003-PORT OF SEATTLE\060003-01\06000301-RP-049.dwg Map 1-1

Map 1-1
Vicinity Map and Study Area Boundaries
Supplemental Remedial Investigation
East Waterway Study Area



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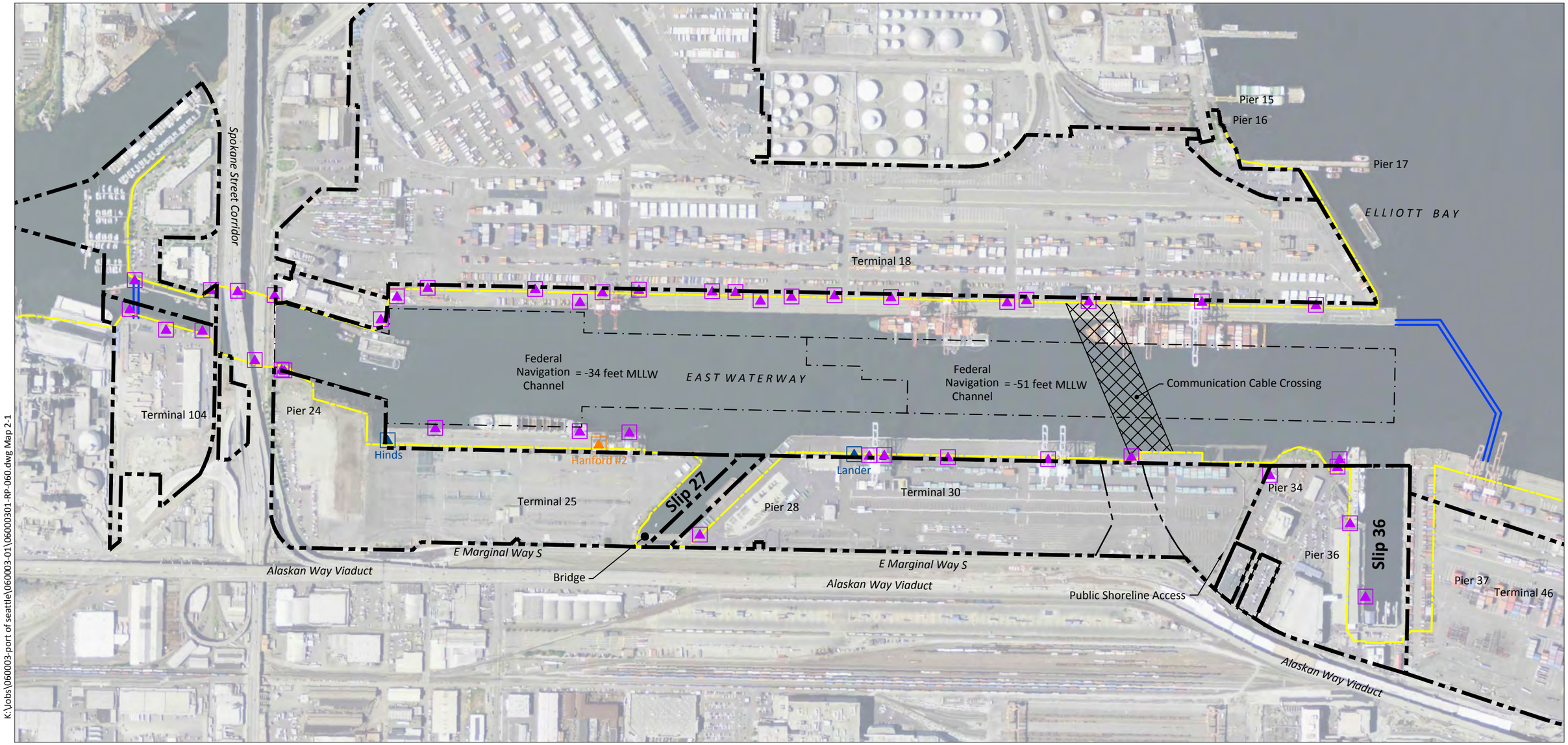
Harbor Island Sediment OU
Approximate Operable Unit Boundary (OU)

0 330 660 990 1,320
Scale in Feet

Map 1-2
Harbor Island Superfund Site Operable Units
Supplemental Remedial Investigation
East Waterway Study Area



K:\Jobs\060003-port of seattle\060003-01\06000301-RP-060.dwg Map 2-1

Aug 23, 2013 11:44am epipkin

NOTES:

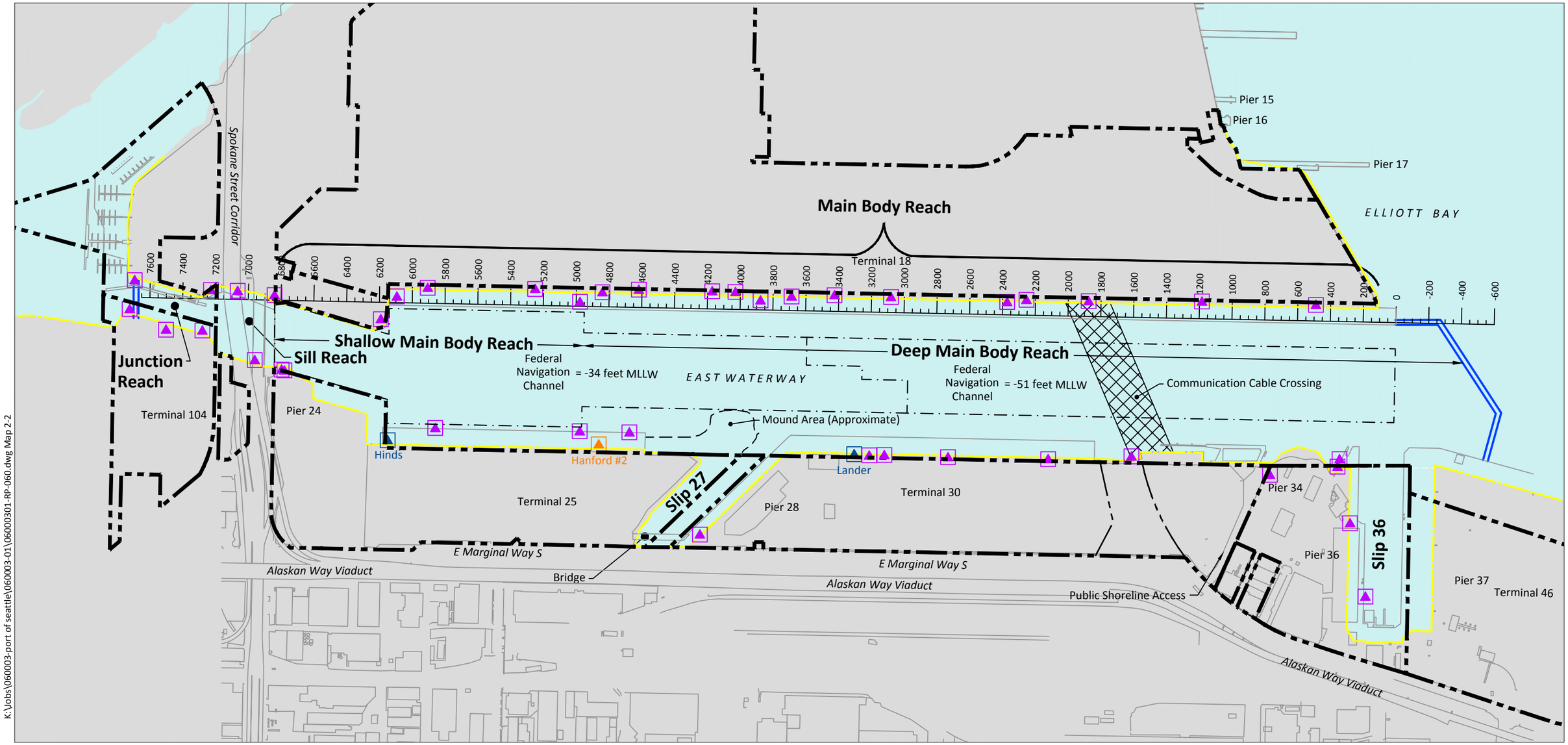
1. Aerial Photo, NAIP 2011.
2. Previously established station locations for the East Waterway are shown along the western shoreline for reference.

LEGEND:

- Property Line
- East Waterway Study Boundary
- MHHW Line
- Terminal 25 Federal Navigation Channel
- CSO
- Storm Drain
- CSO/Storm Drain

0 600
Scale in Feet

Map 2-1
East Waterway Aerial Photo
Supplemental Remedial Investigation
East Waterway Study Area



K:\Jobs\060003-port of seattle\060003-01\06000301-RP-060.dwg Map 2-2

Aug 23, 2013 11:44am epipkin

NOTES:

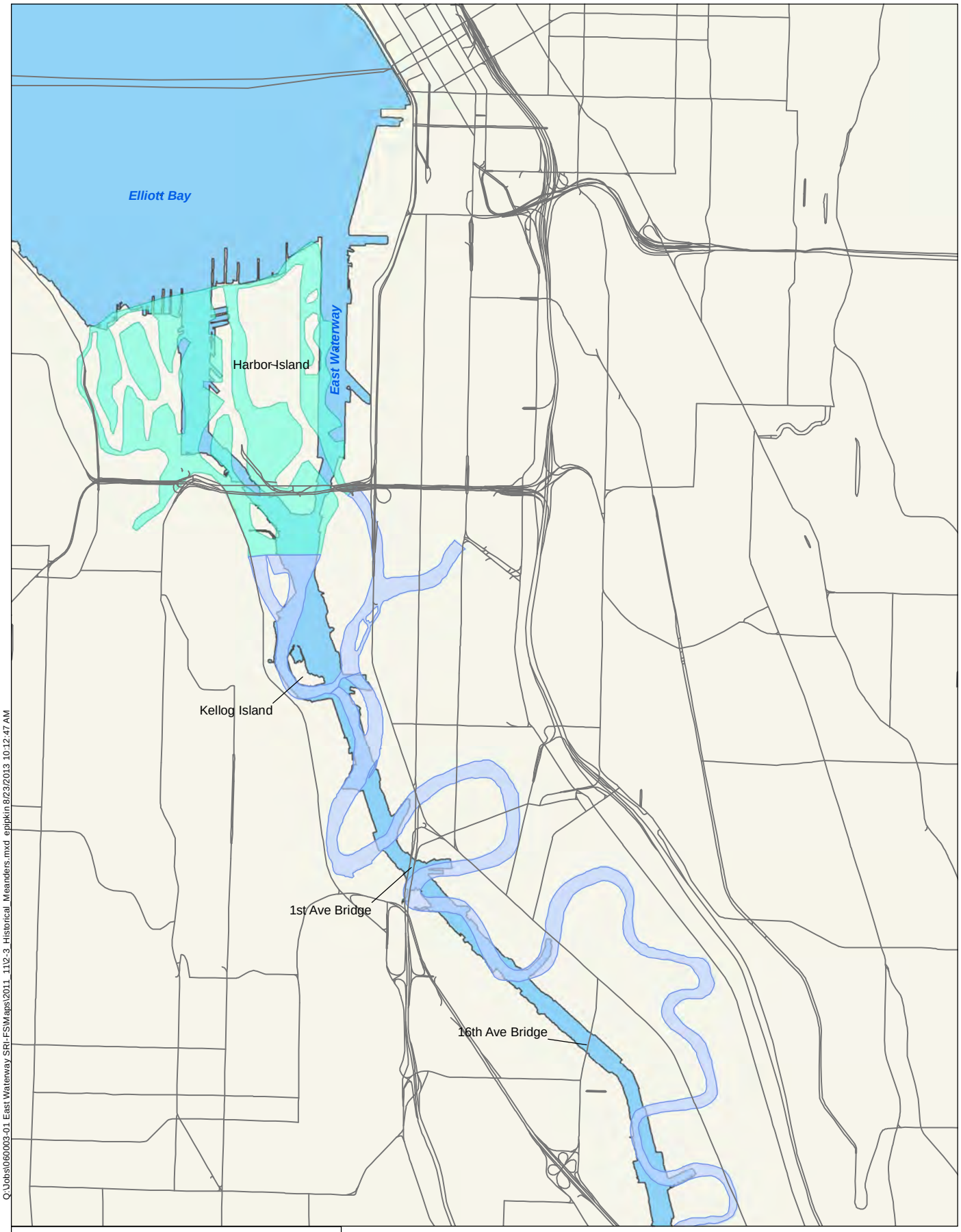
1. Aerial by USGS 2009.
2. Previously established station locations for the East Waterway are shown along the western shoreline for reference.

LEGEND:

- Property Line
- East Waterway Study Boundary
- MHHW Line
- Terminal 25 Federal Navigation Channel
- CSO
- Storm Drain
- CSO/Storm Drain

0 600
Scale in Feet

Map 2-2
Major East Waterway Features
Supplemental Remedial Investigation
East Waterway Study Area



Historical LDW Meander (ca. 1850)
Historical LDW Meander (ca. 1909)
Source: The Seattle Times
Current Waterbody

N

0 2,000 4,000
Scale in Feet

Map 2-3
Lower Duwamish River Historical Meanders
Supplemental Remedial Investigation
East Waterway Study Area

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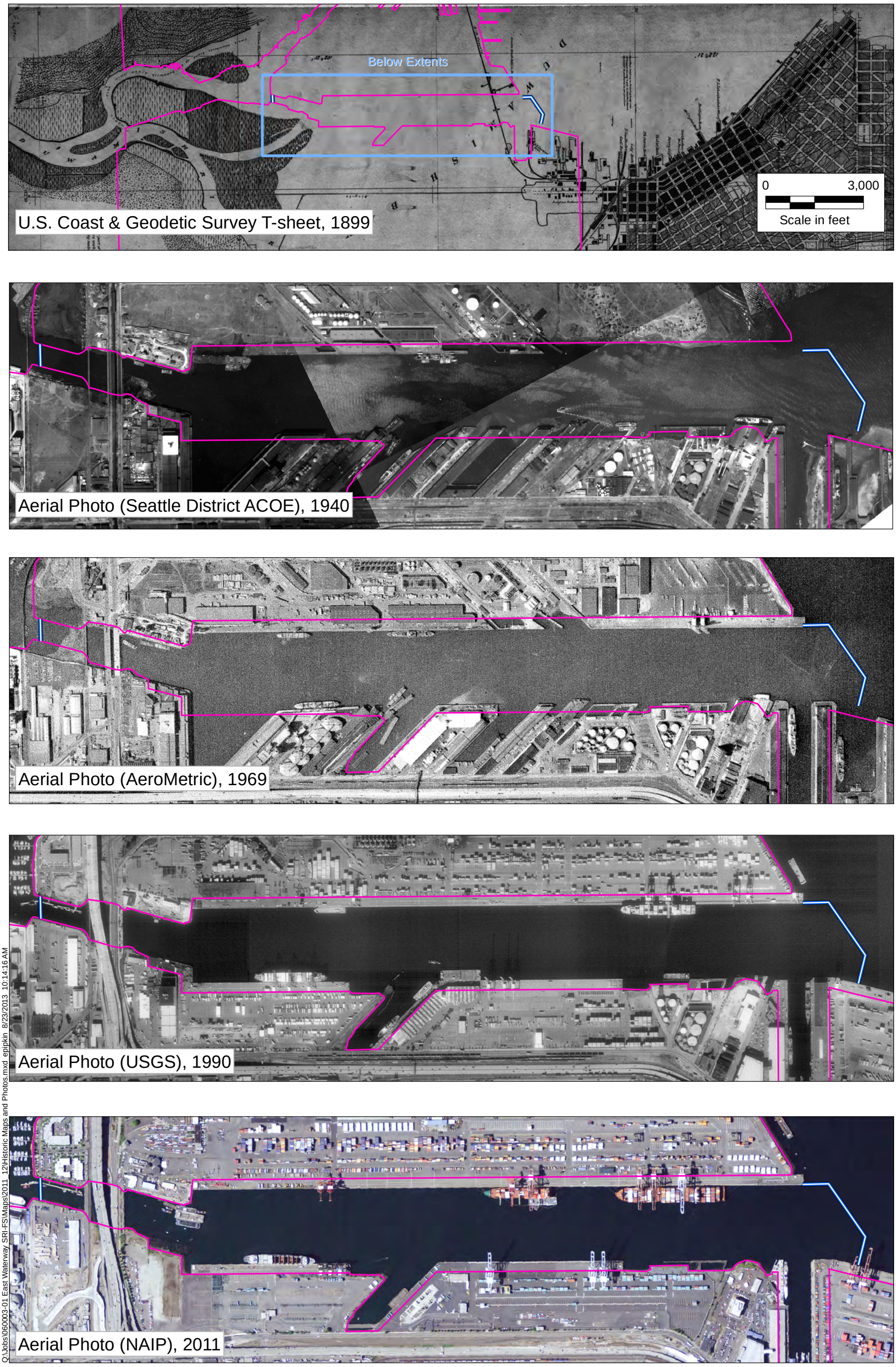

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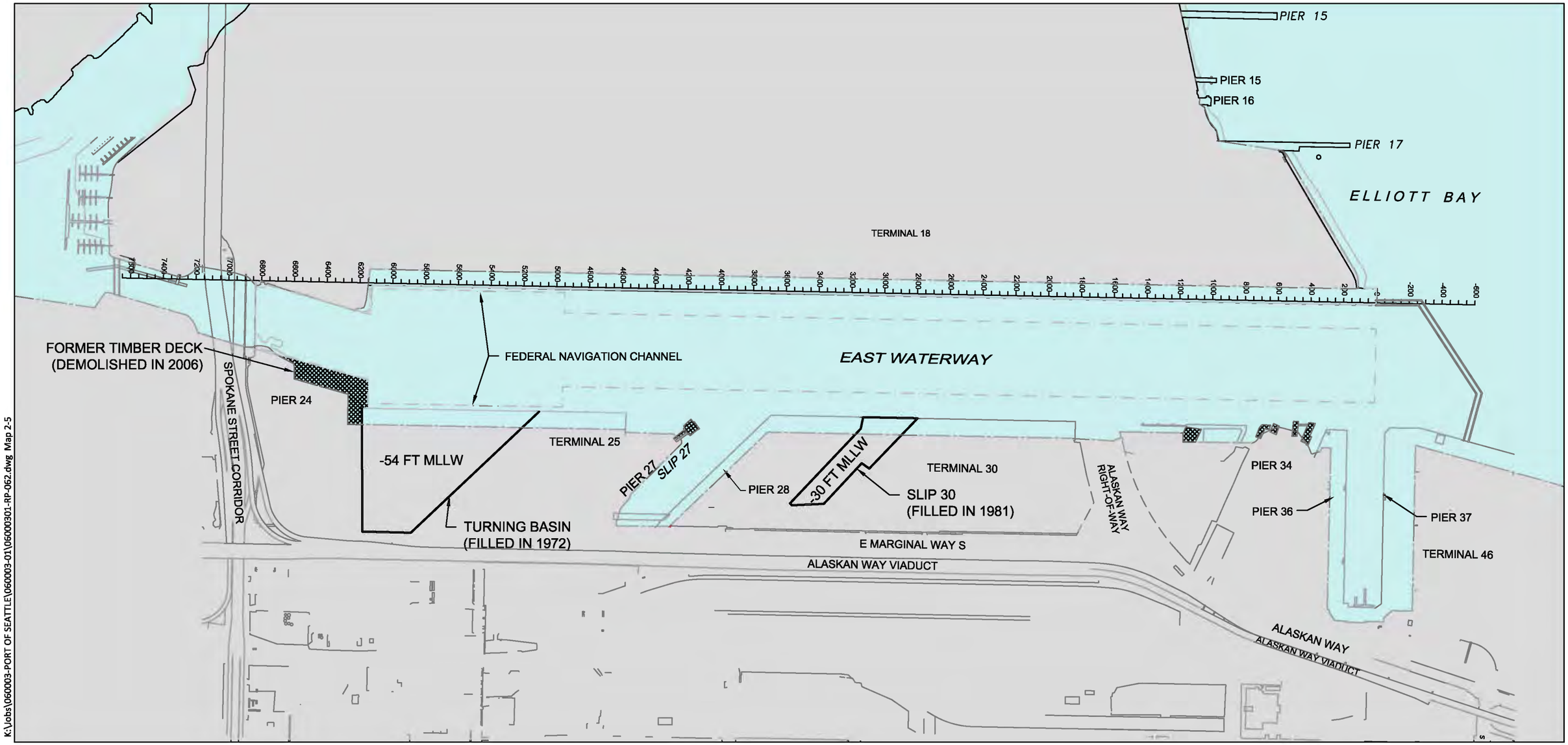
East Waterway Study Area Boundary
Present Day EW Region (MHHW)

0 1,000
Scale in feet

Map 2-4
Historical Site Development
Supplemental Remedial Investigation
East Waterway Study Area



K:\Jobs\060003-PORT OF SEATTLE\060003-01\06000301-RP-062.dwg Map 2-5

Aug 27, 2013 3:34pm epipkin

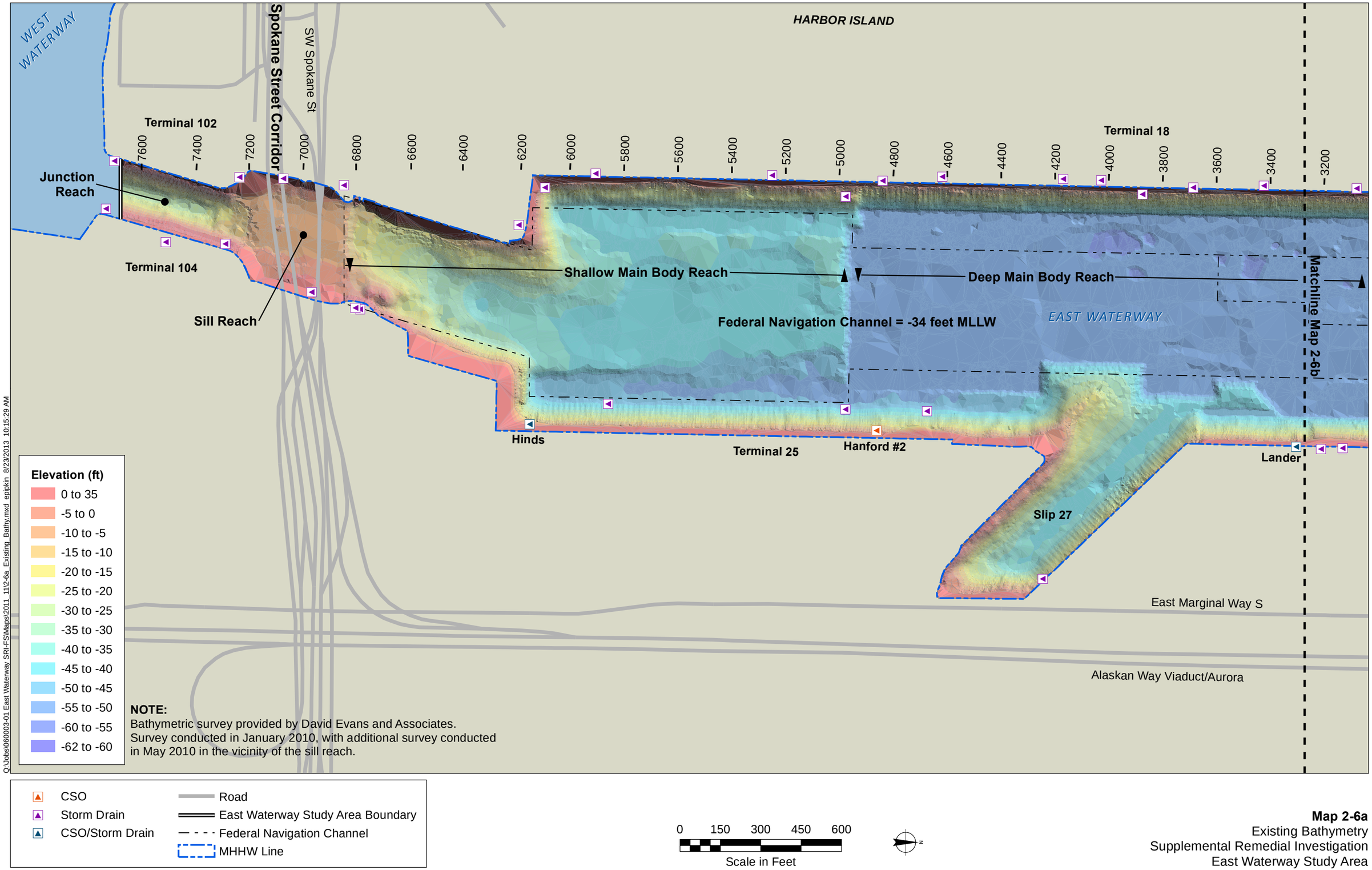
HORIZONTAL DATUM: Washington State Plane North, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

NOTE:
Previously established station locations for the East Waterway are shown along the western shoreline for reference.

LEGEND:
- East Waterway Study Boundary
- MHHW Line
- Former Structures

0 600
Scale in Feet

Map 2-5
Historical East Waterway Features
Supplemental Remedial Investigation
East Waterway Study Area



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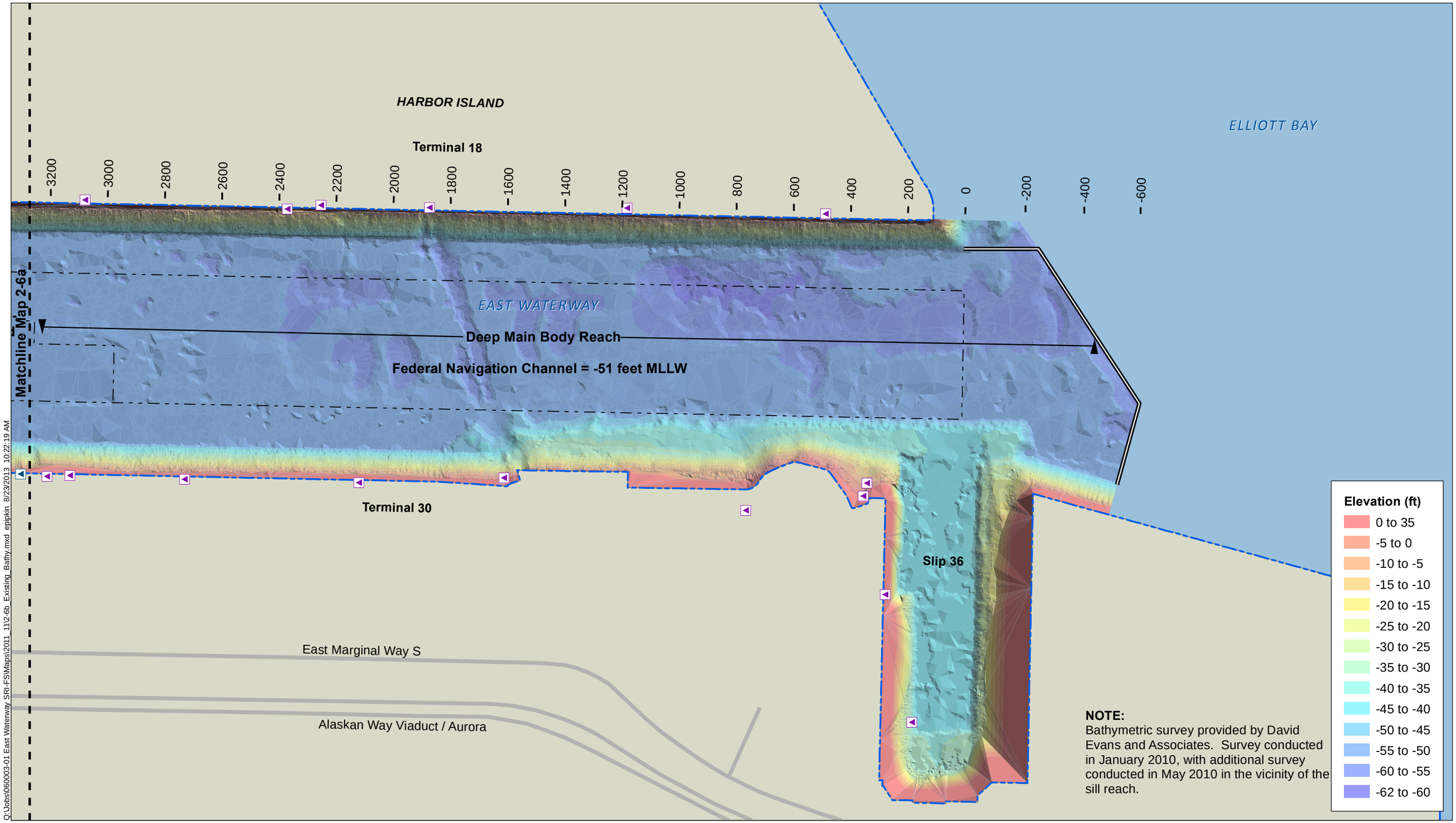
Map 2-6a
Existing Bathymetry
Supplemental Remedial Investigation
East Waterway Study Area



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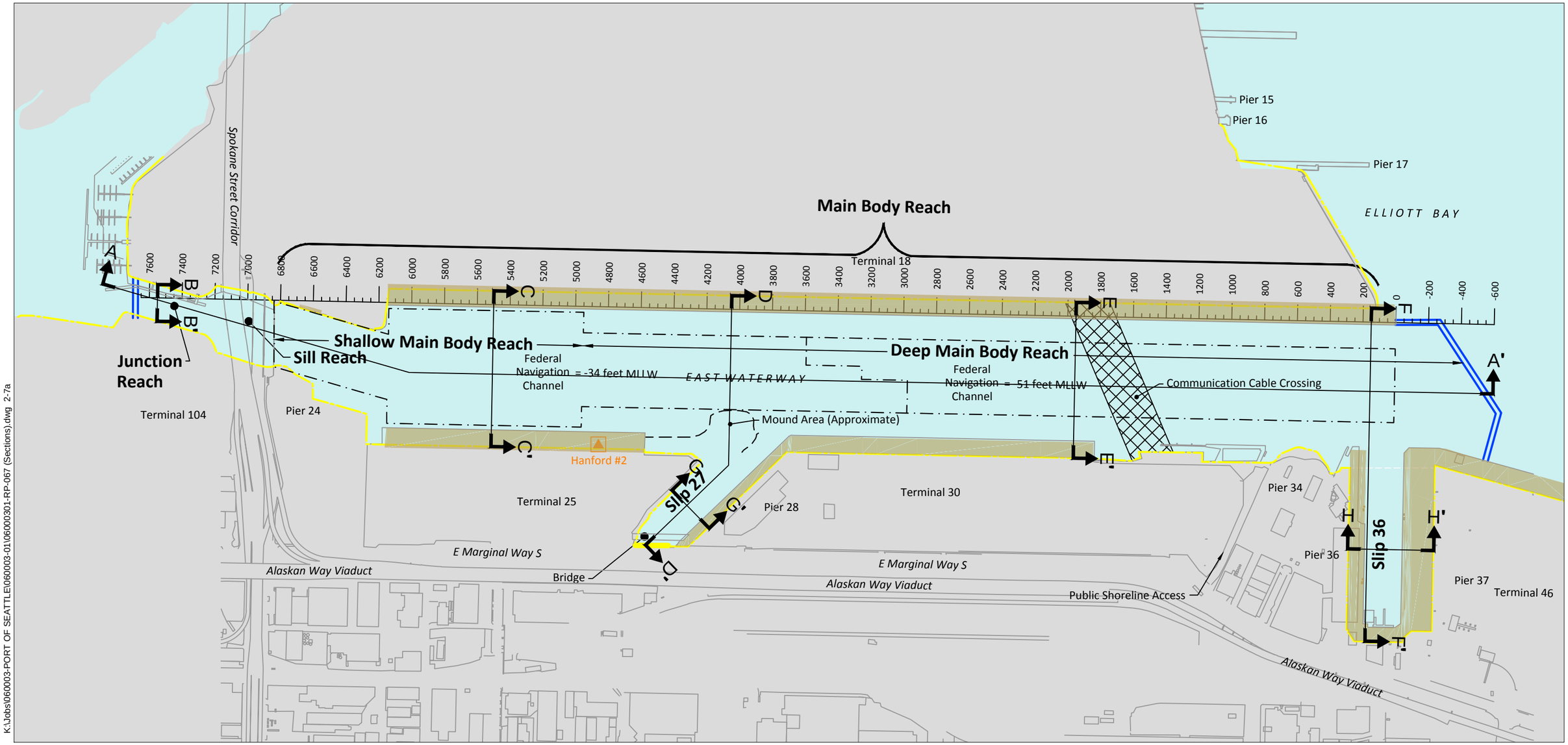
CSO
Storm Drain
CSO/Storm Drain
Road
East Waterway Study Area Boundary
Federal Navigation Channel
MHHW Line

0 150 300 450 600
Scale in Feet

Map 2-6b
Existing Bathymetry
Supplemental Remedial Investigation
East Waterway Study Area



K:\Jobs\060003-PORT OF SEATTLE\060003-01\06000301-RP-067 (Sections).dwg 2-7a

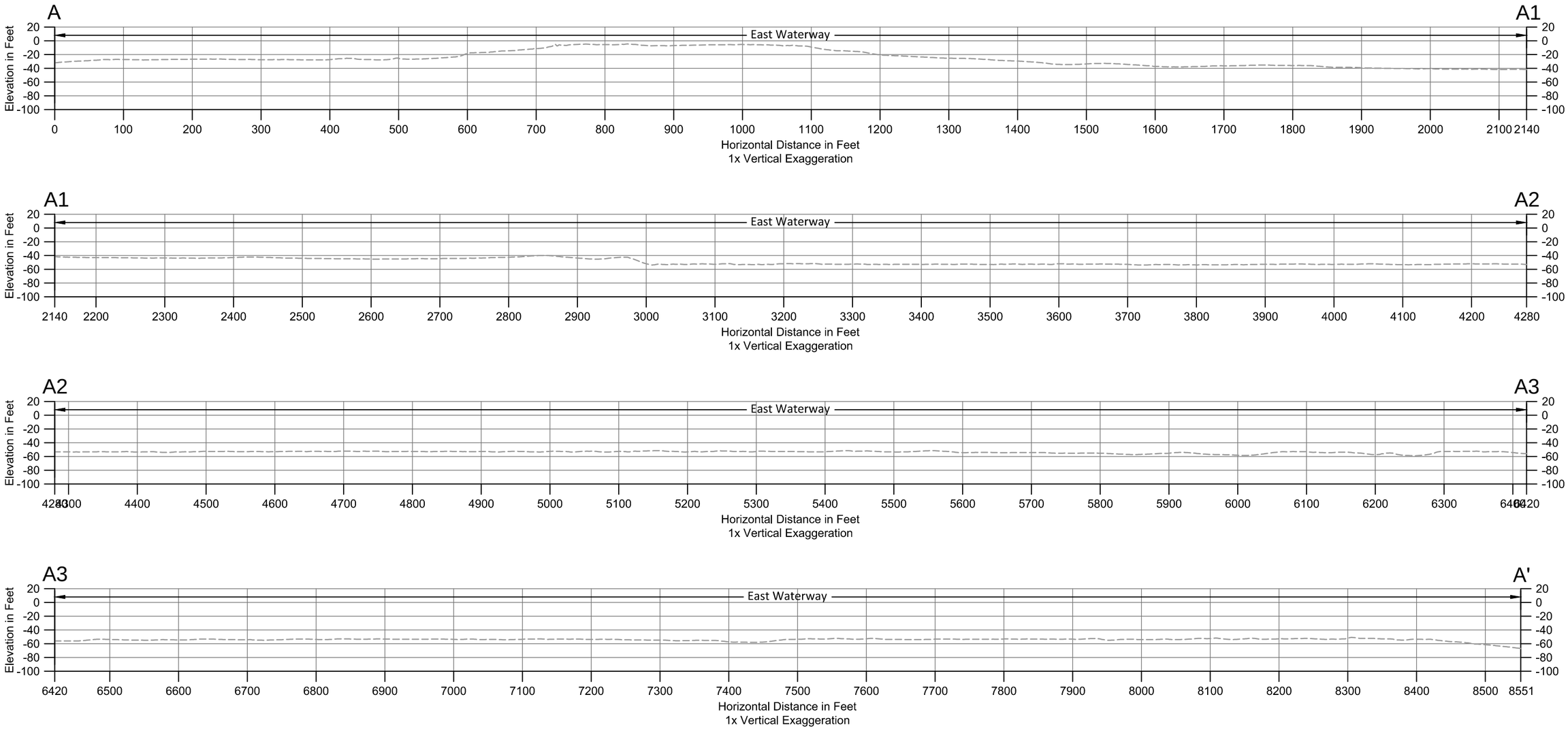
Aug 23, 2013 11:23am epipkin

LEGEND:

- East Waterway Study Boundary
- MHHW Line
- Federal Navigation Channel
- Overwater Pier Above Riprap

0 600
Scale in Feet

Map 2-7a
Cross-section Plan View
Supplemental Remedial Investigation
East Waterway Study Area



SOURCE: Existing bathymetry survey provided by David Evans and Associates.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

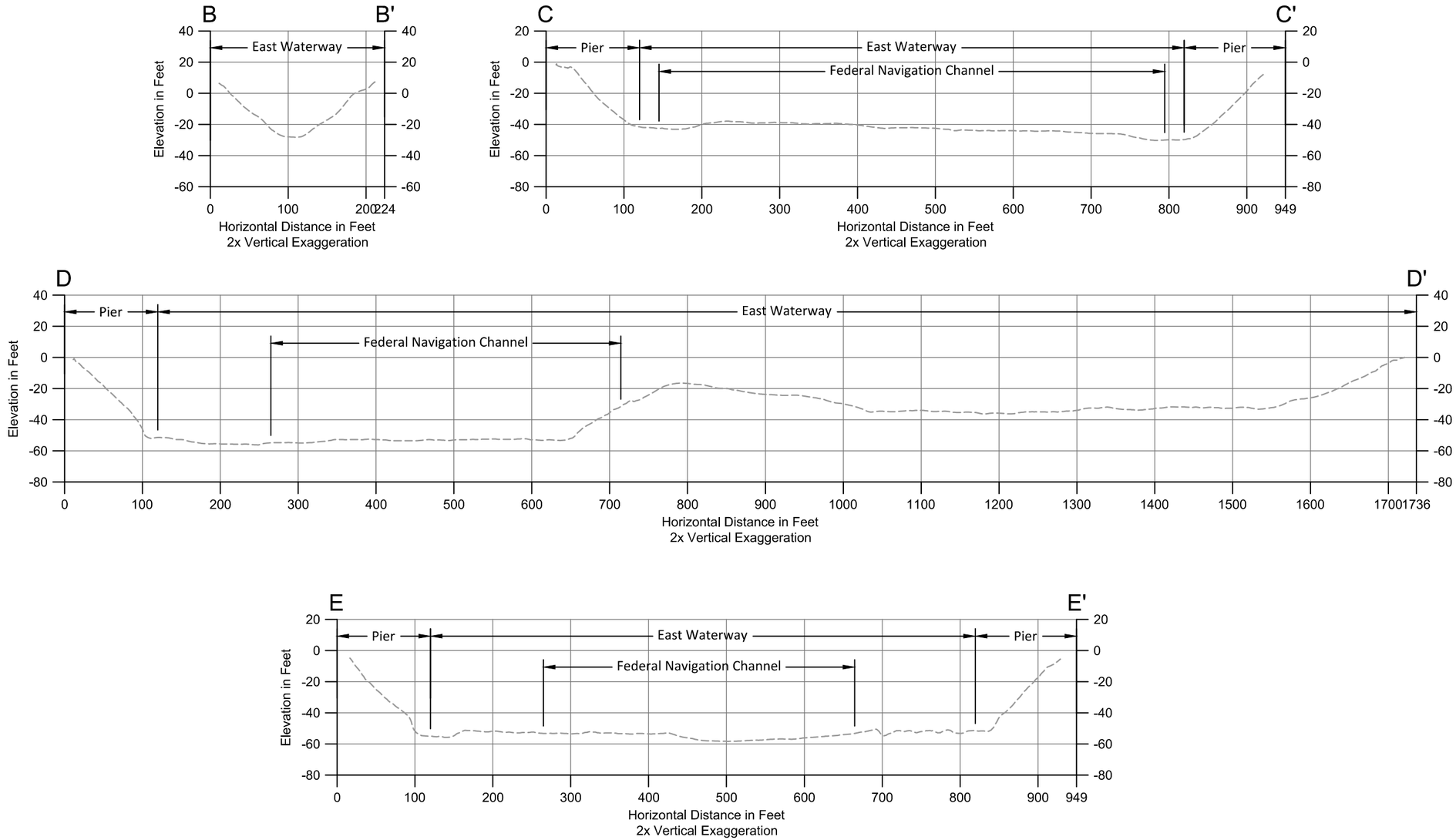
- - - - - - - Existing Mudline

0 150
Scale in Feet

K:\Jobs\060003-PORT OF SEATTLE\060003-01\06000301-RP-067 (Sections).dwg 2-7b

Aug 23, 2013 11:24am epipkin

Map 2-7b
Cross-Sections
Supplemental Remedial Investigation
East Waterway Study Area



SOURCE: Existing bathymetry survey provided by David Evans and Associates.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

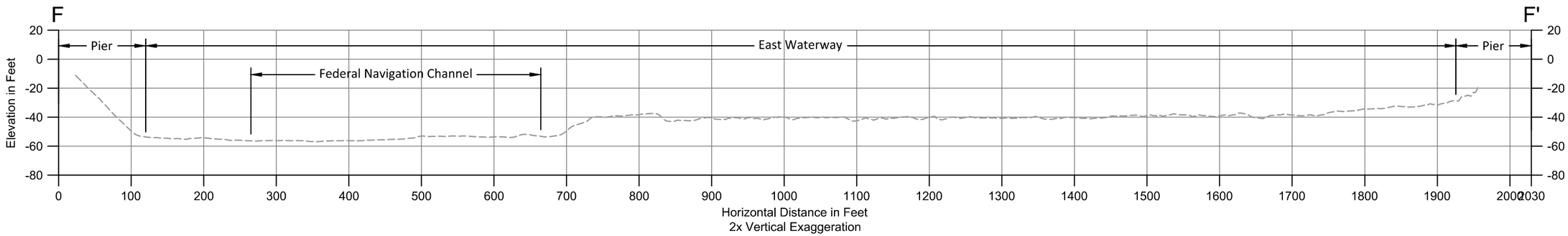
Existing Mudline

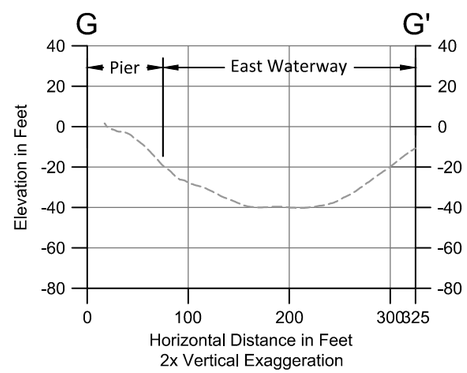
0 150
Scale in Feet

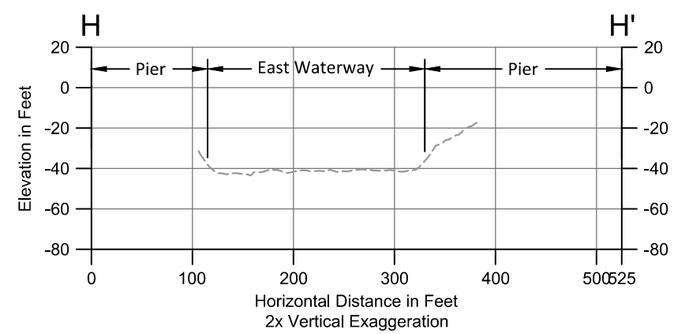
K:\Jobs\060003-PORT OF SEATTLE\060003-01\06000301-RP-067 (Sections).dwg 2-7c

Aug 23, 2013 11:26am epipkin

Map 2-7c
Cross-Sections
Supplemental Remedial Investigation
East Waterway Study Area







K:\Jobs\060003-PORT OF SEATTLE\060003-01\06000301-RP-067 (Sections).dwg 2-7d

Aug 23, 2013 11:26am epipkin

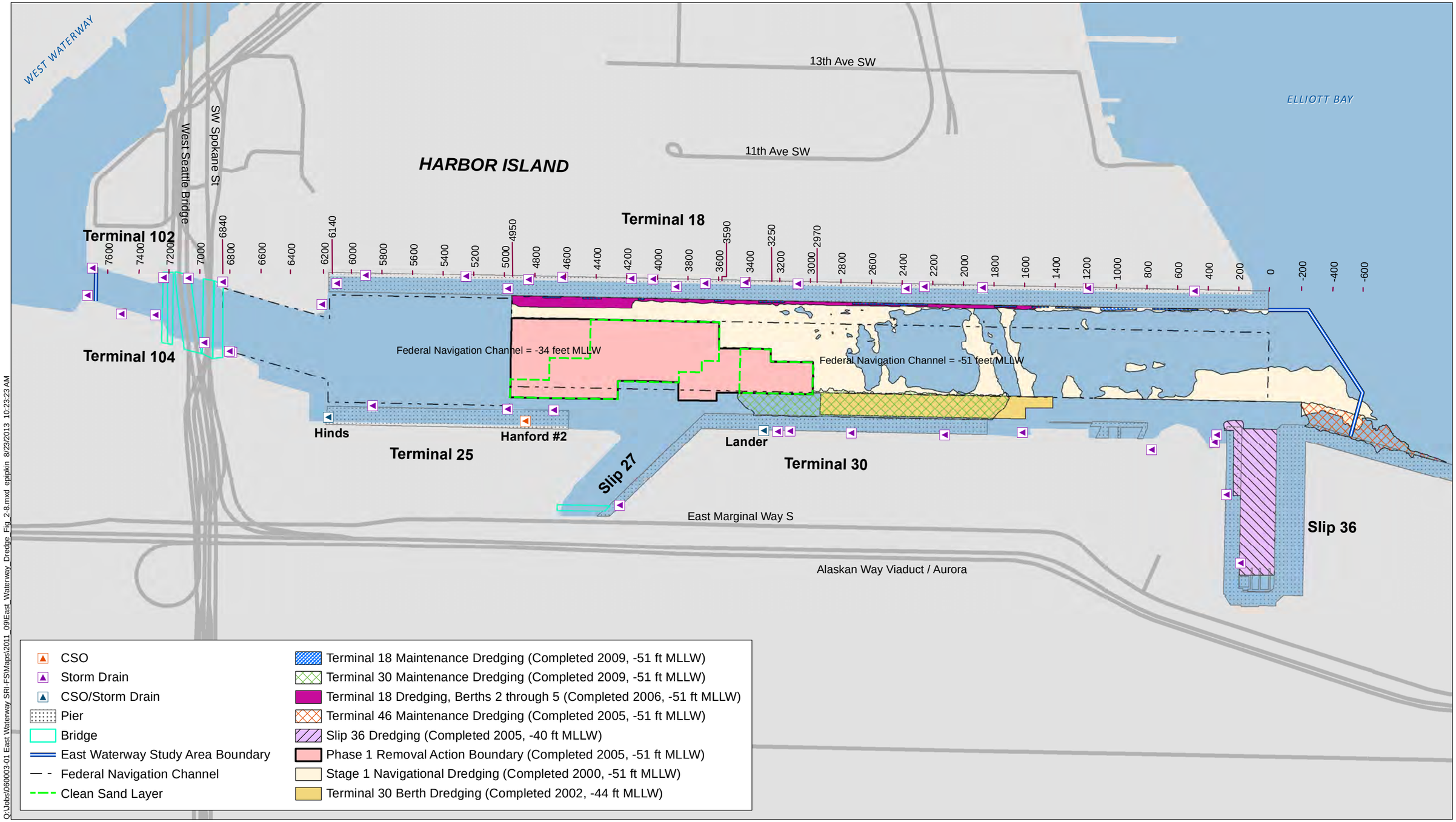
SOURCE: Existing bathymetry survey provided by David Evans and Associates.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

LEGEND:

−−−−−−− Existing Mudline

0 150
Scale in Feet

Map 2-7d
Cross-Sections
Supplemental Remedial Investigation
East Waterway Study Area



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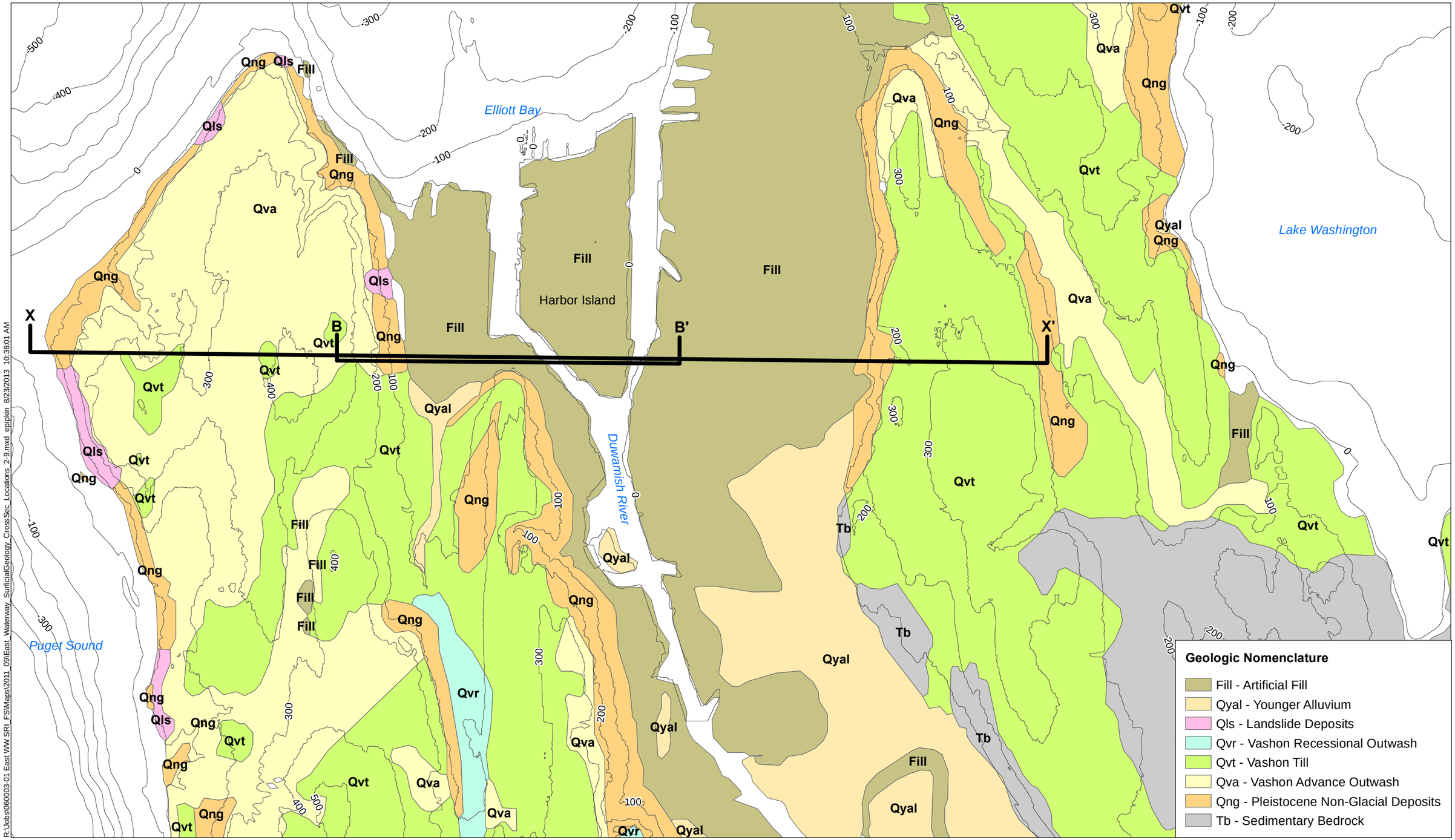
NOTES:
1. Previously established station locations for the East Waterway are shown along the western shoreline for reference.
2. Dredge activities listed indicate events since 2000.

0 300 600 900 1,200
Scale in Feet

Map 2-8
Recent Dredge History
Supplemental Remedial Investigation
East Waterway Study Area



R:\Jobs\0600003-01 East WW SRI_FS\Maps\2011_09\East_Waterway_SurficialGeology_CrossSec_Locations_2-9.mxd epiplin 8/23/2013 10:36:01 AM

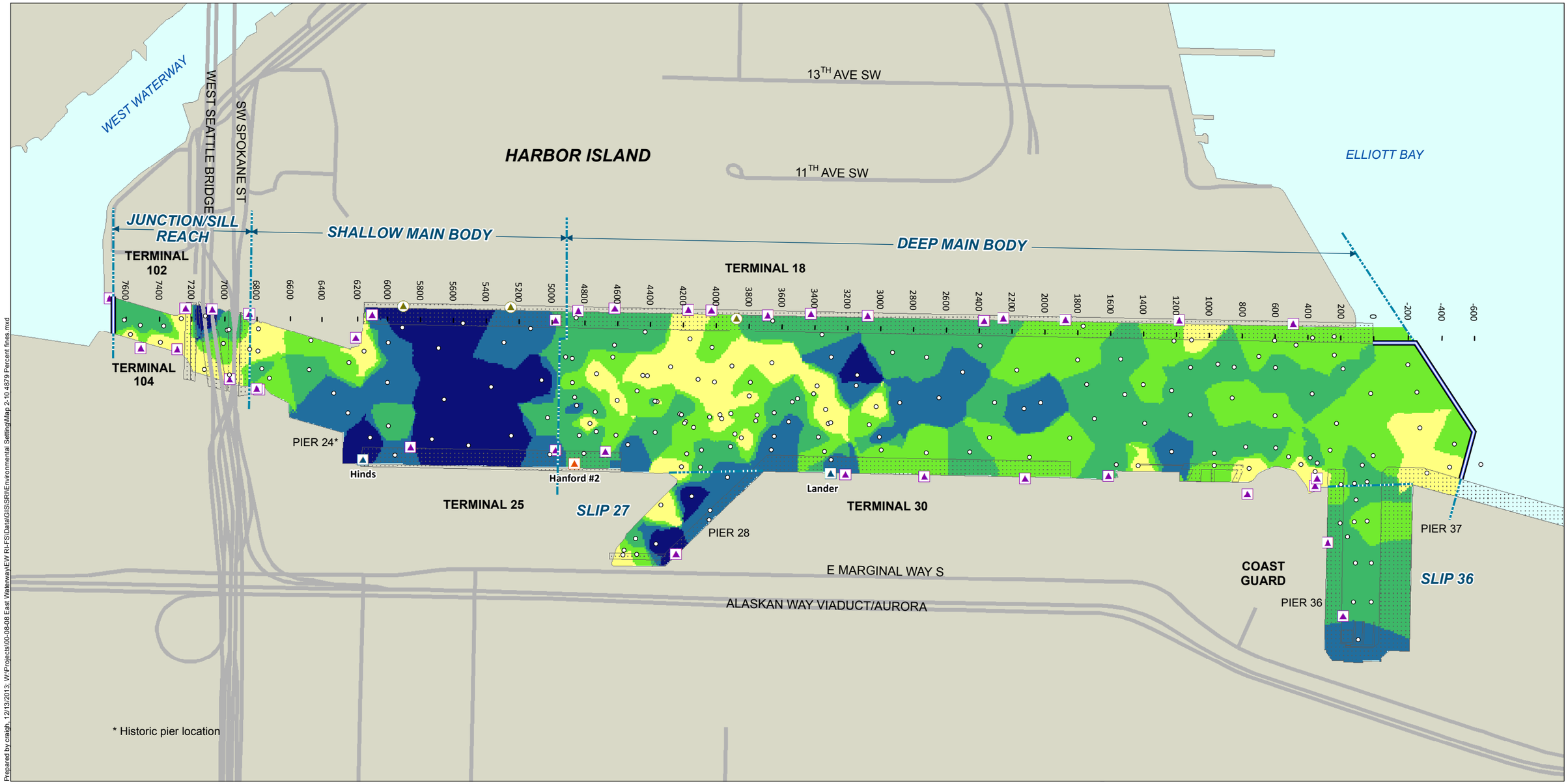
NOTES:

1. Cross section locations are approximated from Booth and Herman (1998). Cross sections are shown on Figure 2-1.
2. Surficial geologic GIS data layer acquired from USGS (http://ngmdb.usgs.gov/Prodesc/proddesc_82852.htm).
3. Geologic unit nomenclature was revised from USGS to correspond with Booth and Herman (1998).
4. Qng includes units Qtb (transitional beds), Qob (Olympia beds), and Q(B)f (fine grained deposits) of Booth and Herman (1998).
5. Topograhic contour GIS data layer acquired from King County (http://www5.kingcounty.gov/gisdataportal/Default.aspx).

0 0.5 1
Miles

N

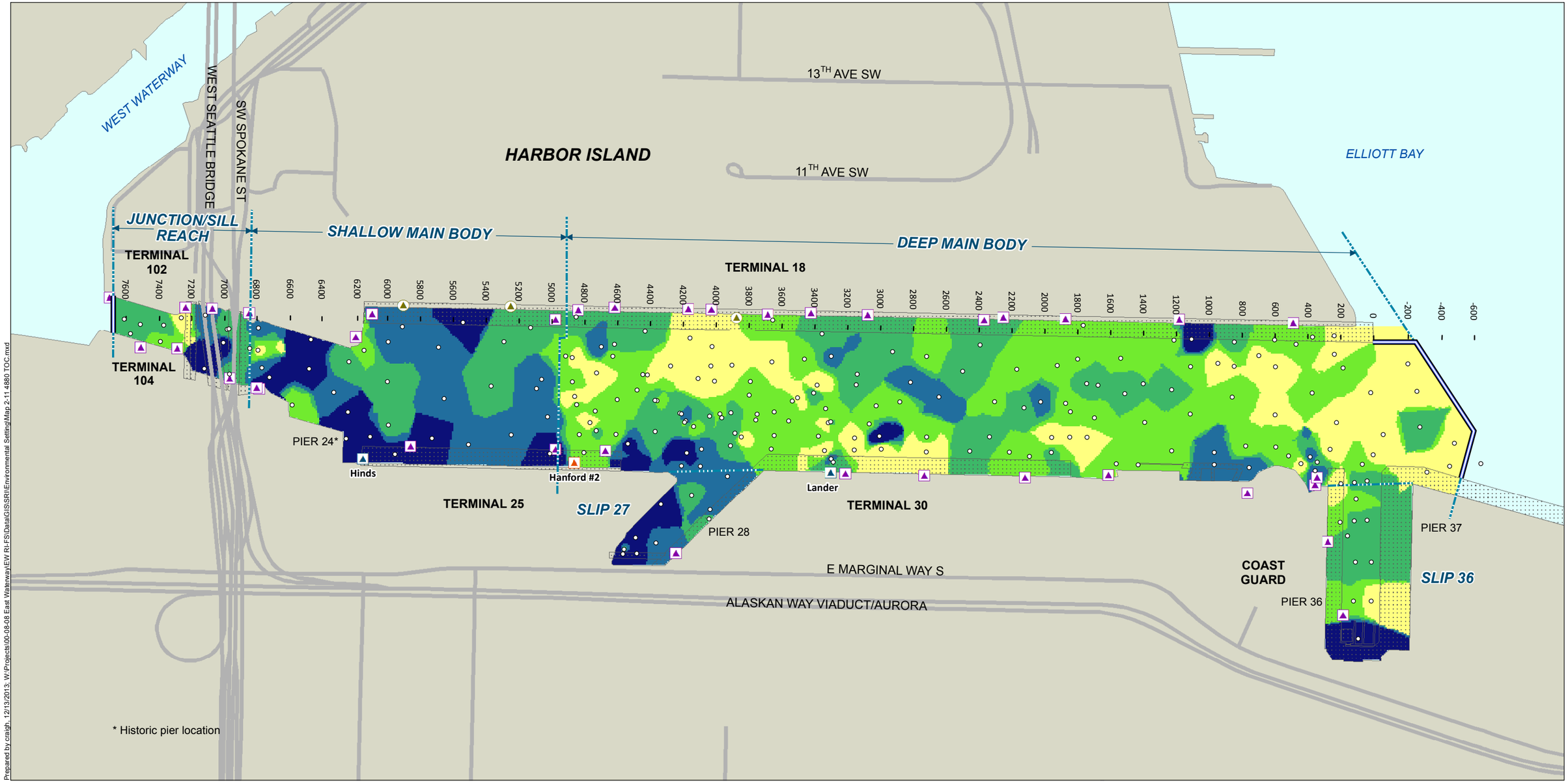
Map 2-9
Surficial Geology with Cross Section Locations
Supplemental Remedial Investigation
East Waterway Study Area



Fines (% dw)
- > 80%
- > 60% and ≤ 80%
- > 40% and ≤ 60%
- > 20% and ≤ 40%
- ≤ 20%
- Fines Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

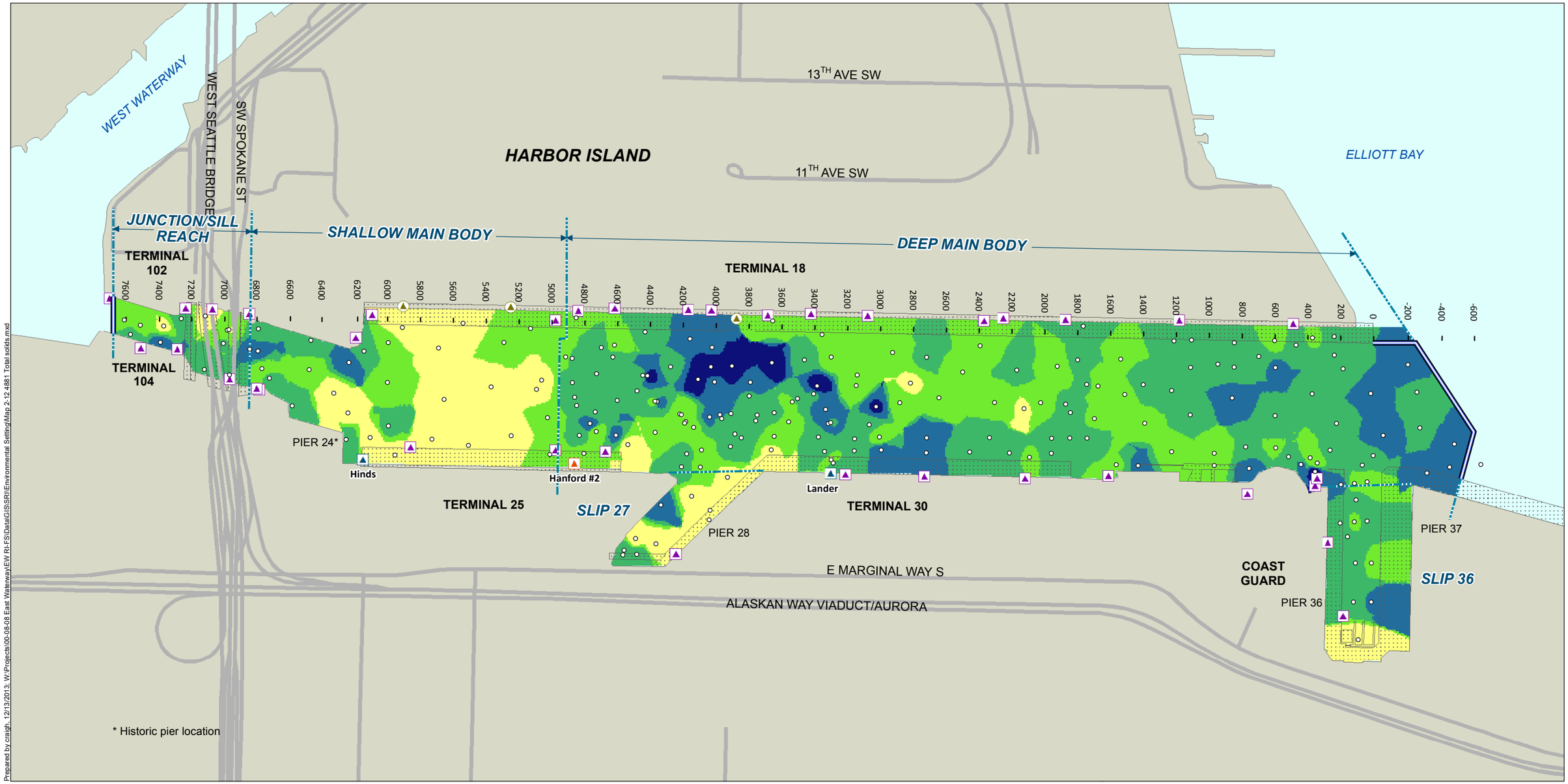
0 600
Scale in feet

Map 2-10
Percent Fines in Surface Sediment (0 to 10 cm)
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Environmental Setting\Map 2-11 4880 TOC.mxd

Map 2-11
Total Organic Carbon in Surface Sediment (0 to 10 cm)
Supplemental Remedial Investigation
East Waterway Study Area

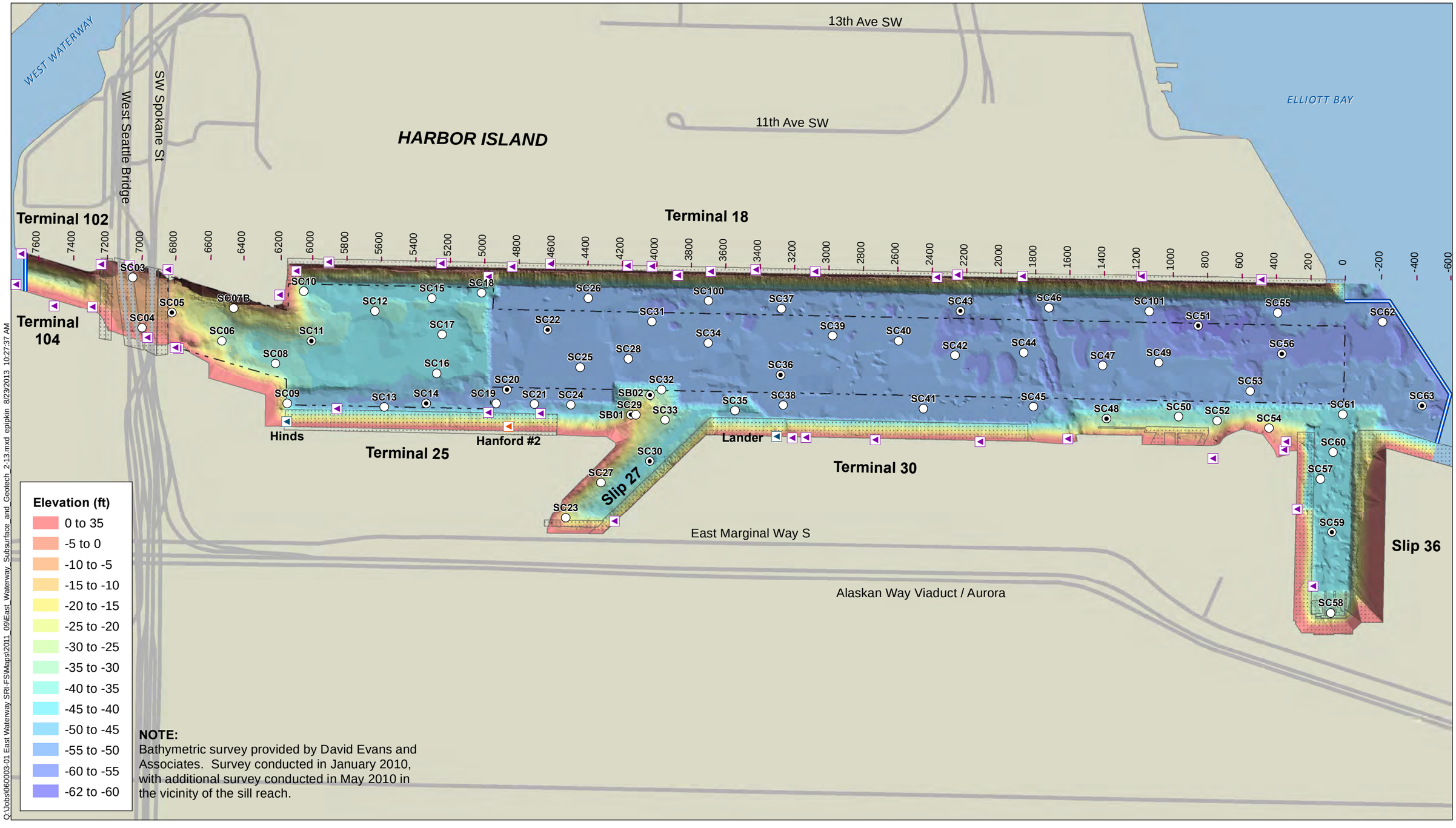


Total Solids (% ww)

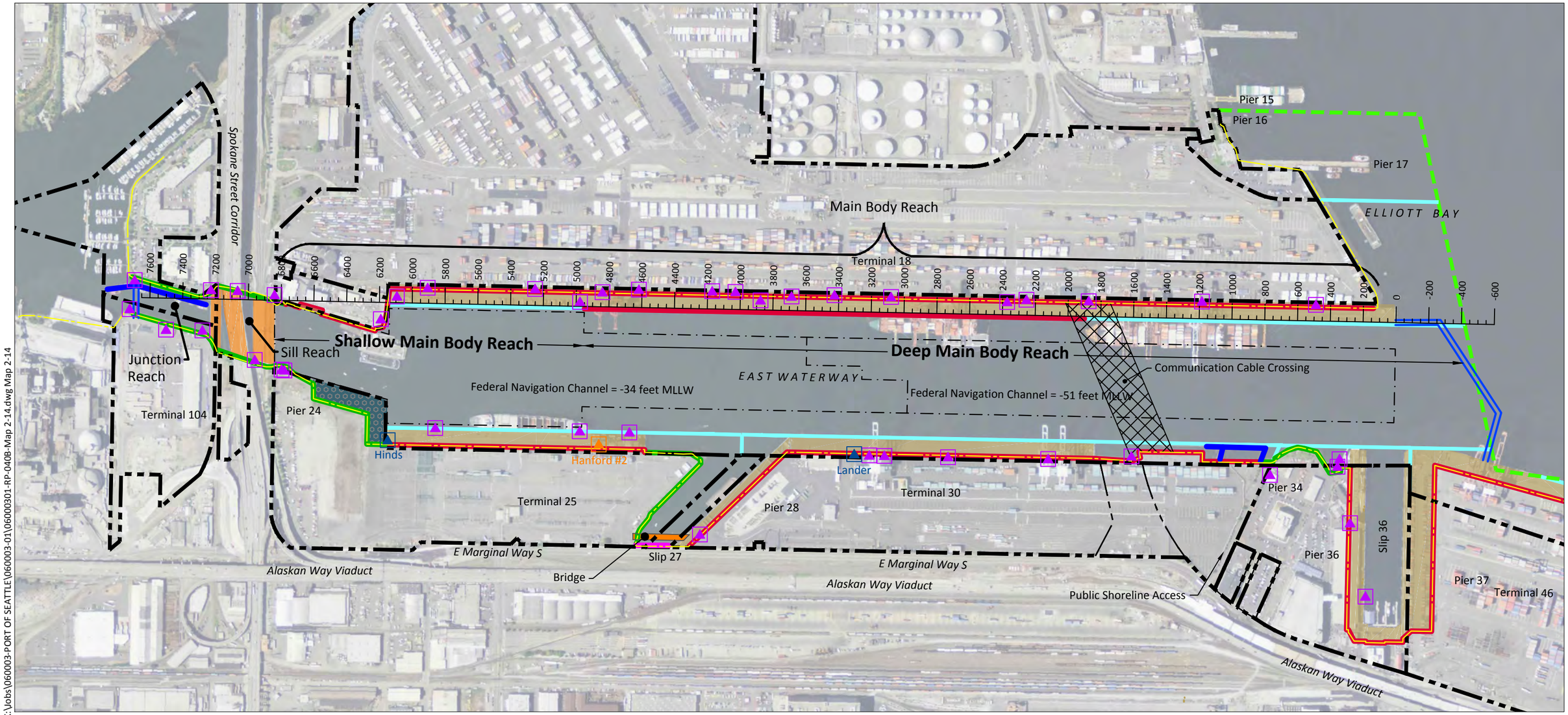
- > 80%
- > 70% and ≤ 80%
- > 60% and ≤ 70%
- > 50% and ≤ 60%
- ≤ 50%
- Total Solids Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

0 600
Scale in feet

Map 2-12
Total Solids in Surface Sediment (0 to 10 cm)
Supplemental Remedial Investigation
East Waterway Study Area



Map 2-13
SRI Subsurface and Geotechnical Sampling Locations
Supplemental Remedial Investigation
East Waterway Study Area



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Aug 23, 2013 11:39am epipkin

NOTES:

1. Previously established station locations for the East Waterway are shown along the western shoreline for reference.
2. Values along Westside of East Waterway are station reference values.
3. Aerial photo, NAIP 2011.

LEGEND:

- Property Line
- East Waterway Study Boundary
- MHHW Line
- Pierhead Line
- Outer Harbor Line
- Federal Navigation Channel
- Piling Field
- Sheetpile Wall
- Exposed Riprap
- Overwater Pier Above Riprap
- Concrete or Timber Bulkhead
- Bridge
- Timber Dock
- CSO
- Storm Drain
- CSO/Storm Drain Location

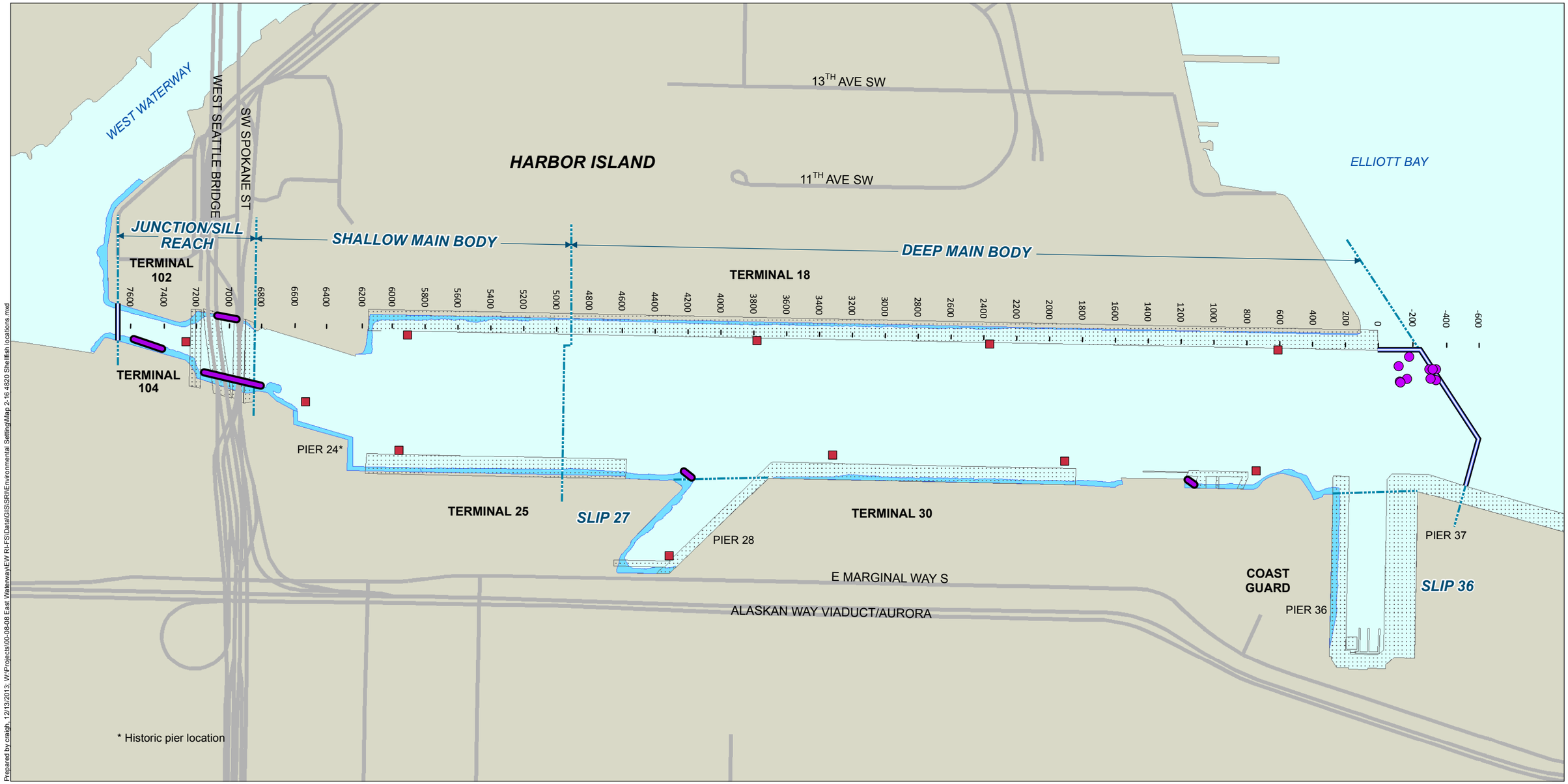
0 600
Scale in Feet

Map 2-14
Shoreline Structures
Supplemental Remedial Investigation
East Waterway Study Area

Q:\Jobs\060003-01 East Waterway SRI-FS\Maps\2011_09\East_Waterway_FlowTideStations_2-15.mxd epipkin 8/23/2013 10:33:59 AM

River
Basin Boundary
NOAA Tide Station
USGS Flow Gage Station

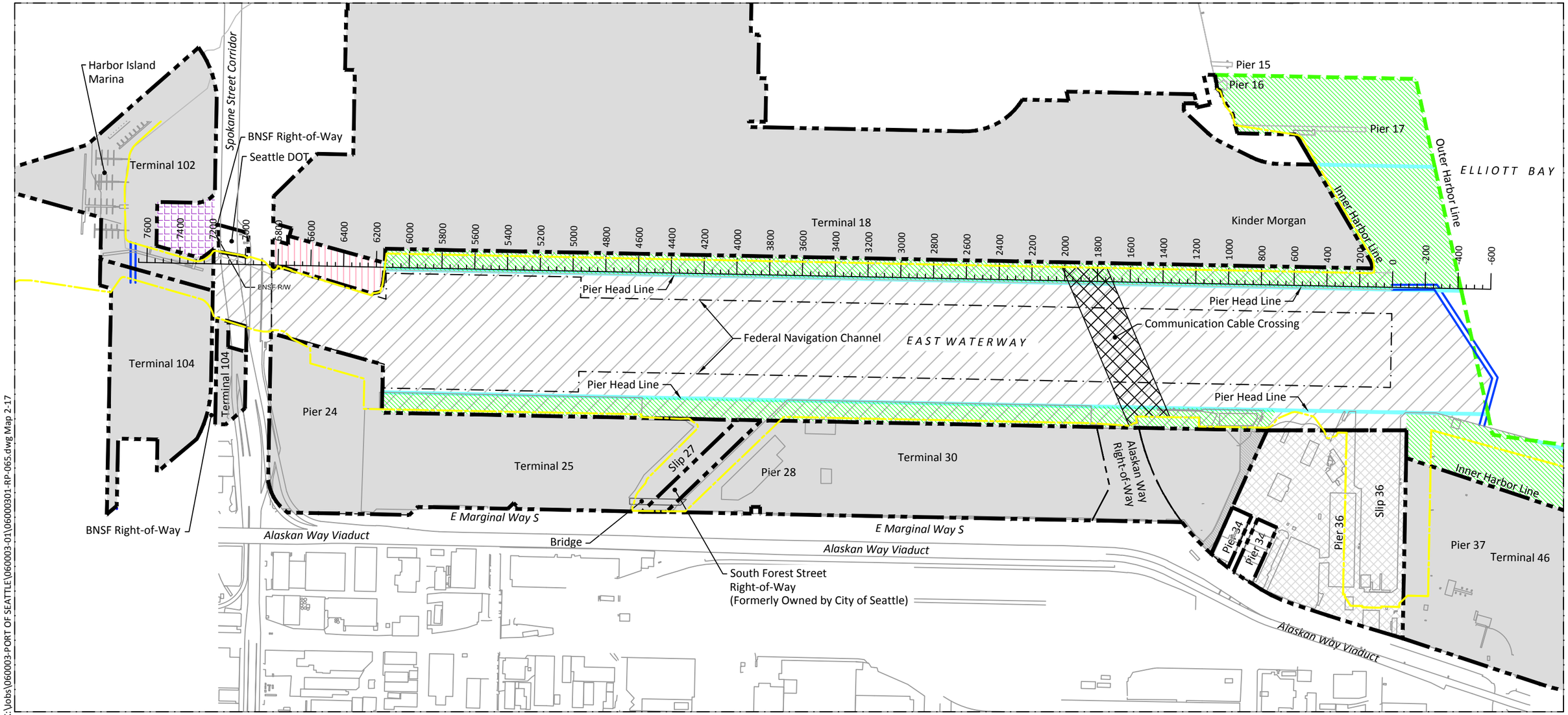
Map 2-15
Flow and Tide Gage Stations within the Green/Duwamish River Watershed
Supplemental Remedial Investigation
East Waterway Study Area



- Clam Collection Beach
- Geoduck Sampling Location
- Mussel Sampling Location
- Intertidal zone
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

0 600
Scale in feet

Map 2-16
East Waterway Shellfish Sampling Locations
Supplemental Remedial Investigation
East Waterway Study Area



K:\Jobs\060003-PORT OF SEATTLE\060003-01\06000301-RP-065.dwg Map 2-17

Aug 23, 2013 11:49am epipkin

NOTES:

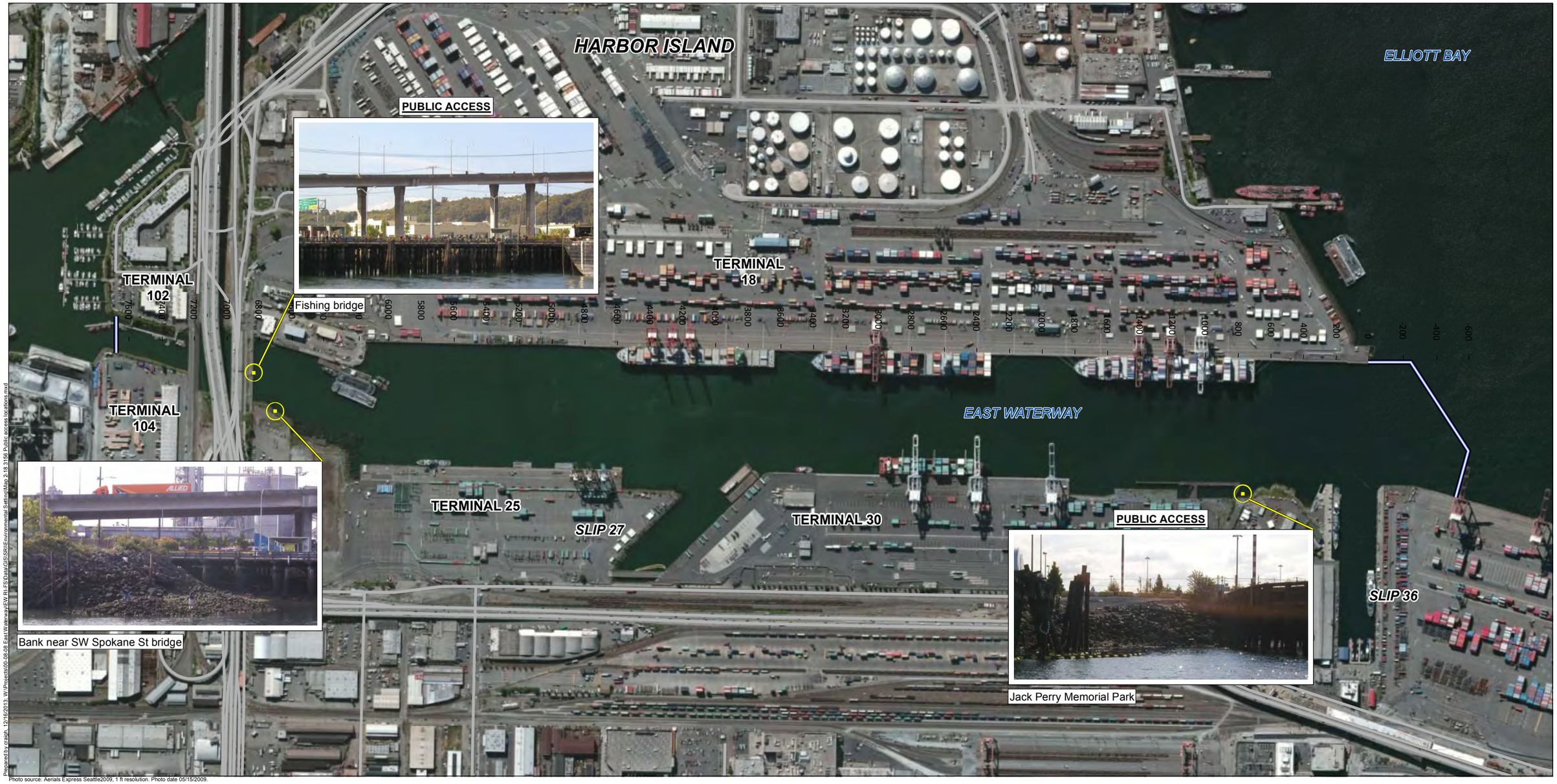
1. Previously established station locations for the East Waterway are shown along the western shoreline for reference.
2. Olympic Tug and Barge operates as a subsidiary to Harley Marine Services.

LEGEND:

- Property Line
- East Waterway Study Boundary
- MHHW Line
- Pier Head Line
- Outer Harbor Line
- Federal Navigation Channel
- Port of Seattle
- Harbor Real Estate
- Duwamish Properties, operated by Harley Marine Services
- US Coast Guard
- State-owned Land Managed by the Port of Seattle Under Current Port Management Agreement (PMA) with DNR
- State-owned Land Within East Waterway
- Communication Cable Crossing
- Park/Public Space

0 600
Scale in Feet

Map 2-17
Upland and Aquatic Ownership
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by cralph, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Environmental Setting\Map 2-18 3156 Public access locations.mxd

Photo source: Aerials Express Seattle2009, 1 ft resolution. Photo date 05/15/2009.

0 600
Scale in feet

Photo Locations
East Waterway Study Area

Map 2-18
Public Access Locations Within the East Waterway
Supplemental Remedial Investigation
East Waterway Study Area

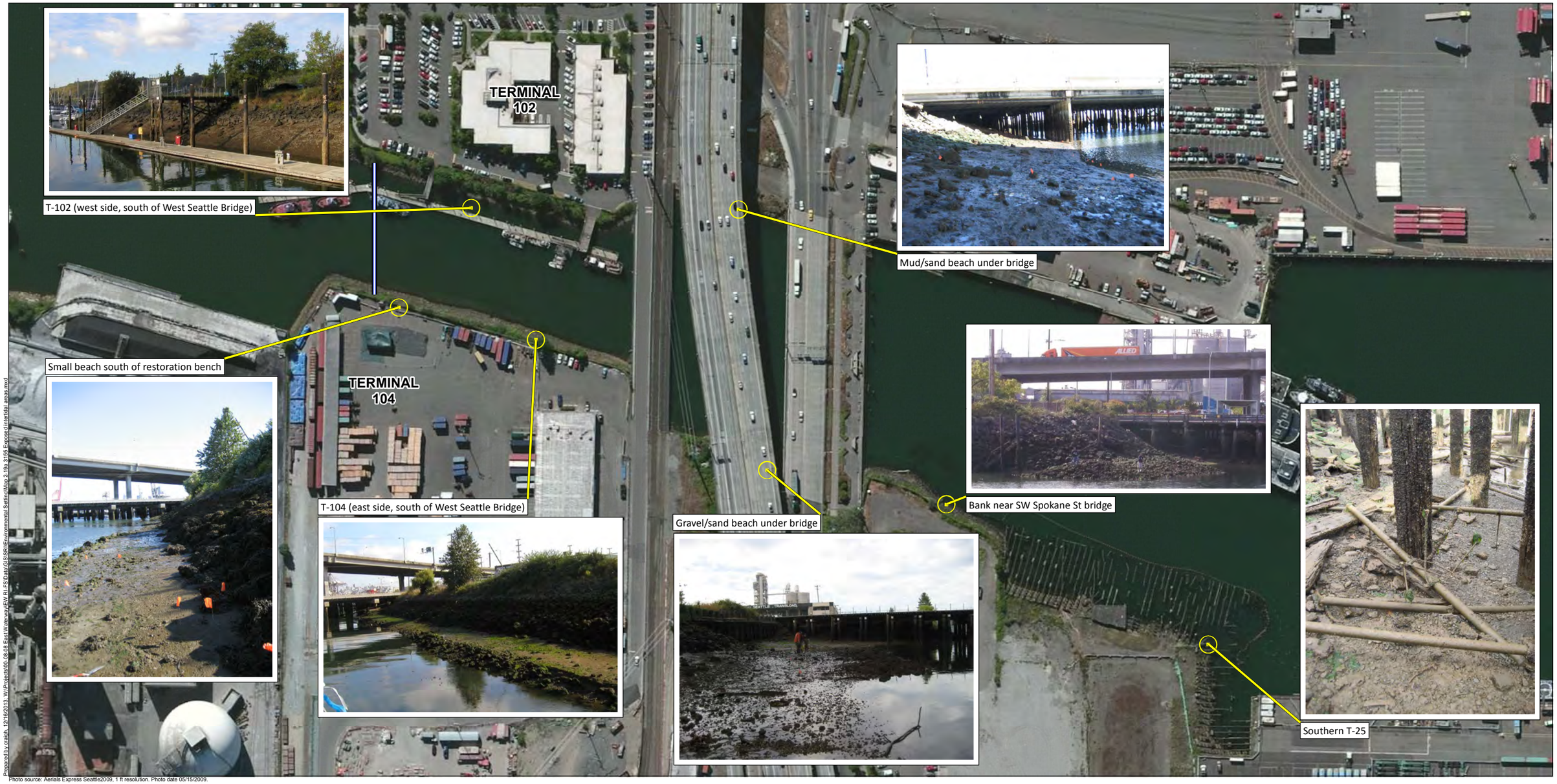


Photo source: Aerials Express Seattle2009, 1 ft resolution. Photo date 05/15/2009.

Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Environmental Setting\Map 2-19a 3155 Exposed intertidal areas.mxd

0 300
Scale in feet

Photo Locations
East Waterway Study Area

Map 2-19a
Exposed Intertidal Areas Within the East Waterway
Supplemental Remedial Investigation
East Waterway Study Area

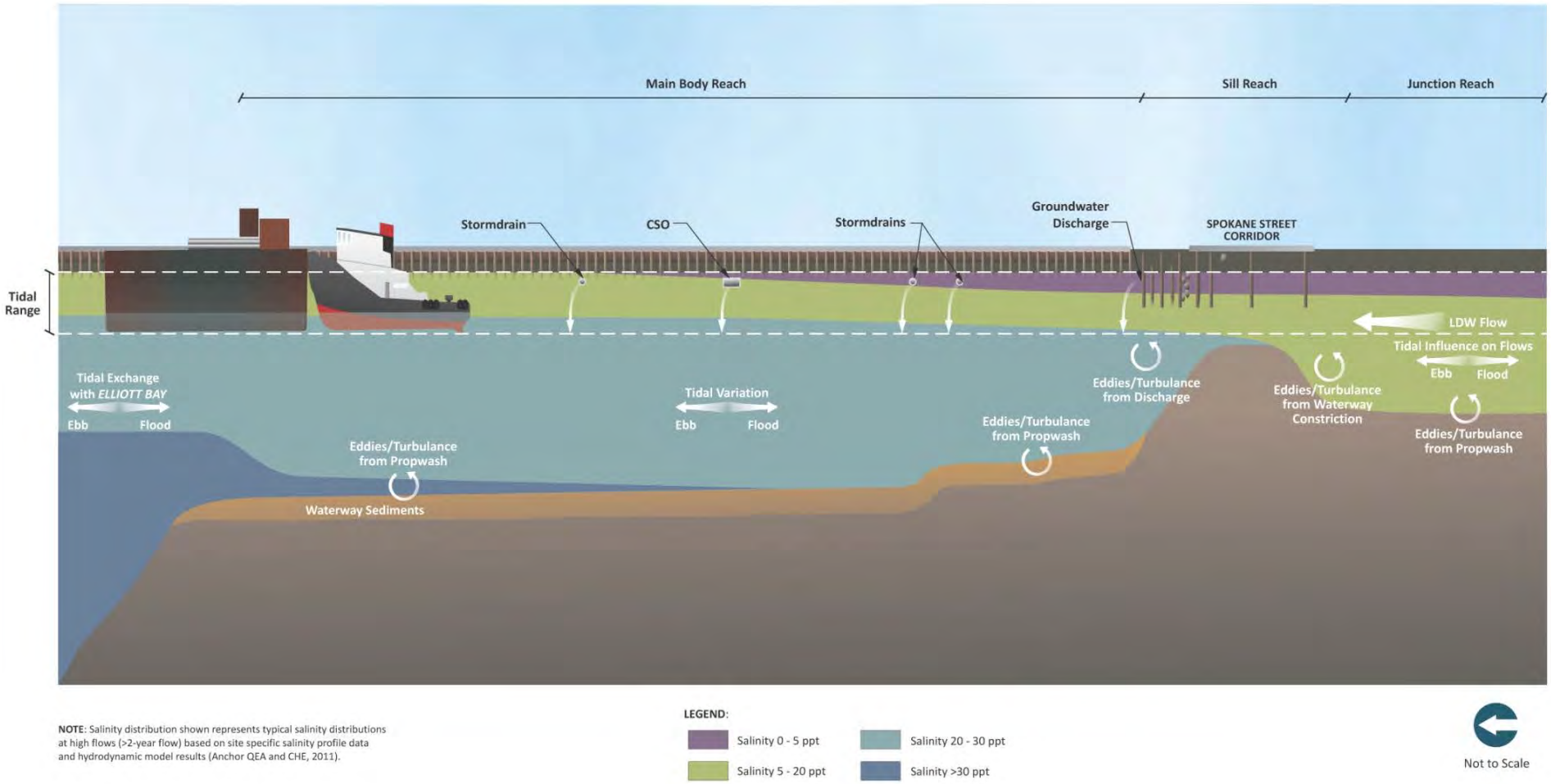
Photo source: Aerials Express Seattle2009, 1 ft resolution. Photo date 05/15/2009.

Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SSRI\Environmental Settings\Map 2-19b 3155 Exposed intertidal areas.mxd

0 600
Scale in feet

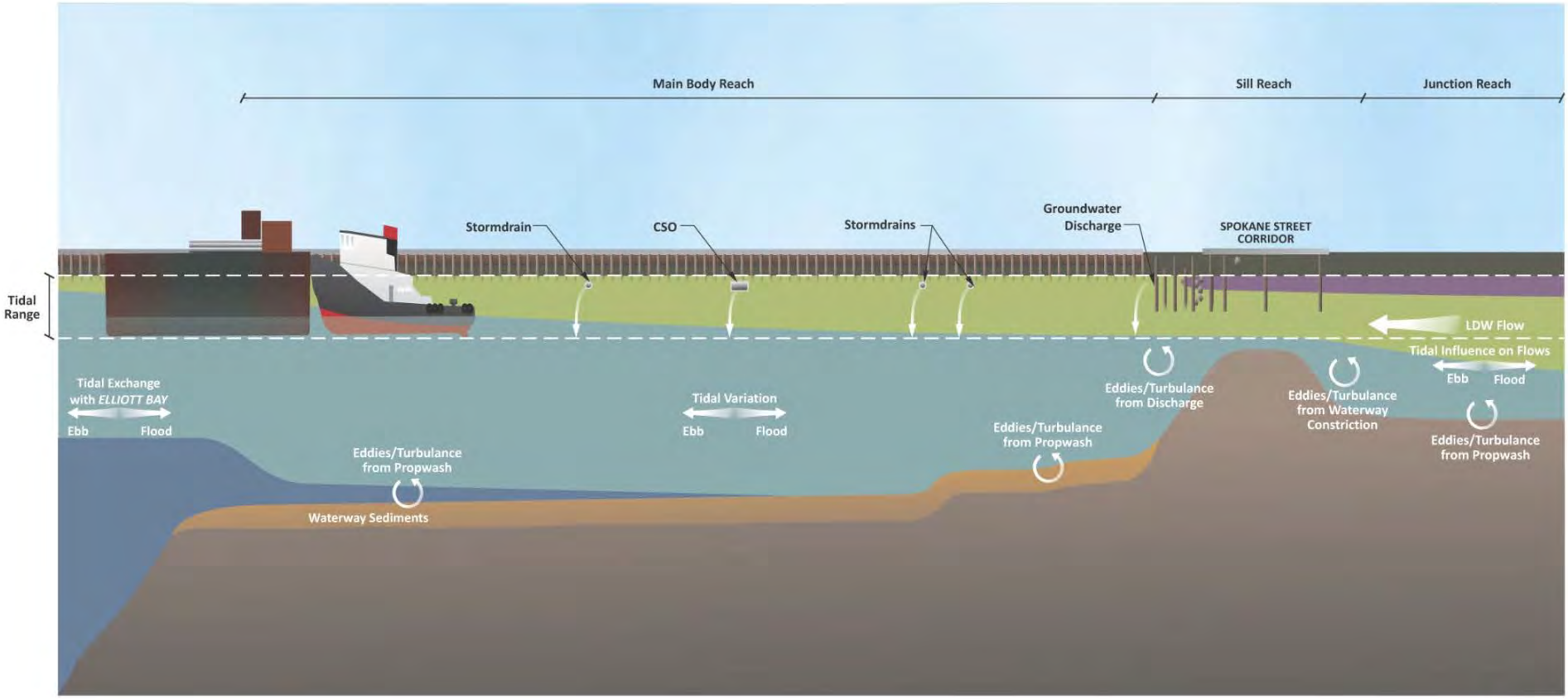
Photo Locations
East Waterway Study Area

Map 2-19b
Exposed Intertidal Areas Within the East Waterway
Supplemental Remedial Investigation
East Waterway Study Area



NOTE: Salinity distribution shown represents typical salinity distributions at high flows (>2-year flow) based on site specific salinity profile data and hydrodynamic model results (Anchor QEA and CHE, 2011).

Map 3-1a
Summary of Hydrodynamics in East Waterway, Flow Events Greater than a 2-Year Flow
Draft Supplemental Remedial Investigation
East Waterway Operable Unit



NOTE: Salinity distribution shown represents typical salinity distributions at low flows (>2-year flow) based on site specific salinity profile data and hydrodynamic model results (Anchor QEA and CHE, 2011).

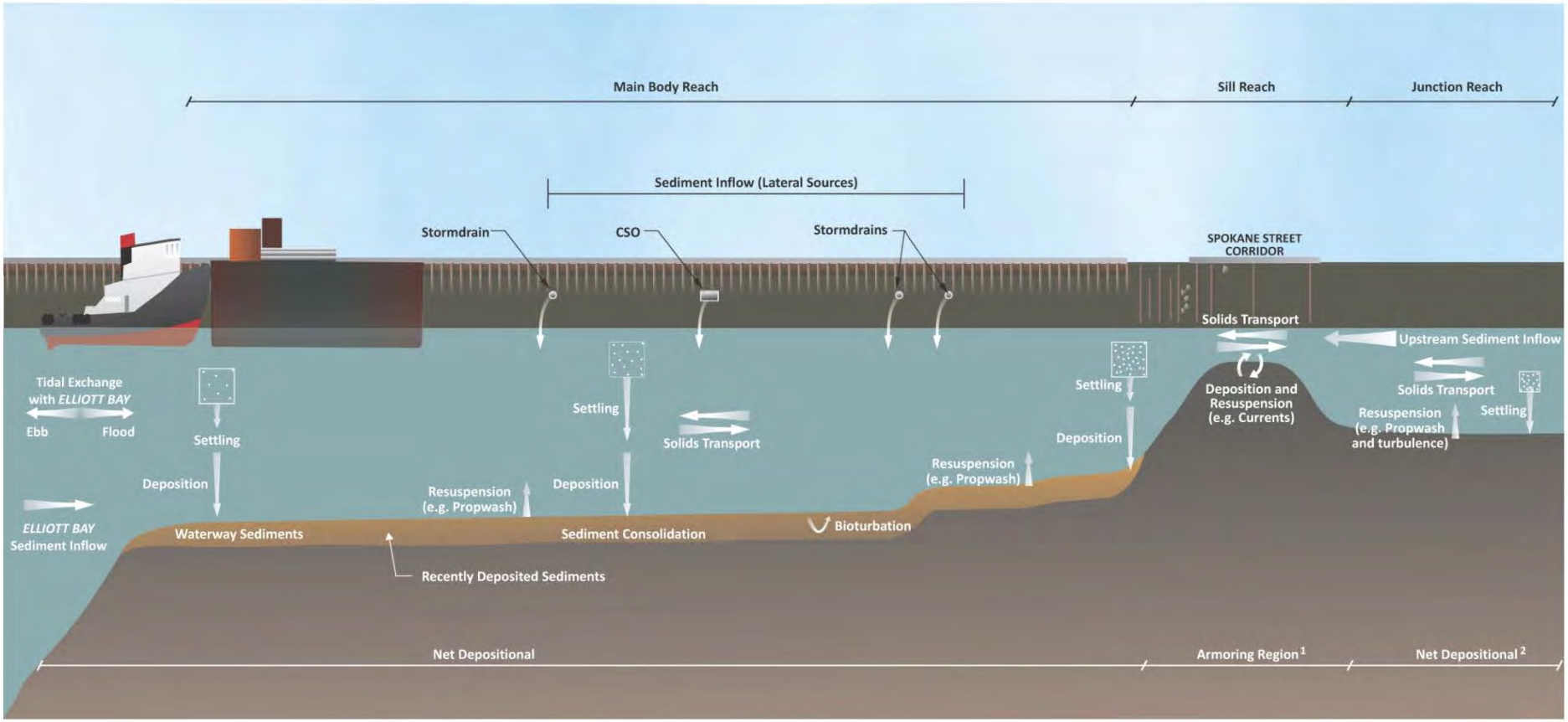
LEGEND:

- Salinity 0 - 5 ppt
- Salinity 5 - 20 ppt
- Salinity 20 - 30 ppt
- Salinity >30 ppt

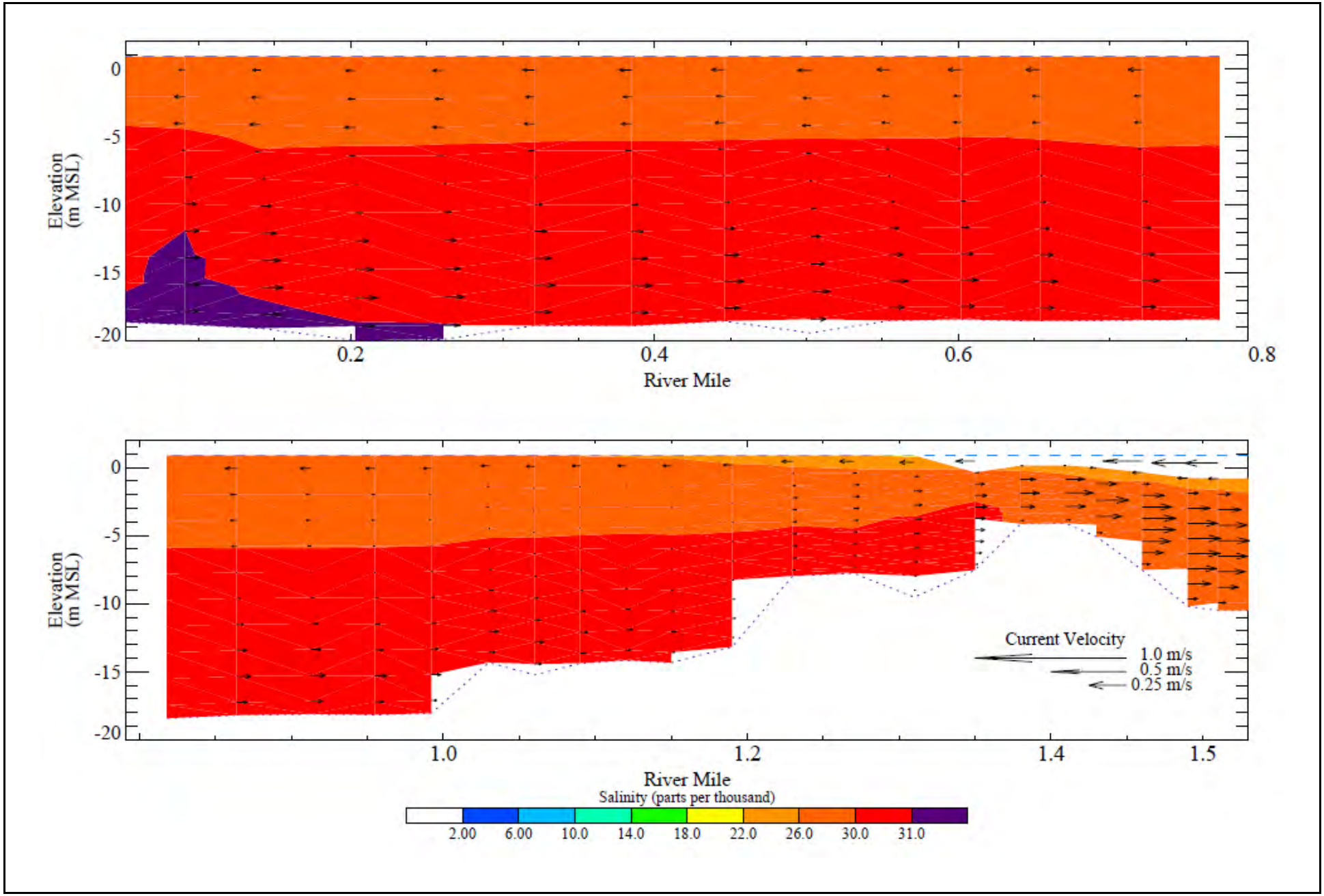
Not to Scale

Map 3-1b

Summary of Hydrodynamics in East Waterway, Flow Events Equal to or Less than a 2-Year Flow
Draft Supplemental Remedial Investigation
East Waterway Operable Unit

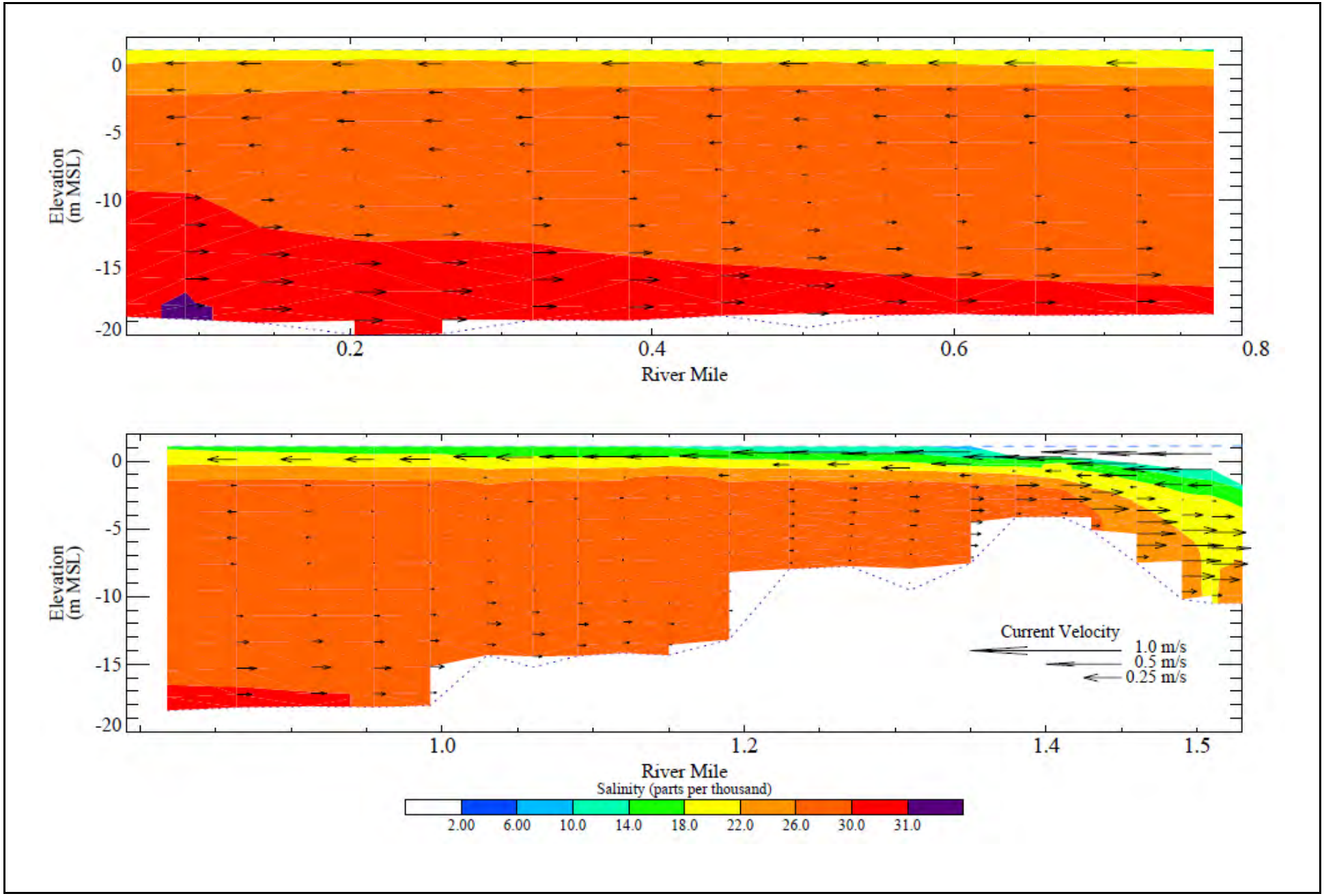


Map 3-2
Summary of Sediment Transport in East Waterway
Draft Supplemental Remedial Investigation
East Waterway Operable Unit



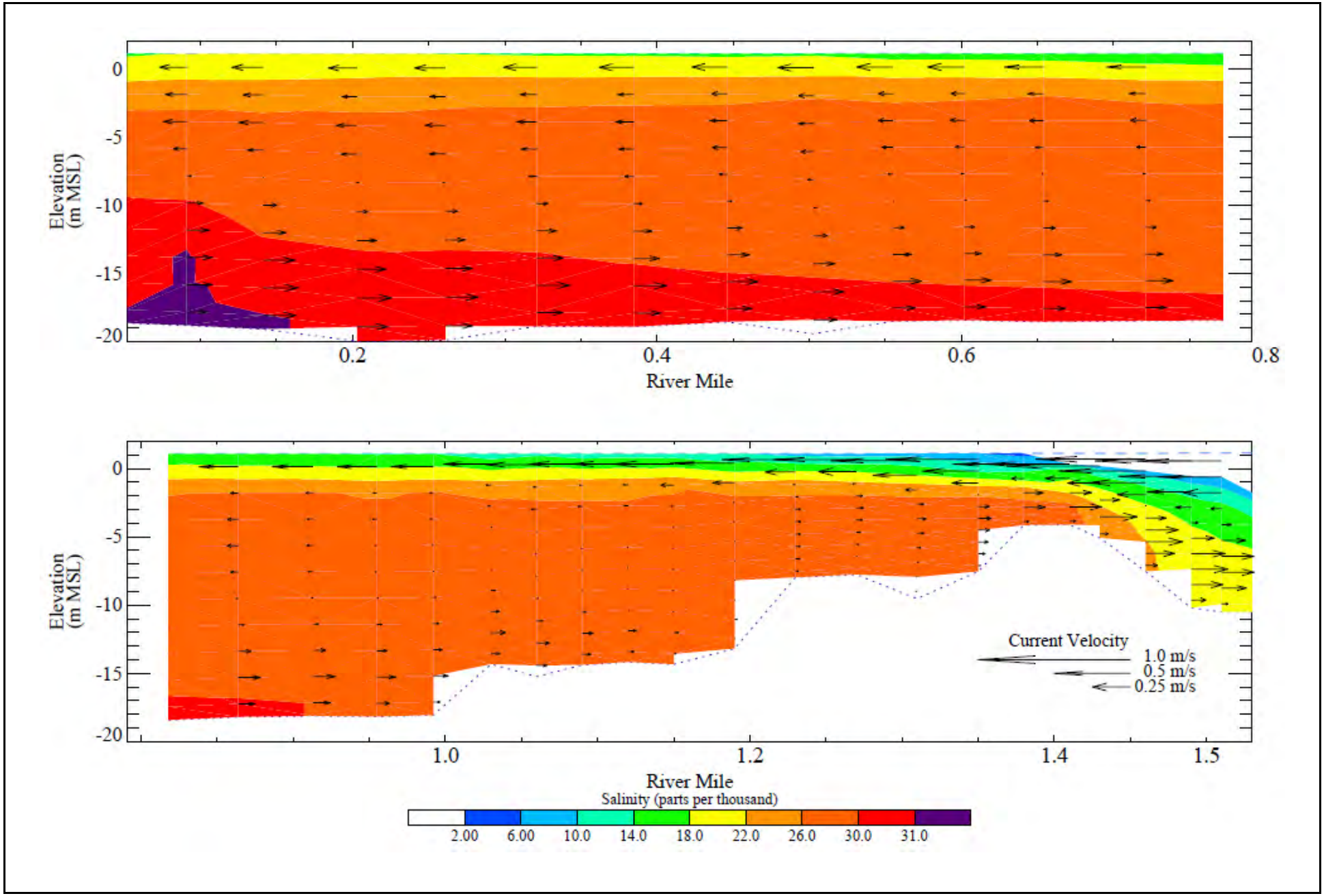
Map 3-3

Hydrodynamic Model Results: Transect of Salinity and Velocity at Flood Tide with Mean Annual Upstream Flow
Supplemental Remedial Investigation
East Waterway Study Area

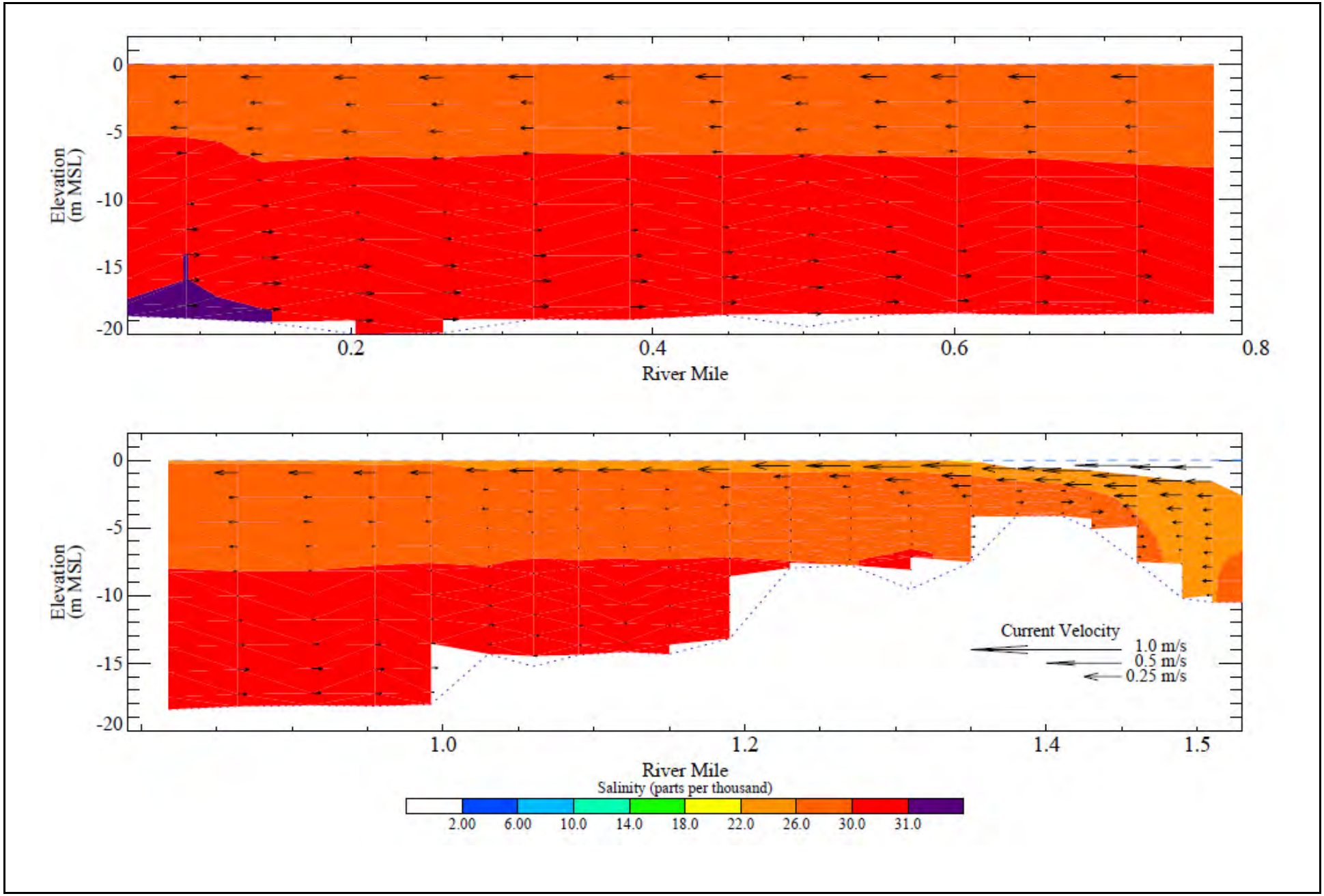


Map 3-4

Hydrodynamic Model Results: Transect of Salinity and Velocity at Flood Tide with 2-Year Upstream Flow
Supplemental Remedial Investigation
East Waterway Study Area



Map 3-5
Hydrodynamic Model Results: Transect of Salinity and Velocity at Flood Tide with 100-Year Upstream Flow
Supplemental Remedial Investigation
East Waterway Study Area

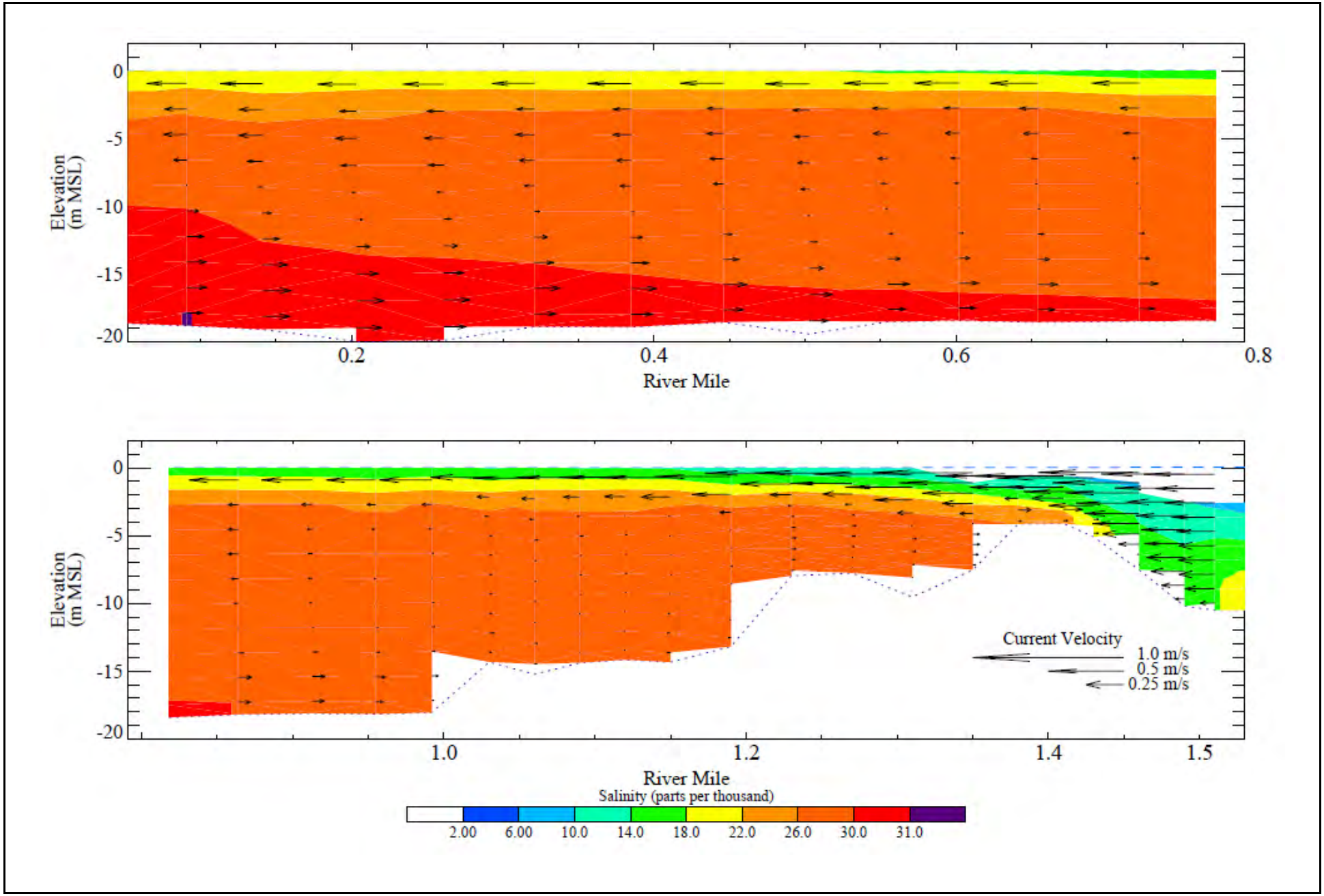


Map 3-6

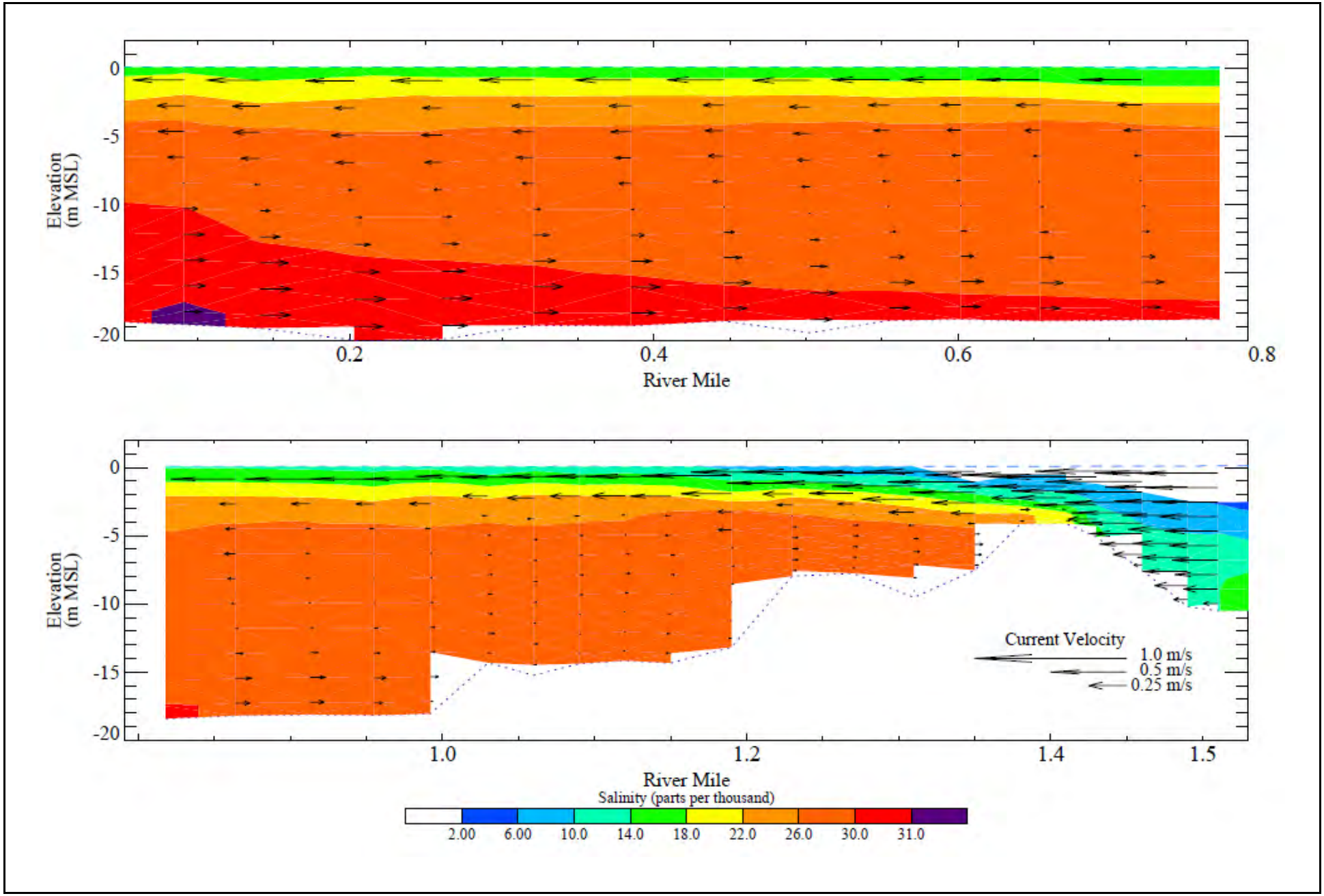
Hydrodynamic Model Results: Transect of Salinity and Velocity at Ebb Tide with Mean Annual Upstream Flow

Supplemental Remedial Investigation

East Waterway Study Area

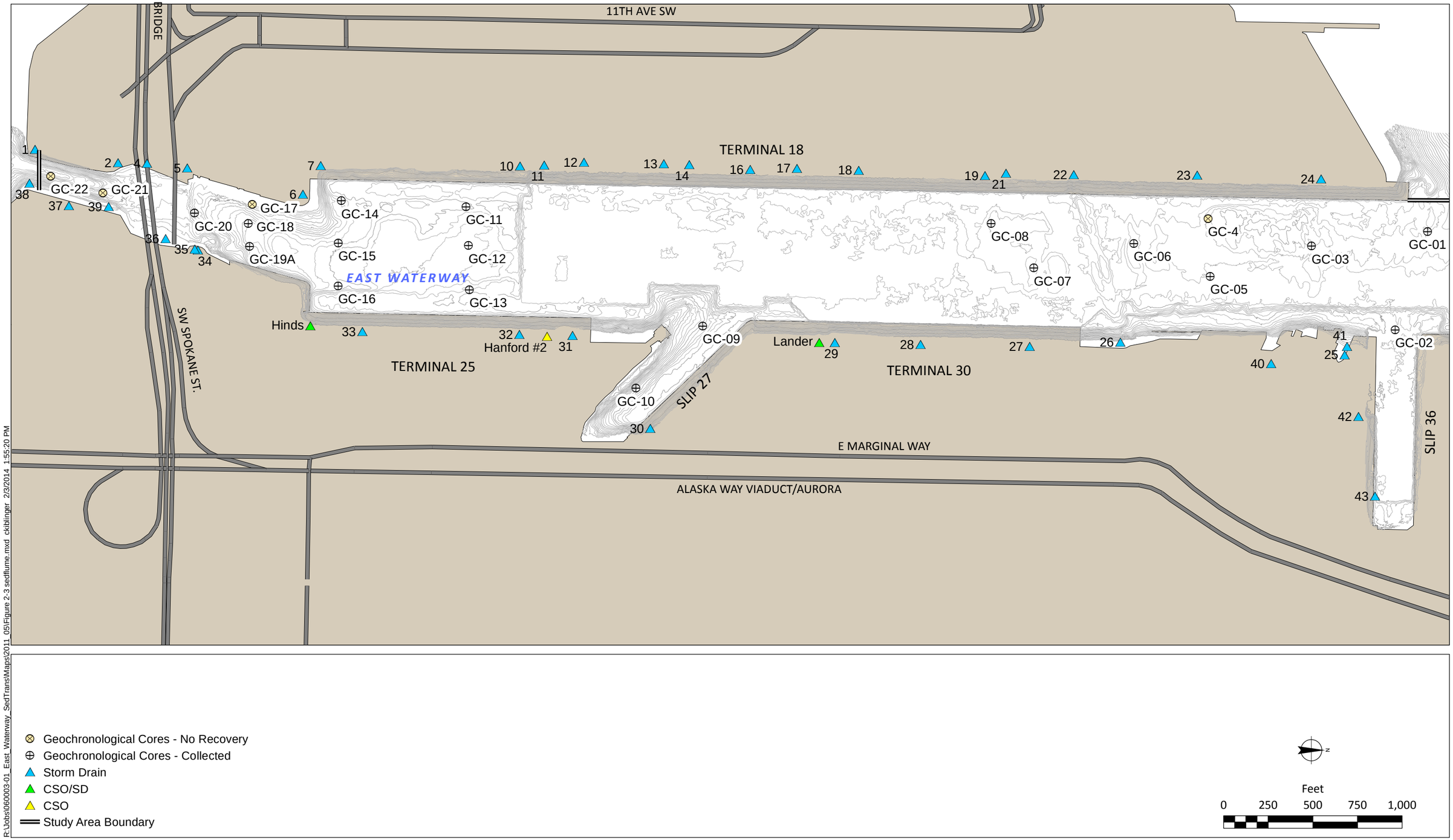


Map 3-7
Hydrodynamic Model Results: Transect of Salinity and Velocity at Ebb Tide with 2-Year Upstream Flow
Supplemental Remedial Investigation
East Waterway Study Area



Map 3-8
Hydrodynamic Model Results: Transect of Salinity and Velocity at Ebb Tide with 100-Year Upstream Flow
Supplemental Remedial Investigation
East Waterway Study Area

Map 3-9
Operational Propwash Areas
Draft Supplemental Remedial Investigation
East Waterway Operable Unit



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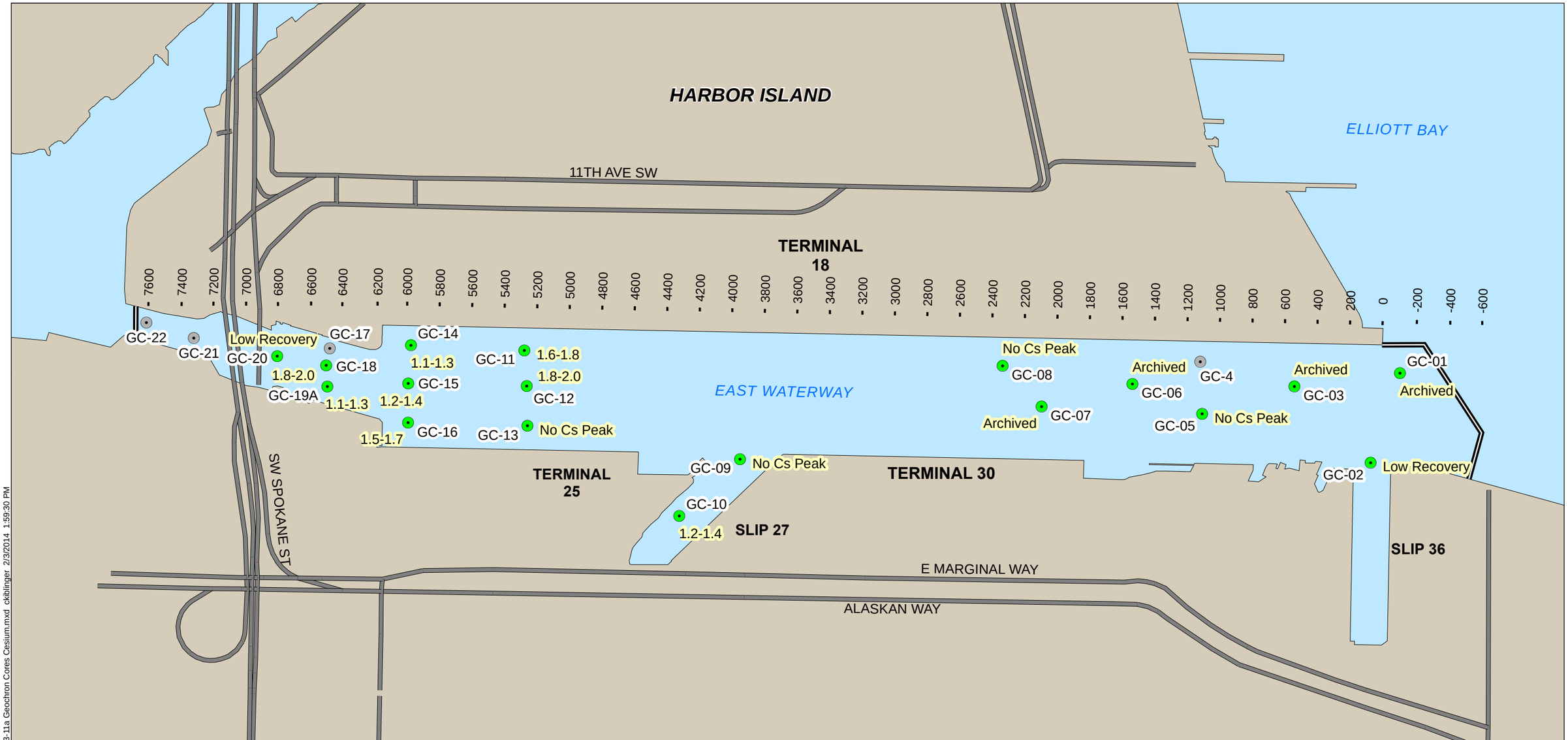
Map 3-10
Geochronological Core Locations
Draft Supplemental Remedial Investigation Report
East Waterway Operable Unit



Geochronological Cores, Cesium-137 Results
Geochronological Cores - No Recovery
Study Area Boundary

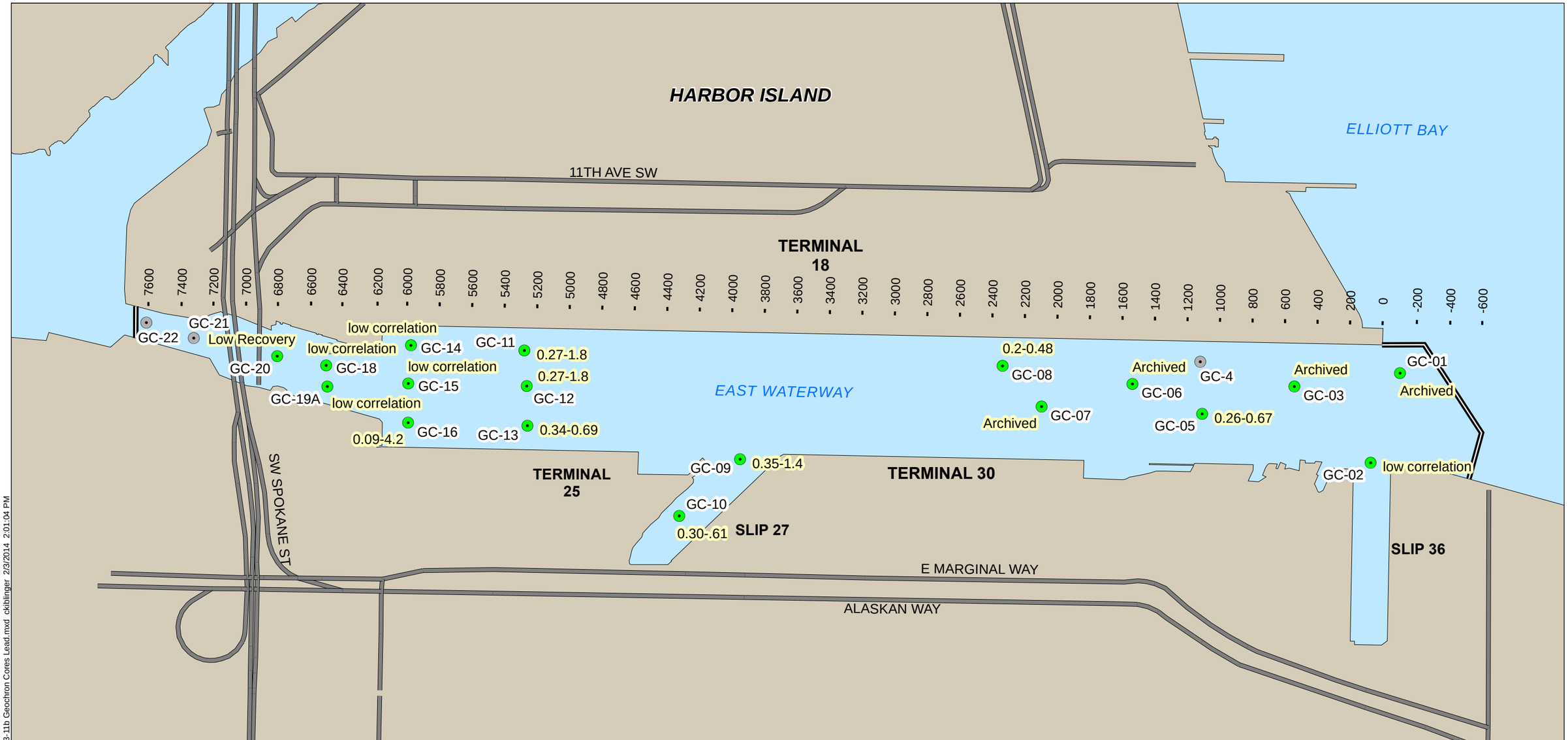
NOTES:
1. Horizontal Datum: NAD 83 WA North US ft
2. Rates are in cm/yr.
3. Presented locations represent accepted at or final attempt.
4. Low recovery: cores that were less than 45 cm in length upon retrieval.
5. Samples collected in July 2010 have been archived to support additional testing.

N

0 500 1,000
Scale in Feet

R:\Jobs\060003-01 East WW SRI FS\Maps\3-11a Geochron Cores Cesium.mxd ckiblinger 2/3/2014 1:59:30 PM

Map 3-11a
Geochronology Core Location Map and Cesium-137 Sedimentation Rates (cm/yr)
Supplemental Remedial Investigation Report
East Waterway Operable Unit SRI/FS



Geochronological Cores, Lead-210 Results

Geochronological Cores - No Recovery

Study Area Boundary

NOTES:

1. Horizontal Datum: NAD 83 WA North US ft
2. Rates are in cm/yr.
3. Presented locations represent accepted at or final attempt.
4. Low recovery: cores that were less than 45 cm in length upon retrieval.
5. Low correlation: cores where the statistical relationship between depth in the core (below mudline) and Pb-210 value had a R^2 value less than 0.5.
6. Samples collected in July 2010 have been archived to support additional testing.

N

0 500 1,000

Scale in Feet

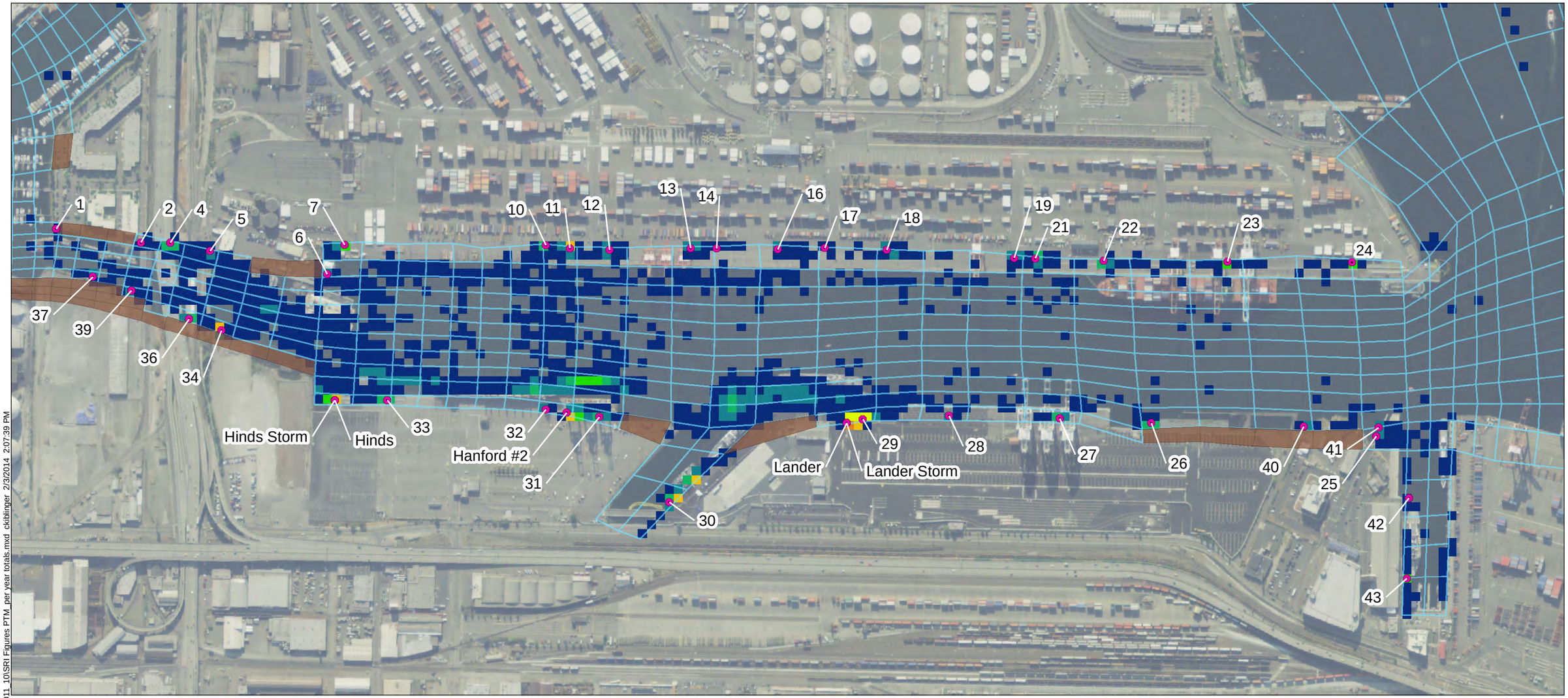
R:\Jobs\060003-01 East WW SRI FS\Maps\3-11b Geochron Cores Lead.mxd ckiblinger 2/3/2014 2:01:04 PM

Map 3-11b

Geochronology Core Location Map and Lead-210 Sedimentation Rates (cm/yr)

Supplemental Remedial Investigation Report

East Waterway Operable Unit SRI/FS



PTM Outfall Locations

EFDC Hydrodynamic Model Grid

Land

Water

Deposition in lb/sq.ft per year

0 - 0.1
0.11 - 0.25
0.26 - 0.5
0.51 - 0.75
0.76 - 1
1.01 - 5
5.01 - 15
15.01 - 20

Areas with no color shading had no deposition during the model simulation period.

Feet

0 250 500 750 1,000

NOTES:

1. Deposition data (points) output from PTM model simulation has been represented by a 50 ft x 50 ft resolution raster map of mass accumulation per square foot (lb/sq foot)
2. Mass accumulation represents deposition over one year (extrapolated from a 28 day simulation time).
4. Lander, Hanford, and Hines are CSOs.
5. Outfall numbers (names) correspond to drainage basins.
6. Deposition pattern shown does not account for re-suspension of particles due to prop wash.

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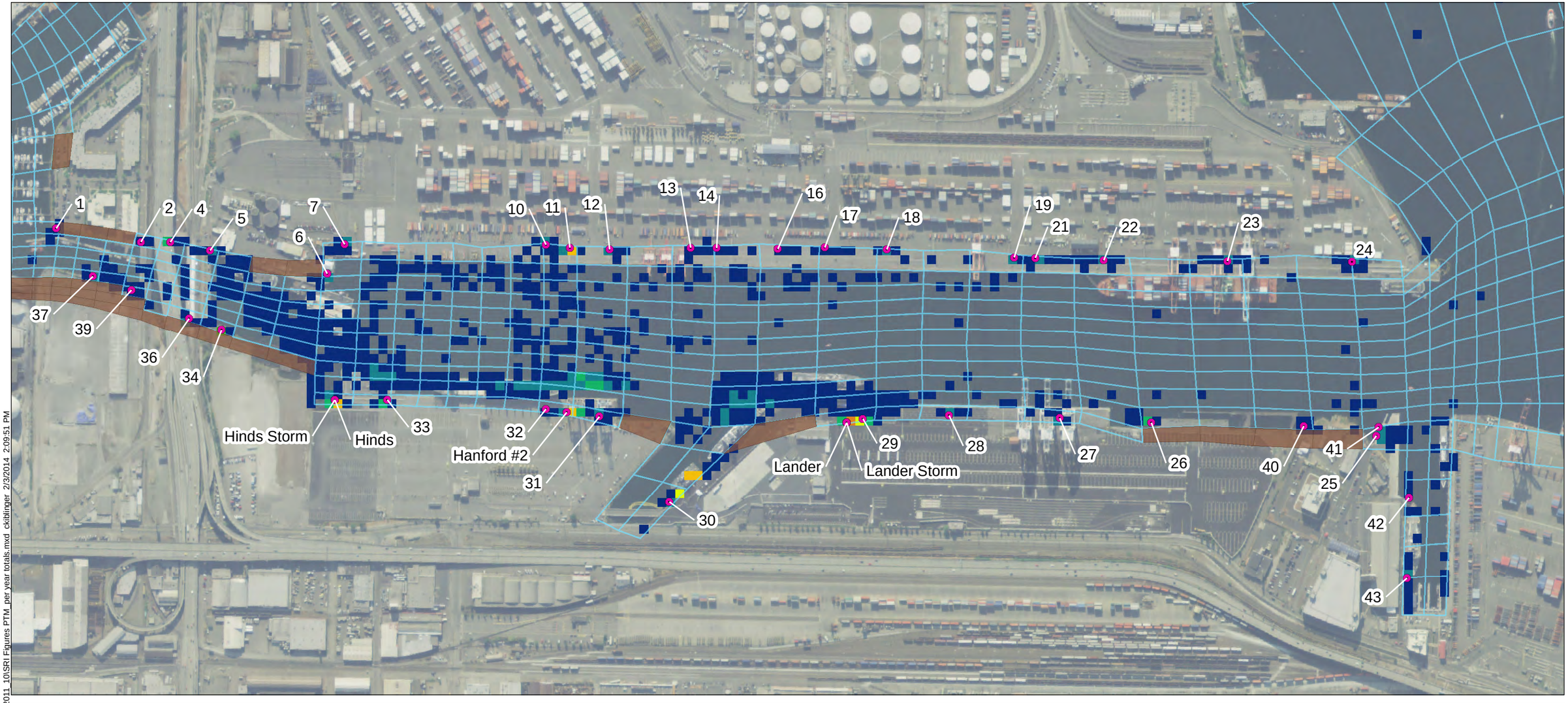
Map 3-12

Predicted Annual Deposition (lb/sq.ft.) due to Lateral Loads, Base Case

Draft Supplemental Remedial Investigation Report

East Waterway Operable Unit



PTM Outfall Locations

EFDC Hydrodynamic Model Grid

Land

Water

Deposition in lb/sq.ft per year

0 - 0.1
0.11 - 0.25
0.26 - 0.5
0.51 - 0.75
0.76 - 1
1.01 - 5
5.01 - 15
15.01 - 20

Areas with no color shading had no deposition during the model simulation period.

Feet
0 250 500 750 1,000

NOTES:
1. Deposition data (points) output from PTM model simulation has been represented by a 50 ft x 50 ft resolution raster map of mass accumulation per square foot (lb/sq foot)
2. Mass accumulation represents deposition over one year (extrapolated from a 28 day simulation time).
4. Lander, Hanford, and Hines are CSOs.
5. Outfall numbers (names) correspond to drainage basins.
6. Deposition pattern shown does not account for re-suspension of particles due to prop wash.

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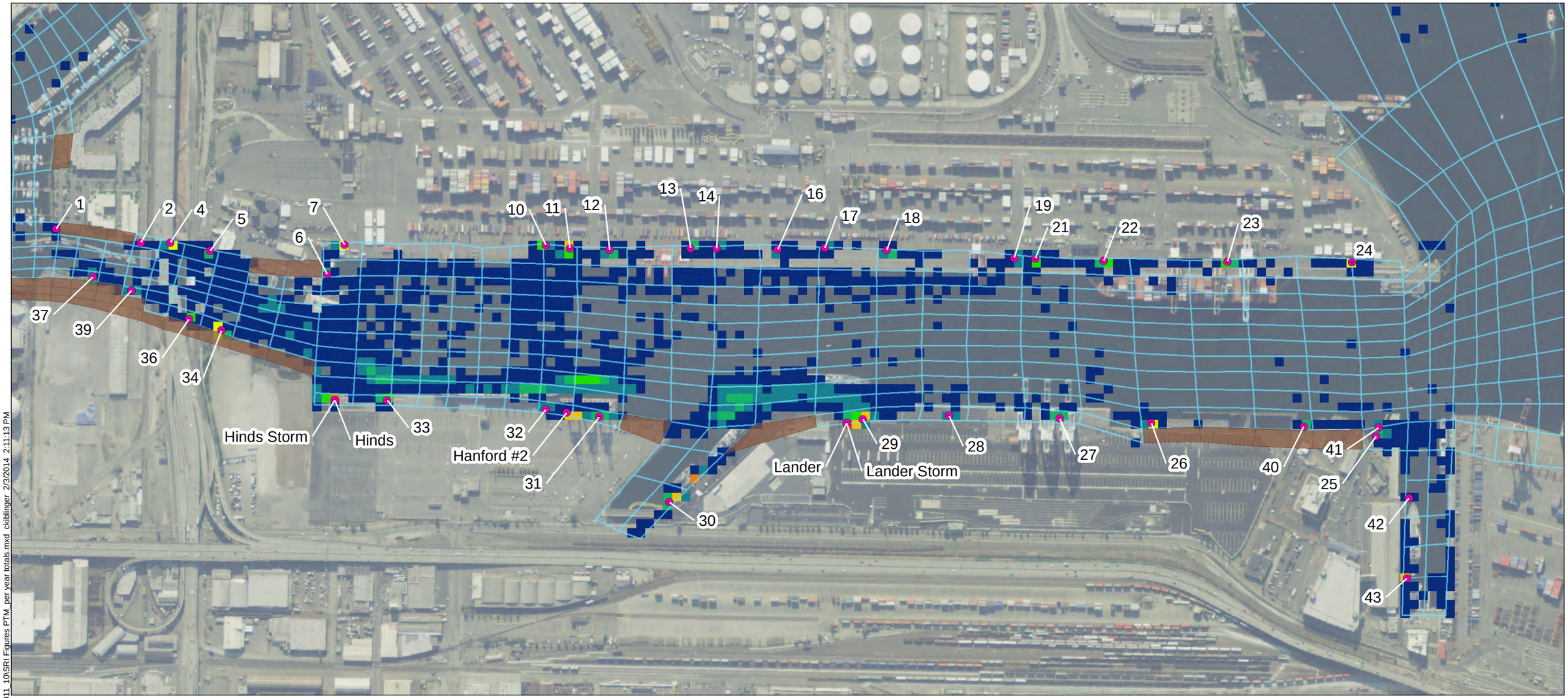
Map 3-13
Predicted Annual Deposition (lb/sq.ft.) due to Lateral Loads, Lower Bounding Case (25% TSS Values)
Draft Supplemental Remedial Investigation Report
East Waterway Operable Unit



PTM Outfall Locations

EFDC Hydrodynamic Model Grid

Land

Water

Deposition in lb/sq.ft per year

0 - 0.1
0.11 - 0.25
0.26 - 0.5
0.51 - 0.75
0.76 - 1
1.01 - 5
5.01 - 15
15.01 - 20

Areas with no color shading had no deposition during the model simulation period.

Feet

0 250 500 750 1,000

NOTES:

1. Deposition data (points) output from PTM model simulation has been represented by a 50 ft x 50 ft resolution raster map of mass accumulation per square foot (lb/sq foot)
2. Mass accumulation represents deposition over one year (extrapolated from a 28 day simulation time).
4. Lander, Hanford, and Hines are CSOs.
5. Outfall numbers (names) correspond to drainage basins.
6. Deposition pattern shown does not account for re-suspension of particles due to prop wash.

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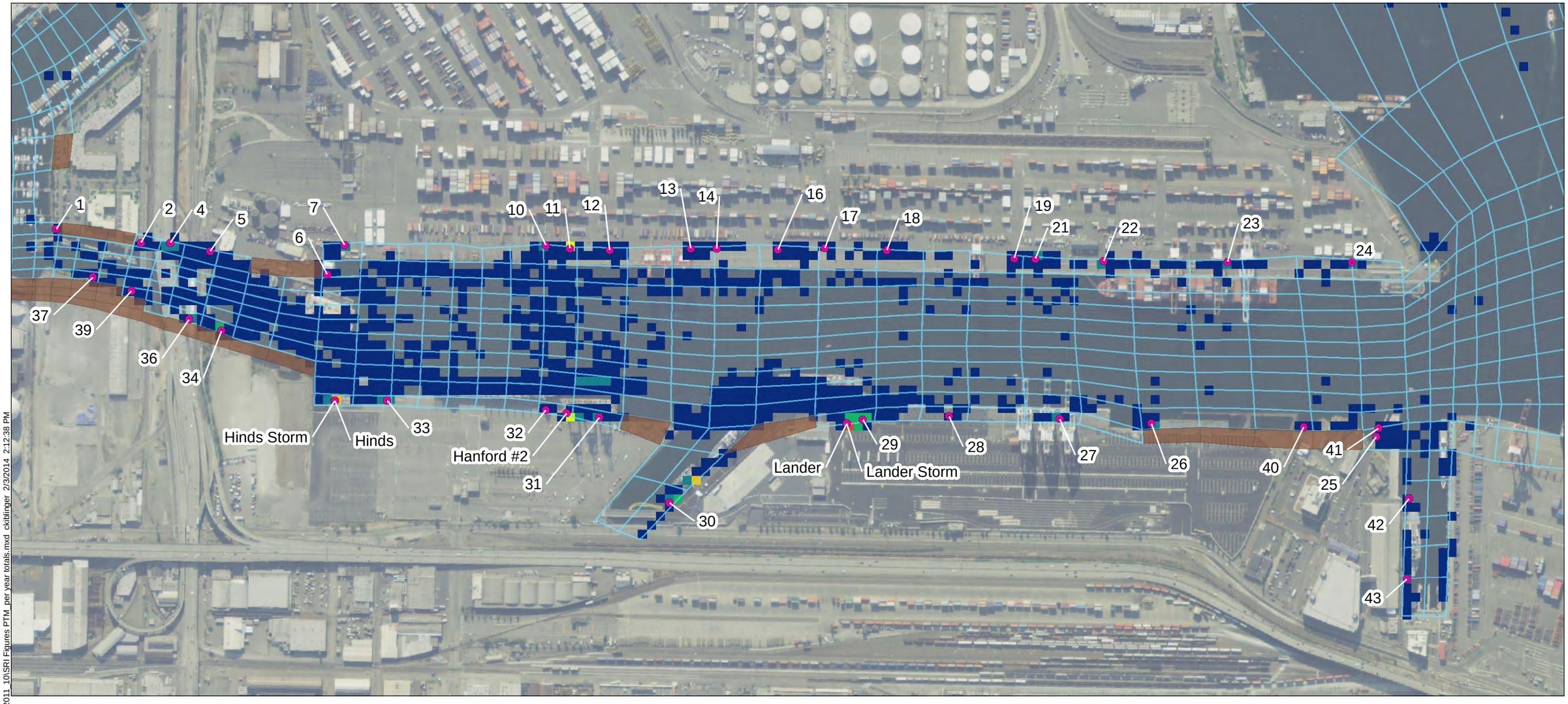
Map 3-14

Predicted Annual Deposition (lb/sq.ft.) due to Lateral Loads, Upper Bounding Case (75% TSS Values)

Draft Supplemental Remedial Investigation Report

East Waterway Operable Unit



PTM Outfall Locations

EFDC Hydrodynamic Model Grid

Land

Water

Deposition in cm/year

< 0.1
0.11 - 0.25
0.26 - 0.5
0.51 - 0.75
0.76 - 1
1.01 - 2
2.01 - 4
4.01 - 7

Areas with no color shading had no deposition during the model simulation period.

Feet
0 250 500 750 1,000

NOTES:
1. Deposition data (points) output from PTM model simulation has been represented by a 50 ft x 50 ft resolution raster map of mass accumulation per square foot (lb/sq foot)
2. Mass accumulation represents deposition over one year (extrapolated from a 28 day simulation time).
4. Lander, Hanford, and Hines are CSOs.
5. Outfall numbers (names) correspond to drainage basins.
6. Deposition pattern shown does not account for re-suspension of particles due to prop wash.

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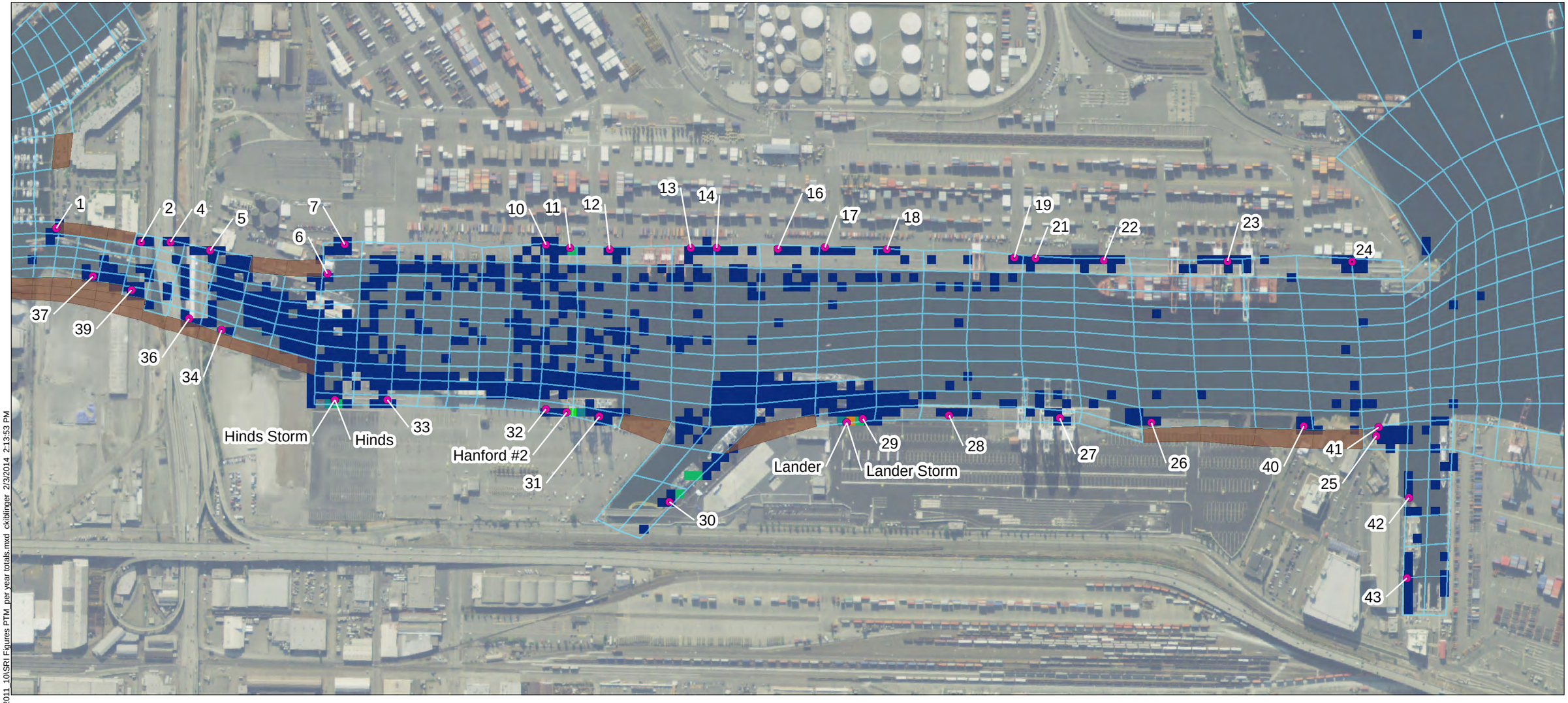
Map 3-15
Predicted Annual Deposition (cm/yr) due to Lateral Loads, Base Case
Draft Supplemental Remedial Investigation Report
East Waterway Operable Unit



PTM Outfall Locations

EFDC Hydrodynamic Model Grid

Land

Water

Deposition in cm/year

< 0.1 | 0.11 - 0.25 | 0.26 - 0.5 | 0.51 - 0.75 | 0.76 - 1 | 1.01 - 2 | 2.01 - 4 | 4.01 - 7

Areas with no color shading had no deposition during the model simulation period.

Feet

0 250 500 750 1,000

NOTES:

1. Deposition data (points) output from PTM model simulation has been represented by a 50 ft x 50 ft resolution raster map of mass accumulation per square foot (lb/sq foot)
2. Mass accumulation represents deposition over one year (extrapolated from a 28 day simulation time).
4. Lander, Hanford, and Hines are CSOs.
5. Outfall numbers (names) correspond to drainage basins.
6. Deposition pattern shown does not account for re-suspension of particles due to prop wash.

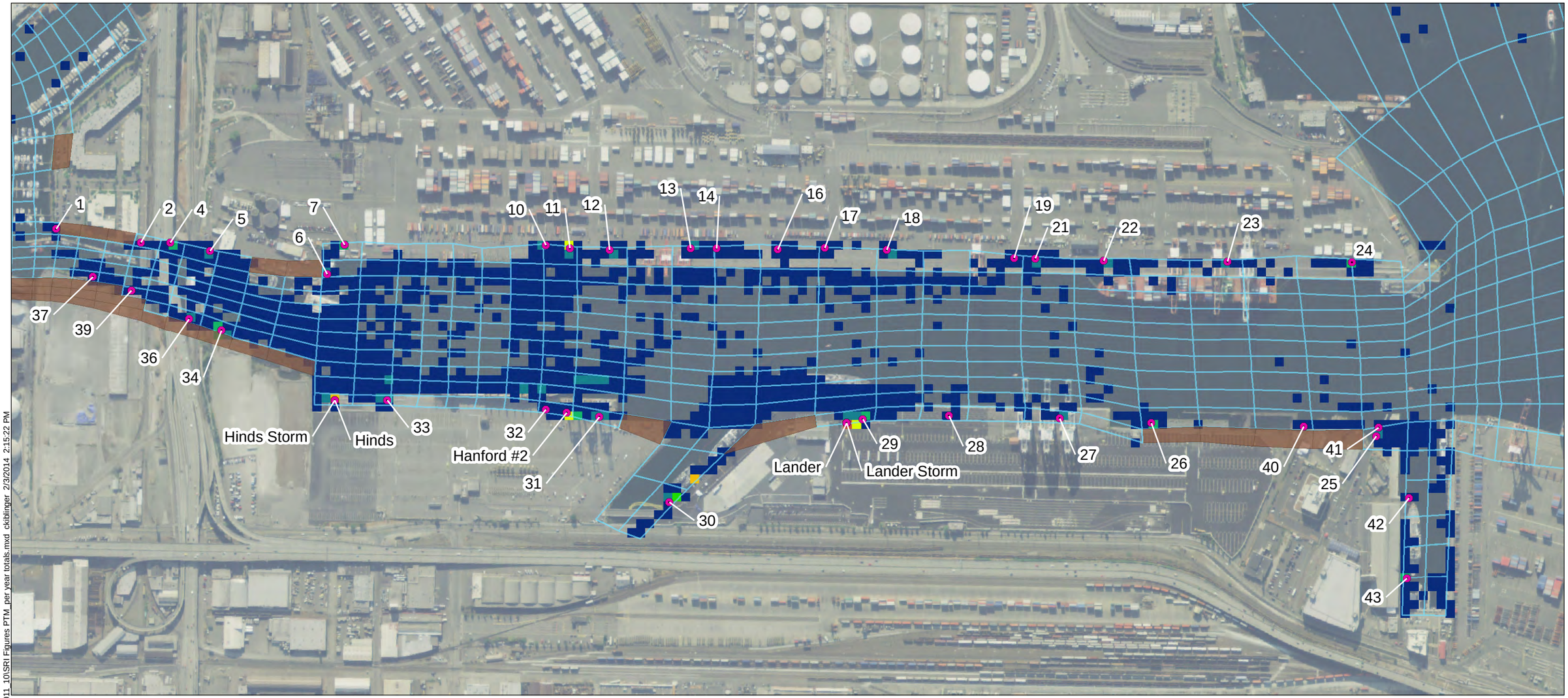
R:\Jobs\060003-01_East_Waterway_SedTransMaps\2011_10\SRI Figures PTM_per year totals.mxd ckilbinger 2/3/2014 2:13:53 PM

Map 3-16

Predicted Annual Deposition (cm/yr) due to Lateral Loads, Lower Bounding Case (25% TSS Values)

Draft Supplemental Remedial Investigation Report

East Waterway Operable Unit



PTM Outfall Locations

EFDC Hydrodynamic Model Grid

Land

Water

Deposition in cm/year

< 0.1 | 0.11 - 0.25 | 0.26 - 0.5 | 0.51 - 0.75 | 0.76 - 1 | 1.01 - 2 | 2.01 - 4 | 4.01 - 7

Areas with no color shading had no deposition during the model simulation period.

Feet

0 250 500 750 1,000

NOTES:

1. Deposition data (points) output from PTM model simulation has been represented by a 50 ft x 50 ft resolution raster map of mass accumulation per square foot (lb/sq foot)
2. Mass accumulation represents deposition over one year (extrapolated from a 28 day simulation time).
4. Lander, Hanford, and Hines are CSOs.
5. Outfall numbers (names) correspond to drainage basins.
6. Deposition pattern shown does not account for re-suspension of particles due to prop wash.

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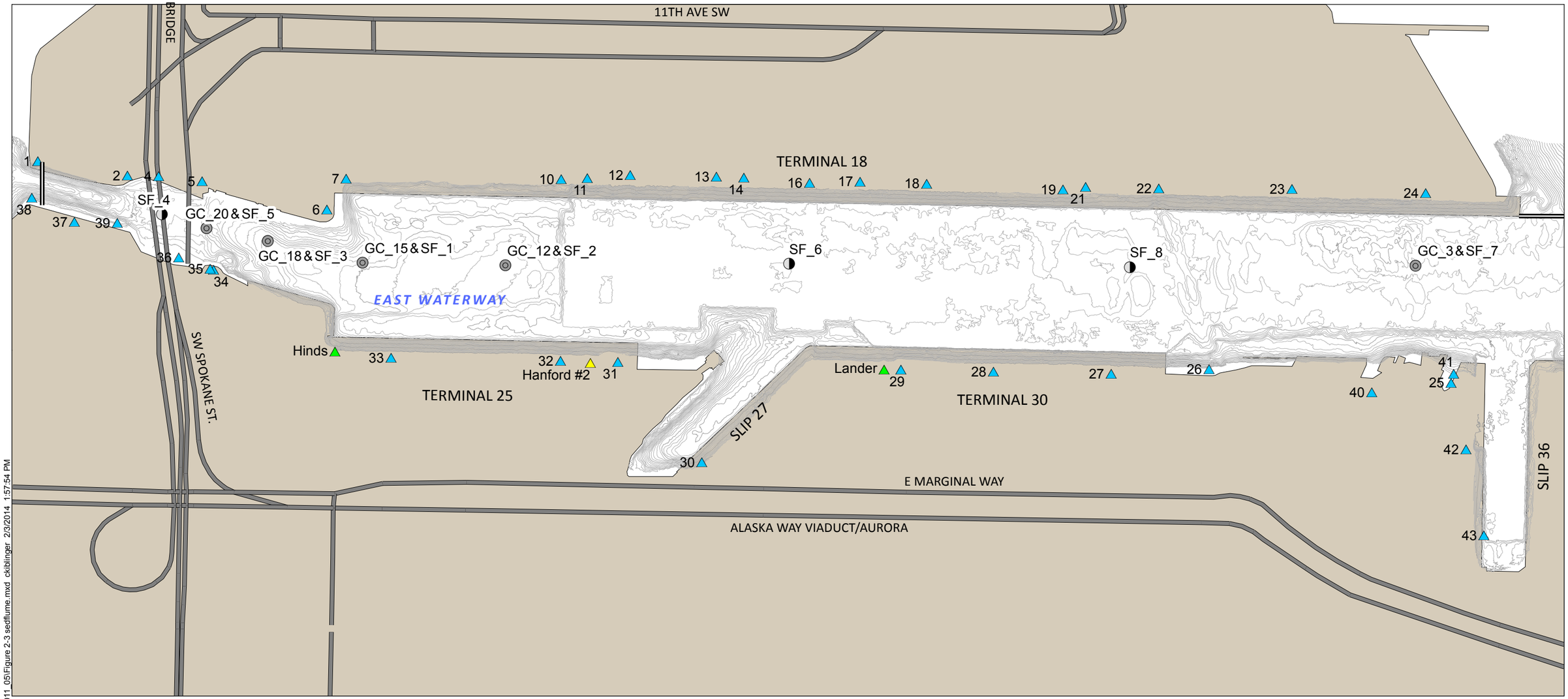
Map 3-17

Predicted Annual Deposition (cm/yr) due to Lateral Loads, Upper Bounding Case (75% TSS Values)

Draft Supplemental Remedial Investigation Report

East Waterway Operable Unit

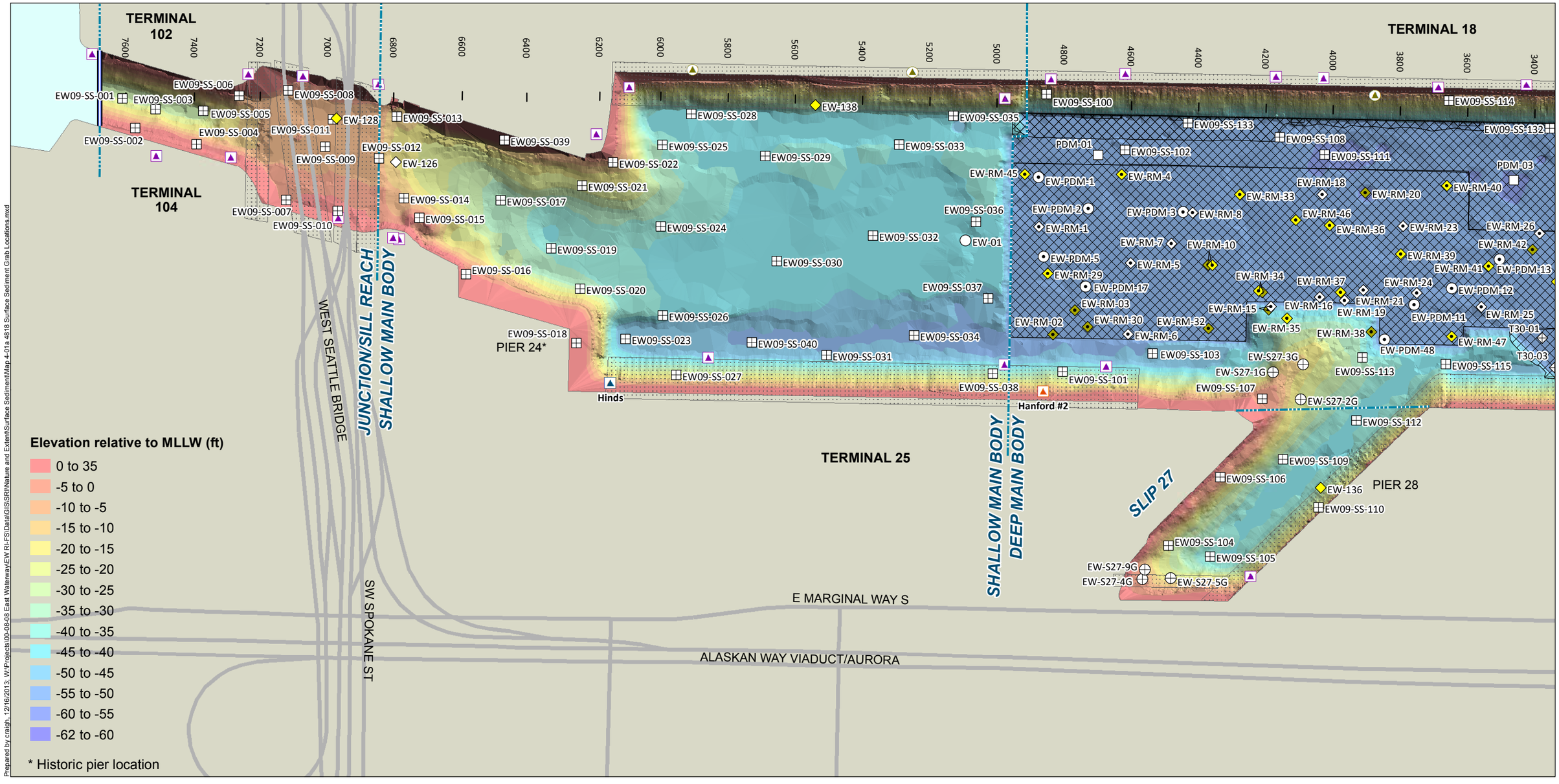


Sedflume Core Locations – Co-located with Geochron Cores
Sedflume Core Locations
Storm Drain
CSO/SD
CSO
Study Area Boundary

Feet
0 250 500 750 1,000

R:\Jobs\060003-01_East_Waterway_SedTrans\Maps\2011_05\Figure 2-3 sedflume.mxd ckiblinger 2/3/2014 1:57:54 PM

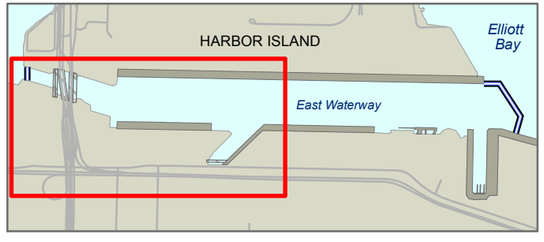
Map 3-18
Sedflume Core Locations
Draft Supplemental Remedial Investigation Report
East Waterway Operable Unit



Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-01a 4818 Surface Sediment Grab Locations.mxd

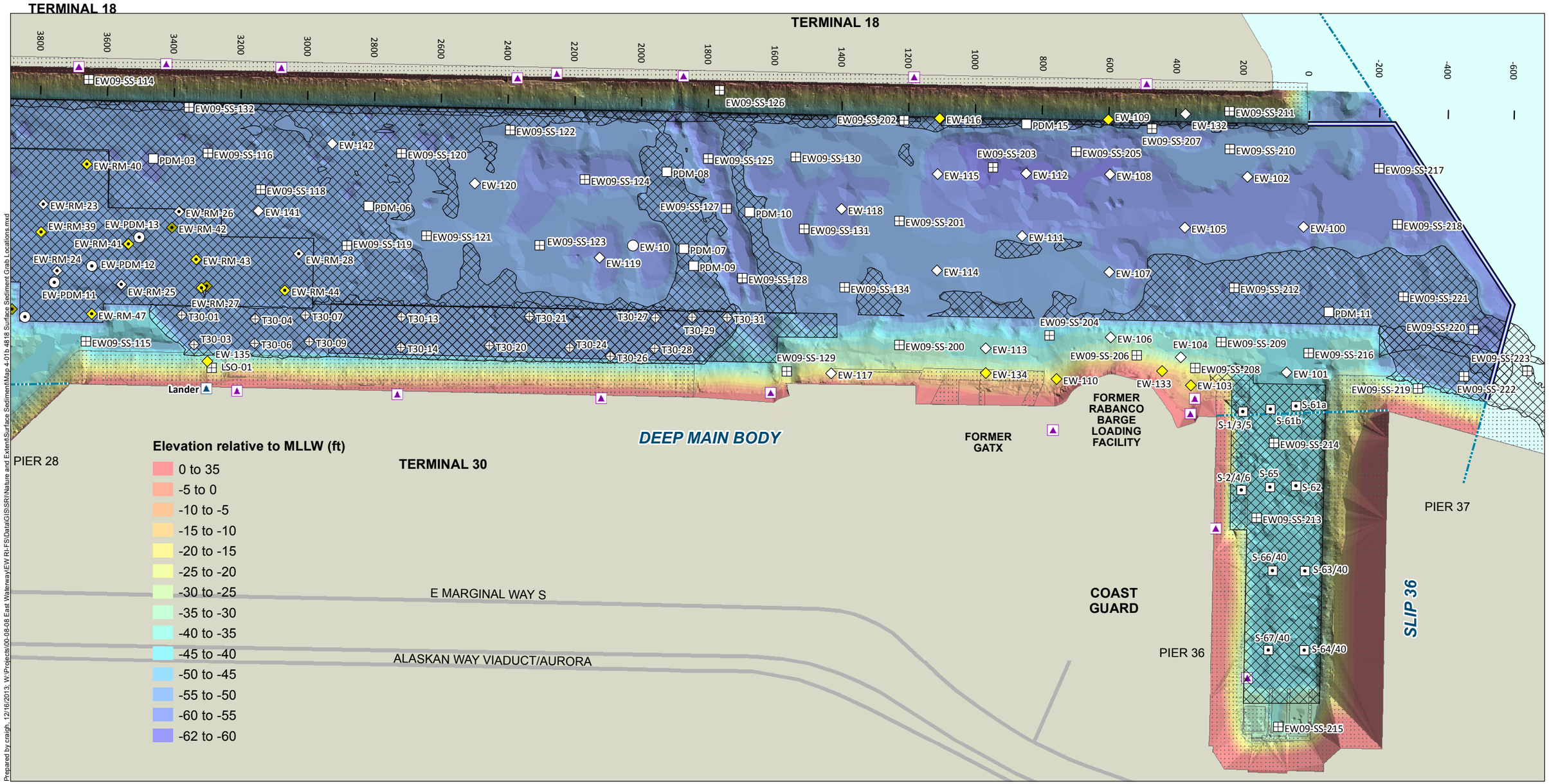
Surface Sediment Location by Sampling Event

- HIRI95
- T18-PDM
- EW/HI Nature and Extent Phase 1
- EW/HI Nature and Extent Phase 2
- PostDredgeMonitoring-2005Phase2
- USCG_P36 PostDredge Sed Char
- Recontamination Monitoring 2006
- Recontamination Monitoring 2007
- EW RCM 2008
- East Waterway - Slip 27
- EW Surface Sediment
- EW T30 PDM 2009
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary



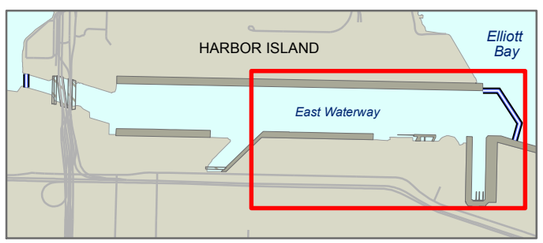
0 600
Scale in feet

Map 4-1a
Locations of SRI Baseline
Surface Sediment Grab Samples
Supplemental Remedial Investigation
East Waterway Study Area



Surface Sediment Location by Sampling Event

- HIRI95
- T18-PDM
- EW/HI Nature and Extent Phase 1
- EW/HI Nature and Extent Phase 2
- PostDredgeMonitoring-2005Phase2
- USCG_P36 PostDredge Sed Char
- Recontamination Monitoring 2006
- Recontamination Monitoring 2007
- EW RCM 2008
- East Waterway - Slip 27
- EW Surface Sediment
- EW T30 PDM 2009
- Storm Drain
- CSO/Storm Drain
- Area Dredged in the Last 11 Years
- Dock/Pier
- Road
- East Waterway Study Area Boundary



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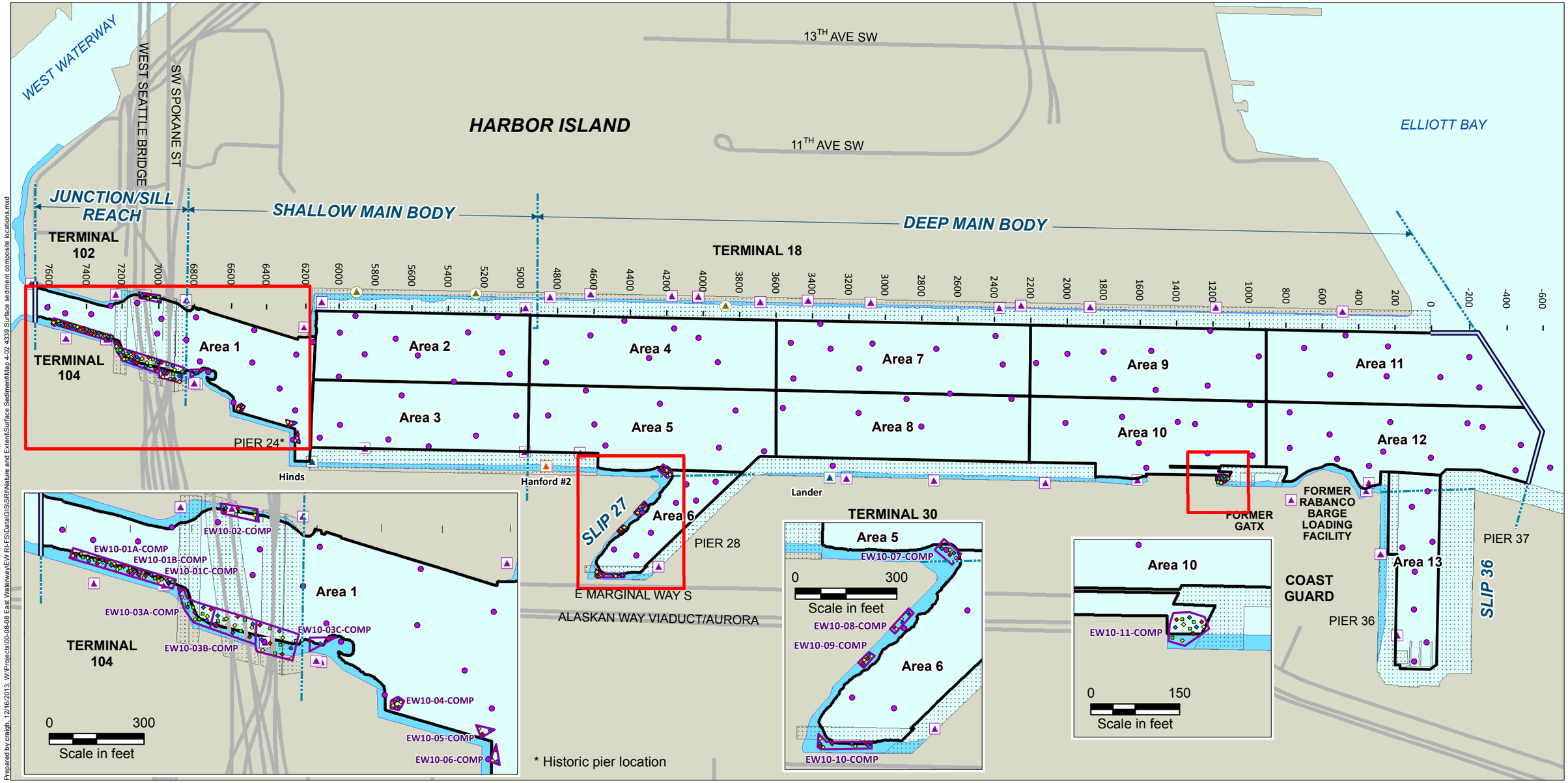
Scale in feet

Map 4-1b
Locations of SRI Baseline
Surface Sediment Grab Samples
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-01b 4818 Surface Sediment Grab Locations.mxd



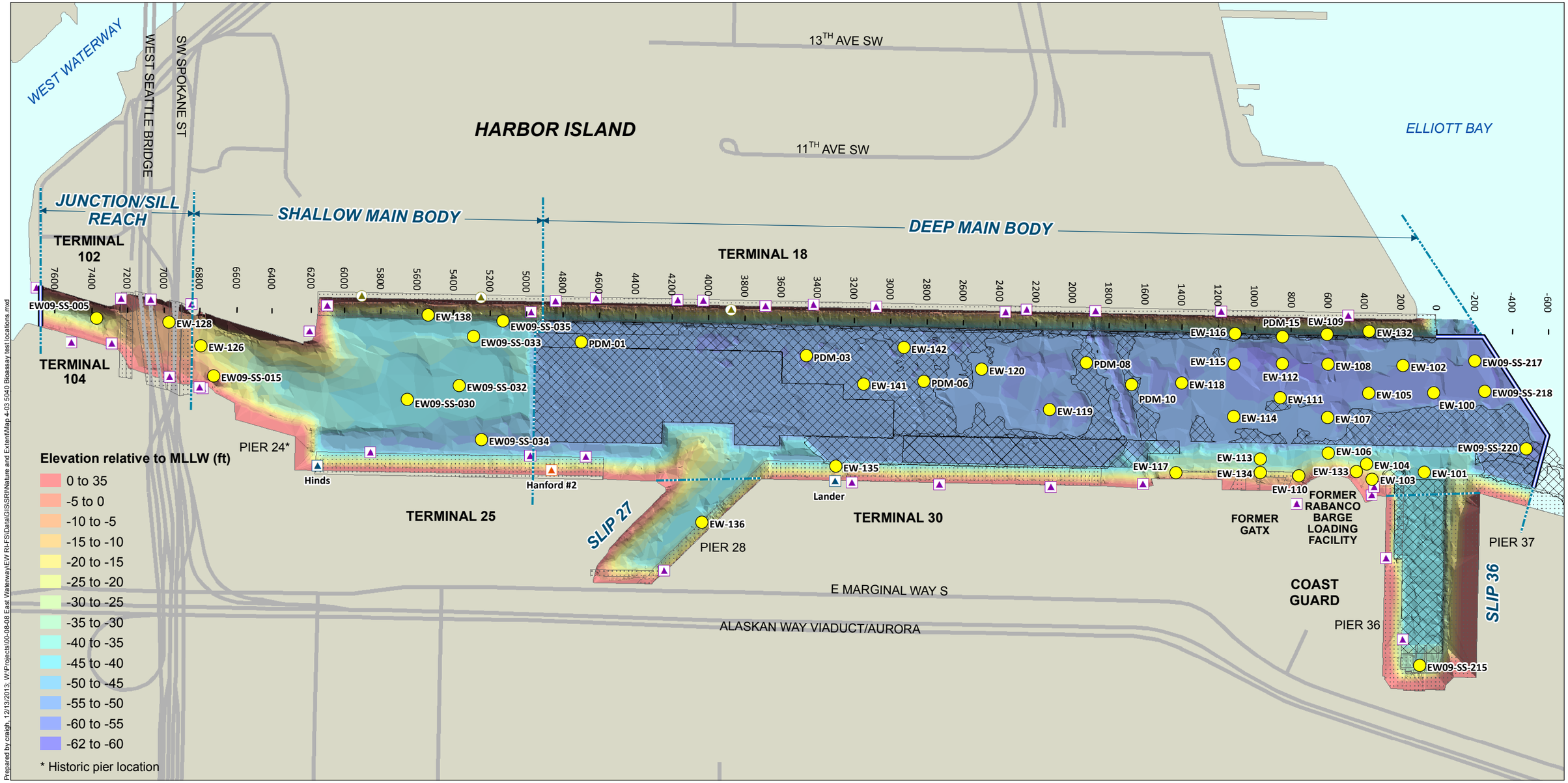
Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-02 4339 Surface sediment composite locations.mxd

- Subtidal Sampling Location Used in Composite Samples
- Subtidal Composite Area

Multi-Increment Sampling (MIS) Composite Locations

- Area wide - Rep 1
- Area wide - Rep 2
- Area wide - Rep 3
- Public access
- Intertidal PAH Composite Area
- Intertidal Zone
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

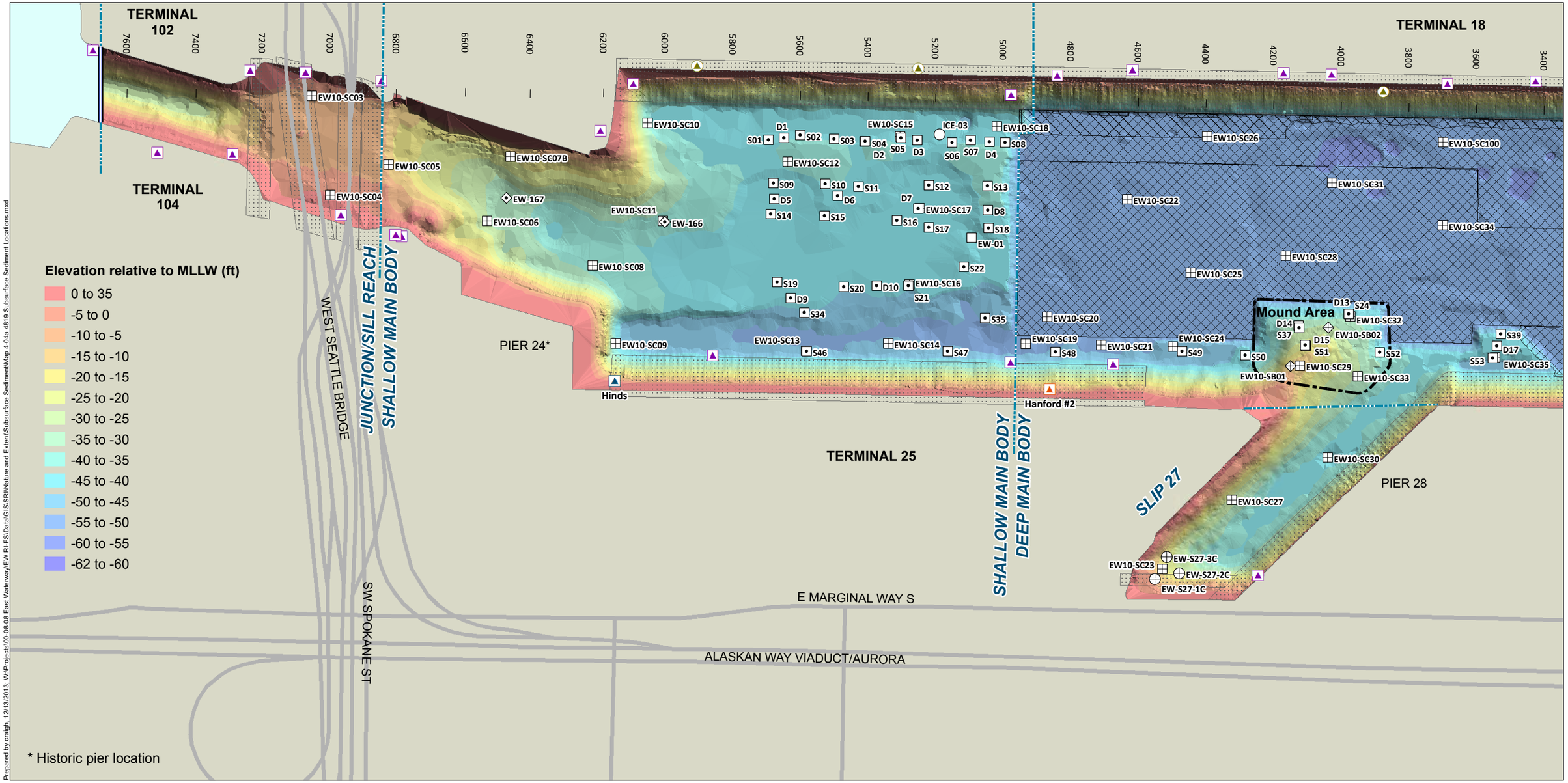
Map 4-2
Locations of SRI Baseline Surface Sediment Composite Samples
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Map 4-03 5040 Bioassay test locations.mxd

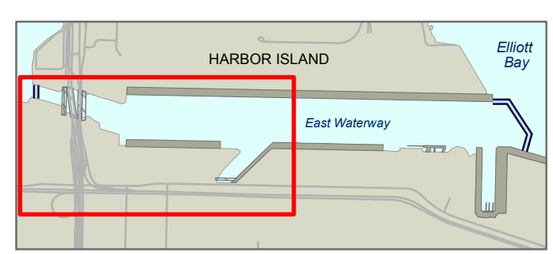
- Bioassay Test Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

Map 4-3
SRI Baseline Bioassay Test Locations
Supplemental Remedial Investigation
East Waterway Study Area



Subsurface Core Location by Event

- Harbor Island RI
- HIRI95
- T18-Phase1
- T18-Phase 2
- Pier36-prelim
- EW-ChannelDeep
- EW/HI Nature and Extent Phase 3b
- East Waterway - Slip 27
- EW Subsurface Sed
- EW Subsurface Boring
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary



0 600
Scale in feet

Map 4-4a
Locations of SRI Baseline Subsurface Sediment Cores
Supplemental Remedial Investigations
East Waterway Study Area

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-04a 4819 Subsurface Sediment Locations.mxd

TERMINAL 18

TERMINAL 18

3800 3600 3400 3200 3000 2800 2600 2400 2200 2000 1800 1600 1400 1200 1000 800 600 400 200 0 -200 -400 -600

EW10-SC100
EW10-SC37
EW10-SC43
EW10-SC46
EW-163
EW10-SC101
EW10-SC55
EW10-SC62
1C11
1C07
EW10-SC51
EW-162
EW10-SC39
1C12 (Ph2)
1C12 (Ph1)
EW10-SC40
EW10-SC34
EW-165
4C01 (Ph2)
4C01 (Ph1)
EW10-SC42
1C08
1C08
EW10-SC44
EW-164
2C21
EW10-SC47
EW-156
EW10-SC56
EW10-SC49
2C06B
2C06
EW-161
EW10-SC36
2C07
2C04
EW10-SC53
S39
D17
S53
EW10-SC35
EW10-SC38
EW10-SC41
EW10-SC45
S45
EW10-SC48
EW10-SC50
EW-160
EW10-SC52
EW-159
EW-158
EW10-SC54
S30
EW10-SC61
EW10-SC63
Lander
EW10-SC60
EW10-SC57
C-1/C-2
EW10-SC59
EW10-SC58

DEEP MAIN BODY

FORMER GATX

FORMER RABANCO BARGE LOADING FACILITY

PIER 28

TERMINAL 30

PIER 37

COAST GUARD

PIER 36

SLIP 36

E MARGINAL WAY S

ALASKAN WAY VIADUCT/AURORA

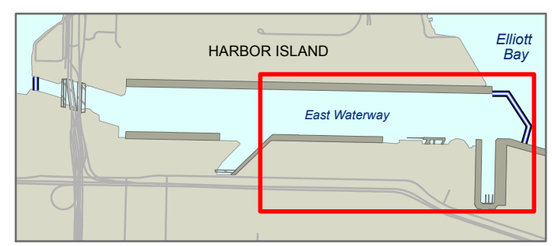
Elevation relative to MLLW (ft)

- 0 to 35
- -5 to 0
- -10 to -5
- -15 to -10
- -20 to -15
- -25 to -20
- -30 to -25
- -35 to -30
- -40 to -35
- -45 to -40
- -50 to -45
- -55 to -50
- -60 to -55
- -62 to -60

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-04b 4819 Subsurface Sediment Locations.mxd

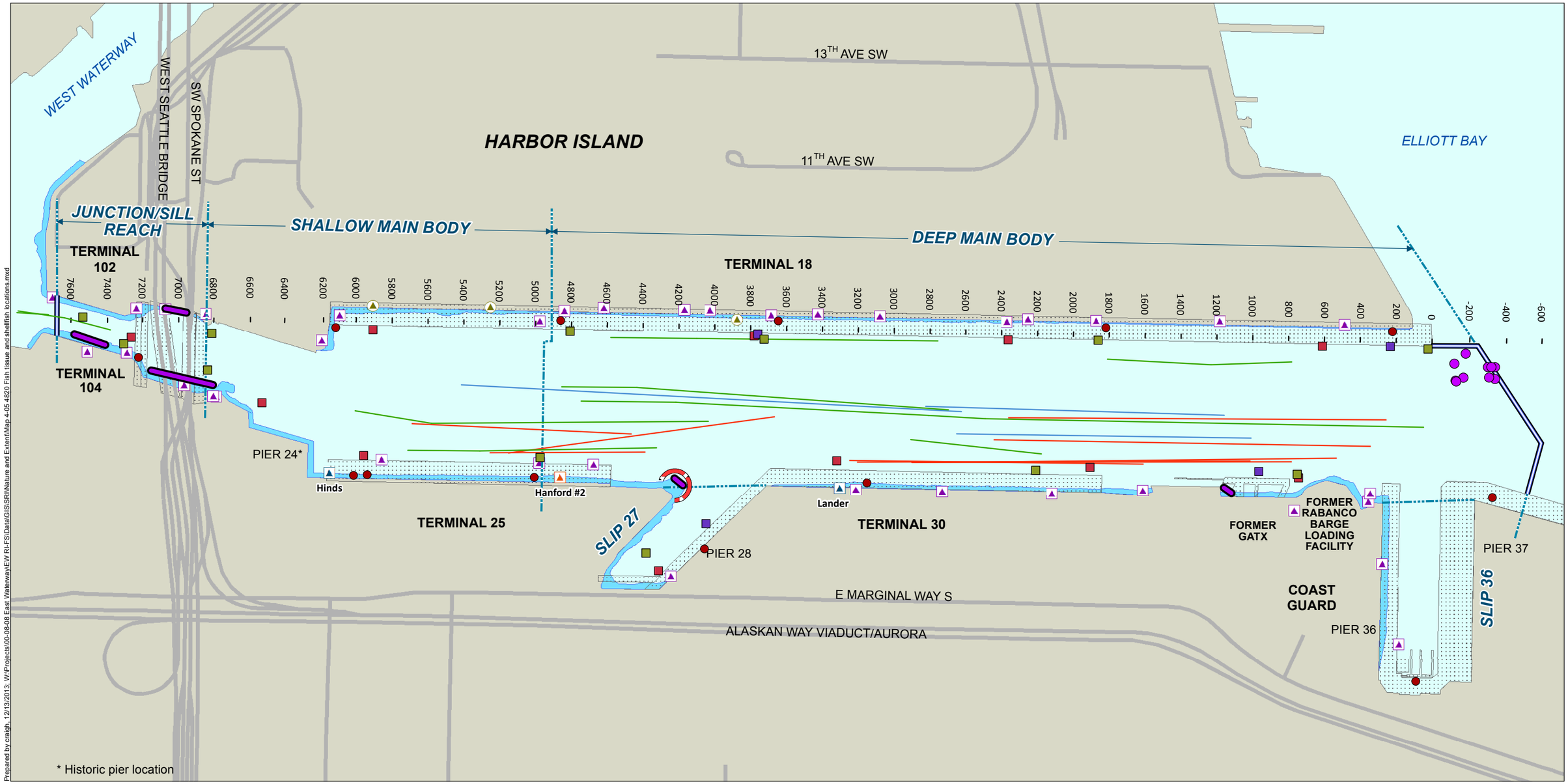
Subsurface Core Location by Event

- Harbor Island RI
- HIRI95
- T18-Phase1
- T18-Phase 2
- Pier36-prelim
- EW-ChannelDeep
- EW/HI Nature and Extent Phase 3b
- East Waterway - Slip 27
- EW Subsurface Sed
- EW Subsurface Boring
- Storm Drain
- CSO/Storm Drain
- Area Dredged in the Last 11 Years
- Dock/Pier
- Road
- East Waterway Study Area Boundary



0 600
Scale in feet

Map 4-4b
Locations of SRI Baseline Subsurface Sediment Cores
Supplemental Remedial Investigations
East Waterway Study Area



Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Map 4-05 4820 Fish tissue and shellfish locations.mxd

- Rockfish Sampling Location (2008)
- Juvenile Chinook Sampling Location (2009)

Tissue Collection Trawl Line

- Elliott Bay/Duwamish River Tissue (1995)
- EW Tissue (2005)
- EW Fish/Shellfish (2008)

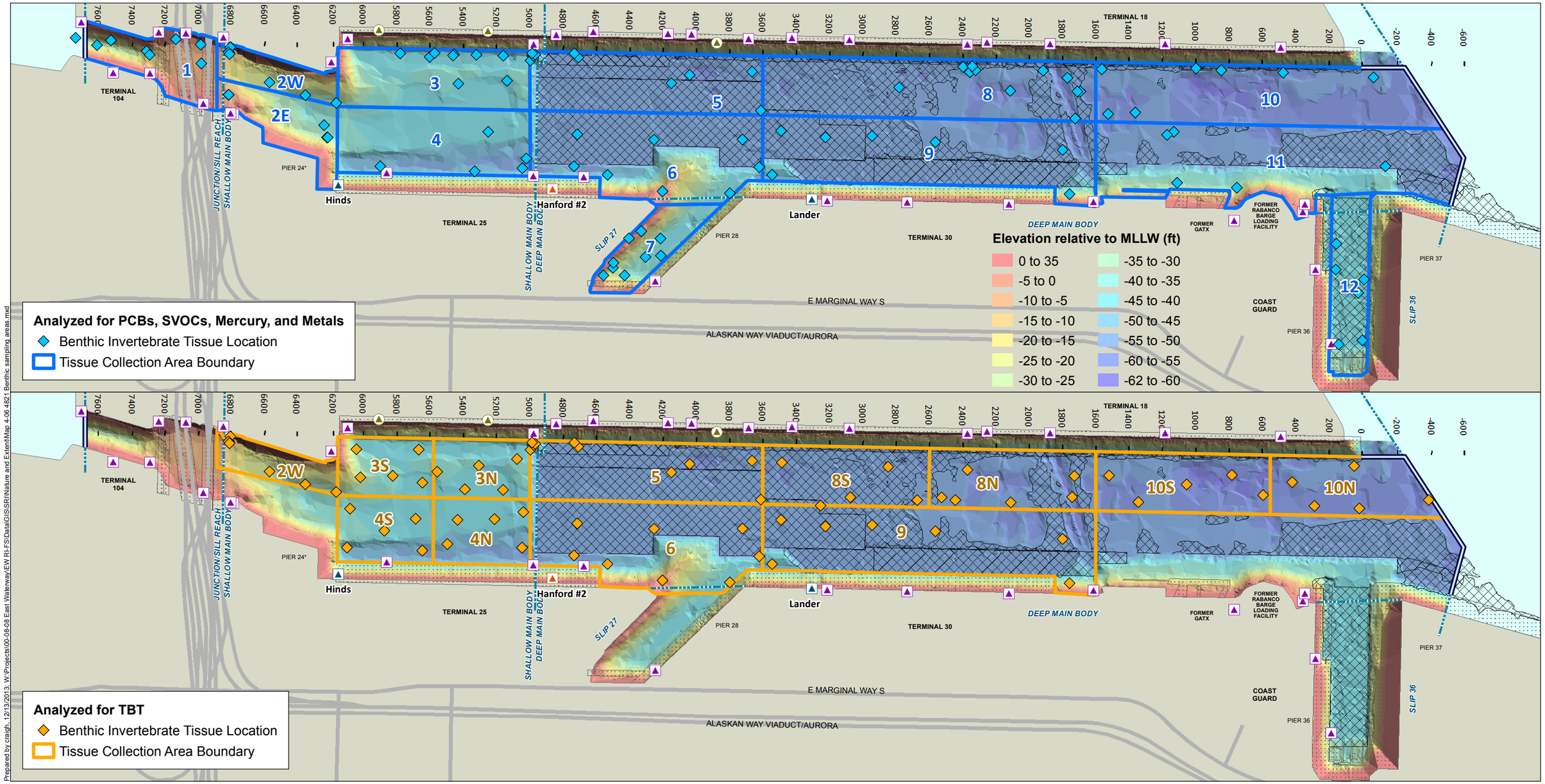
Shellfish Collection Locations (2008)

- Crab Trap and Shrimp Trap
- Shrimp Trap
- Mussel
- Geoduck Sampling Location
- Clam Collection Beach

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

0 600
Scale in feet

Map 4-5
SRI Baseline Fish and Shellfish Tissue Sampling Locations
Supplemental Remedial Investigation
East Waterway Study Area

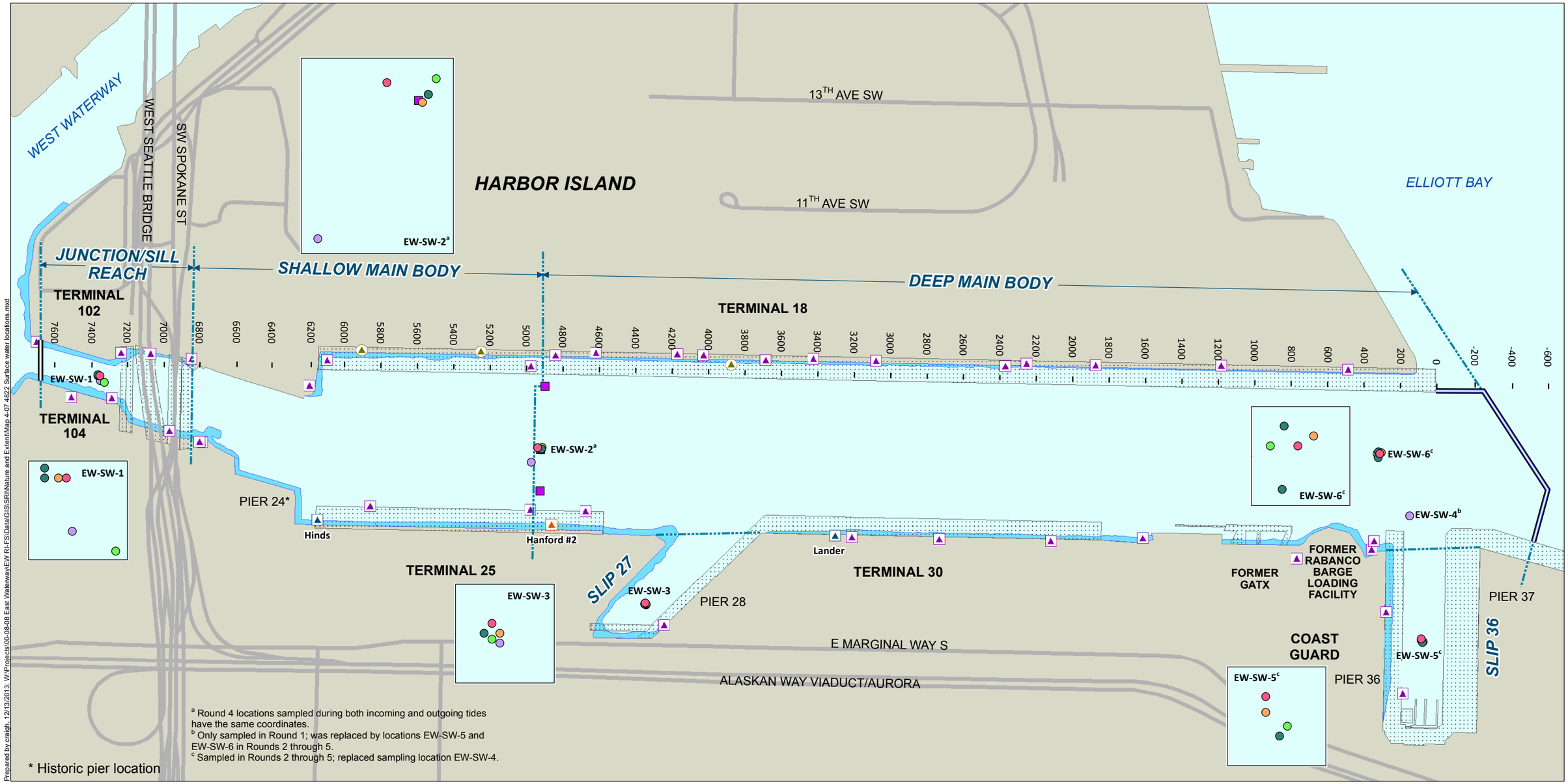


Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Map 4-06 4821 Benthic sampling areas.mxd

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

0 600
Scale in feet

Map 4-6
SRI Baseline Benthic Invertebrate Tissue Sampling Locations
Supplemental Remedial Investigation
East Waterway Study Area



Sampled Surface Water Locations

- SRI Round 1 (Sept 11-12, 2008)
- SRI Round 2 (Sept 25-27, 2008)
- SRI Round 3 (Dec 9-11, 2008)
- SRI Round 4 (Jan 7-9, 2009)
- SRI Round 5 (Feb 21-23, 2009)
- King County WQA

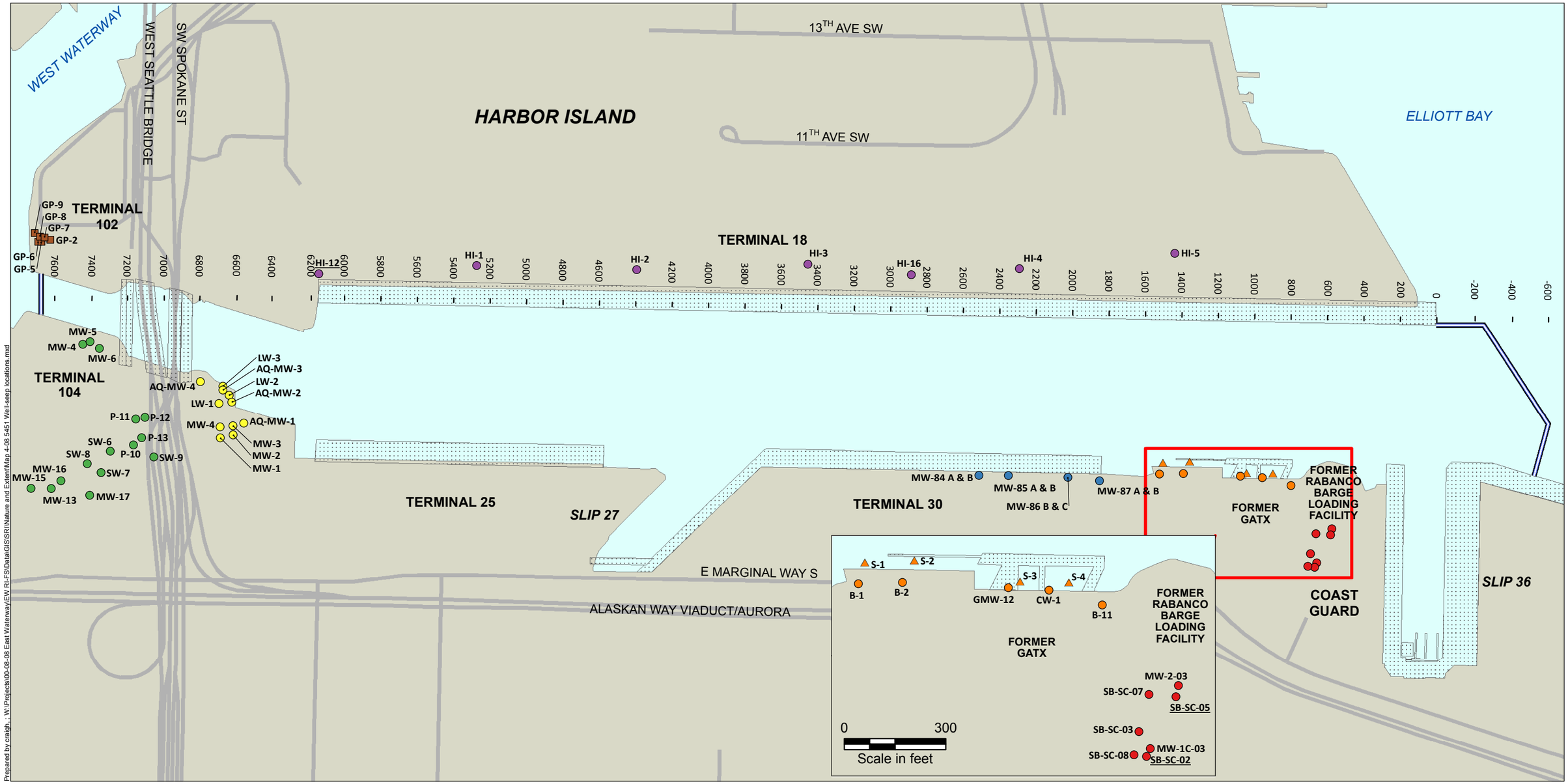
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Dock/Pier/Bridge
- Intertidal Zone
- Road
- East Waterway Study Area Boundary

Note: Samples collected from two depths: 1 m below water surface and 1 m above sediment surface at all locations.

0 600 Scale in feet

0 20 Scale in feet (insets)

Map 4-7
SRI Baseline Surface Water Sampling Locations
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by craigh... W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Map 4-08 5451 Well-seep locations.mxd

Evaluated Wells[a]

- Coast Guard (Pier 35)
- Former Chevron (Terminal 30)
- Former GATX (Pier 34)
- Harbor Island Soil and Groundwater OU
- Terminal 104 and Vicinity
- Terminal 25

Approximate Geoprobe Borings (Evaluated Wells)

- Terminal 102 LUST Site

Evaluated Seep Sample Locations

- Former GATX (Pier 34)
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

[a] Locations with underlined labels are associated with water quality exceedances.

0 600
Scale in feet

Map 4-8
Evaluated Well and Seep Locations
Supplemental Remedial Investigation
East Waterway Study Area

TERMINAL 102

TERMINAL 104

TERMINAL 18

TERMINAL 25

PIER 24*

PIER 28

SLIP 27

WEST SEATTLE BRIDGE

JUNCTION/SILL REACH

SHALLOW MAIN BODY

SHALLOW MAIN BODY

DEEP MAIN BODY

SW SPOKANE ST

E MARGINAL WAY S

ALASKAN WAY VIADUCT/AURORA

Hinds

Hanford #2

EW-130 EW-129 EW-128 EW-126 EW-127 EW-124 EW-125 EW-122 EW-123 EW-121 EW-138 EW-137 EW-136

EW-PW-PZ-A1-01 EW-PW-PZ-A1-02 EW-PW-PZ-A1-03 EW-PW-PZ-A1-04

EW-PW-PZ-A2-01 EW-PW-PZ-A2-02 EW-PW-PZ-A2-03

S01 D1 S02 S03 S04 D2 S05 D3 S06 ICE-03 S07 D4 S08

S09 D5 S10 D6 S11 S12 S13 D7 D8 S14 S15 S16 S17 S18

S19 D9 S20 D10 S21 S22 S34 S35 S46 S47 S48 S49 S50

EW-PDM-45 EW-PDM-46 D14 S37 D13 S24 S51 D15 S52 S39 D17 S53

7600 7400 7200 7000 6800 6600 6400 6200 6000 5800 5600 5400 5200 5000 4800 4600 4400 4200 4000 3800 3600 3400

Elevation relative to MLLW (ft)

- 0 to 35
- -5 to 0
- -10 to -5
- -15 to -10
- -20 to -15
- -25 to -20
- -30 to -25
- -35 to -30
- -40 to -35
- -45 to -40
- -50 to -45
- -55 to -50
- -60 to -55
- -62 to -60

* Historic pier location

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Map 4-09a 4823 Porewater locations.mxd

Porewater Sampling Locations

Analyzed for TBT - Subsurface Sediment

- Harbor Island RI
- T18-Phase 2
- Pier36-prelim
- EW-ChannelDeep

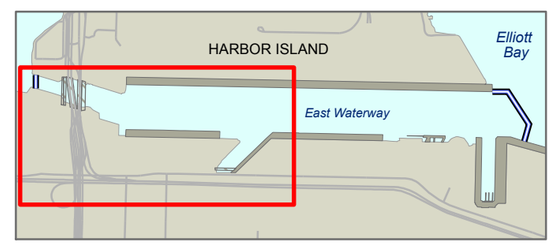
Analyzed for TBT - Surface Sediment

- EW Pre-Sand Placement Monitoring
- EW/HI Nature and Extent Phase 2
- EW/HI Nature and Extent Phase 1

Analyzed for VOC

- EW Porewater

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary



0 600

Scale in feet

Map 4-9a

SRI Baseline Porewater Sampling Locations

Supplemental Remedial Investigation

East Waterway Study Area

TERMINAL 18

TERMINAL 18

3800 3600 3400 3200 3000 2800 2600 2400 2200 2000 1800 1600 1400 1200 1000 800 600 400 200 0 -200 -400 -600

EW-142
EW-120
EW-141
EW-119
1C08
PDM-10
2C06B
EW-118
EW-116
EW-109
EW-132
EW-115
EW-112
EW-108
EW-102
EW-111
EW-105
EW-100
EW-114
EW-107
S39
D17
S53
S52
EW-135
Lander
S45
EW-113
EW-106
S30
EW-104
EW-134
EW-133
EW-101
EW-110
EW-PW-PZ-A3-02
EW-PW-PZ-A3-01
EW-PW-PZ-A3-03
EW-117
EW-PW-PZ-A4-01
EW-PW-PZ-A4-02
EW-103
FORMER RABANCO BARGE LOADING FACILITY
FORMER GATX
DEEP MAIN BODY
PIER 28
TERMINAL 30
PIER 37
0 30
Scale in feet
EW-110
EW-PW-PZ-A4-01
EW-PW-PZ-A4-02
COAST GUARD
C-1
PIER 36
SLIP 36
E MARGINAL WAY S
ALASKAN WAY VIADUCT/AURORA

Elevation relative to MLLW (ft)
- 0 to 35
- -5 to 0
- -10 to -5
- -15 to -10
- -20 to -15
- -25 to -20
- -30 to -25
- -35 to -30
- -40 to -35
- -45 to -40
- -50 to -45
- -55 to -50
- -60 to -55
- -62 to -60

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Map 4-09b 4823 Porewater locations.mxd

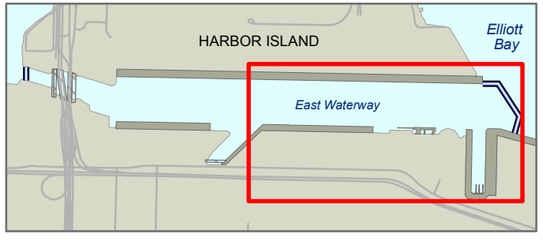
Porewater Sampling Locations

Analyzed for TBT - Subsurface Sediment
- Harbor Island RI
- T18-Phase 2
- Pier36-prelim
- EW-ChannelDeep

Analyzed for TBT - Surface Sediment
- EW Pre-Sand Placement Monitoring
- EW/HI Nature and Extent Phase 2
- EW/HI Nature and Extent Phase 1

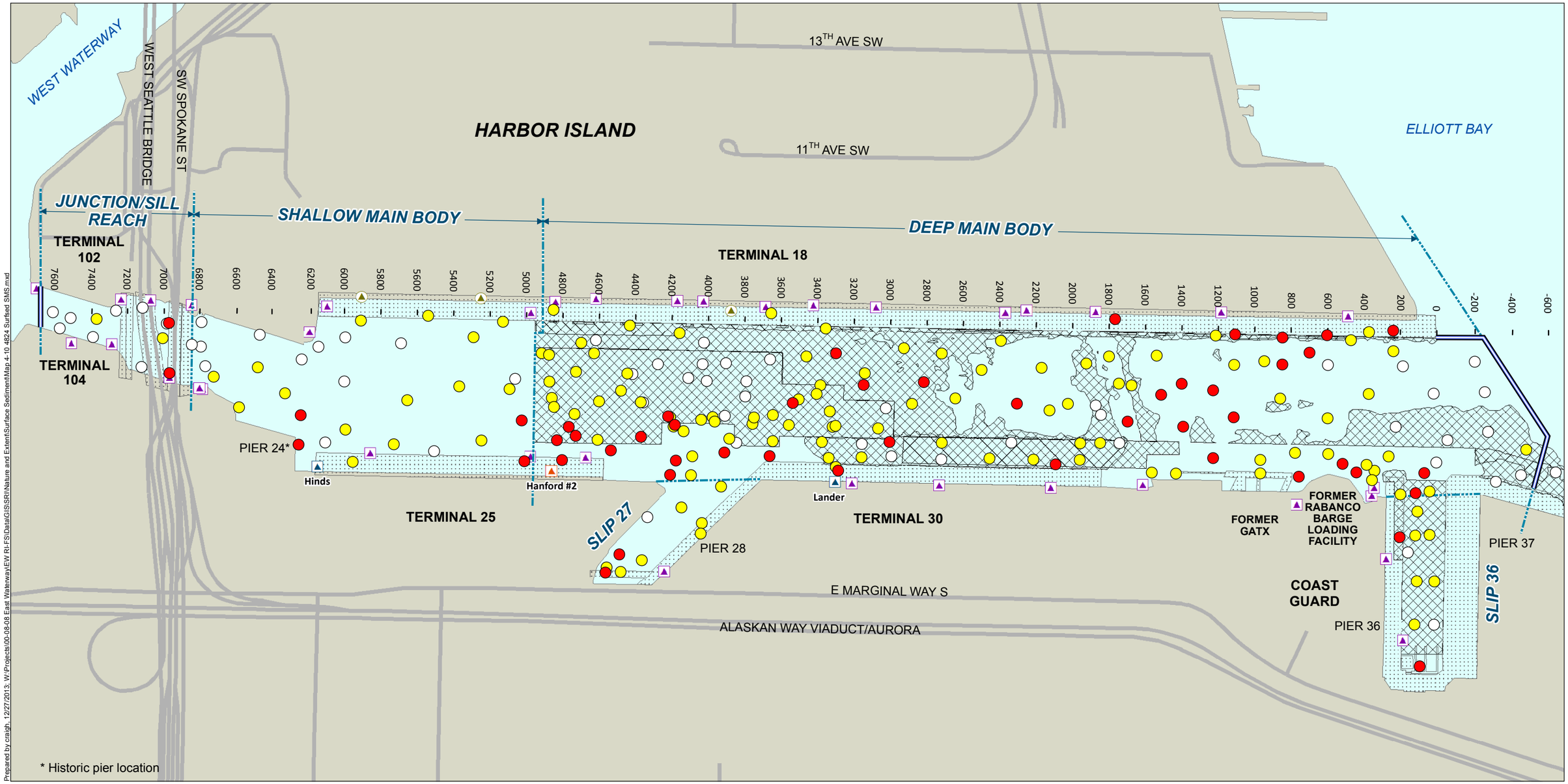
Analyzed for VOC
- EW Porewater

- Storm Drain
- CSO/Storm Drain
- Area Dredged in the Last 11 Years
- Dock/Pier
- Road
- East Waterway Study Area Boundary



0 600
Scale in feet

Map 4-9b
SRI Baseline Porewater Sampling Locations
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by craigh, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-10 4824 Surfsed SMS.mxd

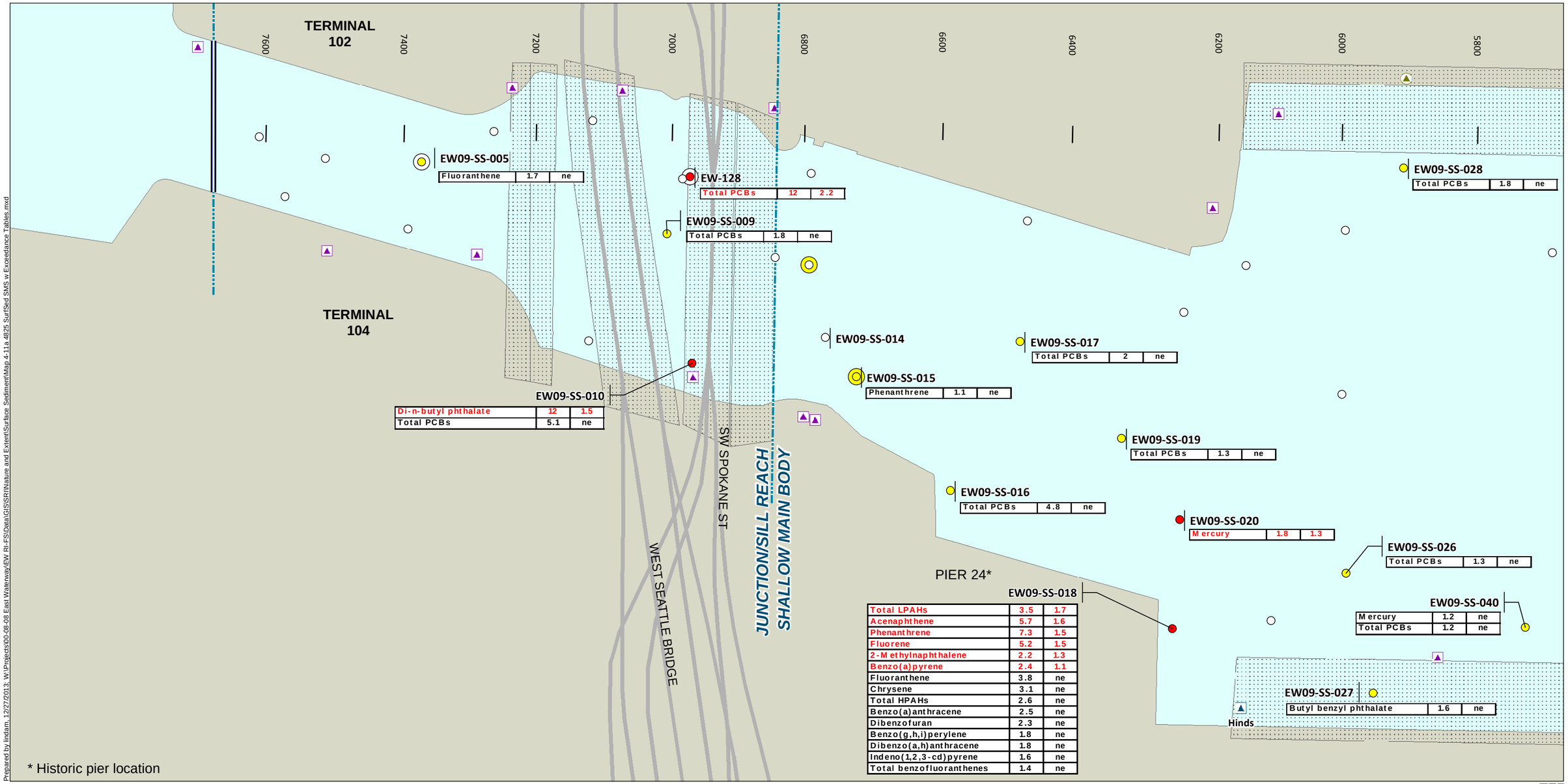
SMS Exceedances at Surface Sediment Sampling Locations

- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall

- Dock/Pier/Bridge
- Area Dredged in the Last 11 Years
- Road
- East Waterway Study Area Boundary

Map 4-10
Exceedances of SQS and CSL Numerical Criteria by All Chemicals with SMS Criteria in the Surface Sediment Dataset
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-11a 48:25 Surf Sed SMS w Exceedance Tables.mxd

Analyte	Exceedance Factor	
	SQS	CSL
PCBs	15	2.8

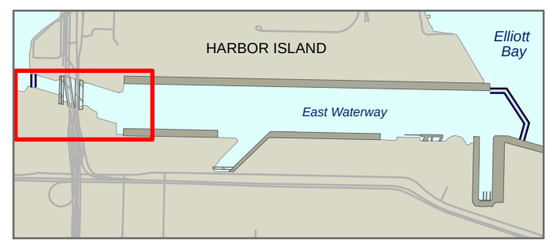
Chemicals in red exceeded CSL. The EF has no regulatory relevance and is presented here to provide an indication of the general magnitude of the concentration. Sampling locations were analyzed for all SMS chemicals. "ne" = not exceeded.

Surface Sediment SMS Status
- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect

Toxicity Test Results[a]
- Fails CSL
- Fails SQS
- Pass

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

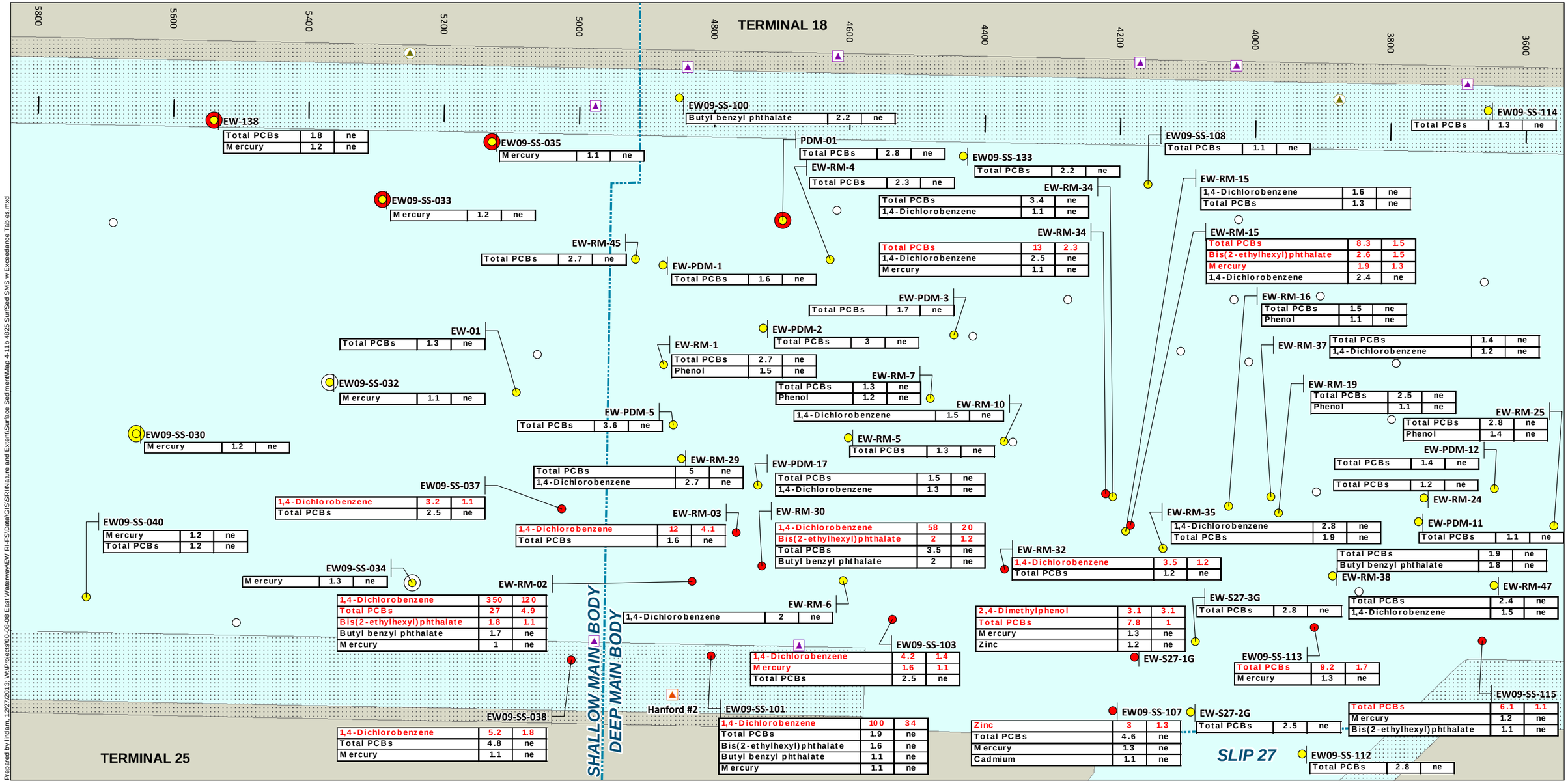
[a] Toxicity test results on Map 4-12.



TER

0 300
Scale in feet

Map 4-11a
Chemical and Toxicity Test Results for Surface Sediment Sampling Locations Compared with SMS Criteria
Supplement Remedial Investigation
East Waterway Study Area



Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-11b 48:25 SurfSed SMS w Exceedance Tables.mxd

Analyte	Exceedance Factor	
	SQS	CSL
PCBs	15	2.8

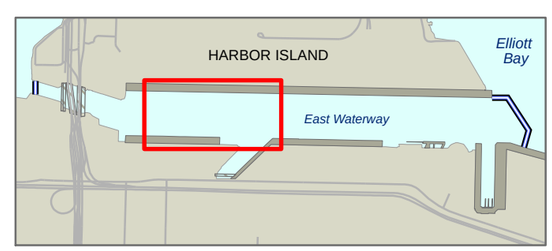
Chemicals in red exceeded CSL. The EF has no regulatory relevance and is presented here to provide an indication of the general magnitude of the concentration. Sampling locations were analyzed for all SMS chemicals. "ne" = not exceeded.

Surface Sediment SMS Status
- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect

Toxicity Test Results[a]
- Fails CSL
- Fails SQS
- Pass

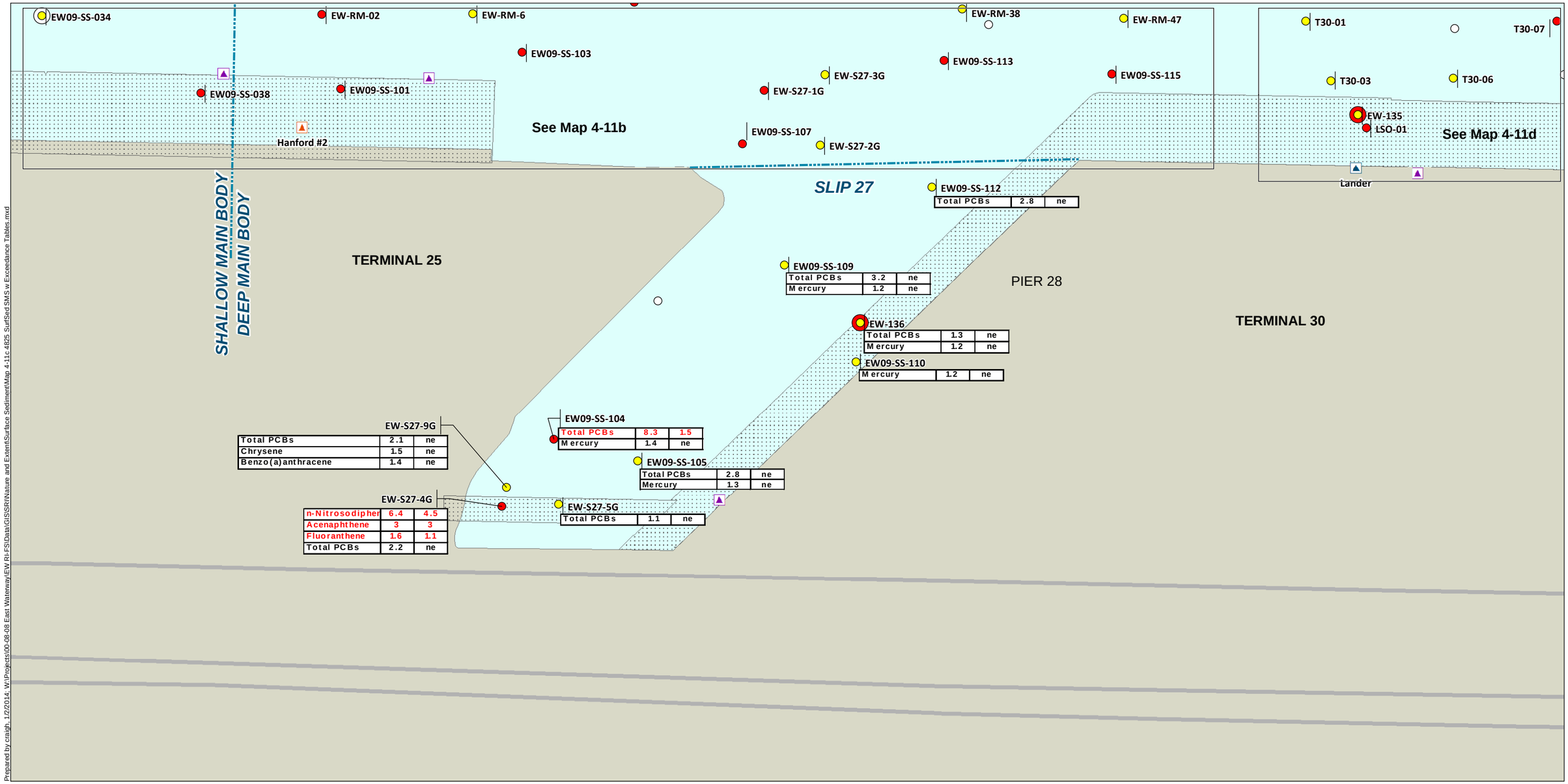
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

[a] Toxicity test results on Map 4-12.



0 300
Scale in feet

Map 4-11b
Chemical and Toxicity Test Results for Surface Sediment Sampling Locations Compared with SMS Criteria
Supplement Remedial Investigation
East Waterway Study Area



Prepared by craigh, 1/2/2014; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-11c 4825 SurfSed SMS w Exceedance Tables.mxd

Analyte	Exceedance Factor	
	SQS	CSL
PCBs	15	2.8

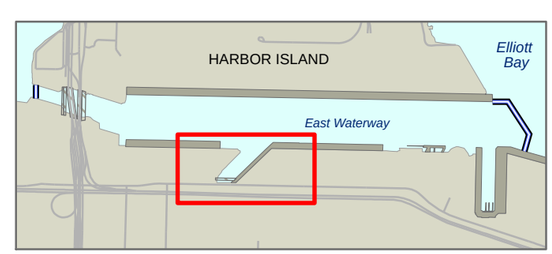
Chemicals in red exceeded CSL. The EF has no regulatory relevance and is presented here to provide an indication of the general magnitude of the concentration. Sampling locations were analyzed for all SMS chemicals. "ne" = not exceeded.

Surface Sediment SMS Status
- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect

Toxicity Test Results[a]
- Fails CSL
- Fails SQS
- Pass

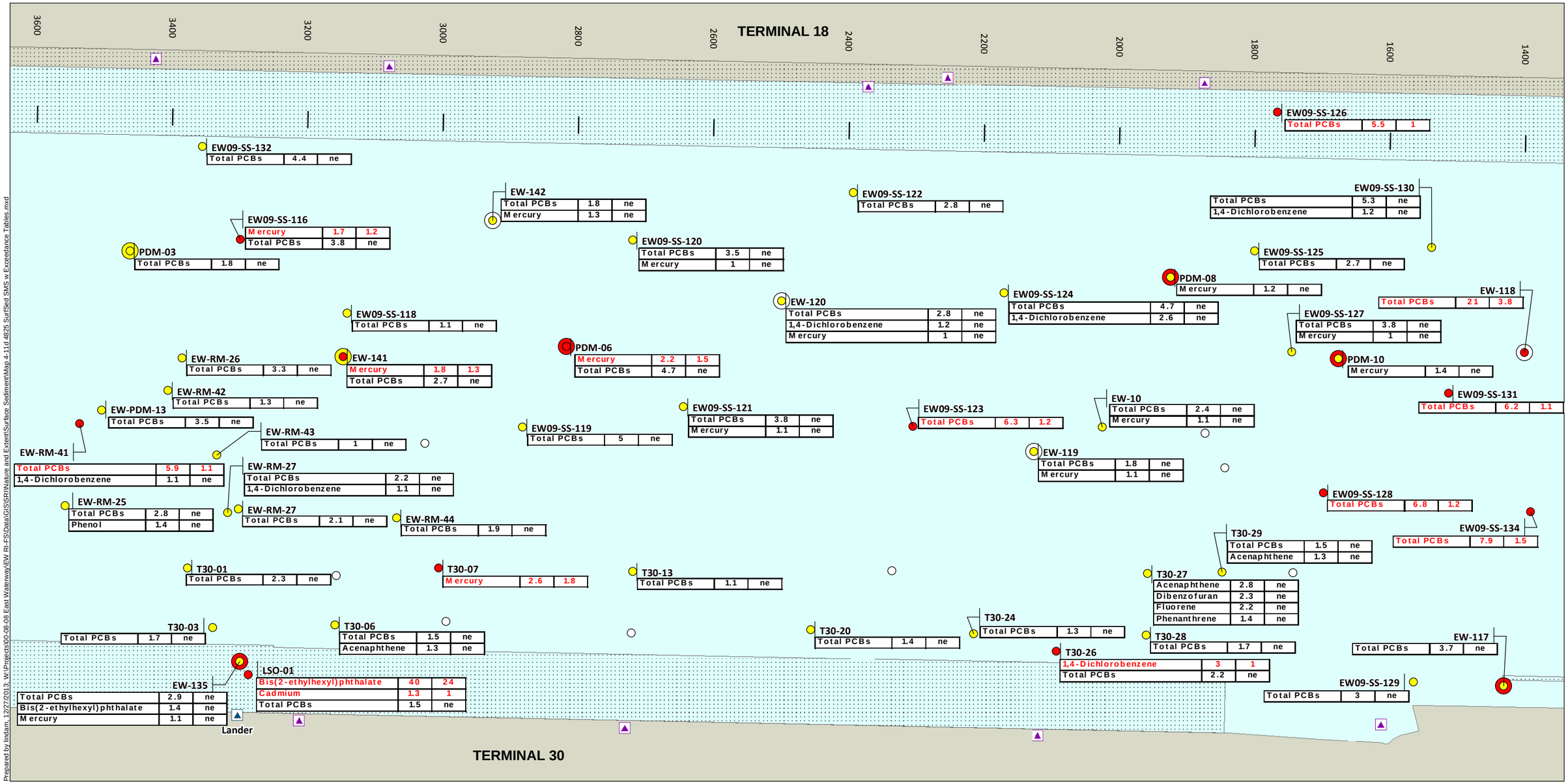
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

[a] Toxicity test results on Map 4-12.



0 300
Scale in feet

Map 4-11c
Chemical and Toxicity Test Results for Surface Sediment Sampling Locations Compared with SMS Criteria
Supplement Remedial Investigation
East Waterway Study Area



Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-11d 48:25 SurfSed SMS w Exceedance Tables.mxd

Analyte	Exceedance Factor SQS	Exceedance Factor CSL
PCBs	15	2.8

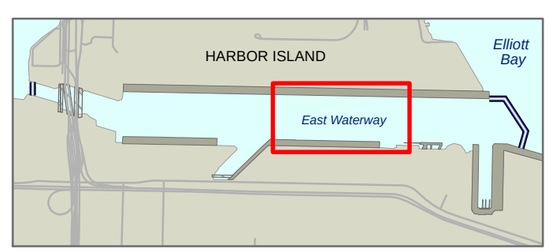
Chemicals in red exceeded CSL. The EF has no regulatory relevance and is presented here to provide an indication of the general magnitude of the concentration. Sampling locations were analyzed for all SMS chemicals. "ne" = not exceeded.

Surface Sediment SMS Status
- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect

Toxicity Test Results[a]
- Fails CSL
- Fails SQS
- Pass

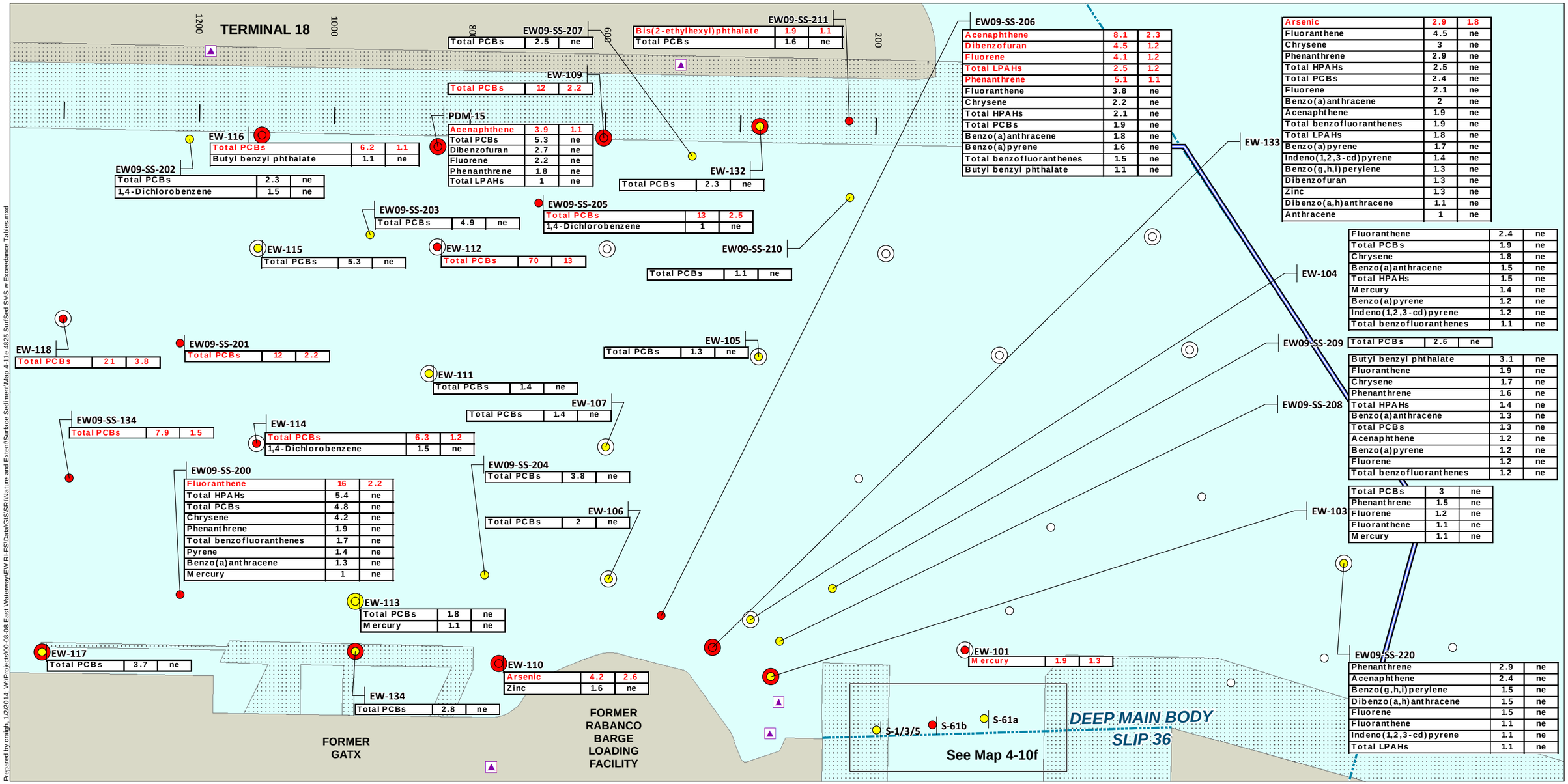
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

[a] Toxicity test results on Map 4-12.



0 300
Scale in feet

Map 4-11d
Chemical and Toxicity Test Results for Surface Sediment Sampling Locations Compared with SMS Criteria
Supplement Remedial Investigation
East Waterway Study Area



Prepared by craigh, 1/2/2014, W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-11e 4825 SurfSed SMS w Exceedance Tables.mxd

Analyte	Exceedance Factor	
	SQS	CSL
PCBs	15	2.8

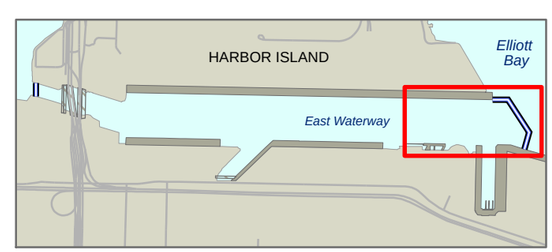
Chemicals in red exceeded CSL. The EF has no regulatory relevance and is presented here to provide an indication of the general magnitude of the concentration. Sampling locations were analyzed for all SMS chemicals. "ne" = not exceeded.

Surface Sediment SMS Status
- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect

Toxicity Test Results[a]
- Fails CSL
- Fails SQS
- Pass

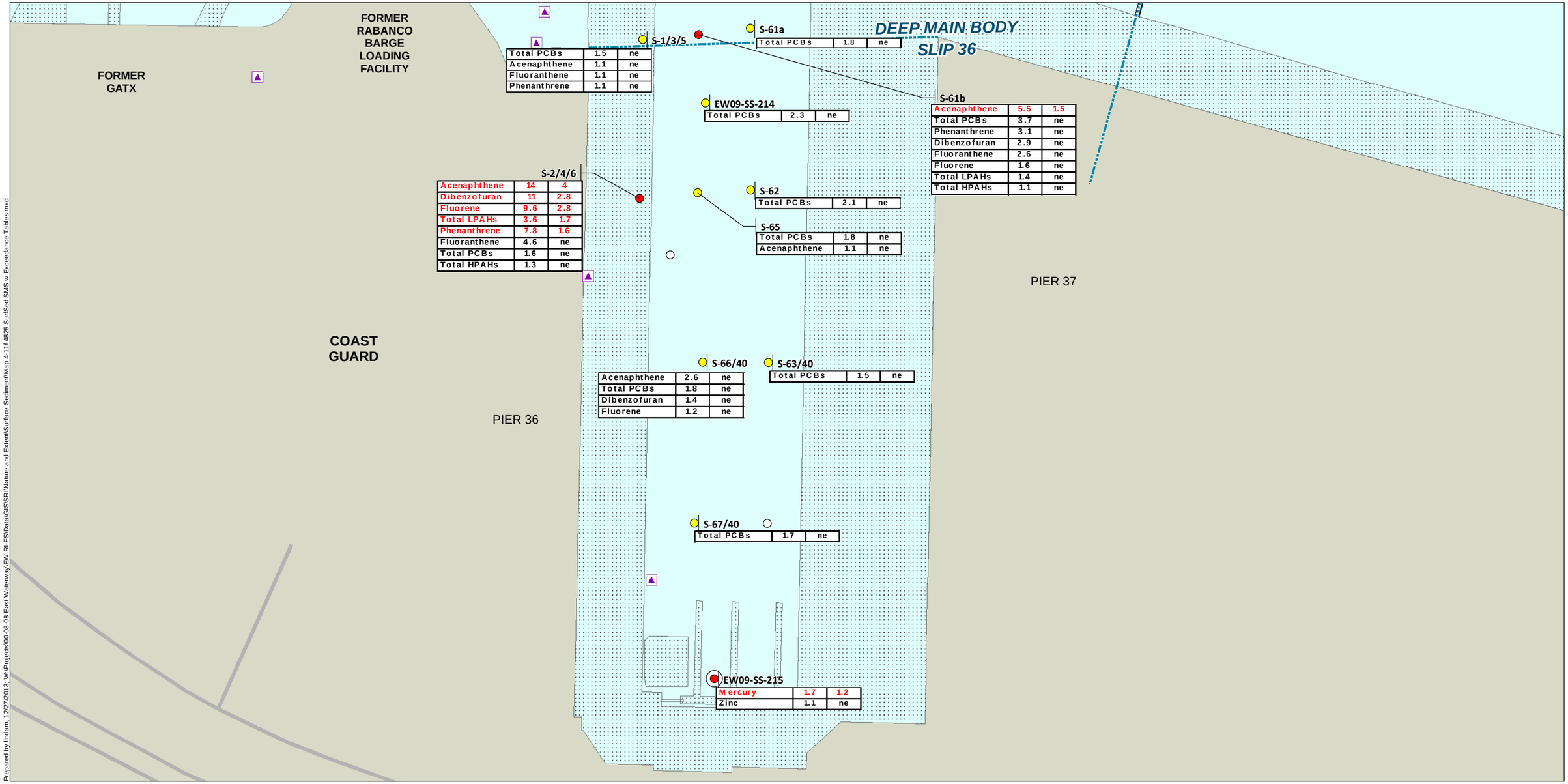
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

[a] Toxicity test results on Map 4-12.



0 300
Scale in feet

Map 4-11e
Chemical and Toxicity Test Results for Surface Sediment Sampling Locations Compared with SMS Criteria
Supplement Remedial Investigation
East Waterway Study Area



Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-11f 4825 SurfSed SMS w Exceedance Tables.mxd

Analyte	Exceedance Factor	
	SQS	CSL
PCBs	15	2.8

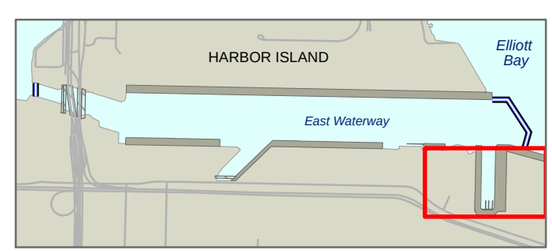
Chemicals in red exceeded CSL. The EF has no regulatory relevance and is presented here to provide an indication of the general magnitude of the concentration. Sampling locations were analyzed for all SMS chemicals. "ne" = not exceeded.

Surface Sediment SMS Status
- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect

Toxicity Test Results[a]
- Fails CSL
- Fails SQS
- Pass

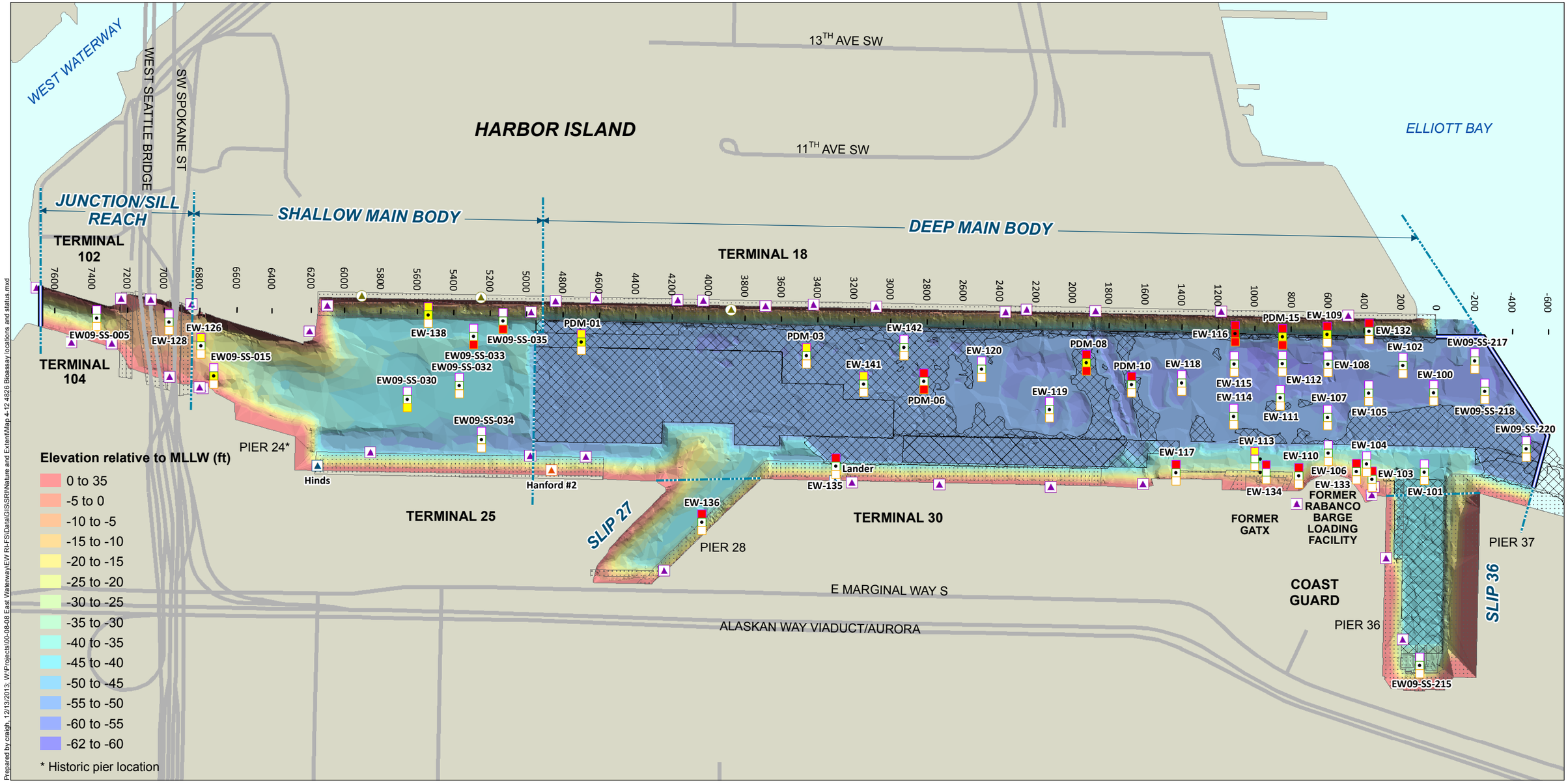
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

[a] Toxicity test results on Map 4-12.



0 300
Scale in feet

Map 4-11f
Chemical and Toxicity Test Results for Surface Sediment Sampling Locations Compared with SMS Criteria
Supplement Remedial Investigation
East Waterway Study Area



Toxicity test results

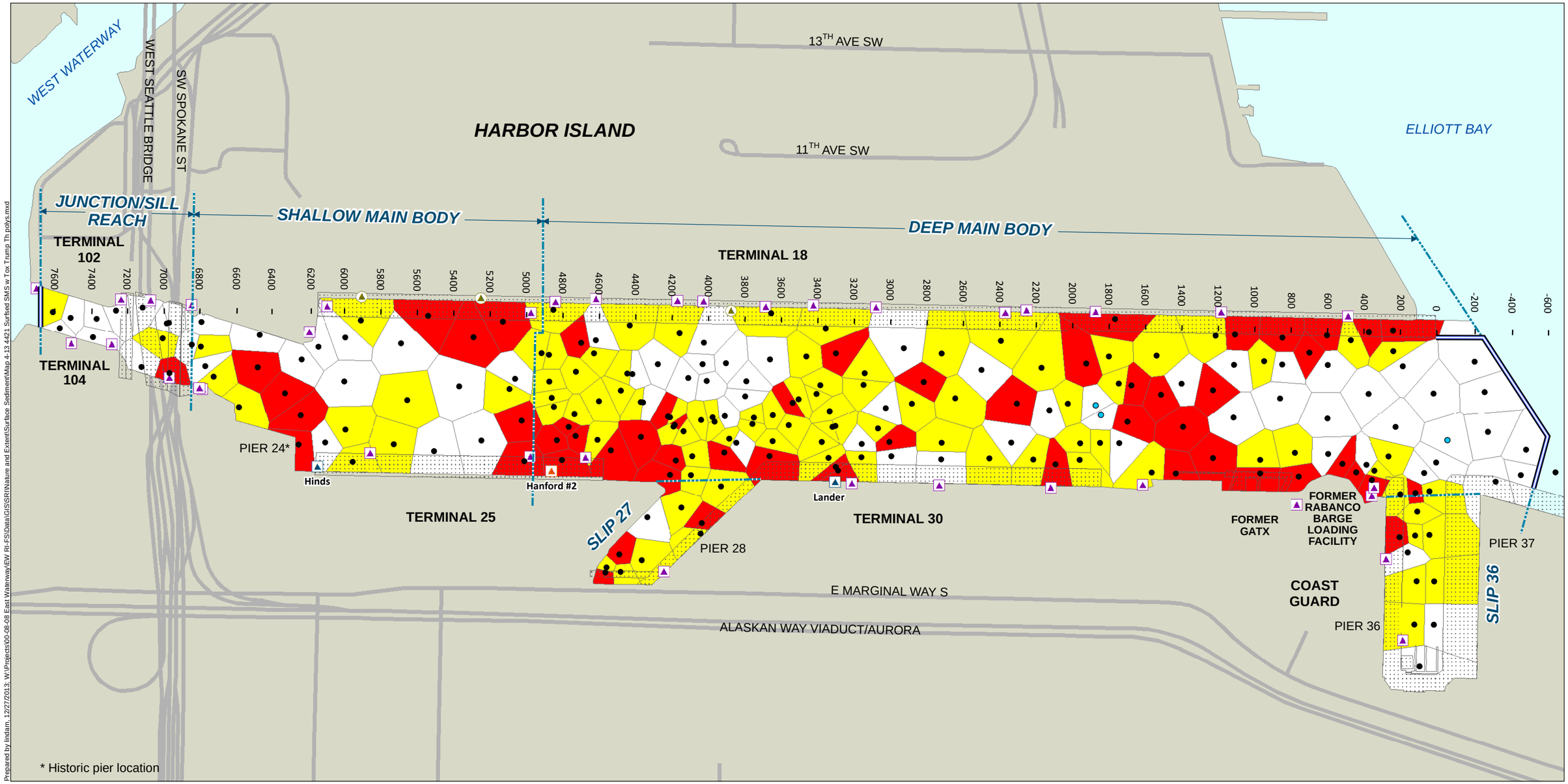
Sample Location: Larval, Polychaete, Amphipod

- > CSL
- > SQS and ≤ CSL
- ≤ SQS

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

0 600
Scale in feet

Map 4-12
Surface Sediment Toxicity Test Results for Individual Bioassay Tests
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-13 4421 Surfsed SMS w Tox Trump Th polys.mxd

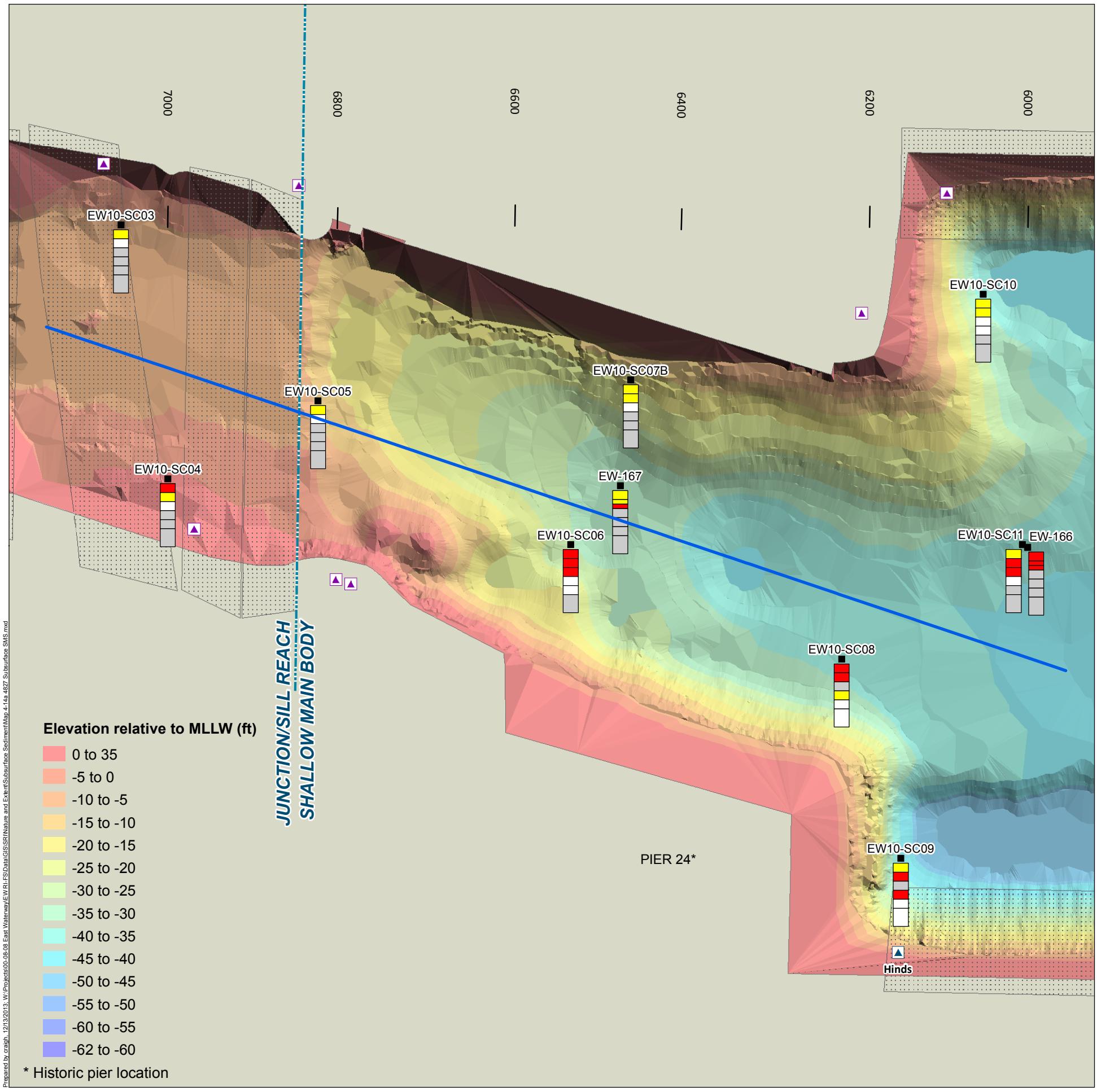
Final SMS Status (Chemical Criteria and Toxicity Combined) in Surface Sediment

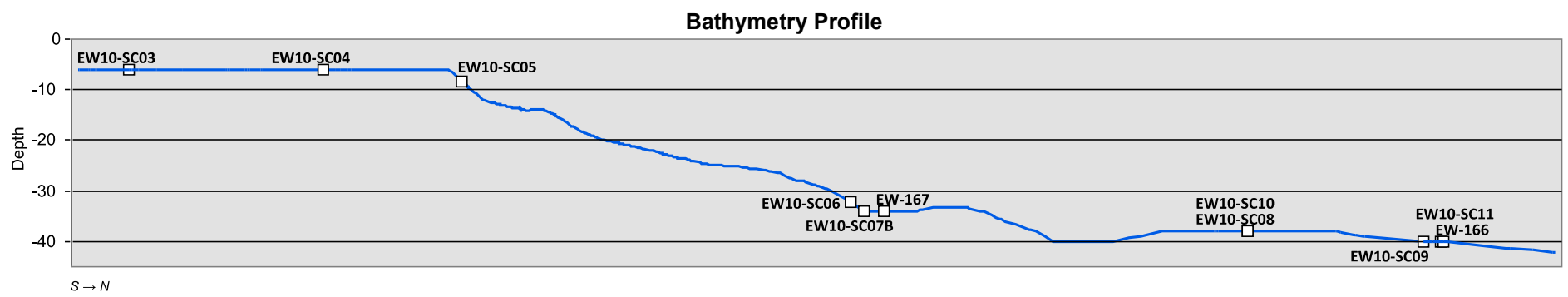
- > CSL
- > SQS and ≤ CSL
- ≤ SQS
- Surface Sediment Sampling Location
- Restricted Analyte Location[a]
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

[a] Not analyzed for SVOCs, phthalates, or metals other than mercury.

0 600
Scale in feet

Map 4-13
Exceedances of SQS and CSL (Chemical Criteria and Toxicity Combined)
Using Thiessen Polygons for the Surface Sediment Dataset
Supplemental Remedial Investigation
East Waterway Study Area



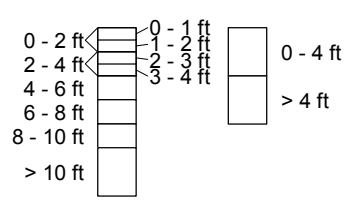


Subsurface Core Depth Charts

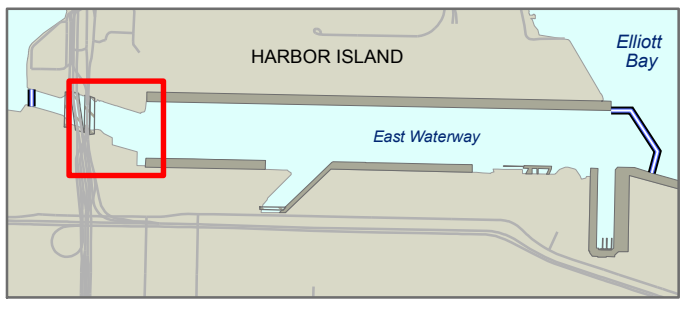
- Subsurface Core Location

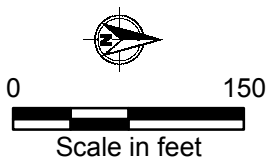
SMS Exceedance

- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect
- Not Analyzed for This Interval

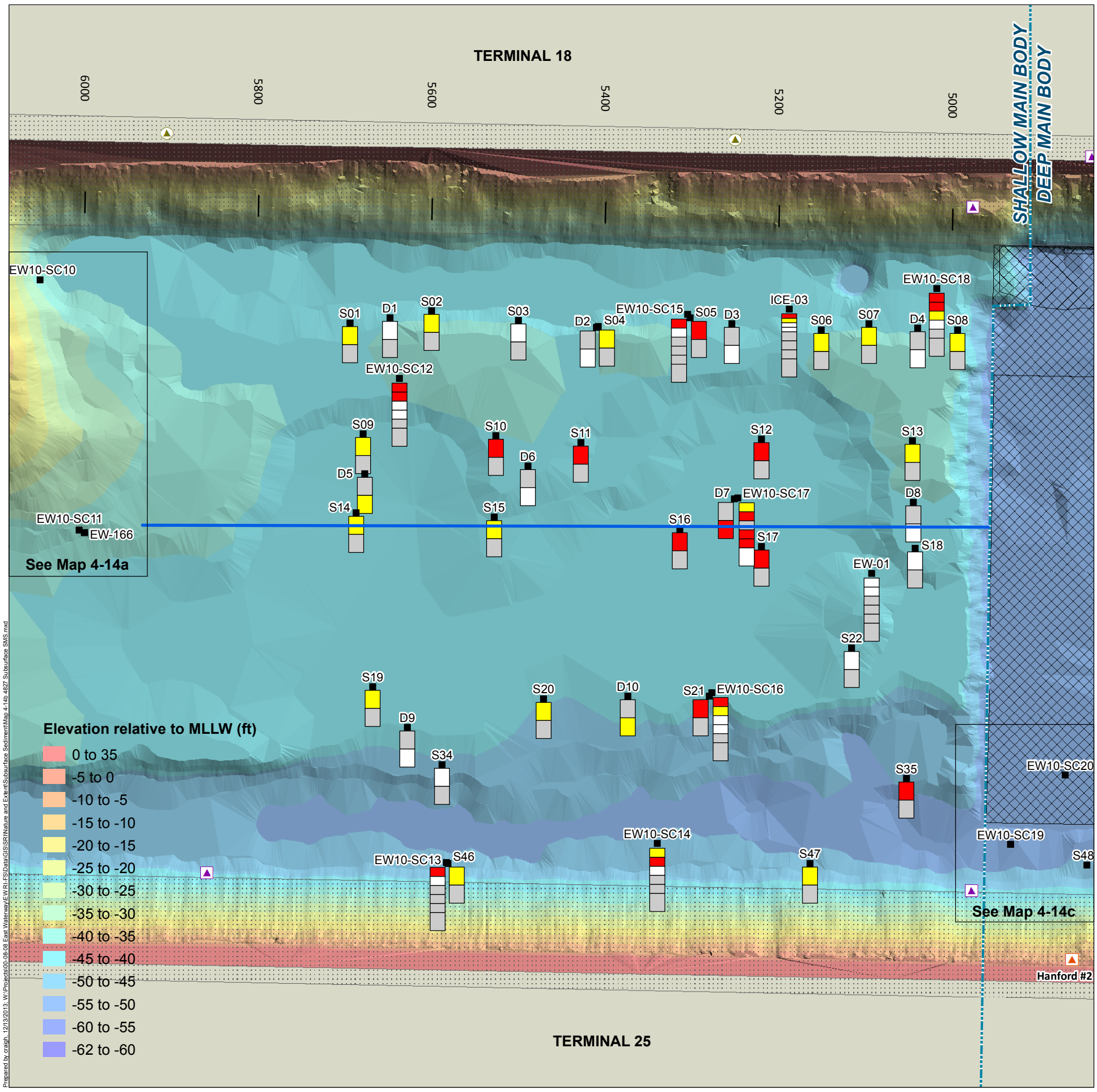


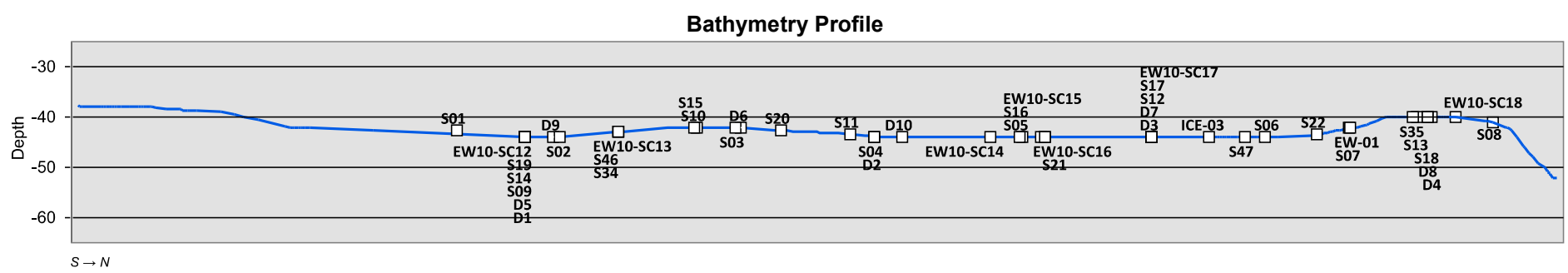
- Dock/Pier/Bridge
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown
- East Waterway Study Area Boundary





Map 4-14a
Concentrations of All SMS Chemicals in Subsurface Sediment Cores Compared with SMS Criteria (SQS or CSL)
Supplemental Remedial Investigation
East Waterway Study Area





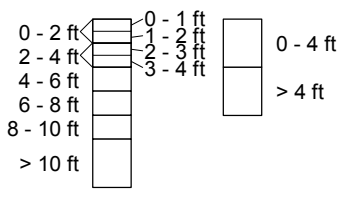
Subsurface Core Depth Charts

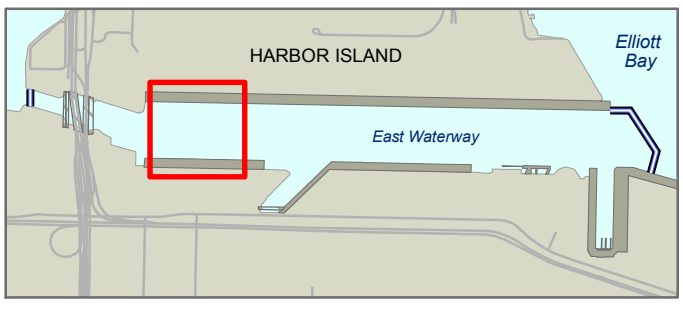
- Subsurface Core Location

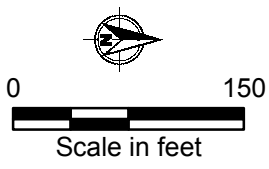
SMS Exceedance

- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect
- Not Analyzed for This Interval

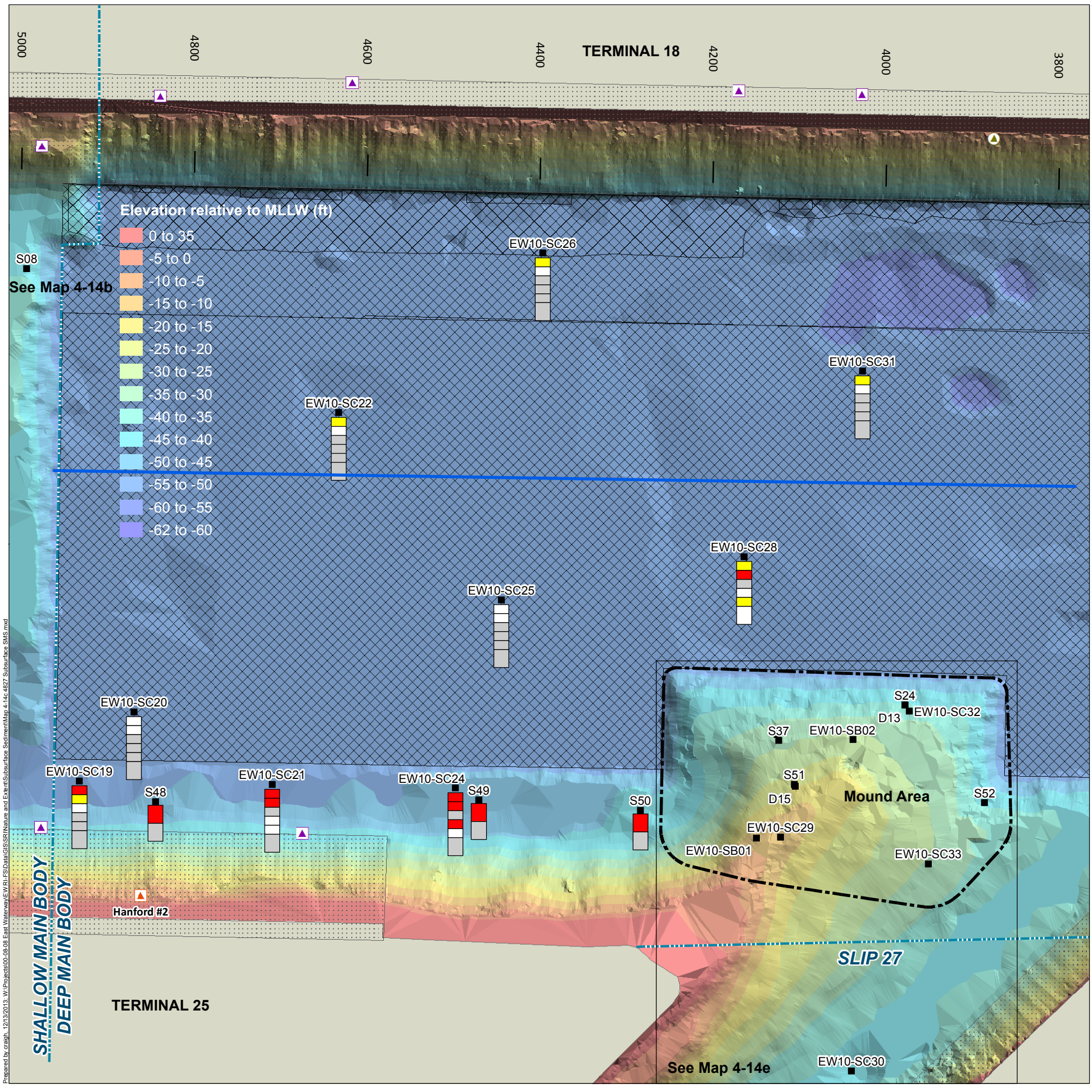
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown
- East Waterway Study Area Boundary

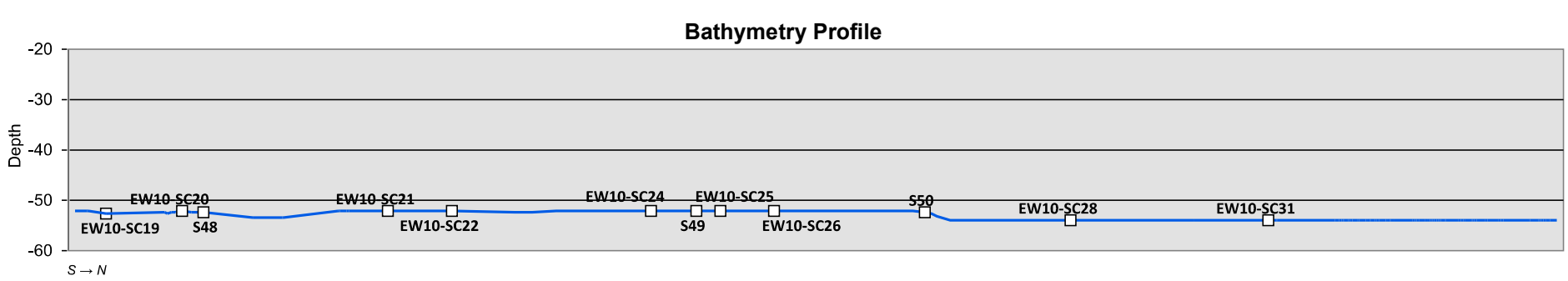






Map 4-14b
Concentrations of All SMS Chemicals in Subsurface Sediment Cores Compared with SMS Criteria (SQS or CSL)
Supplemental Remedial Investigation
East Waterway Study Area





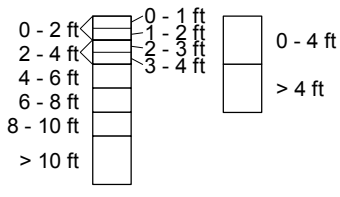
Subsurface Core Depth Charts

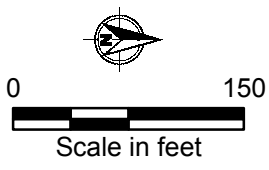
- Subsurface Core Location

SMS Exceedance

- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect
- Not Analyzed for This Interval

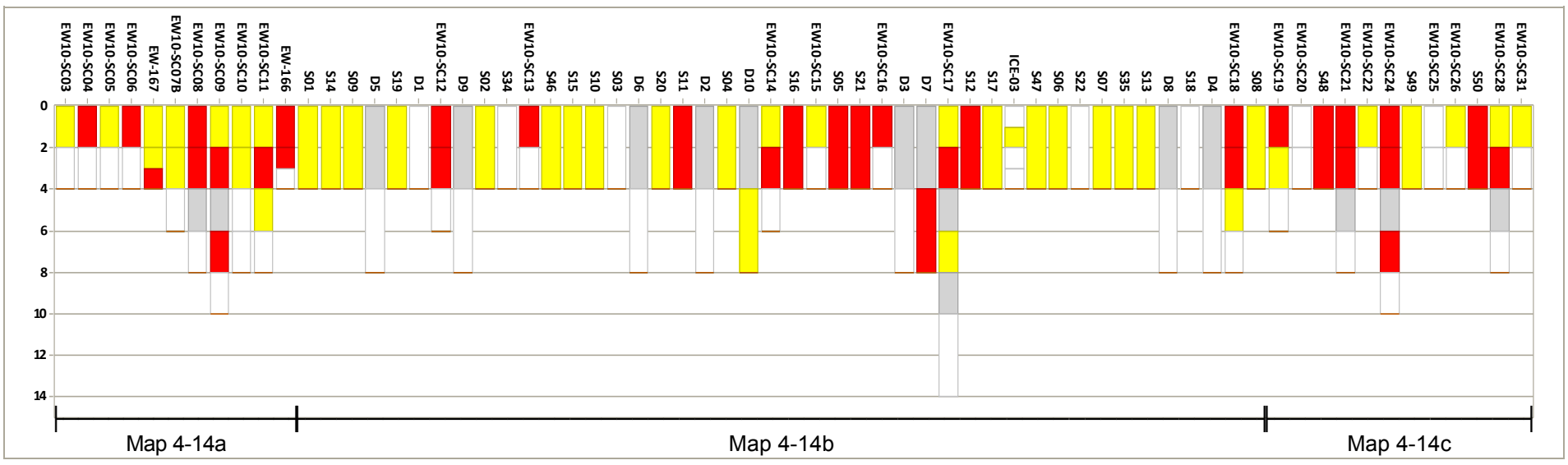
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown
- East Waterway Study Area Boundary



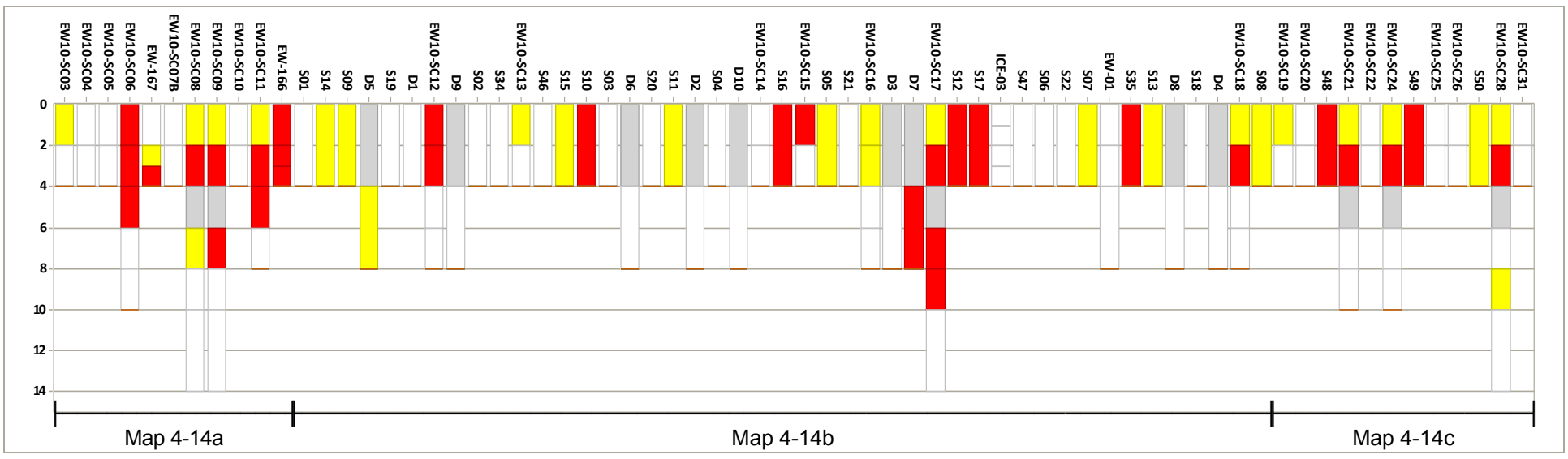


Map 4-14c
Concentrations of All SMS Chemicals in Subsurface Sediment Cores Compared with SMS Criteria (SQS or CSL)
Supplemental Remedial Investigation
East Waterway Study Area

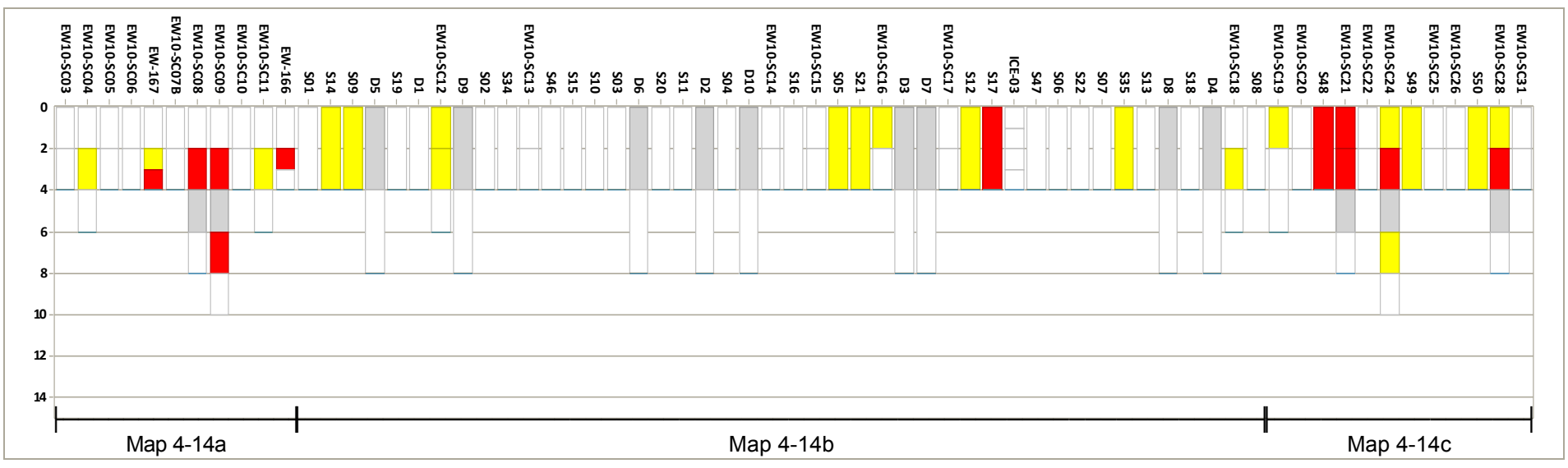
Total PCBs



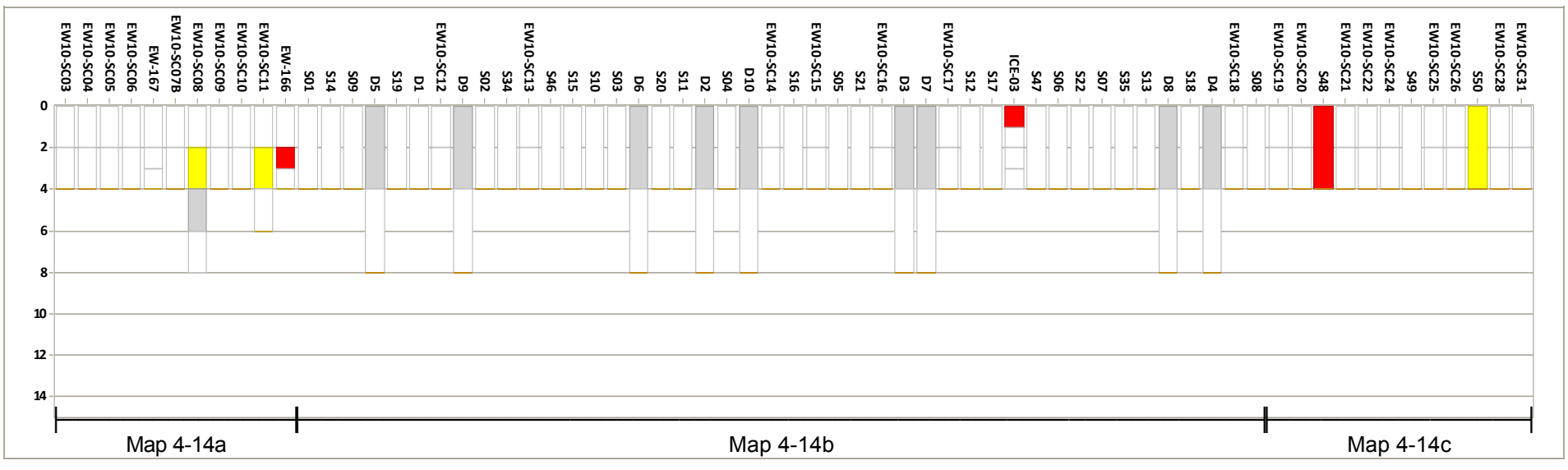
Mercury



SVOCs

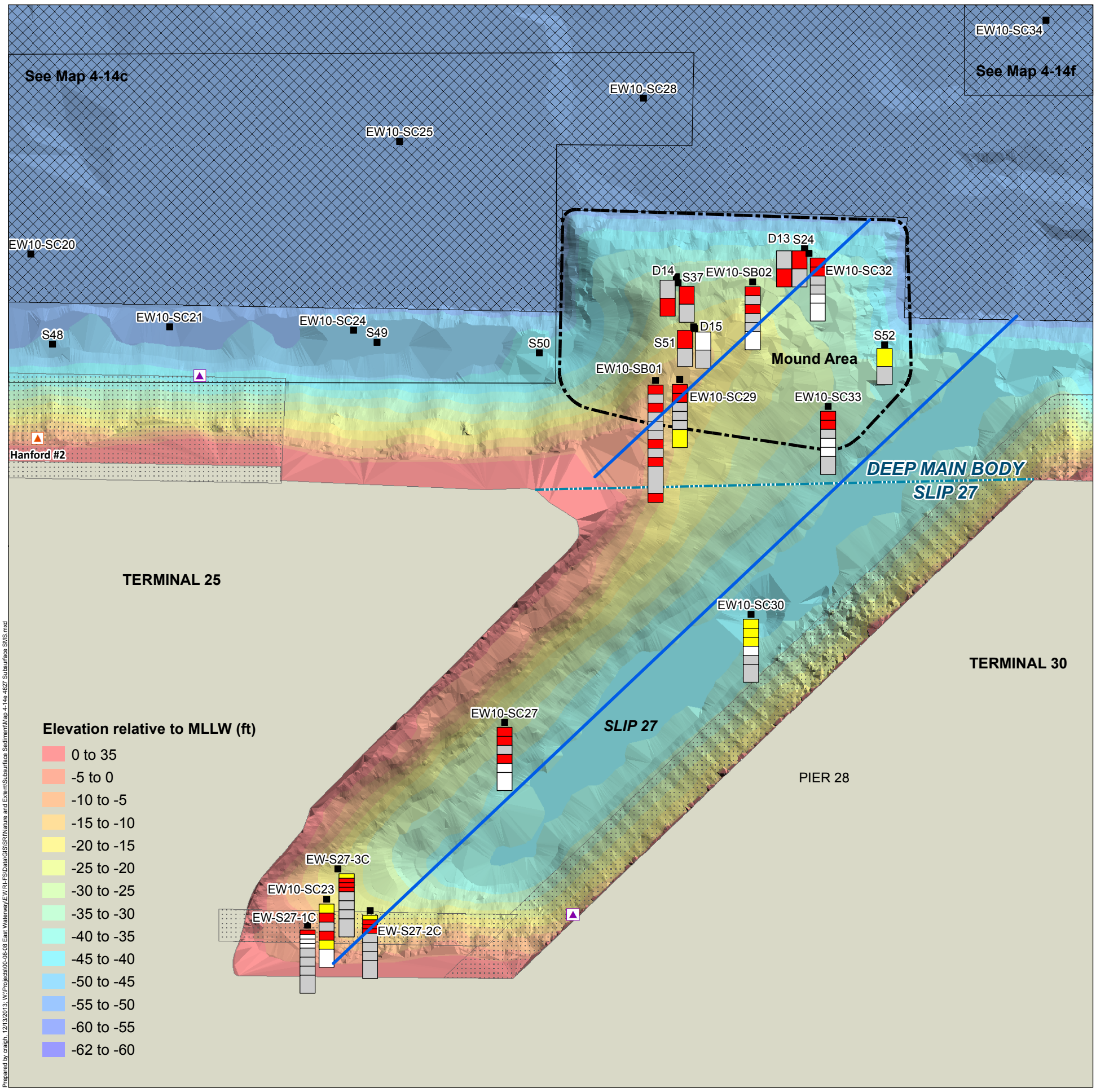


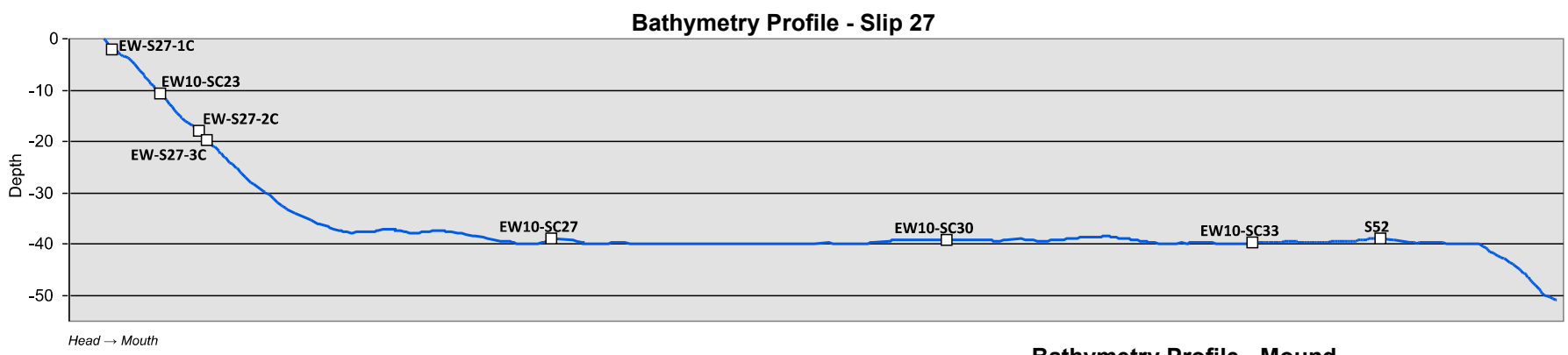
Metals (excluding Mercury)

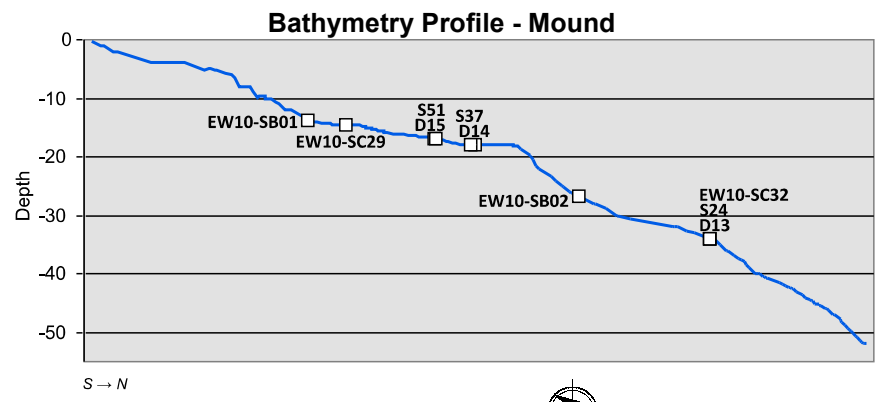


- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect
- Not Analyzed for This Interval

Map 4-14d
Concentrations of All SMS Chemicals in Subsurface Sediment Cores Compared with SMS Criteria (SQS or CSL)
Supplemental Remedial Investigation
East Waterway Study Area





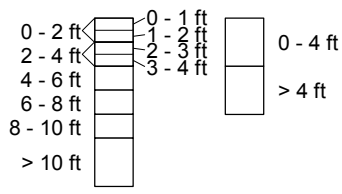


Subsurface Core Depth Charts

- Subsurface Core Location

SMS Exceedance

- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect
- Not Analyzed for This Interval

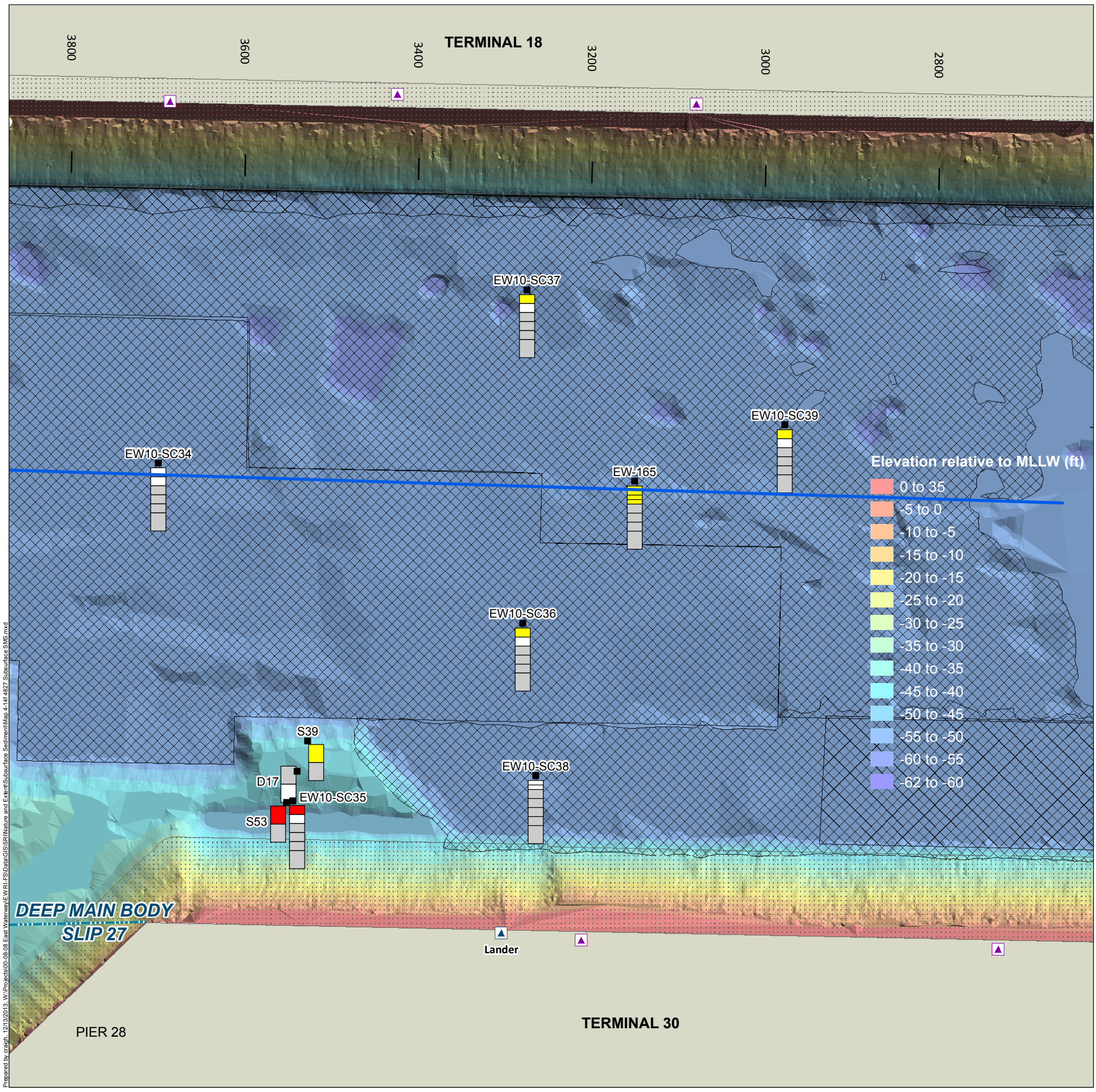


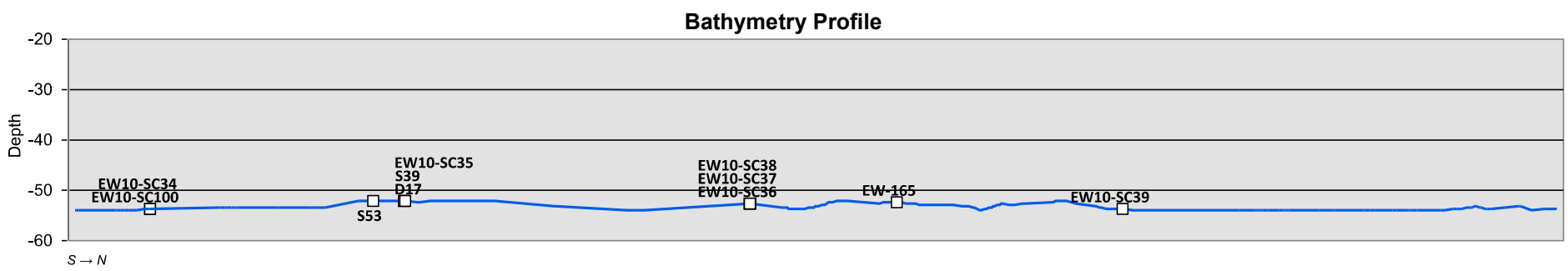
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown
- East Waterway Study Area Boundary

0 150
Scale in feet

Map 4-14e
Concentrations of All SMS Chemicals in Subsurface Sediment Cores Compared with SMS Criteria (SQS or CSL)
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EWRI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-14e 4827 Subsurface SMS.mxd





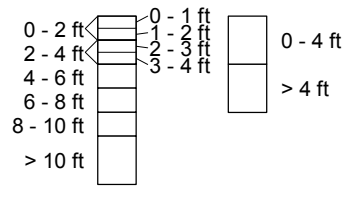
Subsurface Core Depth Charts

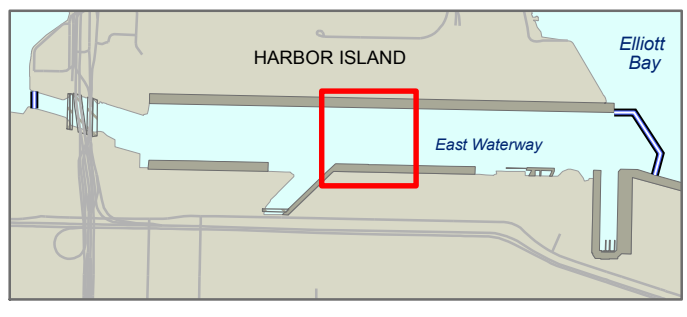
- Subsurface Core Location

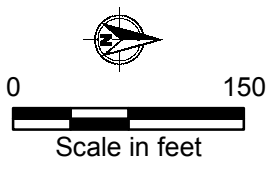
SMS Exceedance

- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect
- Not Analyzed for This Interval

- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown
- East Waterway Study Area Boundary

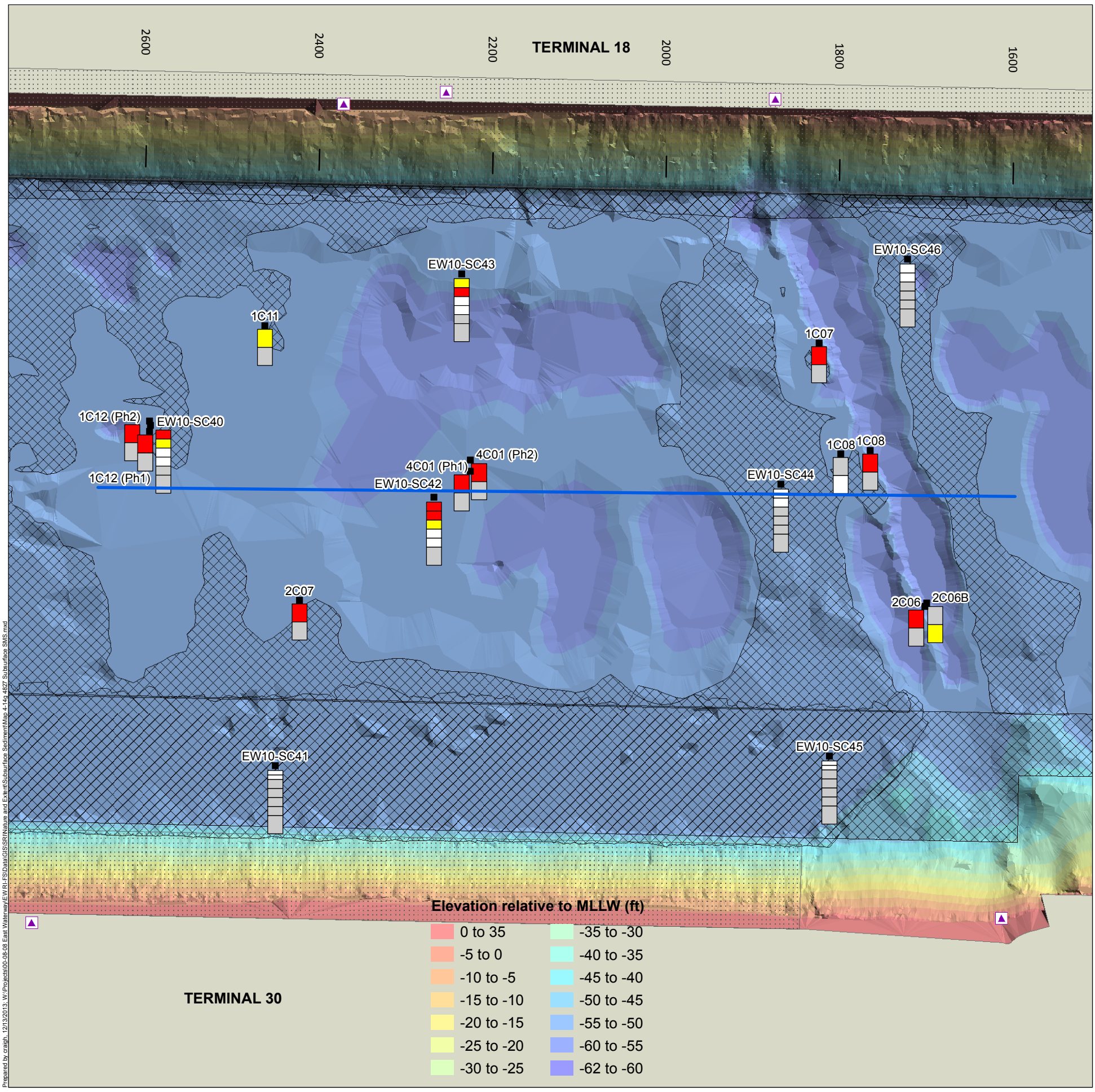


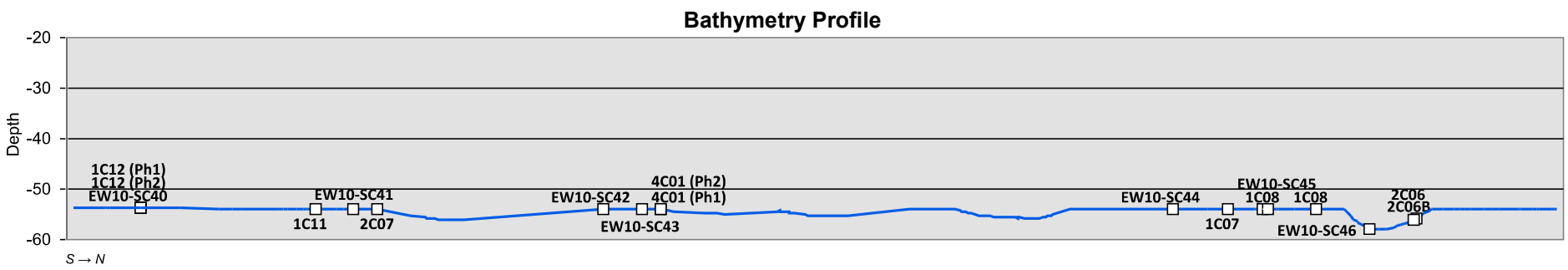




Map 4-14f
Concentrations of All SMS Chemicals in Subsurface Sediment Cores Compared with SMS Criteria (SQS or CSL)
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SKR\Nature and Extent\Subsurface Sediment\Map 4-14f 4827 Subsurface SMS.mxd





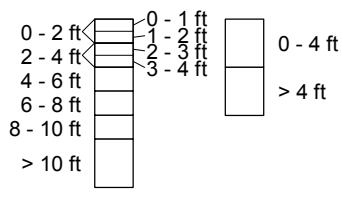
Subsurface Core Depth Charts

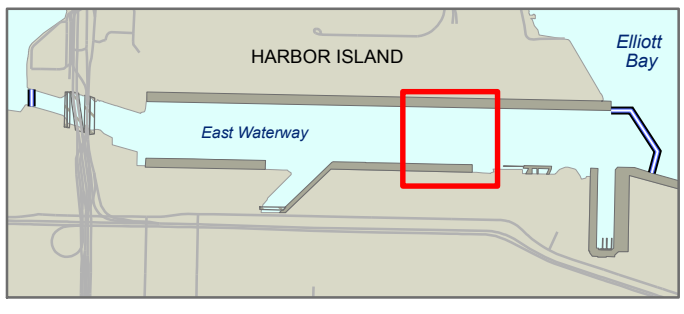
- Subsurface Core Location

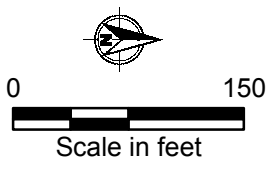
SMS Exceedance

- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect
- Not Analyzed for This Interval

- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown
- East Waterway Study Area Boundary

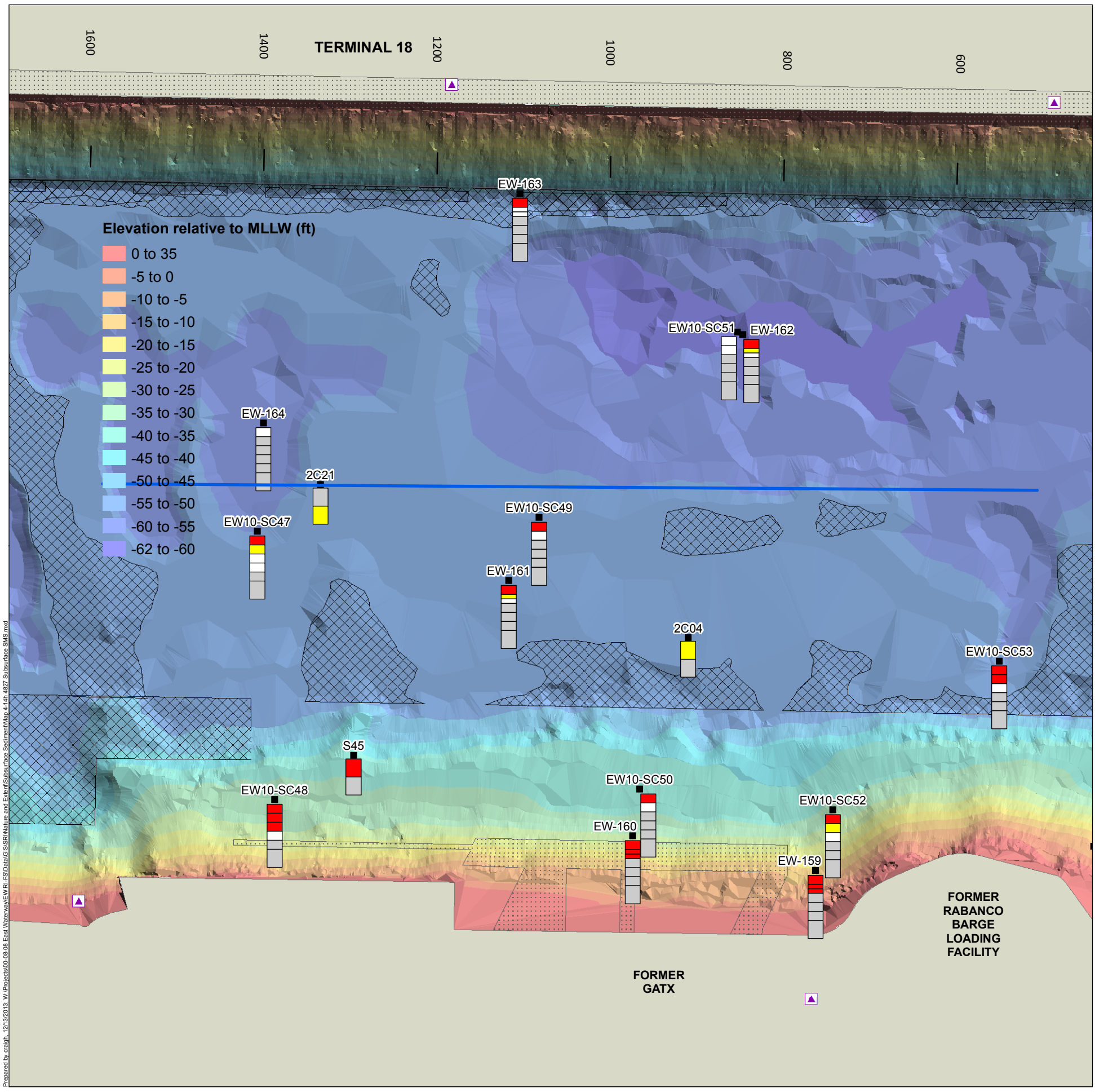


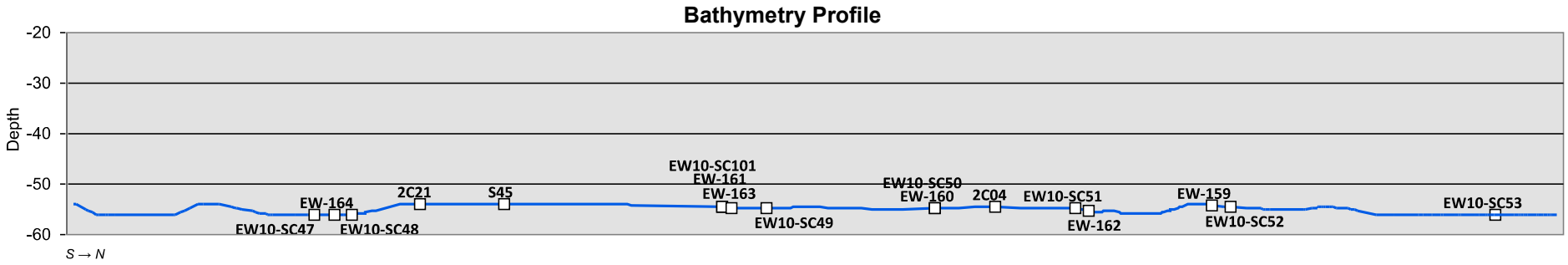




Map 4-14g
Concentrations of All SMS Chemicals in Subsurface Sediment Cores Compared with SMS Criteria (SQS or CSL)
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by: craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EWRI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-14g 4827 Subsurface SMS.mxd





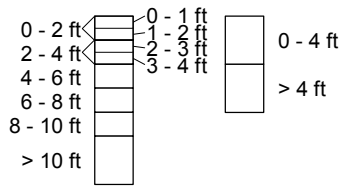
Subsurface Core Depth Charts

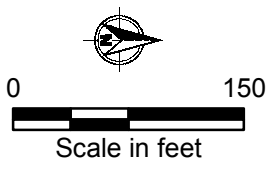
- Subsurface Core Location

SMS Exceedance

- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect
- Not Analyzed for This Interval

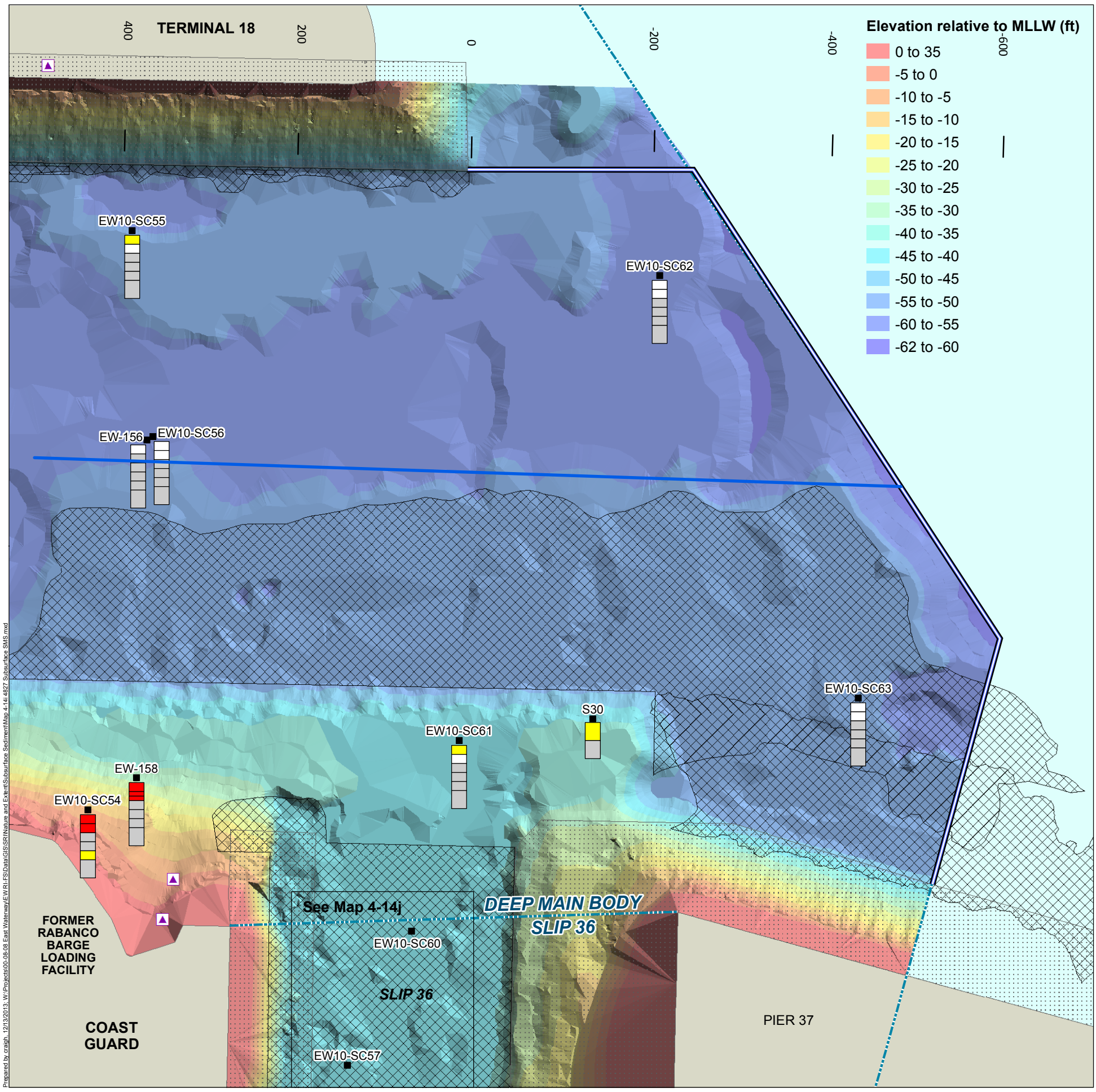
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown
- East Waterway Study Area Boundary





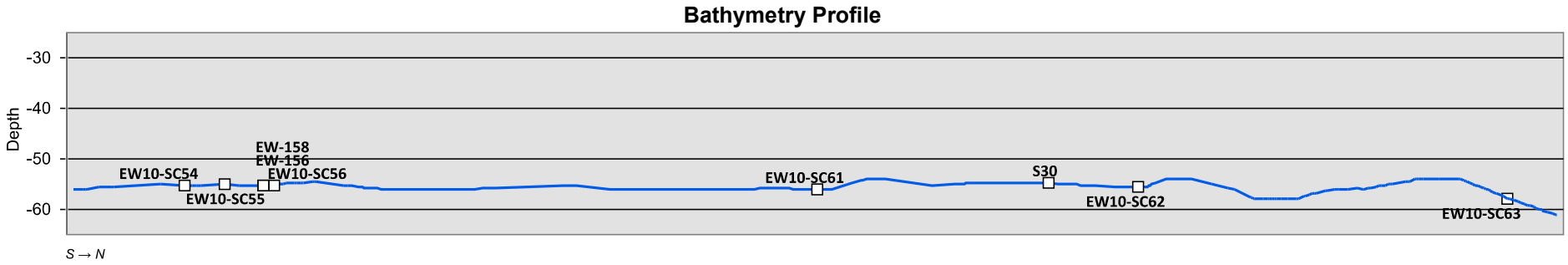
Map 4-14h
Concentrations of All SMS Chemicals in Subsurface Sediment Cores Compared with SMS Criteria (SQS or CSL)
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-14h 4827 Subsurface SMS.mxd



Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-14i 4827 Subsurface SMS.mxd

Bathymetry Profile



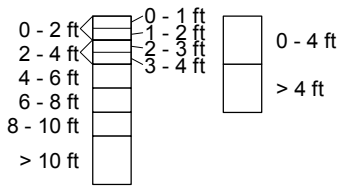
Subsurface Core Depth Charts

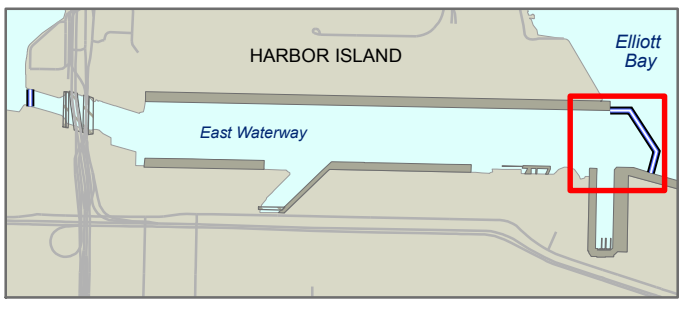
- Subsurface Core Location

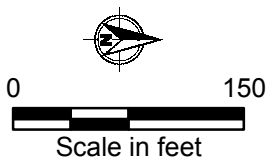
SMS Exceedance

- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect
- Not Analyzed for This Interval

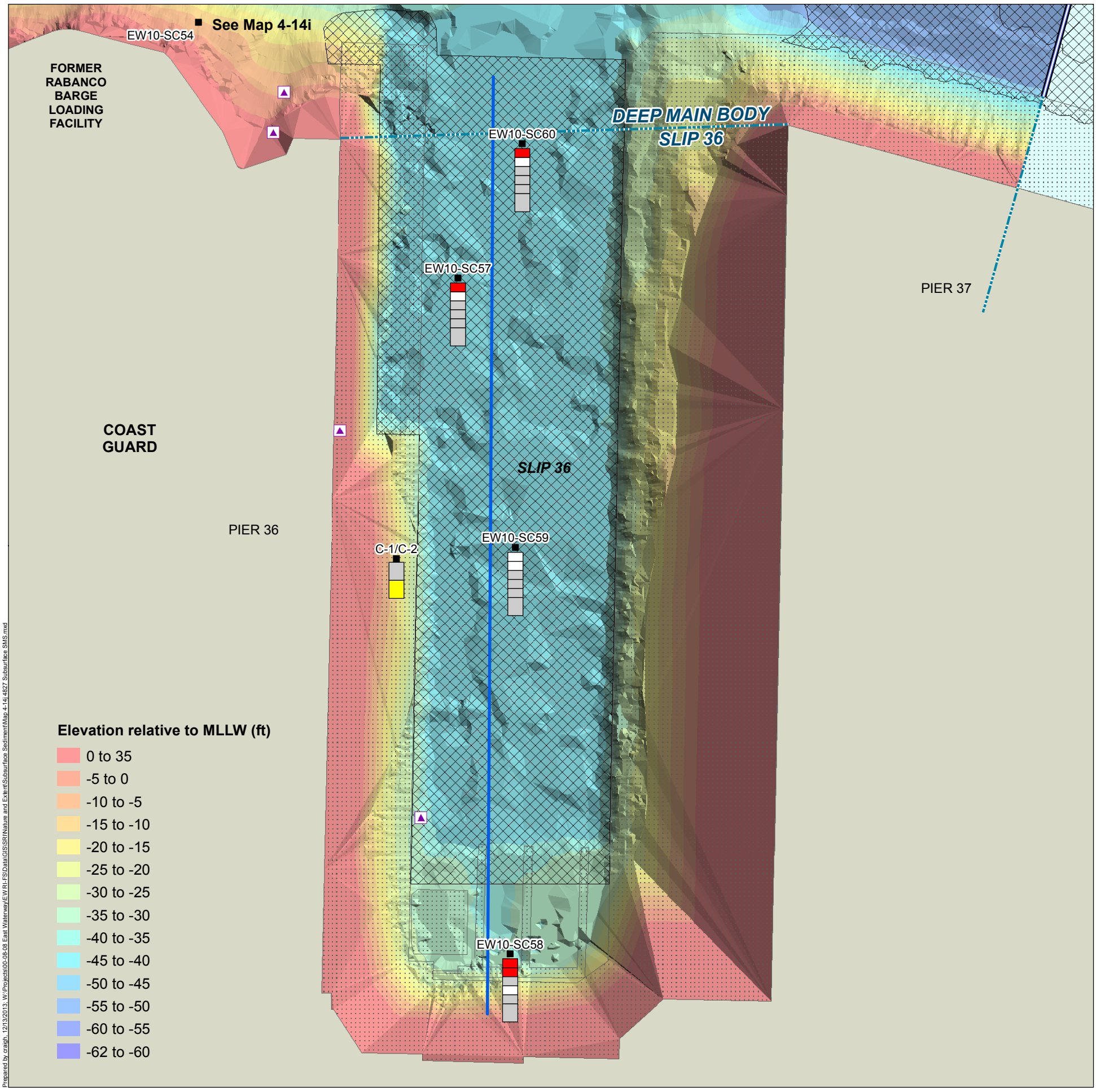
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown
- East Waterway Study Area Boundary

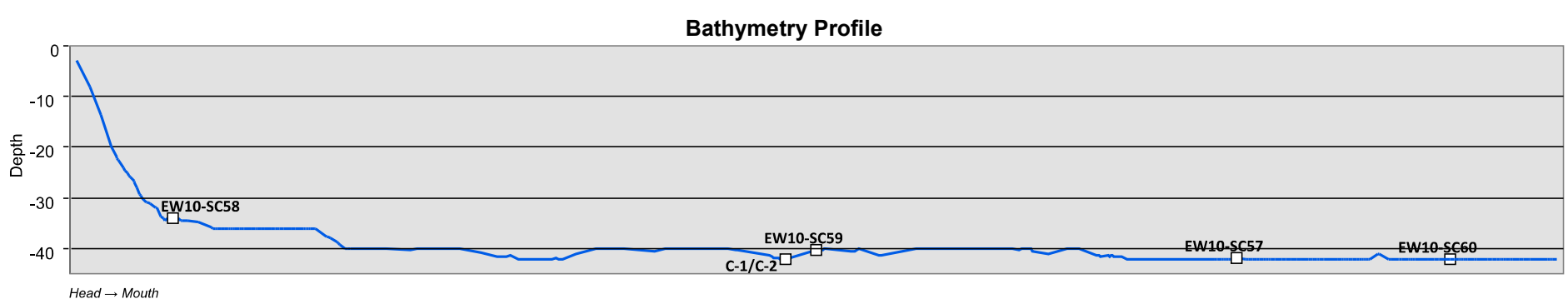






Map 4-14i
Concentrations of All SMS Chemicals in Subsurface Sediment Cores Compared with SMS Criteria (SQS or CSL)
Supplemental Remedial Investigation
East Waterway Study Area





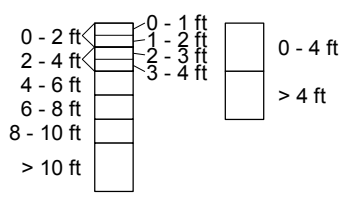
Subsurface Core Depth Charts

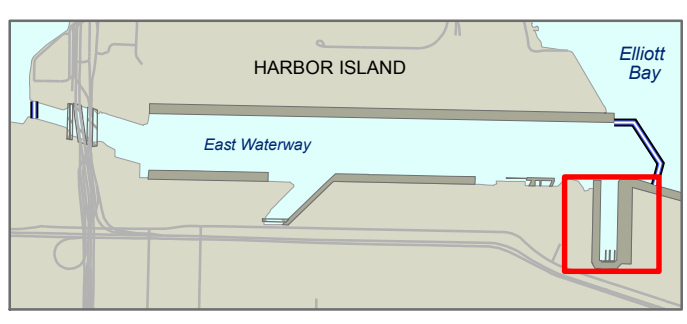
- Subsurface Core Location

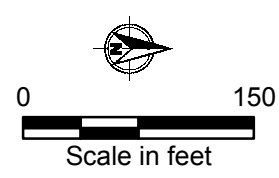
SMS Exceedance

- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect
- Not Analyzed for This Interval

- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown
- East Waterway Study Area Boundary



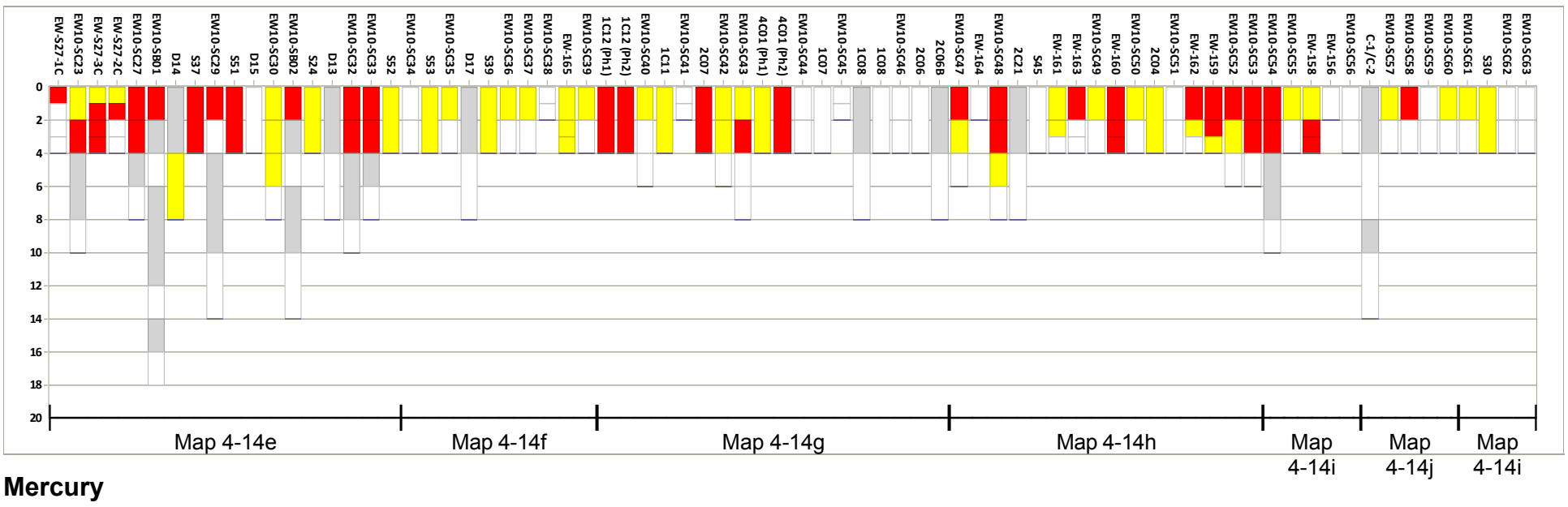




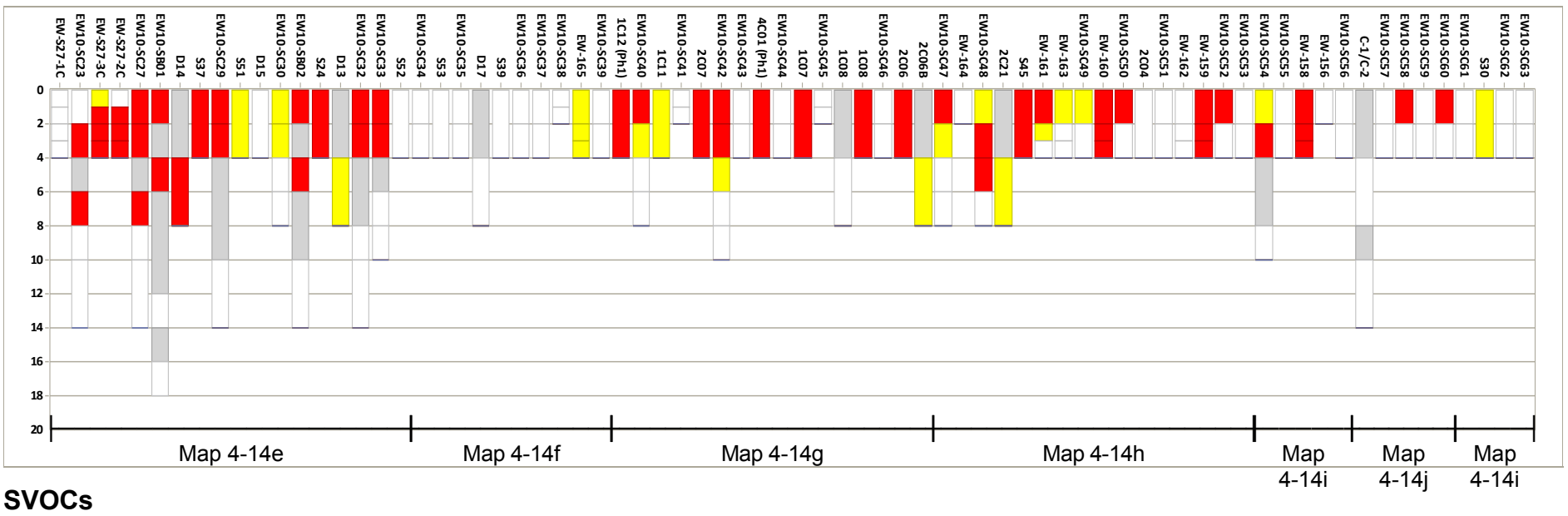
Map 4-14j
Concentrations of All SMS Chemicals in Subsurface Sediment Cores Compared with SMS Criteria (SQS or CSL)
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-14j 4827 Subsurface SMS.mxd

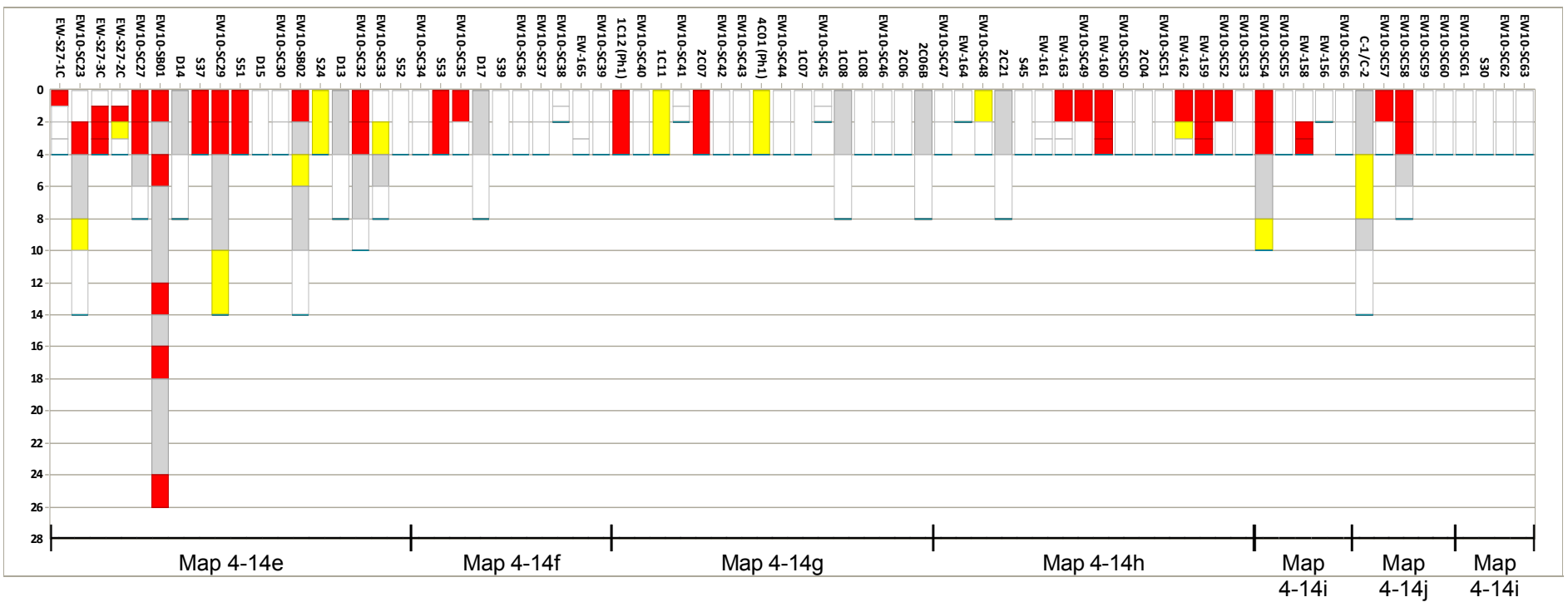
Total PCBs



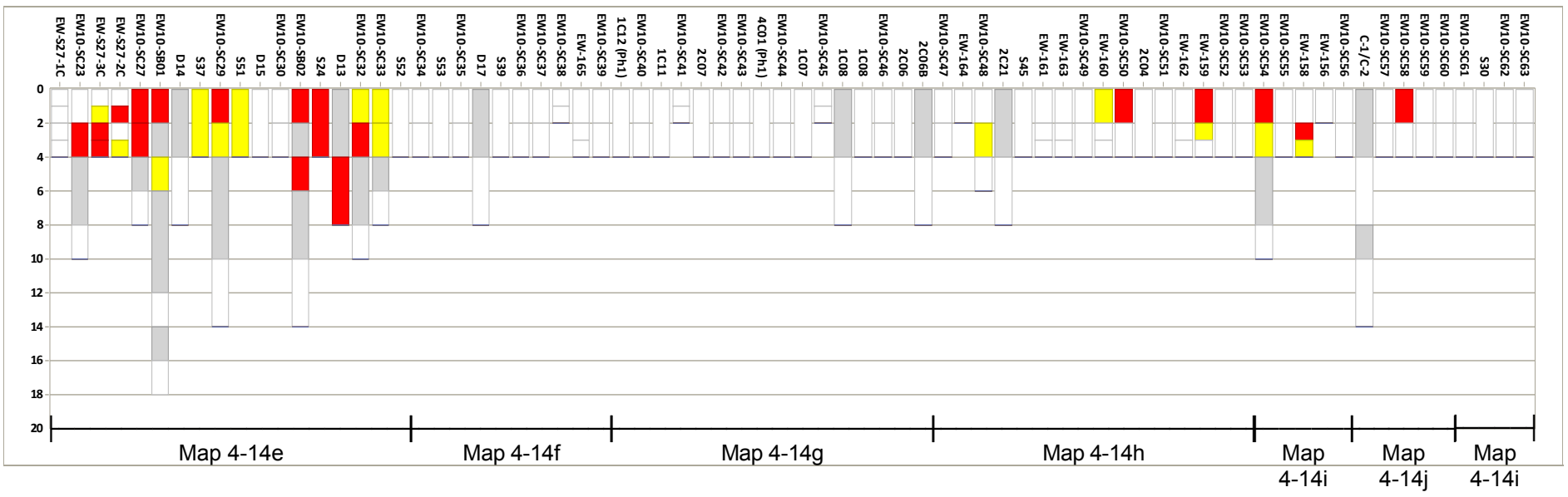
Mercury



SVOCs

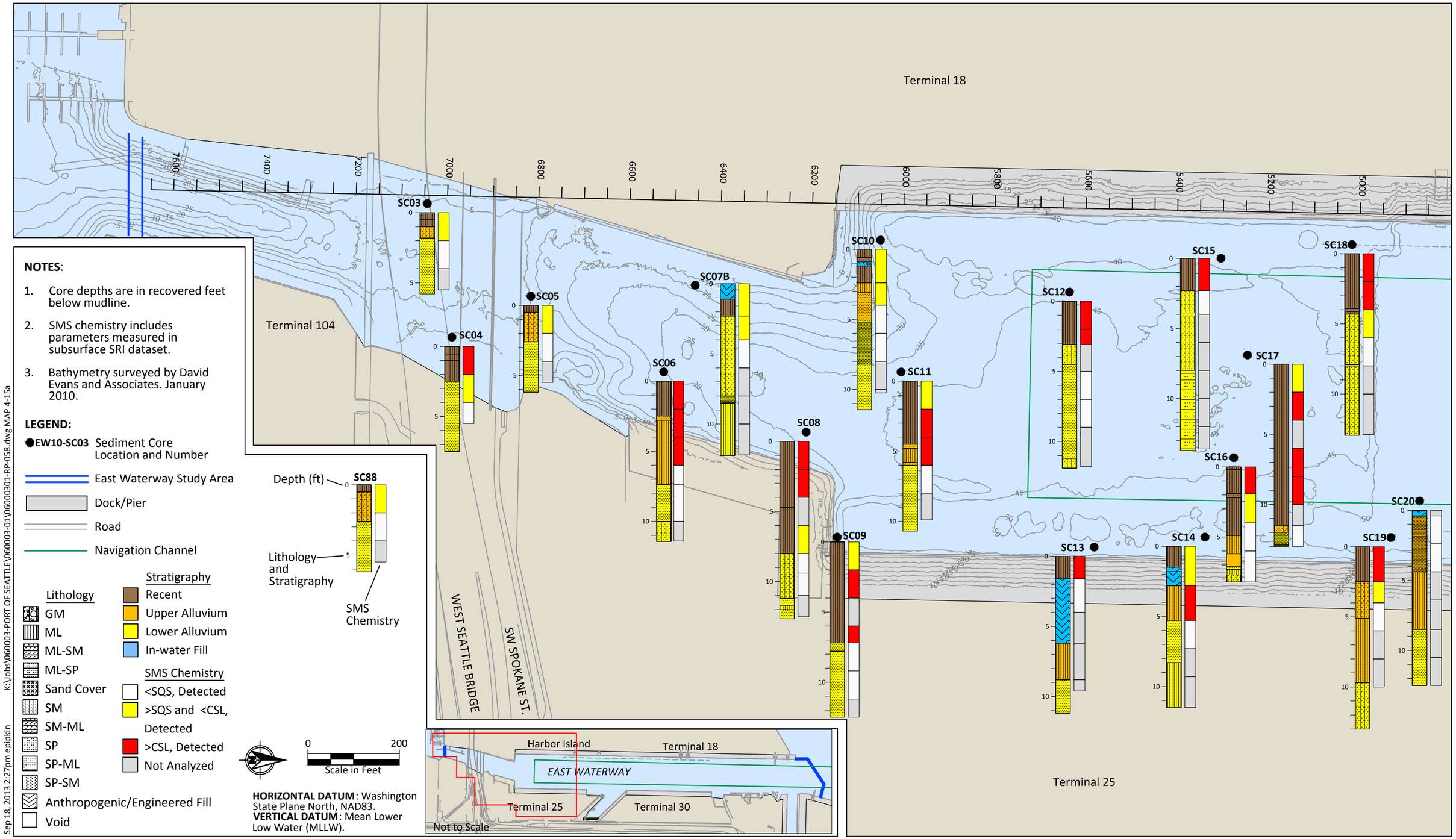


Metals (excluding Mercury)



- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect
- Not Analyzed for This Interval

Map 4-14k
Concentrations of All SMS Chemicals in Subsurface Sediment Cores Compared with SMS Criteria (SQS or CSL)
Supplemental Remedial Investigation
East Waterway Study Area



NOTES:

1. Core depths are in recovered feet below mudline.
2. SMS chemistry includes parameters measured in subsurface SRI dataset.
3. Bathymetry surveyed by David Evans and Associates. January 2010.

LEGEND:

- ●**EW10-SC03** Sediment Core Location and Number
- East Waterway Study Area
- Dock/Pier
- Road
- Navigation Channel

Lithology
- GM
- ML
- ML-SM
- ML-SP
- Sand Cover
- SM
- SM-ML
- SP
- SP-ML
- SP-SM
- Anthropogenic/Engineered Fill
- Void

Stratigraphy
- Recent
- Upper Alluvium
- Lower Alluvium
- In-water Fill

SMS Chemistry
- <SQS, Detected
- >SQS and <CSL, Detected
- >CSL, Detected
- Not Analyzed

HORIZONTAL DATUM: Washington State Plane North, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

K:\Jobs\060003-PORT OF SEATTLE\060003-01\06000301-RP-058.dwg MAP 4-15a
Sep 18, 2013 2:27pm epipkin

Map 4-15a
Subsurface Sediment Core Profiles with SMS Chemistry
Supplemental Remedial Investigation
East Waterway Operable Unit

Terminal 18

Slip 27

Terminal 30

E. MARGINAL WAY S.

SC21 SC22 SC23 SC24 SC25 SC26 SC27 SC28 SC29 SC30 SC31 SC32 SC33 SC34 SC35 SC36 SC37 SC38 SC39 SC100

LEGEND:

- EW10-SC03 Sediment Core Location and Number
- East Waterway Study Area
- Dock/Pier
- Road
- Navigation Channel

Stratigraphy
- Recent
- Upper Alluvium
- Lower Alluvium
- In-water Fill

Lithology
- GM
- ML
- ML-SM
- ML-SP
- Sand Cover
- SM
- SM-ML
- SP
- SP-ML
- SP-SM
- Anthropogenic/Engineered Fill
- Void

SMS Chemistry
- <SQS, Detected
- >SQS and <CSL, Detected
- >CSL, Detected
- Not Analyzed

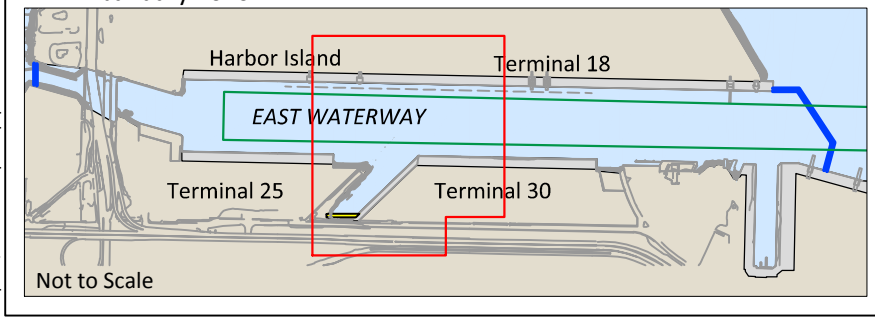
Depth (ft) — SC88 — Lithology and Stratigraphy — SMS Chemistry

NOTES:

1. Core depths are in recovered feet below mudline.
2. SMS chemistry includes parameters measured in subsurface SRI dataset.
3. Bathymetry surveyed by David Evans and Associates. January 2010.

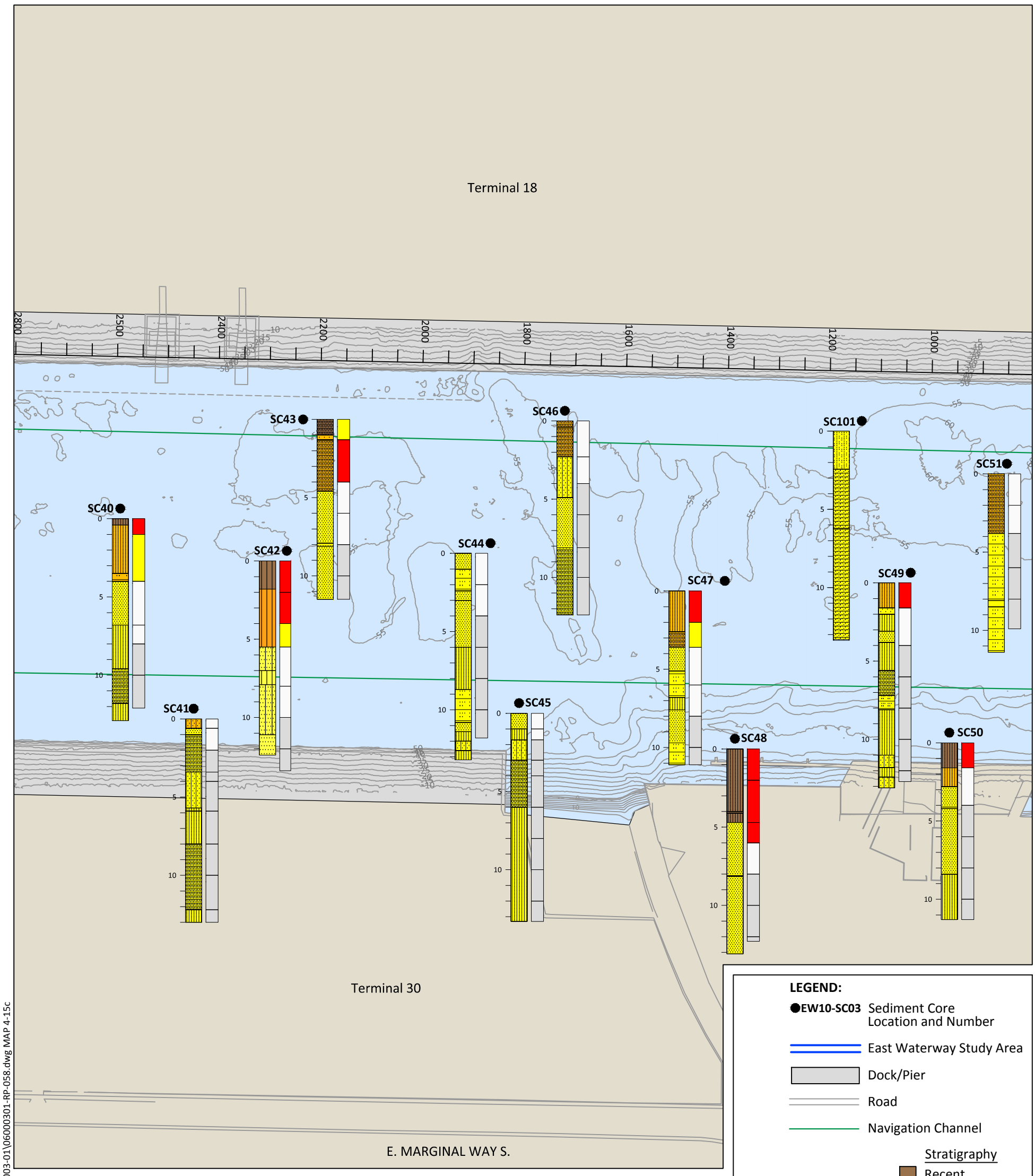
HORIZONTAL DATUM: Washington State Plane North, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

0 200
Scale in Feet



K:\Jobs\060003-PORT OF SEATTLE\060003-01\06000301-RP-058.dwg MAP 4-15b
Sep 18, 2013 2:29pm epipkin

Map 4-15b
Subsurface Sediment Core Profiles with SMS Chemistry
Supplemental Remedial Investigation
East Waterway Operable Unit

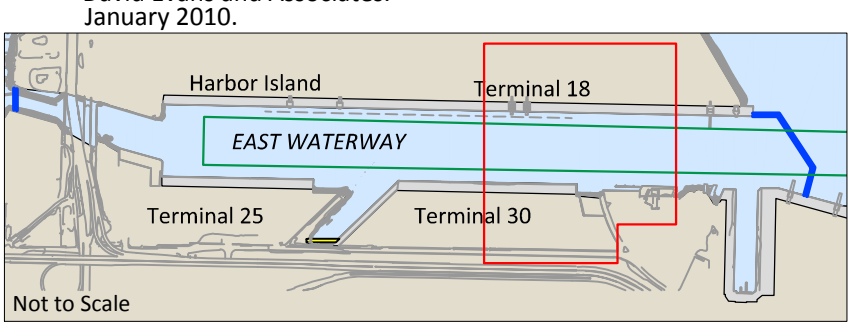


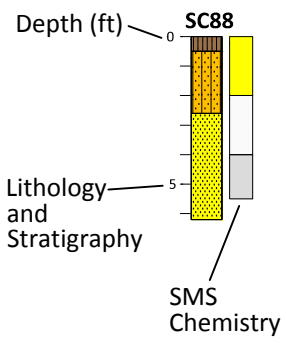
NOTES:

1. Core depths are in recovered feet below mudline.
2. SMS chemistry includes parameters measured in subsurface SRI dataset.
3. Bathymetry surveyed by David Evans and Associates. January 2010.

HORIZONTAL DATUM: Washington State Plane North, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

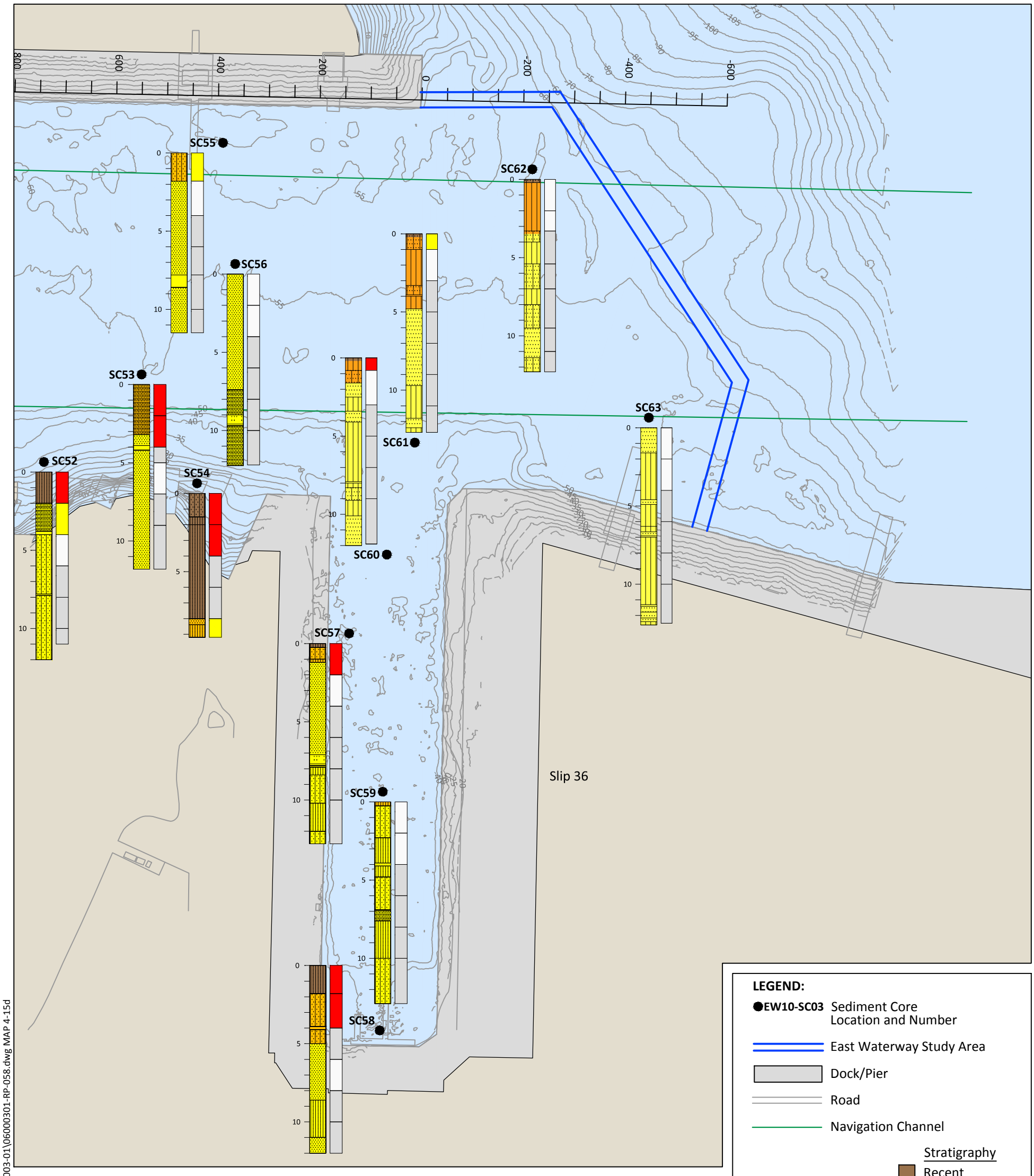
0 200
Scale in Feet





K:\Jobs\060003-PORT OF SEATTLE\060003-01\06000301-RP-058.dwg MAP 4-15c
Sep 18, 2013 2:29pm epipkin

Map 4-15c
Subsurface Sediment Core Profiles with SMS Chemistry
Supplemental Remedial Investigation
East Waterway Operable Unit



LEGEND:

- ●EW10-SC03 Sediment Core Location and Number
- East Waterway Study Area
- Dock/Pier
- Road
- Navigation Channel

Stratigraphy
- Recent
- Upper Alluvium
- Lower Alluvium
- In-water Fill

Lithology
- GM
- ML
- ML-SM
- ML-SP
- Sand Cover
- SM
- SM-ML
- SP
- SP-ML
- SP-SM
- Anthropogenic/Engineered Fill
- Void

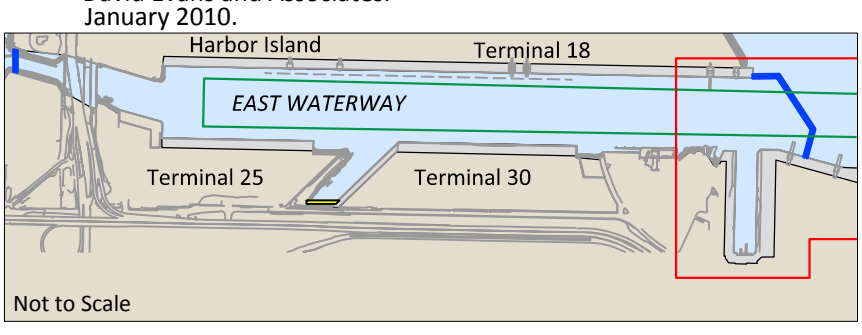
SMS Chemistry
- <SQS, Detected
- >SQS and <CSL, Detected
- >CSL, Detected
- Not Analyzed

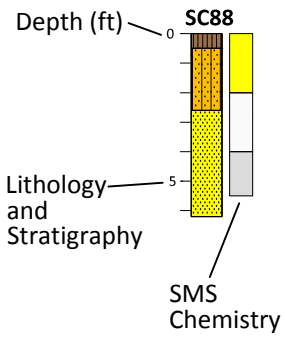
NOTES:

1. Core depths are in recovered feet below mudline.
2. SMS chemistry includes parameters measured in subsurface SRI dataset.
3. Bathymetry surveyed by David Evans and Associates. January 2010.

HORIZONTAL DATUM: Washington State Plane North, NAD83.
VERTICAL DATUM: Mean Lower Low Water (MLLW).

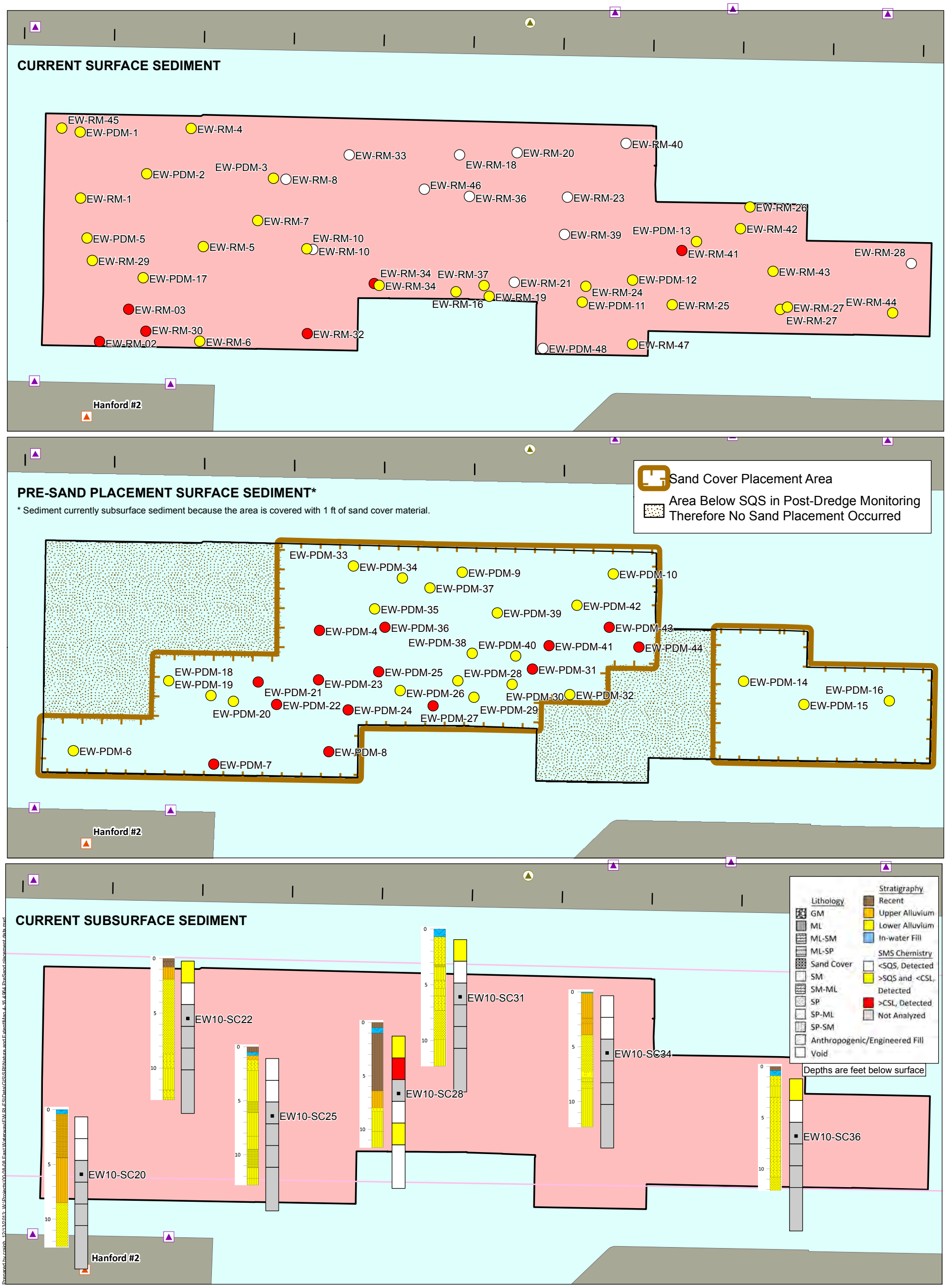
0 200
Scale in Feet





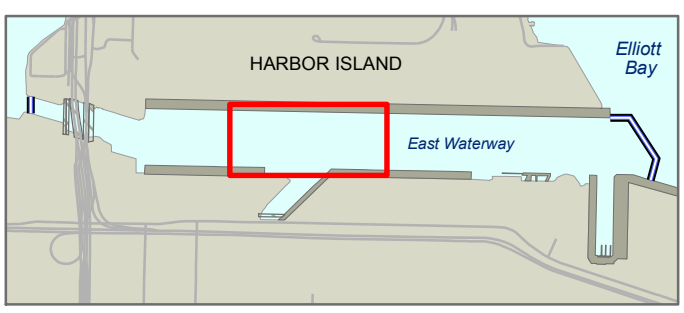
K:\Jobs\060003-PORT OF SEATTLE\060003-01\06000301-RP-058.dwg MAP 4-15d
Sep 18, 2013 2:29pm epipkin

Map 4-15d
Subsurface Sediment Core Profiles with SMS Chemistry
Supplemental Remedial Investigation
East Waterway Operable Unit



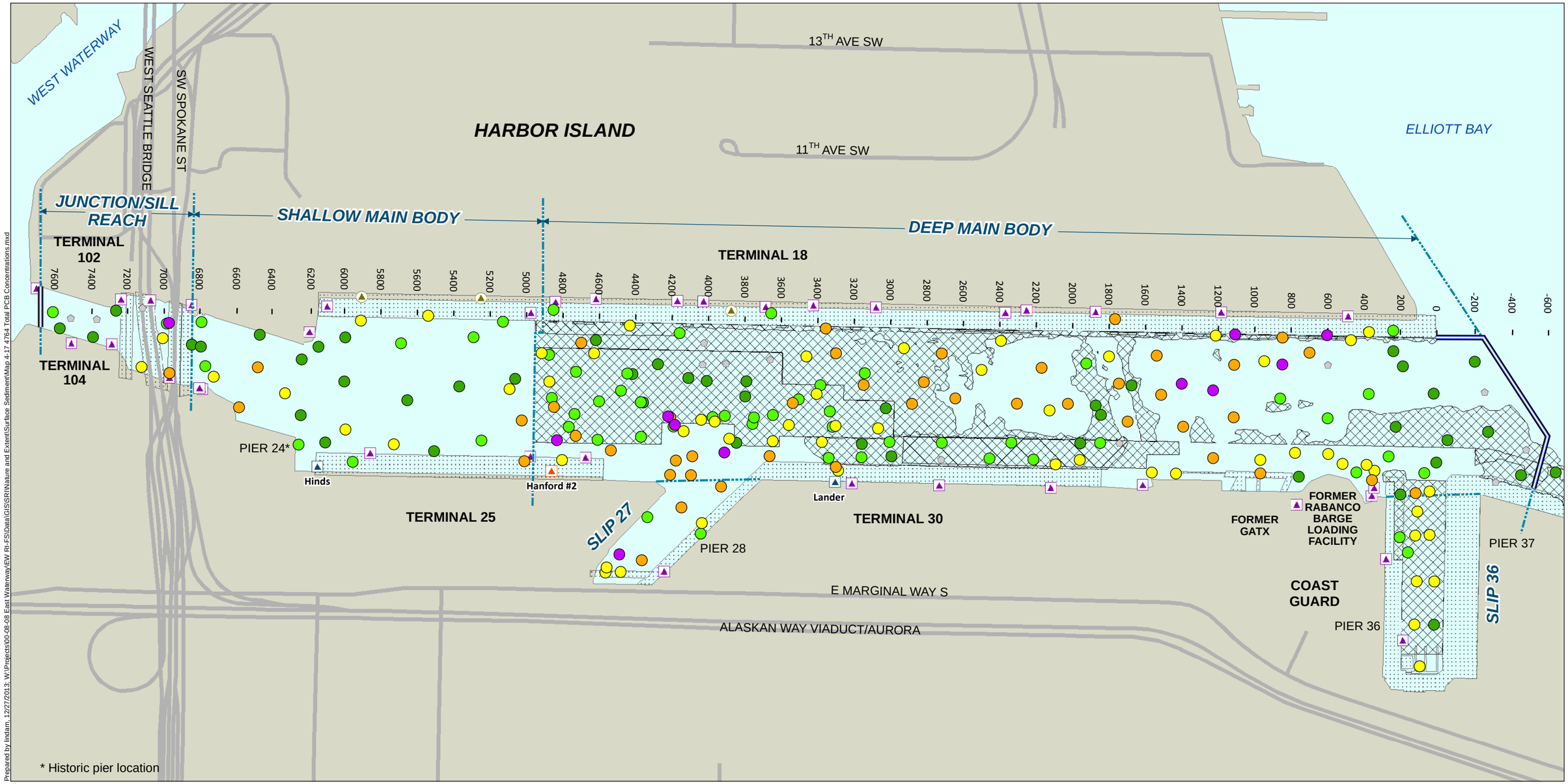
Surface Sediment SMS Status

- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect
- CSO
- Storm Drain
- Unknown Outfall
- Dock/Pier
- Phase 1 Removal Action Boundary



0 150
Scale in feet

Map 4-16
Surface and Subsurface Sediment Datasets Associated with the Phase 1 Dredge Area
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-17 4764 Total PCB Concentrations.mxd

Total PCB Concentration*

µg/kg dw

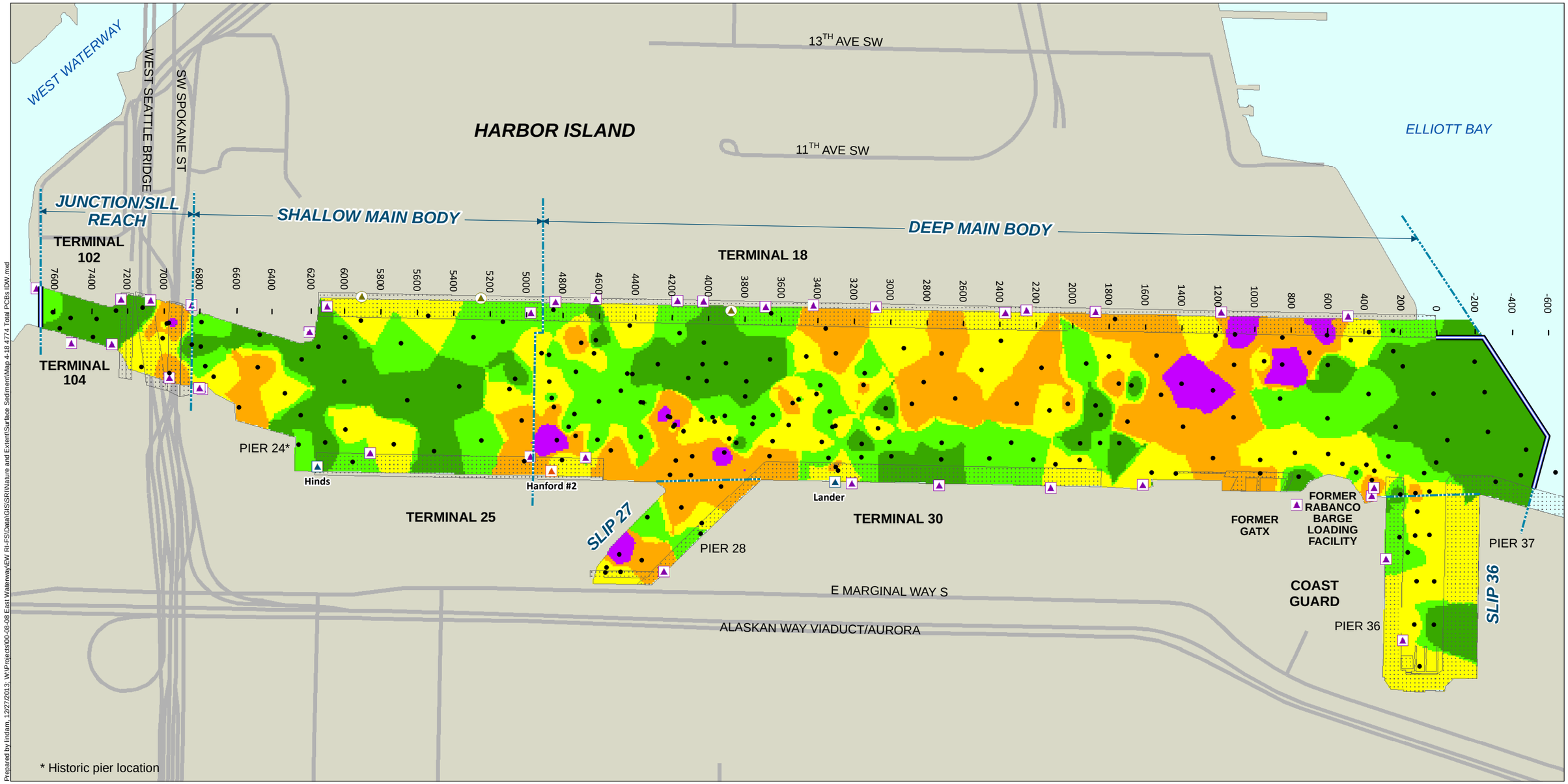
- > 1,800 (> 95th percentile)
- > 590 and ≤ 1,800 (≤ 95th percentile)
- > 270 and ≤ 590 (≤ 75th percentile)
- > 110 and ≤ 270 (≤ 50th percentile)
- ≤ 110 (≤ 25th percentile)
- Non-detect

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.

0 600
Scale in feet

Map 4-17
Total PCB Concentrations in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-18 4774 Total PCBs IDW.mxd

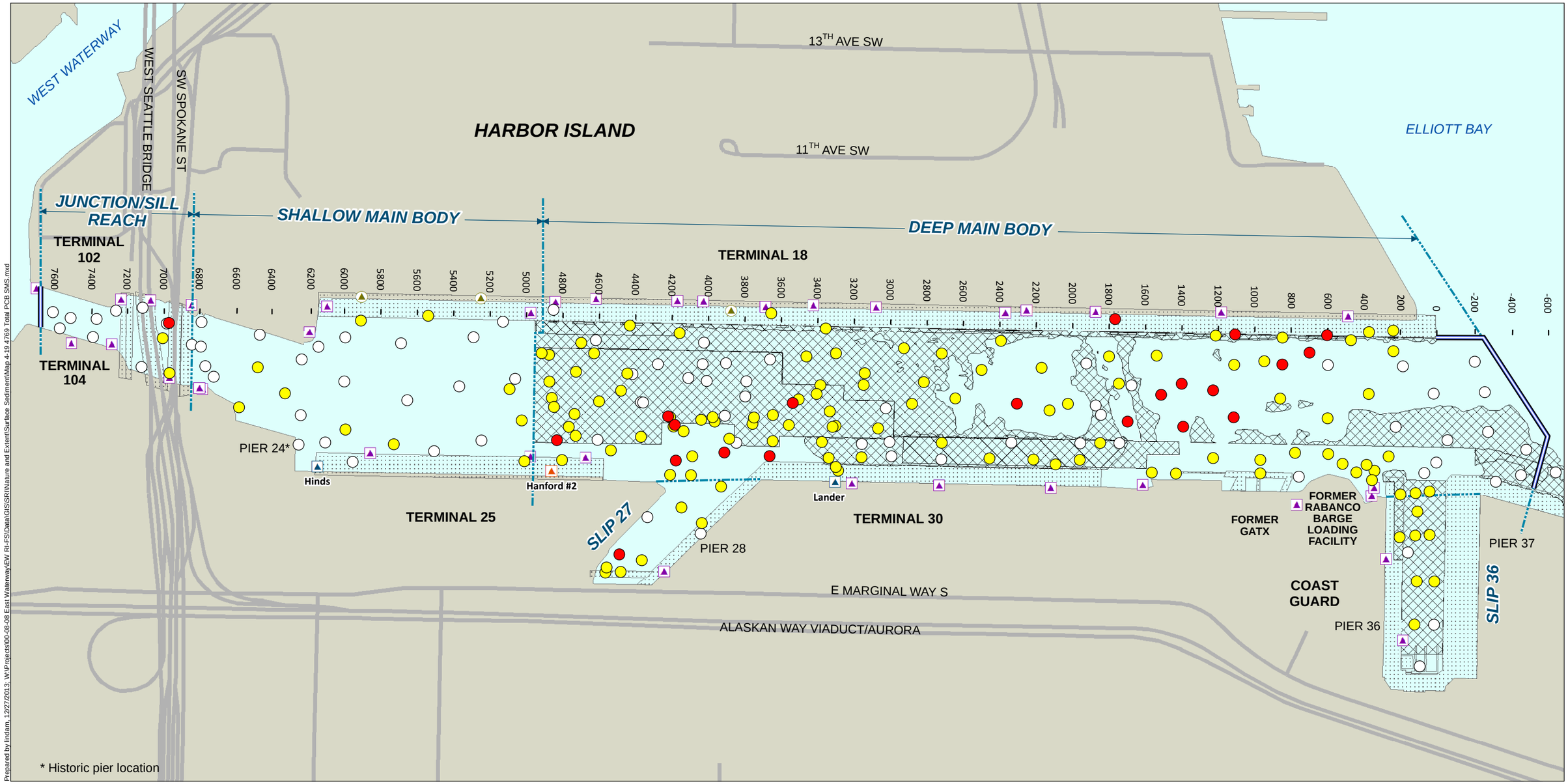
Interpolated Total PCB Concentration*
µg/kg dw

- > 1,800 (> 95th percentile)
- > 590 and ≤ 1,800 (≤ 95th percentile)
- > 270 and ≤ 590 (≤ 75th percentile)
- > 110 and ≤ 270 (≤ 50th percentile)
- ≤ 110 (≤ 25th percentile)
- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.

0 600
Scale in feet

Map 4-18
Inverse Distance Weighted Interpolation of
Total PCB Concentrations in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-19 4769 Total PCB SMS.mxd

SMS Categories for Total PCBs
CSL = 65 mg/kg OC
SQS = 12 mg/kg OC

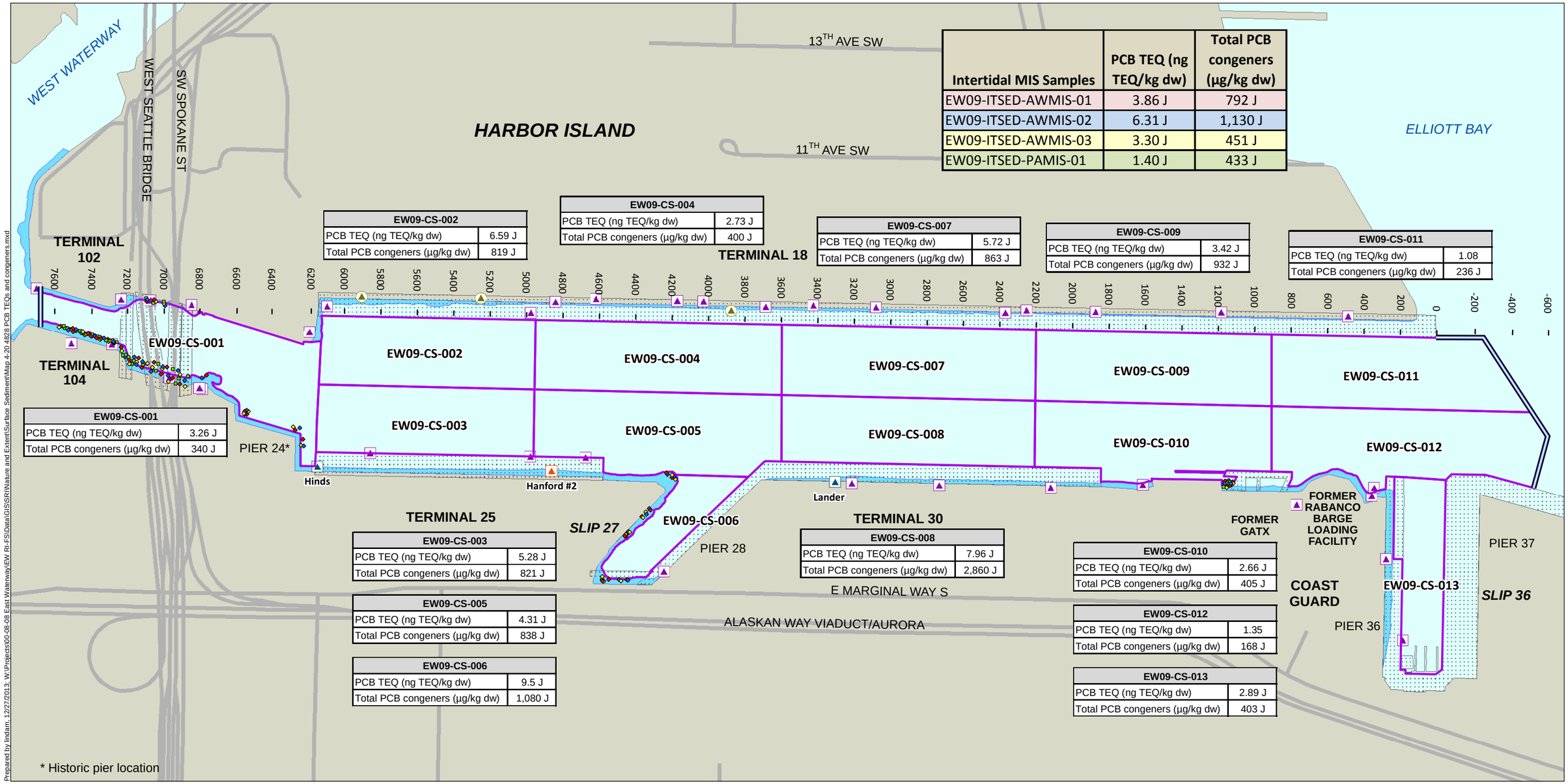
- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall

- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

0 600
Scale in feet

Map 4-19
Exceedances of SMS Criteria (SQS or CSL) by Total PCBs in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Intertidal MIS Samples	PCB TEQ (ng TEQ/kg dw)	Total PCB congeners (µg/kg dw)
EW09-ITSED-AWMIS-01	3.86 J	792 J
EW09-ITSED-AWMIS-02	6.31 J	1,130 J
EW09-ITSED-AWMIS-03	3.30 J	451 J
EW09-ITSED-PAMIS-01	1.40 J	433 J

EW09-CS-001	
PCB TEQ (ng TEQ/kg dw)	3.26 J
Total PCB congeners (µg/kg dw)	340 J

EW09-CS-002	
PCB TEQ (ng TEQ/kg dw)	6.59 J
Total PCB congeners (µg/kg dw)	819 J

EW09-CS-003	
PCB TEQ (ng TEQ/kg dw)	5.28 J
Total PCB congeners (µg/kg dw)	821 J

EW09-CS-004	
PCB TEQ (ng TEQ/kg dw)	2.73 J
Total PCB congeners (µg/kg dw)	400 J

EW09-CS-005	
PCB TEQ (ng TEQ/kg dw)	4.31 J
Total PCB congeners (µg/kg dw)	838 J

EW09-CS-006	
PCB TEQ (ng TEQ/kg dw)	9.5 J
Total PCB congeners (µg/kg dw)	1,080 J

EW09-CS-007	
PCB TEQ (ng TEQ/kg dw)	5.72 J
Total PCB congeners (µg/kg dw)	863 J

EW09-CS-008	
PCB TEQ (ng TEQ/kg dw)	7.96 J
Total PCB congeners (µg/kg dw)	2,860 J

EW09-CS-009	
PCB TEQ (ng TEQ/kg dw)	3.42 J
Total PCB congeners (µg/kg dw)	932 J

EW09-CS-010	
PCB TEQ (ng TEQ/kg dw)	2.66 J
Total PCB congeners (µg/kg dw)	405 J

EW09-CS-011	
PCB TEQ (ng TEQ/kg dw)	1.08
Total PCB congeners (µg/kg dw)	236 J

EW09-CS-012	
PCB TEQ (ng TEQ/kg dw)	1.35
Total PCB congeners (µg/kg dw)	168 J

EW09-CS-013	
PCB TEQ (ng TEQ/kg dw)	2.89 J
Total PCB congeners (µg/kg dw)	403 J

Multi-Increment Sampling (MIS) Composite Locations[a]

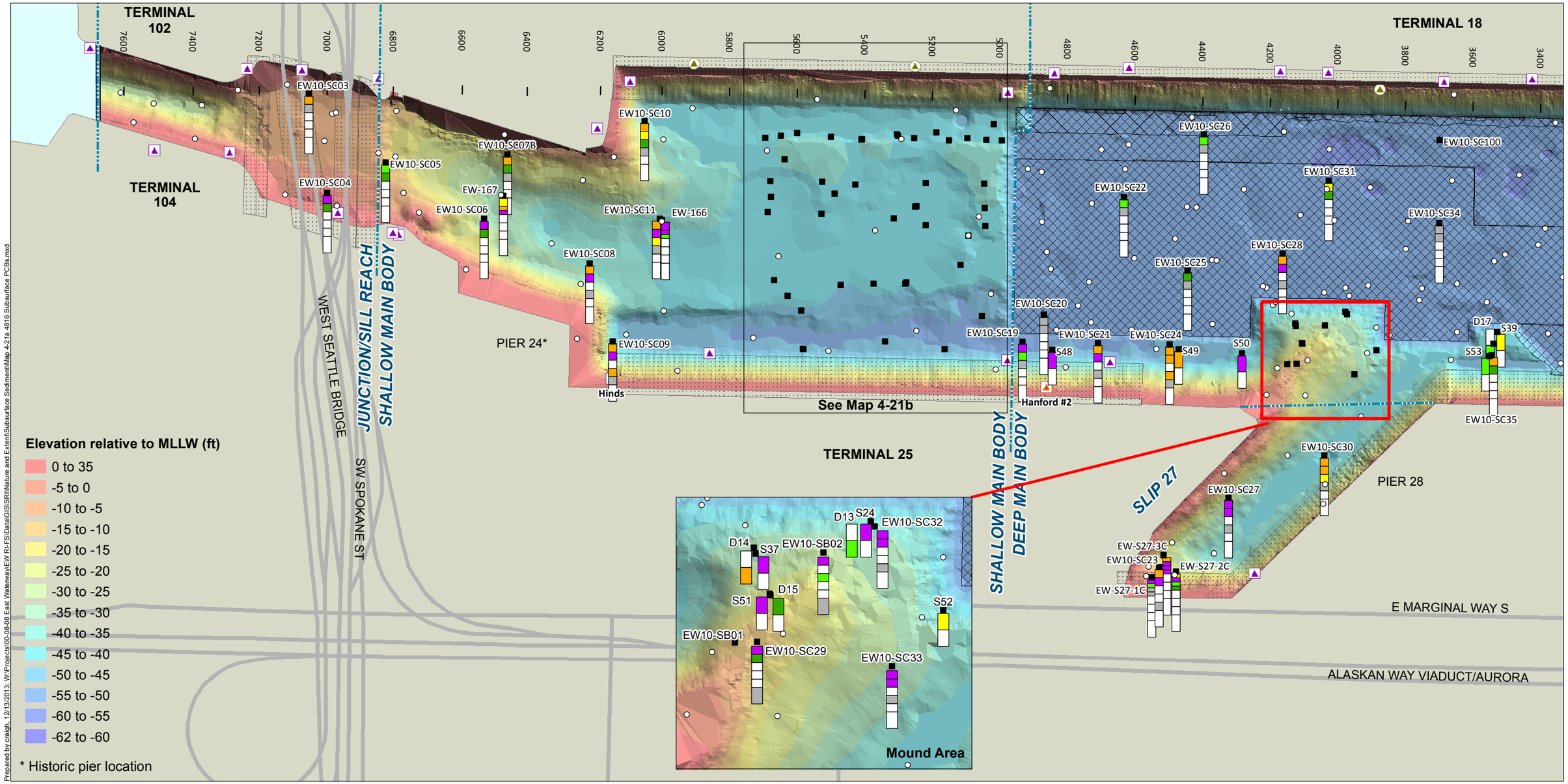
- EW09-ITSED-AWMIS-01
- EW09-ITSED-AWMIS-02
- EW09-ITSED-AWMIS-03
- EW09-ITSED-PAMIS-01
- Subtidal Composite Area Boundary[a]
- Intertidal Zone
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

[a] See Map 4-2 for detail on subtidal and intertidal MIS composites.

0 600
Scale in feet

Map 4-20
Total PCB Congener Concentrations and PCB TEQ Values for Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-20 4828 PCB TEQs and congeners.mxd



Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SR\Nature and Extent\Subsurface Sediment\Map 4-21a 4816 Subsurface PCBs.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

Total PCBs in Subsurface Sediment* (µg/kg dw)

- > 1,800 (> 95th percentile)
- > 590 and ≤ 1,800 (≤ 95th percentile)
- > 270 and ≤ 590 (≤ 75th percentile)
- > 110 and ≤ 270 (≤ 50th percentile)
- ≤ 110 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

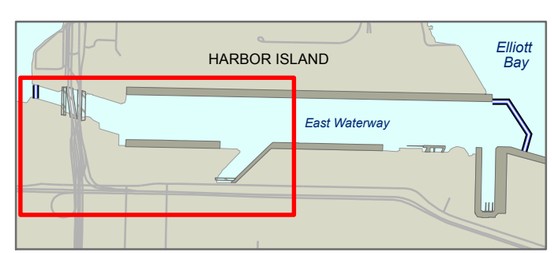
0 - 2 ft; 2 - 4 ft; 4 - 6 ft; 6 - 8 ft; 8 - 10 ft; > 10 ft

0 - 1 ft; 1 - 2 ft; 2 - 3 ft; 3 - 4 ft

0 - 4 ft; > 4 ft

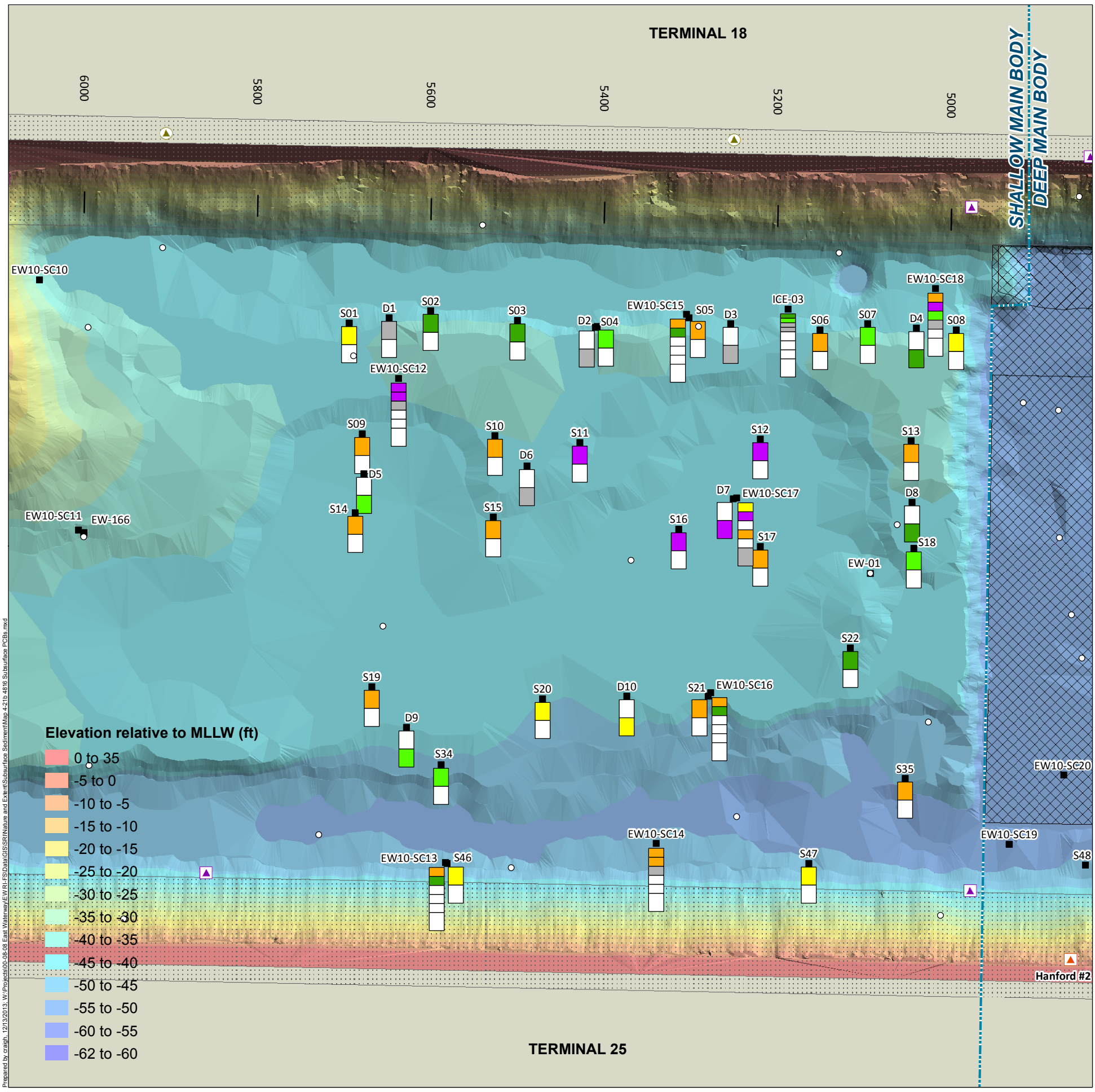
- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.



0 600
Scale in feet

Map 4-21a
Total PCB Concentrations in Subsurface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



0 150
Scale in feet

Subsurface Core Depth Charts

- Subsurface Core Location

Total PCBs in Subsurface Sediment* (µg/kg dw)

- > 1,800 (> 95th percentile)
- > 590 and ≤ 1,800 (≤ 95th percentile)
- > 270 and ≤ 590 (≤ 75th percentile)
- > 110 and ≤ 270 (≤ 50th percentile)
- ≤ 110 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

* The percentiles are all numeric percentiles of the surface sediment dataset.

0 - 2 ft: 0 - 1 ft, 1 - 2 ft
2 - 4 ft: 2 - 3 ft, 3 - 4 ft
4 - 6 ft
6 - 8 ft
8 - 10 ft
> 10 ft

0 - 4 ft
> 4 ft

- Surface Sediment Sampling Location
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- CSO
- CSO/Storm Drain
- Storm Drain
- Unknown
- East Waterway Study Area Boundary

Map 4-21b
Total PCB Concentrations
in Subsurface Sediment
Supplemental Remedial Investigation
East Waterway Study Area

TERMINAL 18

3400 3200 3000 2800 2600 2400 2200 2000 1800 1600 1400 1200 1000 800 600 400 200 0 -200 -400 -600

EW10-SC37
EW10-SC39
EW-165
EW10-SC36
EW10-SC38
Lander
EW10-SC41
EW10-SC42
EW10-SC40
1C12 (Ph1)
1C12 (Ph2)
1C11
2C07
4C01 (Ph1)
4C01 (Ph2)
EW10-SC43
EW10-SC44
1C07
1C08
1C08
2C06
2C06B
EW10-SC45
EW10-SC46
EW10-SC47
EW10-SC48
S45
EW-164
2C21
EW-163
EW10-SC101
EW10-SC51
EW-162
EW-161
EW10-SC49
2C04
EW10-SC50
EW-160
EW10-SC52
EW-159
EW10-SC53
EW10-SC54
EW-158
EW10-SC55
EW10-SC56
EW-156
EW10-SC62
EW10-SC61
S30
EW10-SC63
EW10-SC60
EW10-SC57
EW10-SC59
C-1/C-2
EW10-SC58

ELLIOTT BAY

DEEP MAIN BODY

TERMINAL 30

FORMER GATX

FORMER RABANCO BARGE LOADING FACILITY

PIER 37

COAST GUARD

PIER 36

SLIP 36

E MARGINAL WAY S

ALASKAN WAY VIADUCT/AURORA

Elevation relative to MLLW (ft)

- 0 to 35
- -5 to 0
- -10 to -5
- -15 to -10
- -20 to -15
- -25 to -20
- -30 to -25
- -35 to -30
- -40 to -35
- -45 to -40
- -50 to -45
- -55 to -50
- -60 to -55
- -62 to -60

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-21c 4816 Subsurface PCBs.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

Total PCBs in Subsurface Sediment* (µg/kg dw)

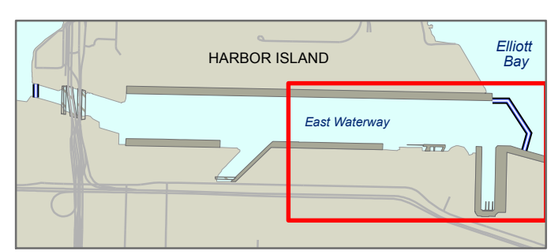
- > 1,800 (> 95th percentile)
- > 590 and ≤ 1,800 (≤ 95th percentile)
- > 270 and ≤ 590 (≤ 75th percentile)
- > 110 and ≤ 270 (≤ 50th percentile)
- ≤ 110 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

0 - 2 ft: 0 - 1 ft, 1 - 2 ft
2 - 4 ft: 2 - 3 ft, 3 - 4 ft
4 - 6 ft
6 - 8 ft
8 - 10 ft
> 10 ft

0 - 4 ft
> 4 ft

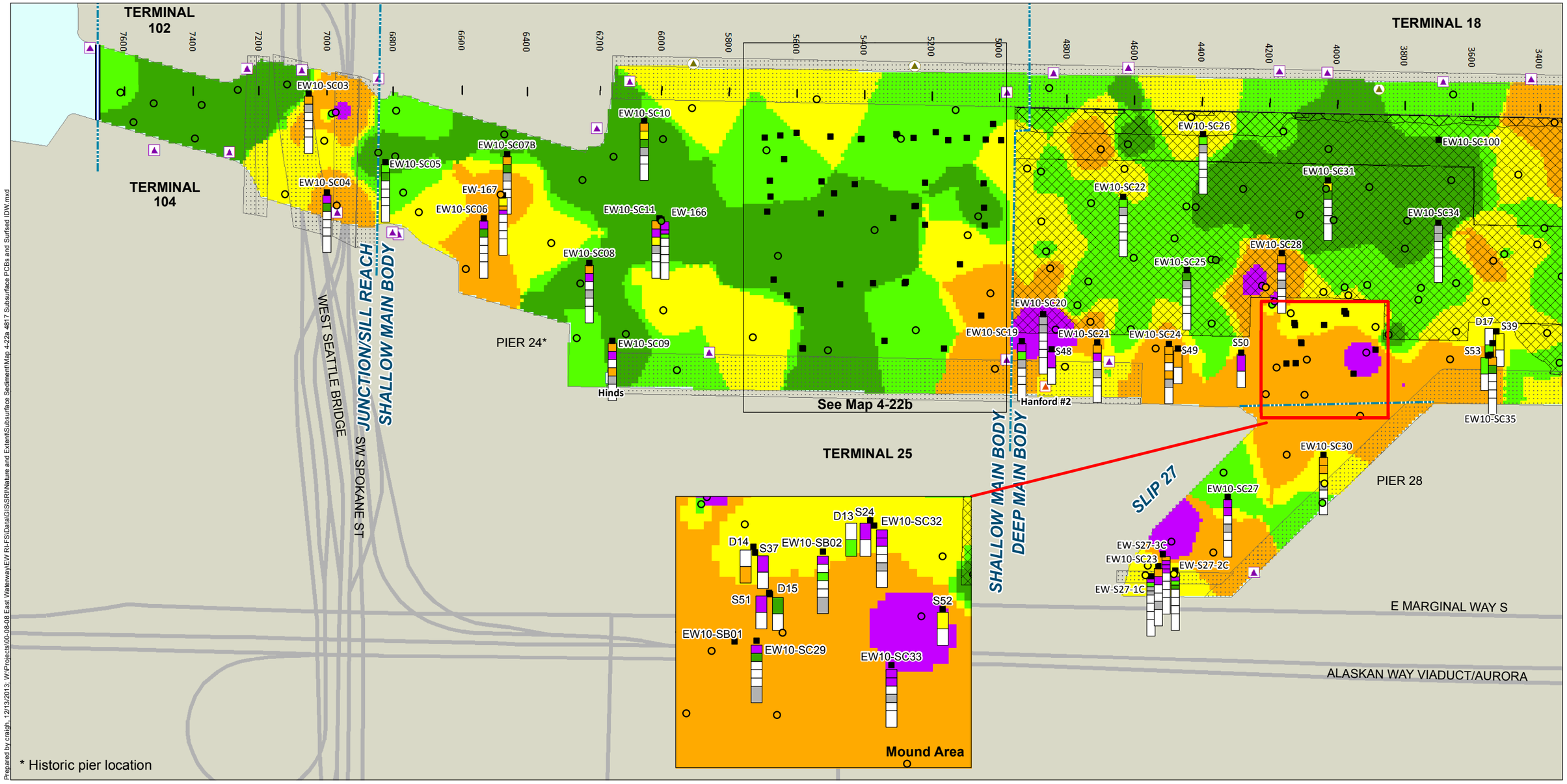
- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.



0 600
Scale in feet

Map 4-21c
Total PCB Concentrations in Subsurface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Subsurface Core Depth Charts

- Subsurface Core Location

Total PCBs in Subsurface and Surface Sediment* (µg/kg dw)

- > 1,800 (> 95th percentile)
- > 590 and ≤ 1,800 (≤ 95th percentile)
- > 270 and ≤ 590 (≤ 75th percentile)
- > 110 and ≤ 270 (≤ 50th percentile)
- ≤ 110 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

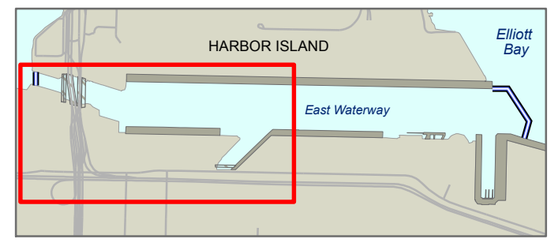
0 - 2 ft; 2 - 4 ft; 4 - 6 ft; 6 - 8 ft; 8 - 10 ft; > 10 ft

0 - 1 ft; 1 - 2 ft; 2 - 3 ft; 3 - 4 ft

0 - 4 ft; > 4 ft

- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.



0 600

Scale in feet

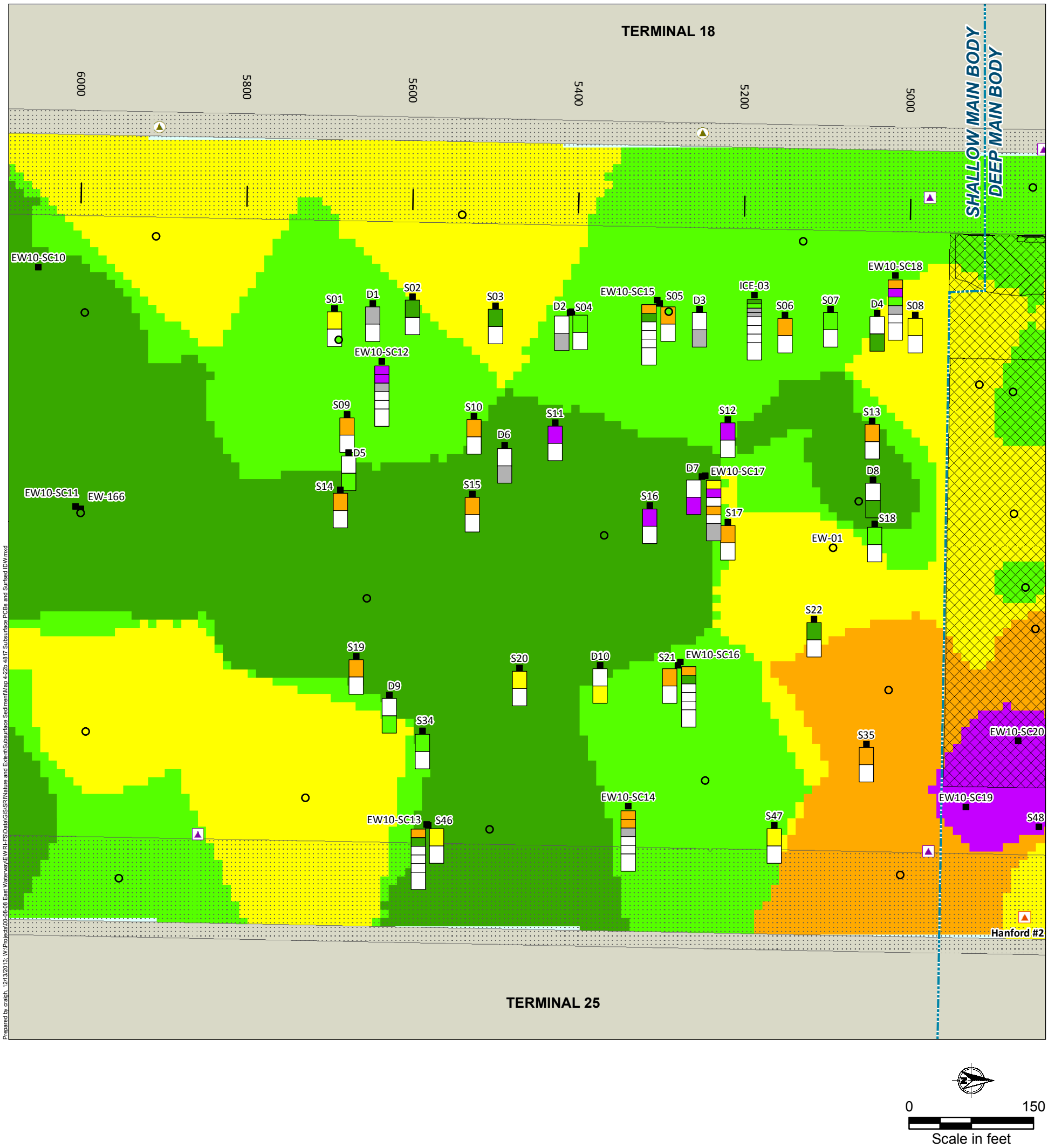
Map 4-22a

Subsurface Sediment Total PCB Concentrations and Interpolated Surface Sediment Total PCB Concentrations

Supplemental Remedial Investigation

East Waterway Study Area

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SR\Nature and Extent\Subsurface Sediment\Map 4-22a 4817 Subsurface PCBs and Surfsed IDW.mxd



Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EWRI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-22b 4817 Subsurface PCBs and Surfaced IDW.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

Total PCBs in Subsurface and Surface Sediment* (µg/kg dw)

- > 1,800 (> 95th percentile)
- > 590 and ≤ 1,800 (≤ 95th percentile)
- > 270 and ≤ 590 (≤ 75th percentile)
- > 110 and ≤ 270 (≤ 50th percentile)
- ≤ 110 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

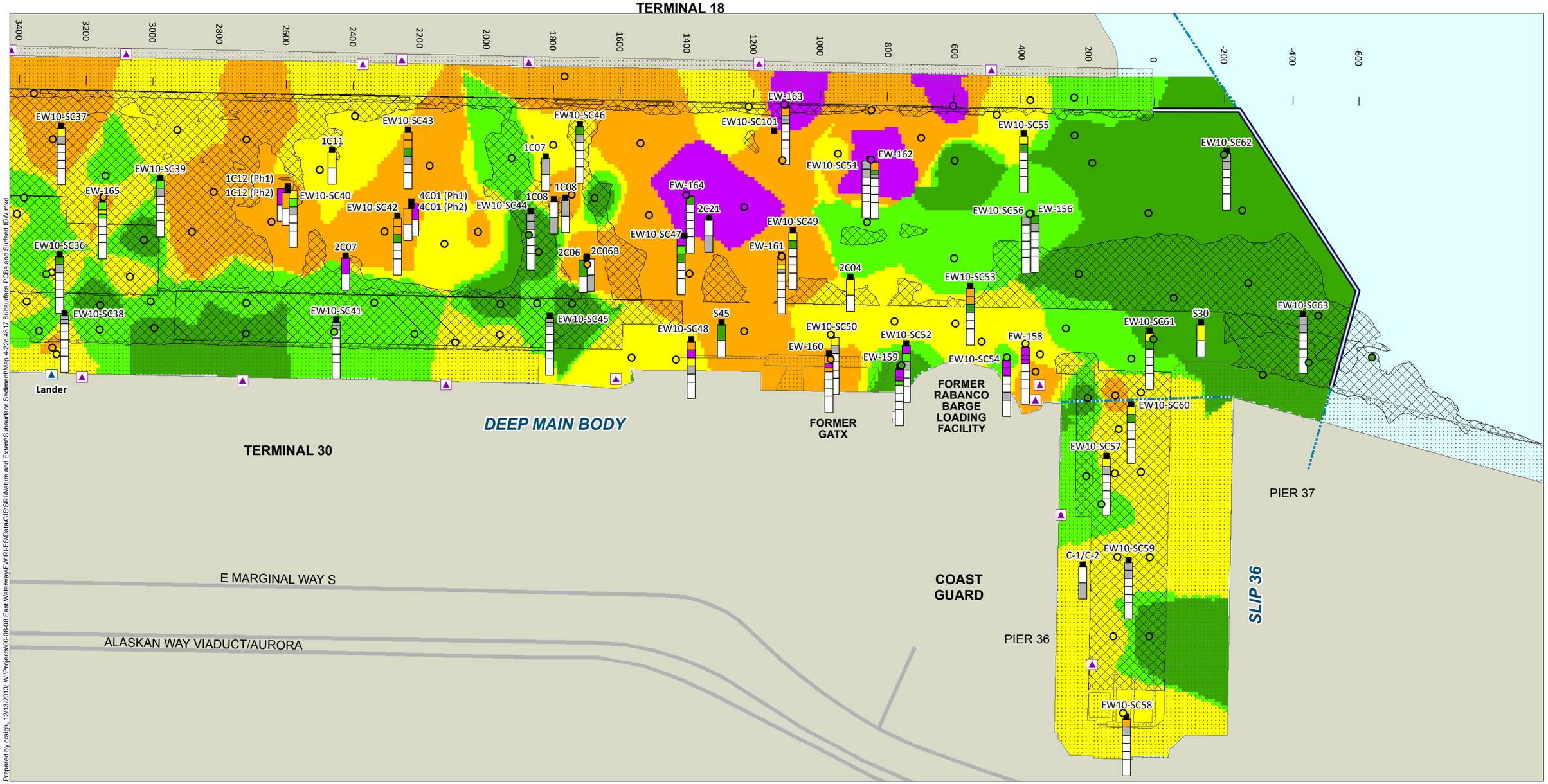
* The percentiles are all numeric percentiles of the surface sediment dataset.

0 - 2 ft: 0 - 1 ft, 1 - 2 ft
2 - 4 ft: 2 - 3 ft, 3 - 4 ft
4 - 6 ft
6 - 8 ft
8 - 10 ft
> 10 ft

0 - 4 ft
> 4 ft

- Surface Sediment Sampling Location
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- CSO
- CSO/Storm Drain
- Storm Drain
- Unknown
- East Waterway Study Area Boundary

Map 4-22b
Subsurface Sediment Total PCB Concentrations and Interpolated Surface Sediment Total PCB Concentrations
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-22c 4817 Subsurface PCBs and Surfsed IDW.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

Total PCBs in Subsurface and Surface Sediment* (µg/kg dw)

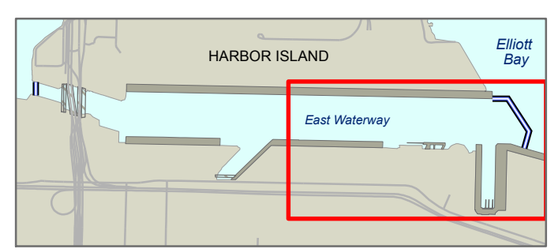
- > 1,800 (> 95th percentile)
- > 590 and ≤ 1,800 (≤ 95th percentile)
- > 270 and ≤ 590 (≤ 75th percentile)
- > 110 and ≤ 270 (≤ 50th percentile)
- ≤ 110 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

0 - 2 ft: 0 - 1 ft, 1 - 2 ft
2 - 4 ft: 2 - 3 ft, 3 - 4 ft
4 - 6 ft
6 - 8 ft
8 - 10 ft
> 10 ft

0 - 4 ft
> 4 ft

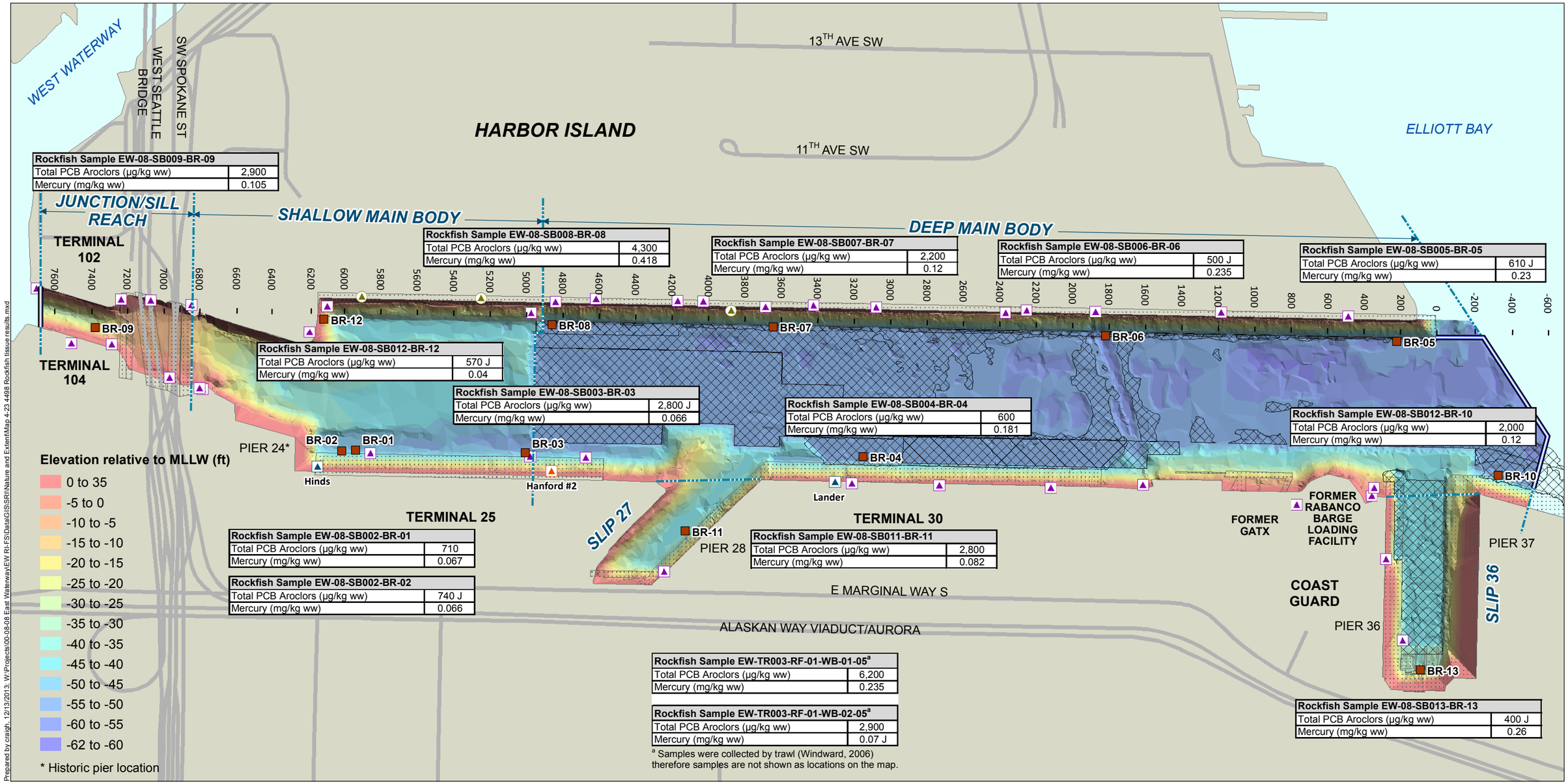
- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.

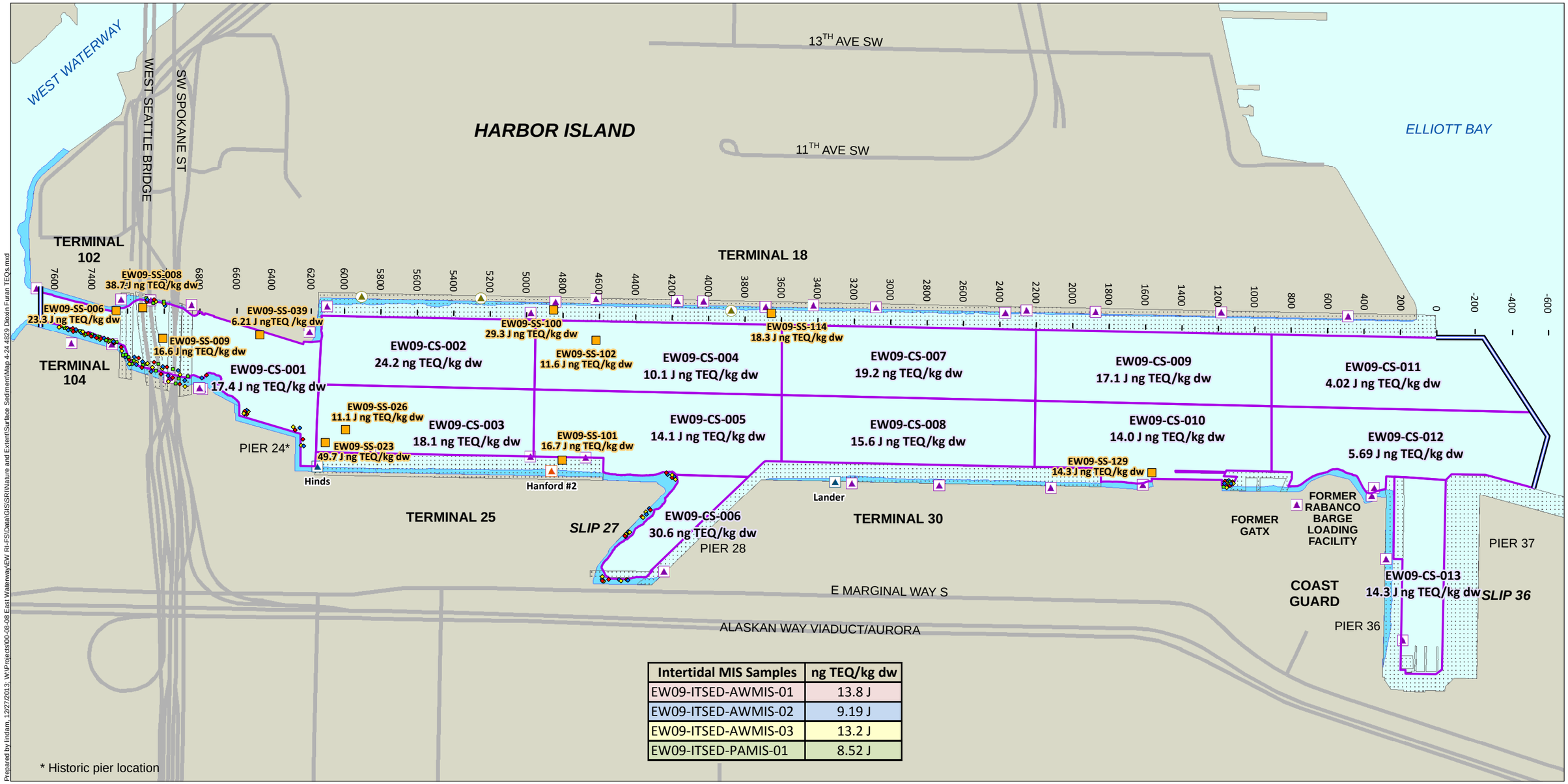


0 600
Scale in feet

Map 4-22c
Subsurface Sediment Total PCB Concentrations and Interpolated Surface Sediment Total PCB Concentrations
Supplemental Remedial Investigation
East Waterway Study Area



Map 4-23
Total PCB and Mercury Concentrations in Brown Rockfish
Supplemental Remedial Investigation
East Waterway Study Area



Intertidal MIS Samples	ng TEQ/kg dw
EW09-ITSED-AWMIS-01	13.8 J
EW09-ITSED-AWMIS-02	9.19 J
EW09-ITSED-AWMIS-03	13.2 J
EW09-ITSED-PAMIS-01	8.52 J

Grab Sample Location

Multi-Increment Sampling (MIS) Composite Locations[a]

- EW09-ITSED-AWMIS-01
- EW09-ITSED-AWMIS-02
- EW09-ITSED-AWMIS-03
- EW09-ITSED-PAMIS-01

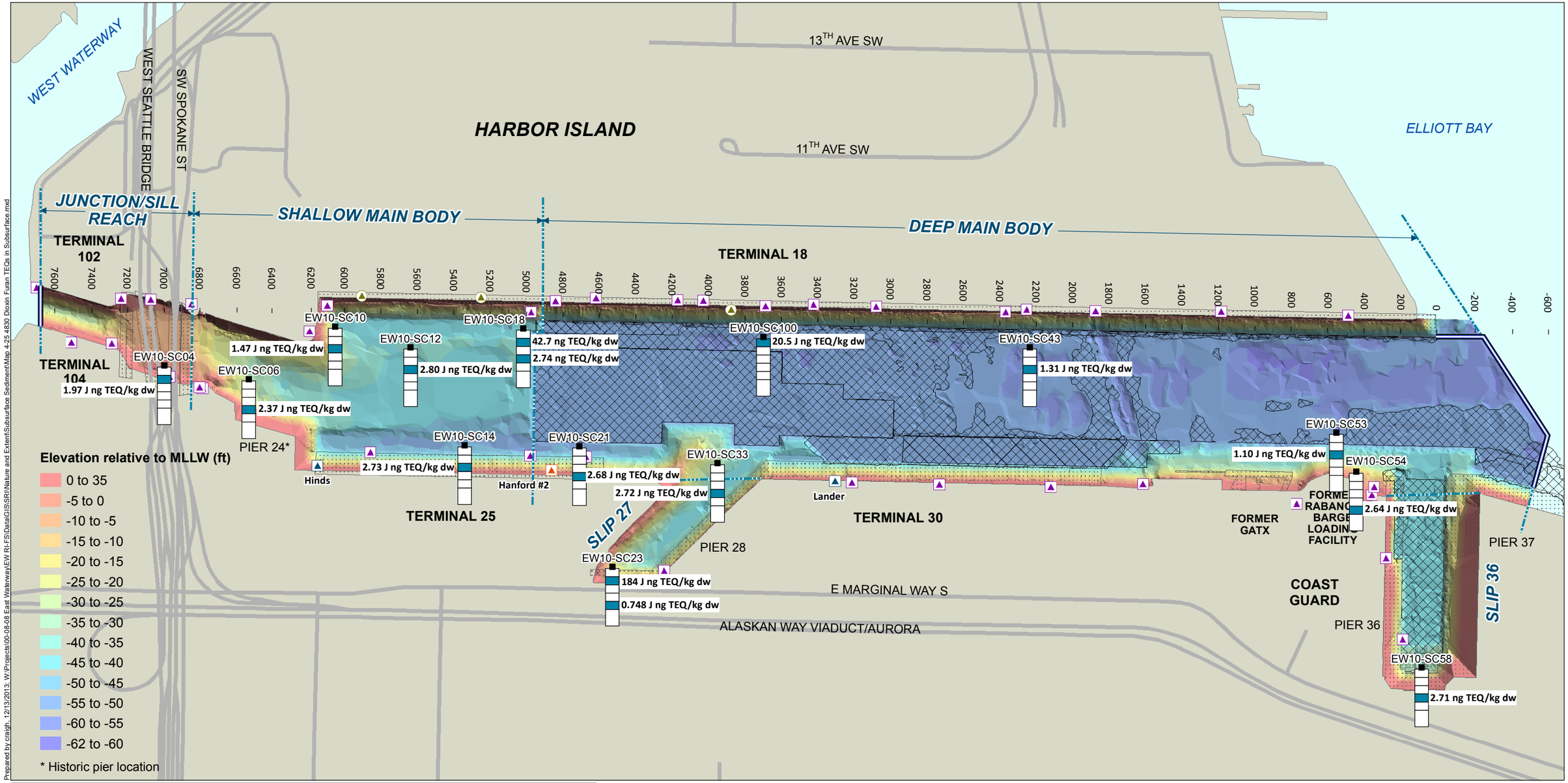
Subtidal Composite Area Boundary[a]

Intertidal Zone
CSO
Storm Drain
CSO/Storm Drain
Unknown Outfall
Dock/Pier/Bridge
Road
East Waterway Study Area Boundary

[a] See Map 4-2 for detail on subtidal and intertidal MIS composites.

Map 4-24
Dioxin and Furan TEQ Values for Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-24 4829 Dioxin Furan TEQs.mxd



Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-25 4830 Dioxin Furan TEQs in Subsurface.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

Dioxin and Furan TEQs in Subsurface Sediment

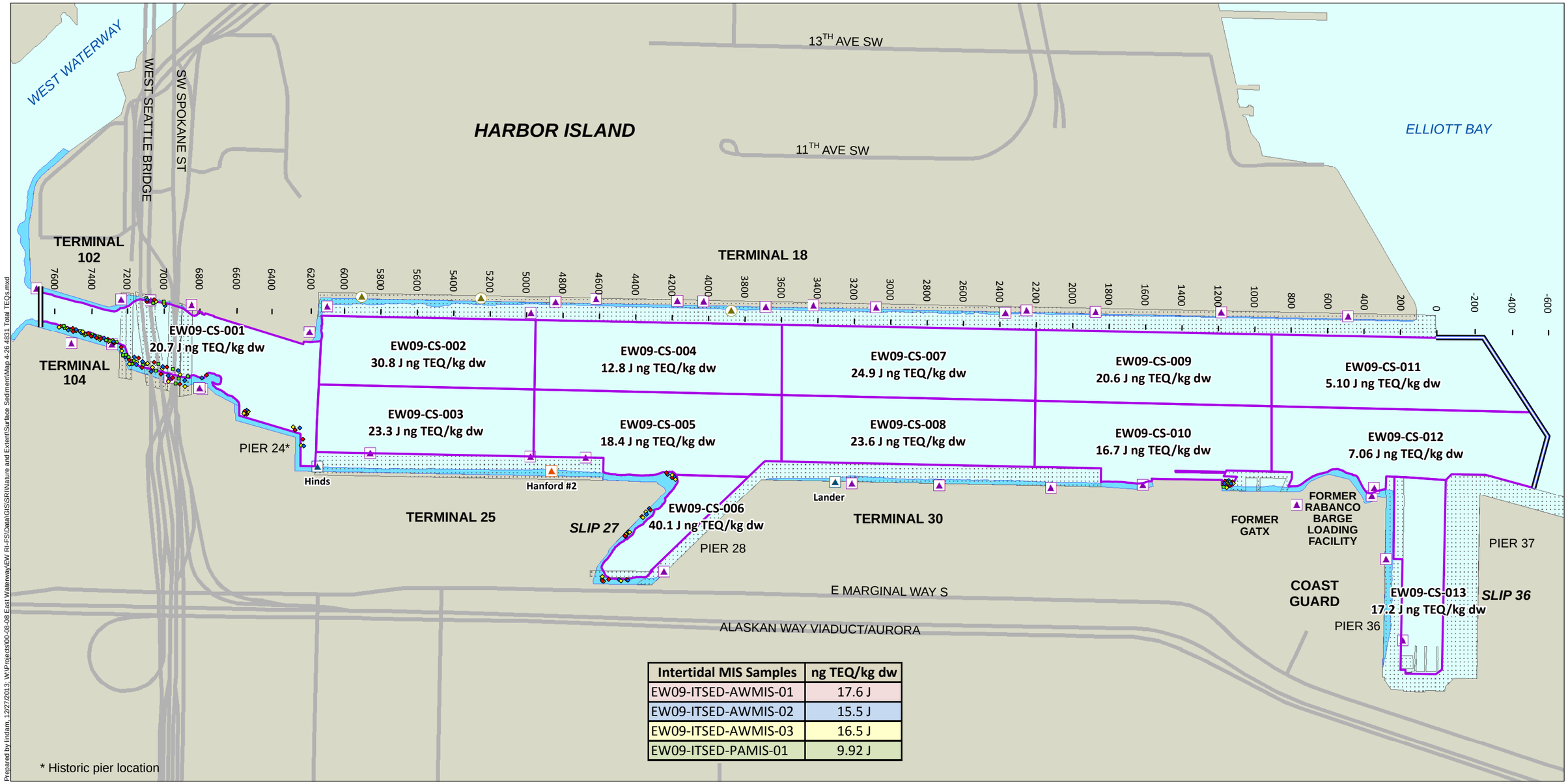
- Sampled Interval
- Not Analyzed for This Interval

0 - 2 ft: 0 - 1 ft, 1 - 2 ft
2 - 4 ft: 2 - 3 ft, 3 - 4 ft
4 - 6 ft
6 - 8 ft
8 - 10 ft
> 10 ft

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

0 600
Scale in feet

Map 4-25
Dioxin and Furan TEQ Values for Subsurface Sediment
Supplement Remediation Investigation
East Waterway Study Area



Intertidal MIS Samples	ng TEQ/kg dw
EW09-ITSED-AWMIS-01	17.6 J
EW09-ITSED-AWMIS-02	15.5 J
EW09-ITSED-AWMIS-03	16.5 J
EW09-ITSED-PAMIS-01	9.92 J

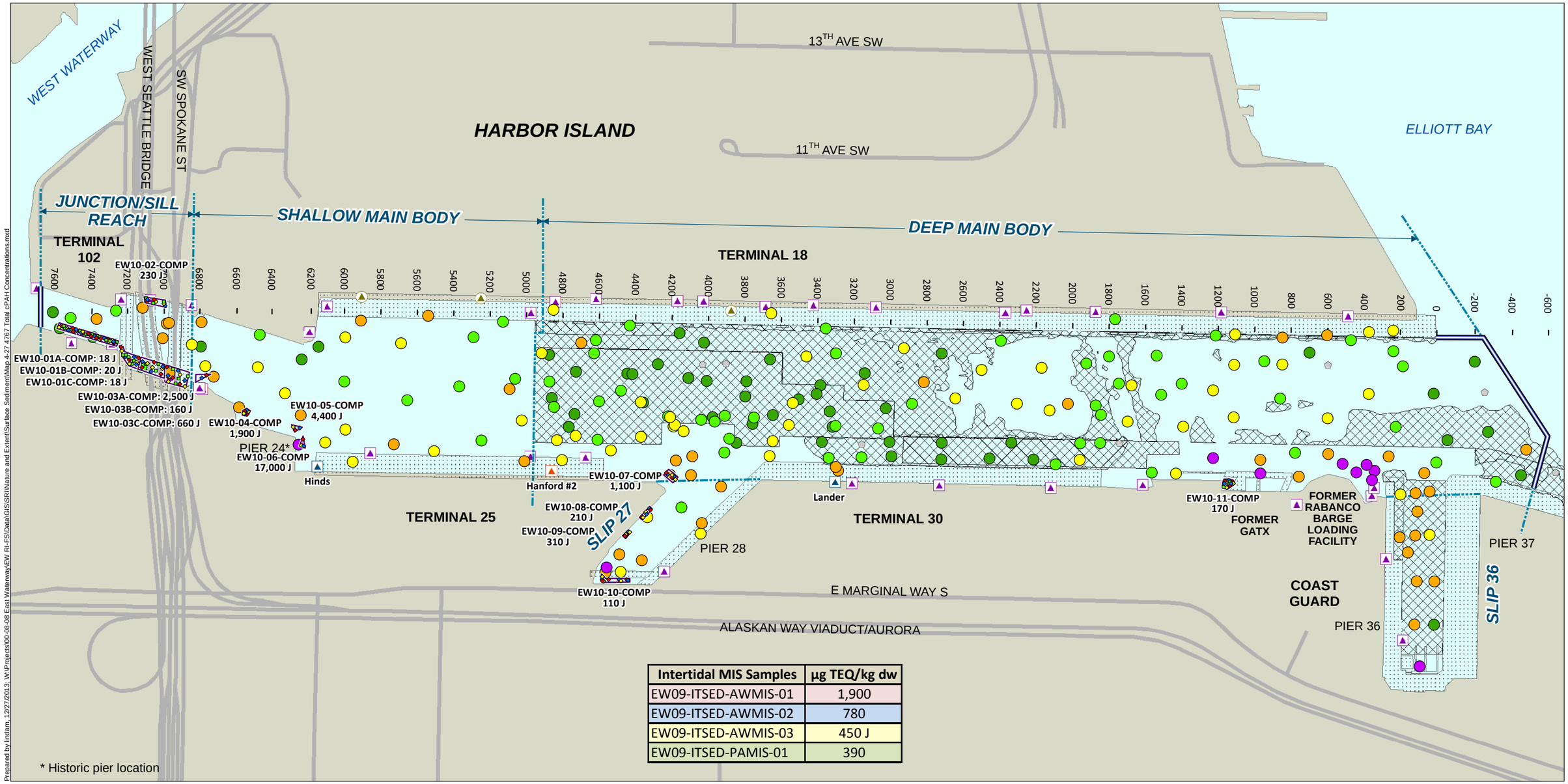
Multi-Increment Sampling (MIS) Composite Locations[a]

- EW09-ITSED-AWMIS-01
- EW09-ITSED-AWMIS-02
- EW09-ITSED-AWMIS-03
- EW09-ITSED-PAMIS-01
- Subtidal Composite Area Boundary[a]
- Intertidal Zone
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

[a] See Map 4-2 for detail on subtidal and intertidal MIS composites.

Map 4-26
Total TEQ Values for Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-26 4831 Total TEQs.mxd



Intertidal MIS Samples	µg TEQ/kg dw
EW09-ITSED-AWMIS-01	1,900
EW09-ITSED-AWMIS-02	780
EW09-ITSED-AWMIS-03	450 J
EW09-ITSED-PAMIS-01	390

Total cPAH Concentration*
µg TEQ/kg dw
- > 1,200 (> 95th percentile)
- > 480 and ≤ 1,200 (≤ 95th percentile)
- > 220 and ≤ 480 (≤ 75th percentile)
- > 95 and ≤ 220 (≤ 50th percentile)
- ≤ 95 (≤ 25th percentile)
- Non-detect

Multi-Increment Sampling (MIS) Composite Locations[a]
- Area wide - Rep 1
- Area wide - Rep 2
- Area wide - Rep 3
- Public access
- Intertidal PAH Composite Area[a]

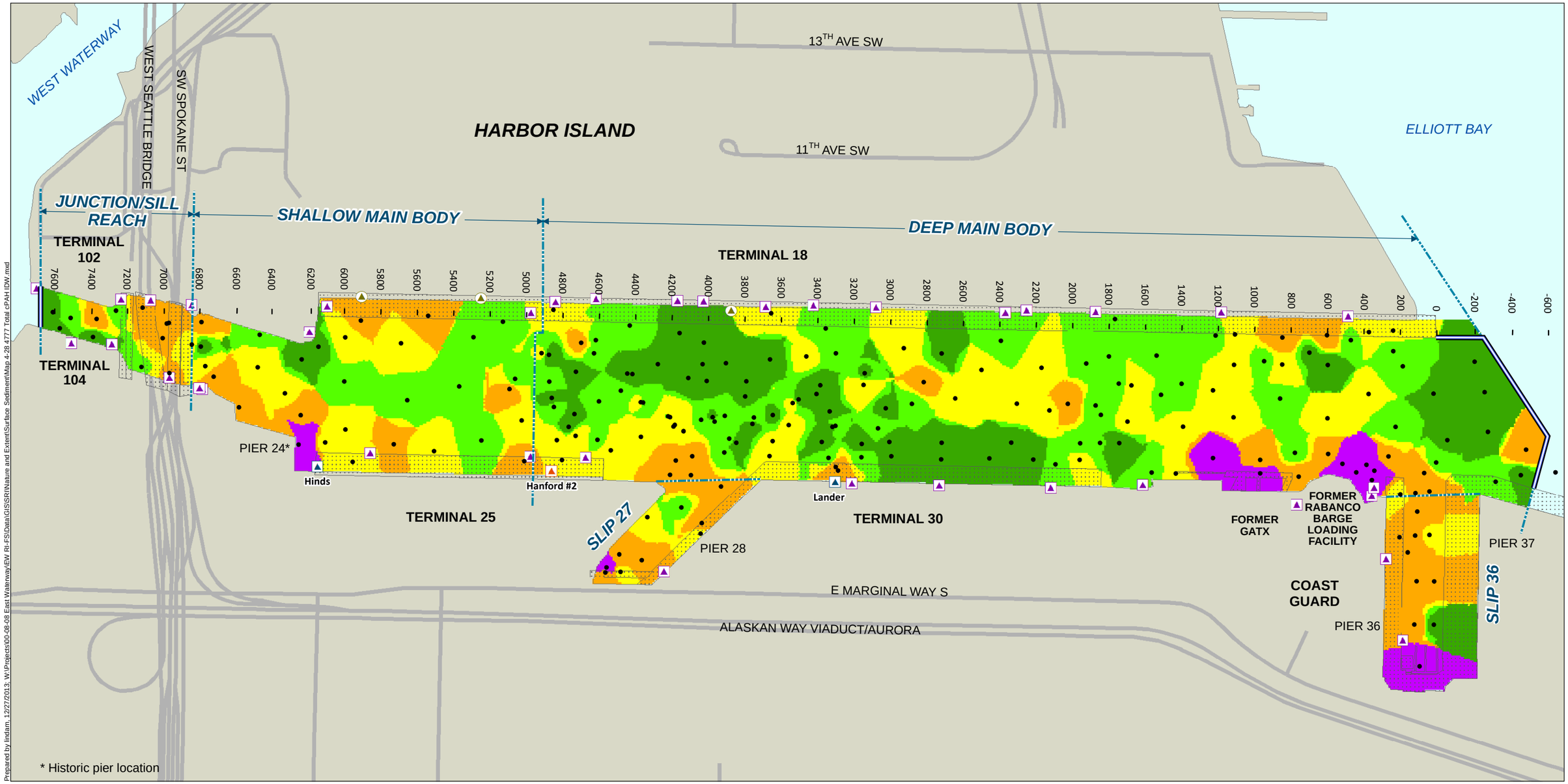
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

0 600
Scale in feet

[a] See Map 4-2 for detail on intertidal composites and intertidal MIS composites.
* The percentiles are all numeric percentiles of the surface sediment dataset.

Map 4-27
cPAH Concentrations in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-27 4767 Total cPAH Concentrations.mxd



Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-28 4777 Total cPAH IDW.mxd

Interpolated Total cPAH Concentration*

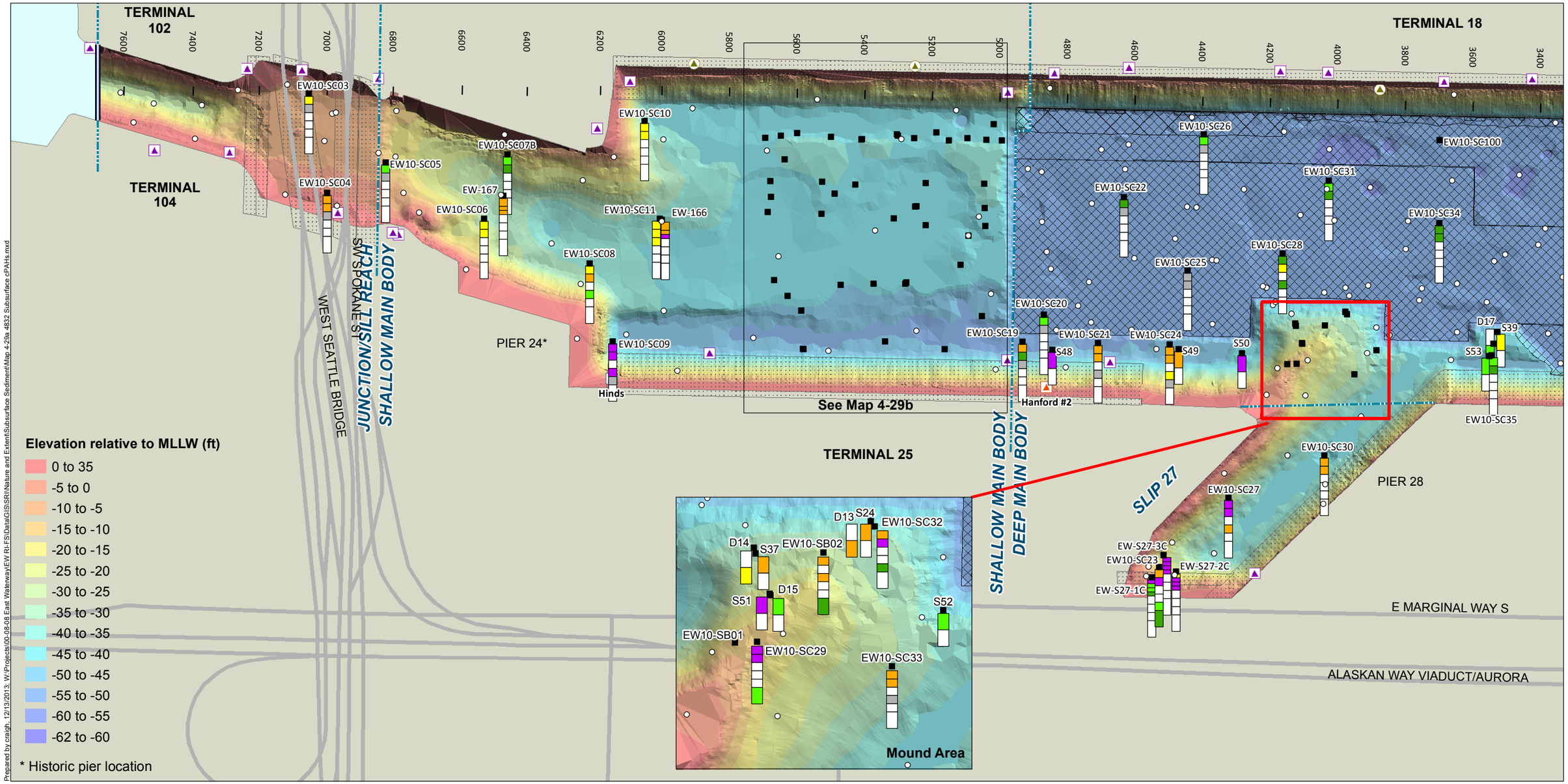
µg TEQ/kg dw

- > 1,200 (>95th percentile)
- > 480 and ≤ 1,200 (≤95th percentile)
- > 220 and ≤ 480 (≤75th percentile)
- > 95 and ≤ 220 (≤50th percentile)
- ≤ 95 (≤25th percentile)
- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.

0 600
Scale in feet

Map 4-28
Inverse Distance Weighted Interpolation of cPAH Concentrations in Surface Sediment
East Waterway Supplemental Remedial Investigation
East Waterway Study Area



Subsurface Core Depth Charts

- Subsurface Core Location

Total cPAHs in Subsurface Sediment* (µg TEQ/kg dw)

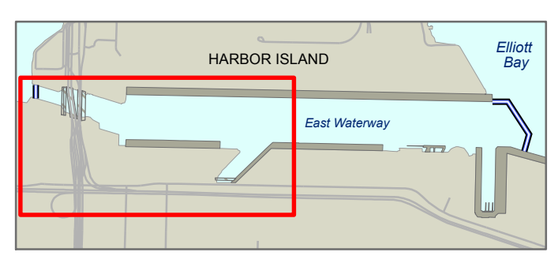
- > 1,200 (> 95th percentile)
- > 480 and ≤ 1,200 (≤ 95th percentile)
- > 220 and ≤ 480 (≤ 75th percentile)
- > 95 and ≤ 220 (≤ 50th percentile)
- ≤ 95 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

0 - 2 ft; 0 - 1 ft; 1 - 2 ft; 2 - 4 ft; 2 - 3 ft; 3 - 4 ft; 4 - 6 ft; 6 - 8 ft; 8 - 10 ft; > 10 ft

0 - 4 ft; > 4 ft

- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

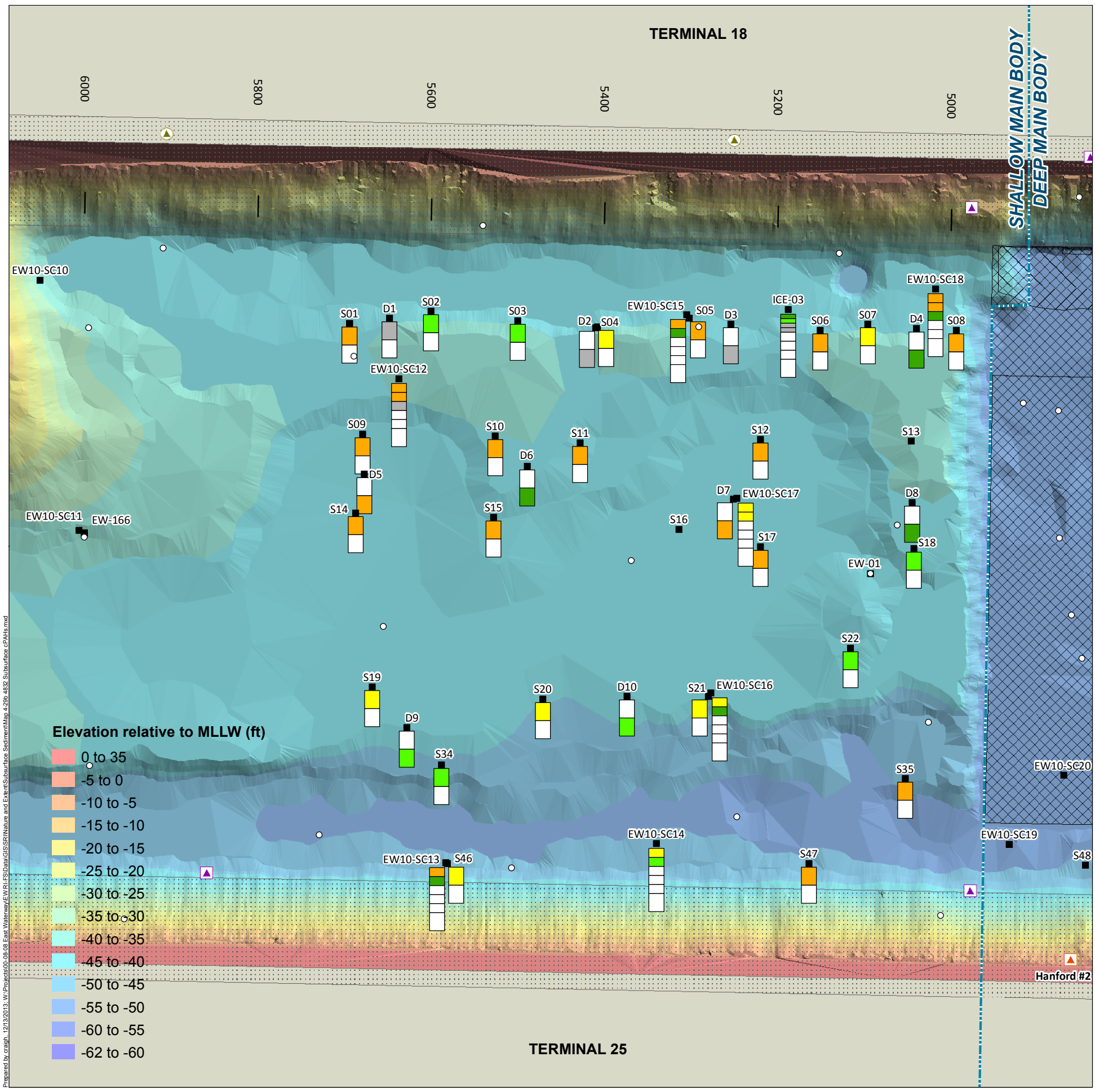
* The percentiles are all numeric percentiles of the surface sediment dataset.



0 600
Scale in feet

Map 4-29a
cPAH Concentrations in Subsurface Sediment
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SR\Nature and Extent\Subsurface Sediment\Map 4-29a 4832 Subsurface cPAHs.mxd



0 150
Scale in feet

Subsurface Core Depth Charts

- Subsurface Core Location

Total cPAHs in Subsurface Sediment* (µg TEQ/kg dw)

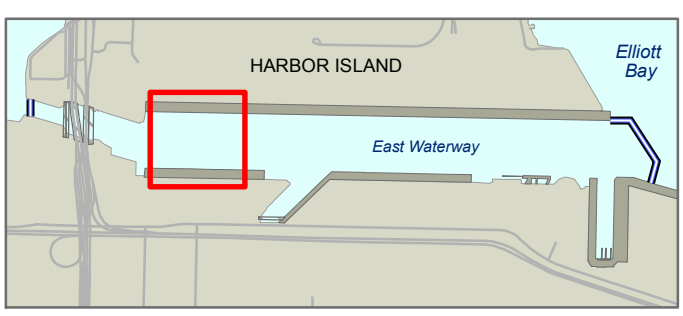
- > 1,200 (> 95th percentile)
- > 480 and ≤ 1,200 (≤ 95th percentile)
- > 220 and ≤ 480 (≤ 75th percentile)
- > 95 and ≤ 220 (≤ 50th percentile)
- ≤ 95 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

* The percentiles are all numeric percentiles of the surface sediment dataset.

0 - 2 ft: 0 - 1 ft, 1 - 2 ft
2 - 4 ft: 2 - 3 ft, 3 - 4 ft
4 - 6 ft
6 - 8 ft
8 - 10 ft
> 10 ft

0 - 4 ft
> 4 ft

- Surface Sediment Sampling Location
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- CSO
- CSO/Storm Drain
- Storm Drain
- Unknown
- East Waterway Study Area Boundary



Map 4-29b
cPAH Concentrations in Subsurface Sediment
Supplemental Remedial Investigation
East Waterway Study Area

TERMINAL 18

3400 3200 3000 2800 2600 2400 2200 2000 1800 1600 1400 1200 1000 800 600 400 200 0 -200 -400 -600

EW10-SC37
EW10-SC39
EW-165
EW10-SC36
EW10-SC38
Lander
EW10-SC43
1C11
1C12 (Ph1)
1C12 (Ph2)
EW10-SC40
EW10-SC42
4C01 (Ph1)
4C01 (Ph2)
2C07
EW10-SC41
EW10-SC46
1C07
1C08
EW10-SC44
2C06
2C06B
EW10-SC45
EW-163
EW10-SC101
EW-164
2C21
EW10-SC47
EW10-SC48
S45
EW10-SC49
EW-161
2C04
EW10-SC50
EW-160
EW10-SC52
EW-159
EW10-SC51
EW-162
EW10-SC55
EW10-SC56
EW-156
EW10-SC53
EW10-SC54
EW-158
EW10-SC61
S30
EW10-SC62
EW10-SC63
EW10-SC60
EW10-SC57
EW10-SC59
C-1/C-2
EW10-SC58

ELLIOTT BAY

DEEP MAIN BODY

FORMER GATX

FORMER RABANCO BARGE LOADING FACILITY

TERMINAL 30

PIER 37

COAST GUARD

PIER 36

SLIP 36

E MARGINAL WAY S

ALASKAN WAY VIADUCT/AURORA

Elevation relative to MLLW (ft)

- 0 to 35
- -5 to 0
- -10 to -5
- -15 to -10
- -20 to -15
- -25 to -20
- -30 to -25
- -35 to -30
- -40 to -35
- -45 to -40
- -50 to -45
- -55 to -50
- -60 to -55
- -62 to -60

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-29c 4832 Subsurface cPAHs.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

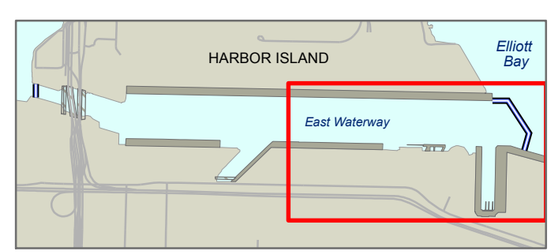
Total cPAHs in Subsurface Sediment* (µg TEQ/kg dw)

- > 1,200 (> 95th percentile)
- > 480 and ≤ 1,200 (≤ 95th percentile)
- > 220 and ≤ 480 (≤ 75th percentile)
- > 95 and ≤ 220 (≤ 50th percentile)
- ≤ 95 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

0 - 2 ft; 0 - 1 ft; 1 - 2 ft; 2 - 4 ft; 2 - 3 ft; 3 - 4 ft; 4 - 6 ft; 6 - 8 ft; 8 - 10 ft; > 10 ft; 0 - 4 ft; > 4 ft

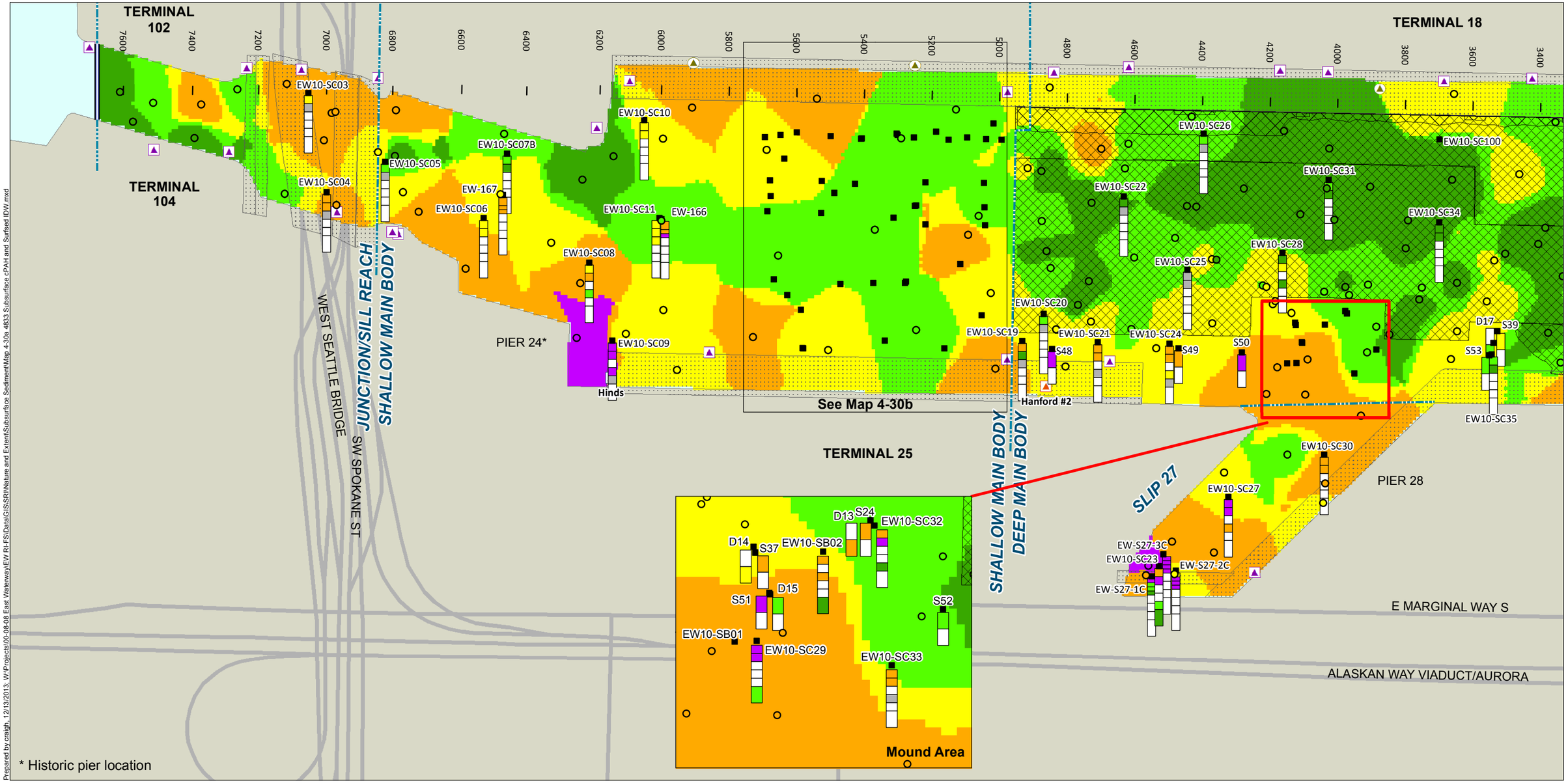
- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.



0 600
Scale in feet

Map 4-29c
cPAH Concentrations in Subsurface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



* Historic pier location

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-30a 4833 Subsurface cPAH and Surfsed IDW.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

cPAH in Subsurface and Surface Sediment* (µg TEQ/kg dw)

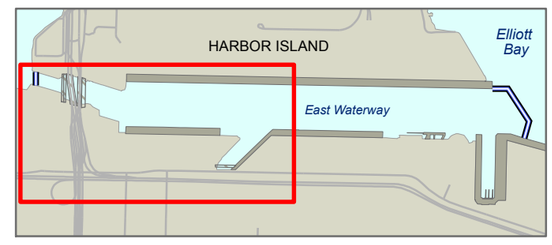
- > 1,200 (> 95th percentile)
- > 480 and ≤ 1,200 (≤ 95th percentile)
- > 220 and ≤ 480 (≤ 75th percentile)
- > 95 and ≤ 220 (≤ 50th percentile)
- ≤ 95 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

0 - 2 ft; 0 - 1 ft; 1 - 2 ft; 2 - 4 ft; 2 - 3 ft; 3 - 4 ft; 4 - 6 ft; 6 - 8 ft; 8 - 10 ft; > 10 ft

0 - 4 ft; > 4 ft

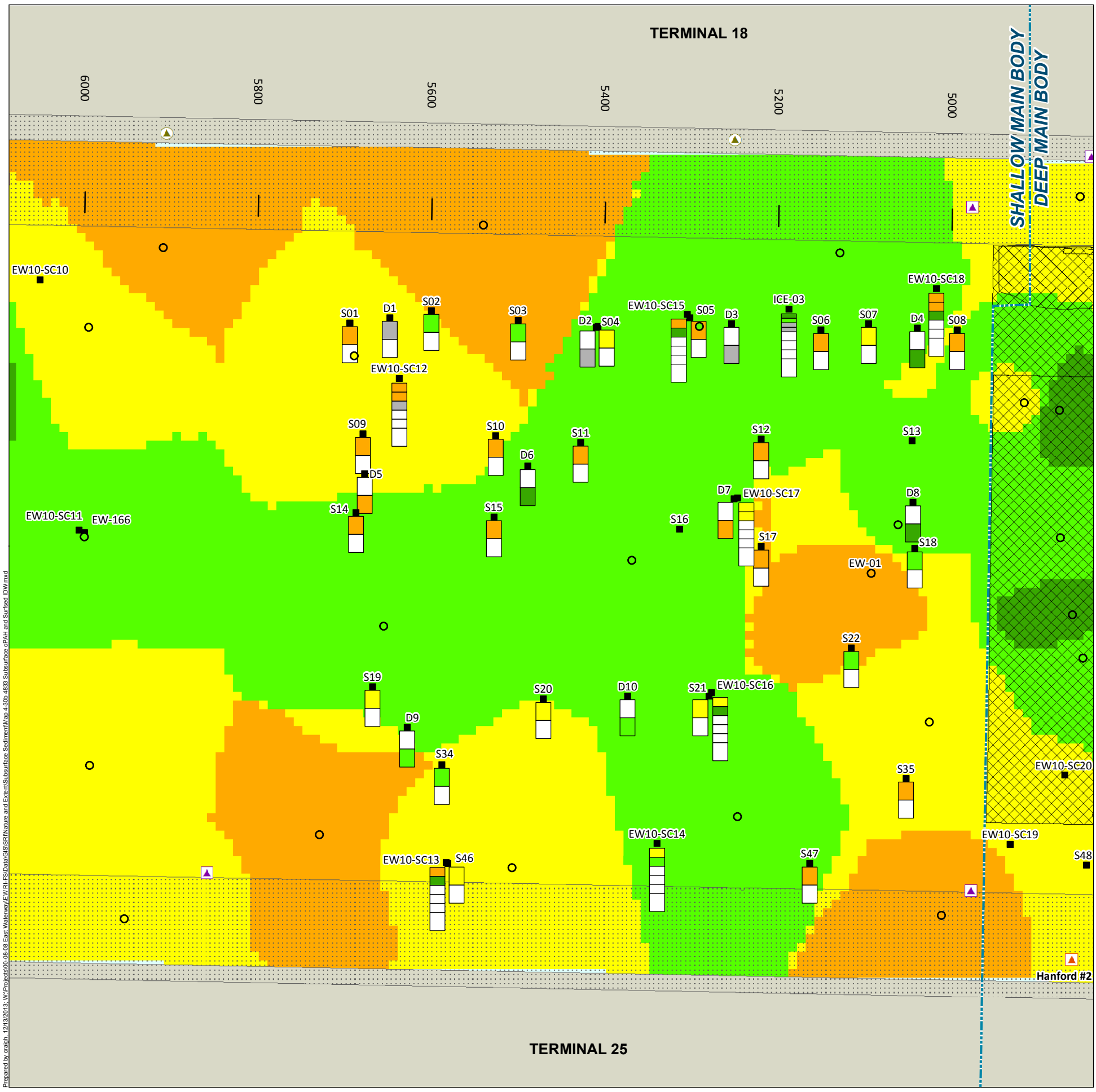
- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.



0 600
Scale in feet

Map 4-30a
Subsurface Sediment cPAH Concentrations and
Interpolated Surface Sediment cPAH Concentrations
Supplemental Remedial Investigation
East Waterway Study Area



0 150
Scale in feet

Subsurface Core Depth Charts

■ Subsurface Core Location

cPAH in Subsurface and Surface Sediment* (µg TEQ/kg dw)

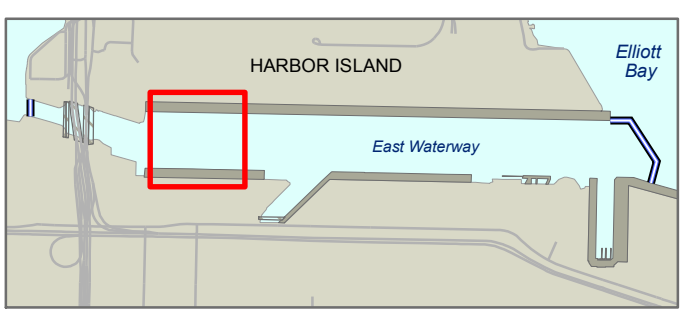
- > 1,200 (> 95th percentile)
- > 480 and ≤ 1,200 (≤ 95th percentile)
- > 220 and ≤ 480 (≤ 75th percentile)
- > 95 and ≤ 220 (≤ 50th percentile)
- ≤ 95 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

* The percentiles are all numeric percentiles of the surface sediment dataset.

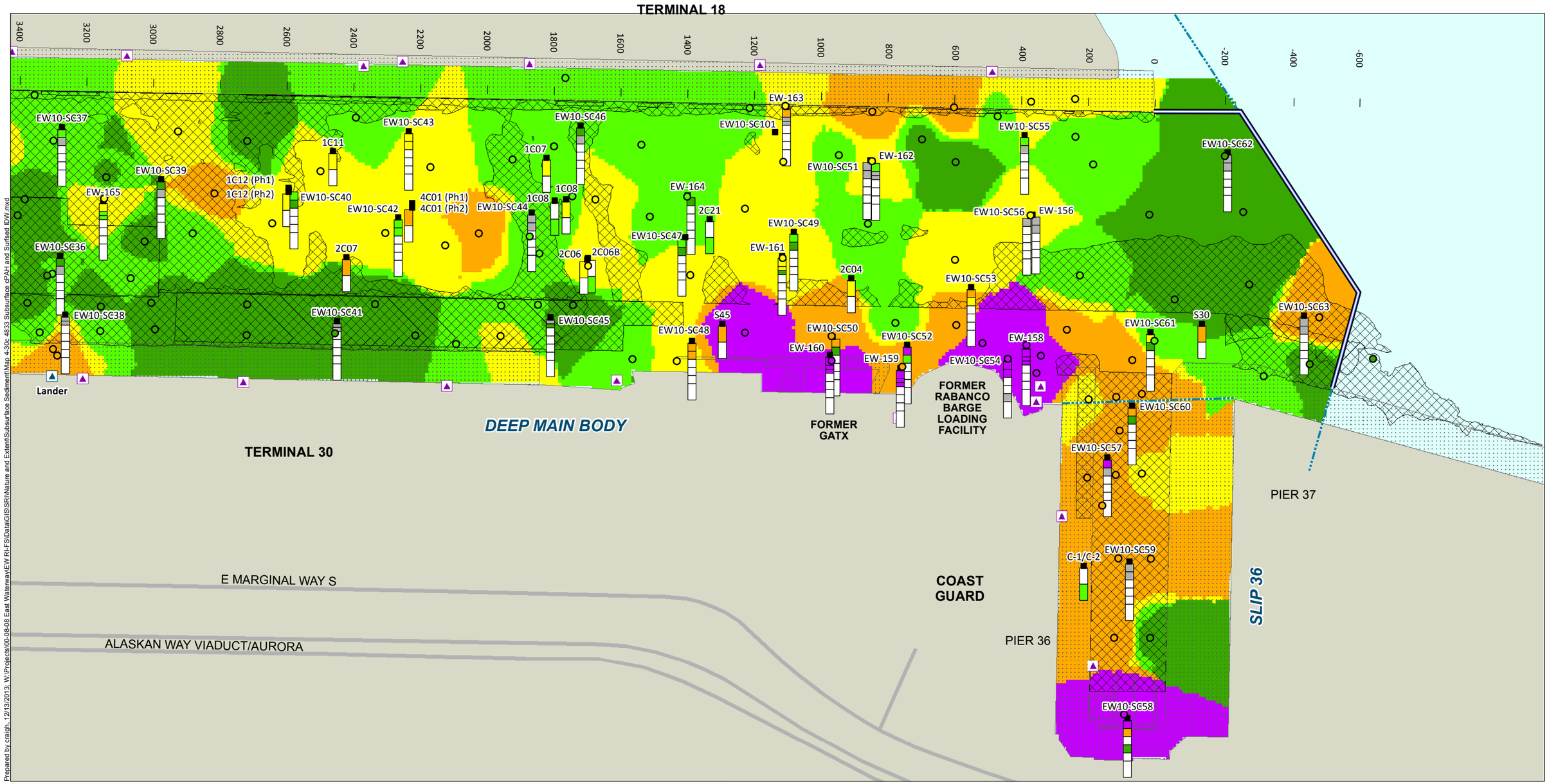
0 - 2 ft: 0 - 1 ft, 1 - 2 ft
2 - 4 ft: 2 - 3 ft, 3 - 4 ft
4 - 6 ft
6 - 8 ft
8 - 10 ft
> 10 ft

0 - 4 ft
> 4 ft

○ Surface Sediment Sampling Location
Area Dredged in the Last 11 Years
Dock/Pier/Bridge
CSO
CSO/Storm Drain
Storm Drain
Unknown
East Waterway Study Area Boundary



Map 4-30b
Subsurface Sediment cPAH Concentrations and Interpolated Surface Sediment cPAH Concentrations
Supplemental Remedial Investigation
East Waterway Study Area



Subsurface Core Depth Charts

- Subsurface Core Location

cPAH in Subsurface and Surface Sediment* (µg TEQ/kg dw)

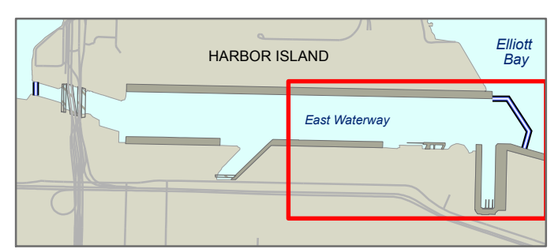
- > 1,200 (> 95th percentile)
- > 480 and ≤ 1,200 (≤ 95th percentile)
- > 220 and ≤ 480 (≤ 75th percentile)
- > 95 and ≤ 220 (≤ 50th percentile)
- ≤ 95 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

0 - 2 ft: 0 - 1 ft, 1 - 2 ft
2 - 4 ft: 2 - 3 ft, 3 - 4 ft
4 - 6 ft
6 - 8 ft
8 - 10 ft
> 10 ft

0 - 4 ft
> 4 ft

- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

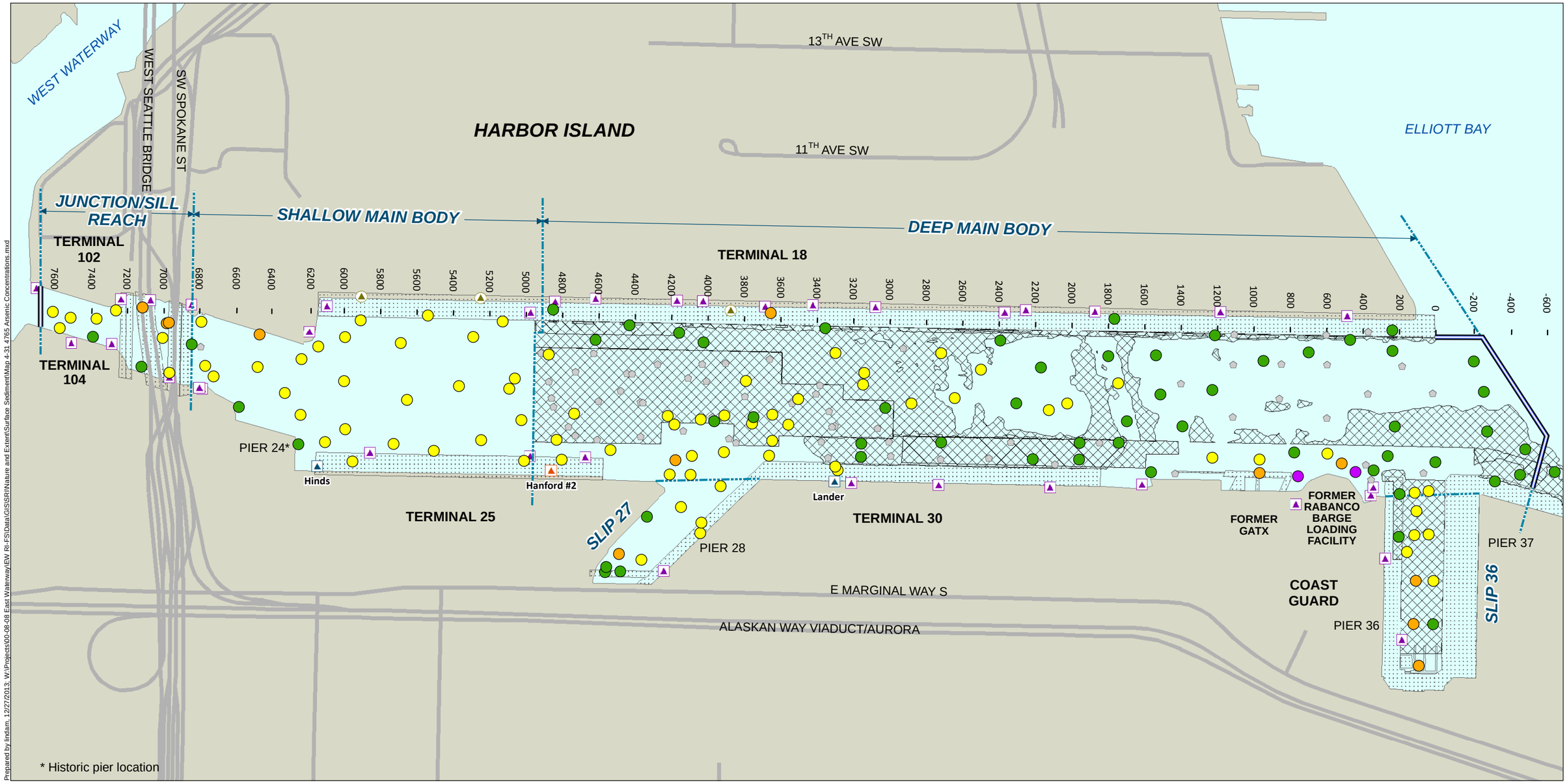
* The percentiles are all numeric percentiles of the surface sediment dataset.



0 600
Scale in feet

Map 4-30c
Subsurface Sediment cPAH Concentrations and Interpolated Surface Sediment cPAH Concentrations
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-30c 4833 Subsurface cPAH and Surfsed IDW.mxd



Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-31 4765 Arsenic Concentrations.mxd

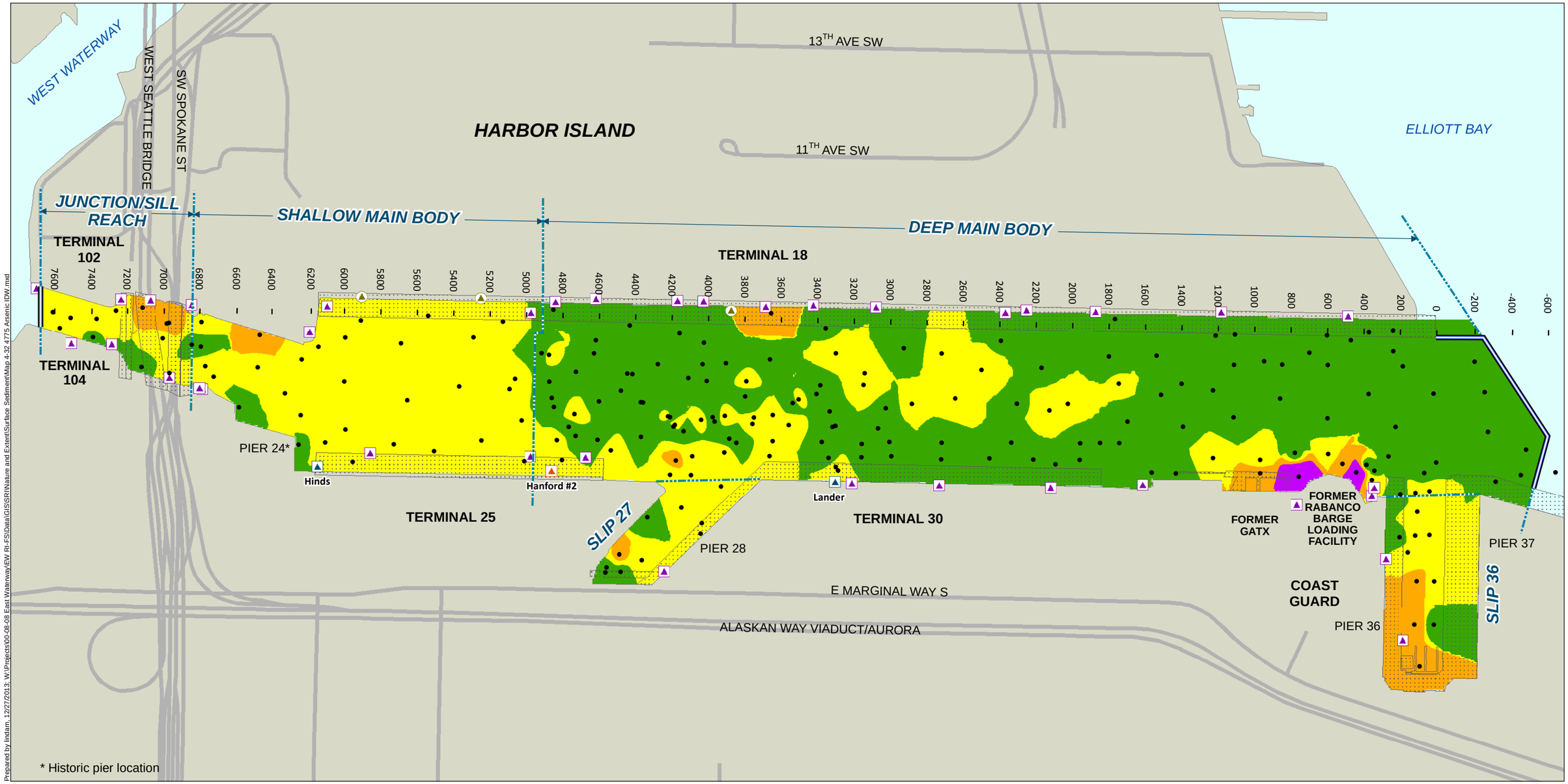
Arsenic Concentration
mg/kg dw
CSL = 93
SQS = 57

- > 57 (> SQS)
- > 15 and ≤ 57 (≤ SQS)
- > 7.0 and ≤ 15
- ≤ 7.0
- Non-detect

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

0 600
Scale in feet

Map 4-31
Arsenic Concentrations in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



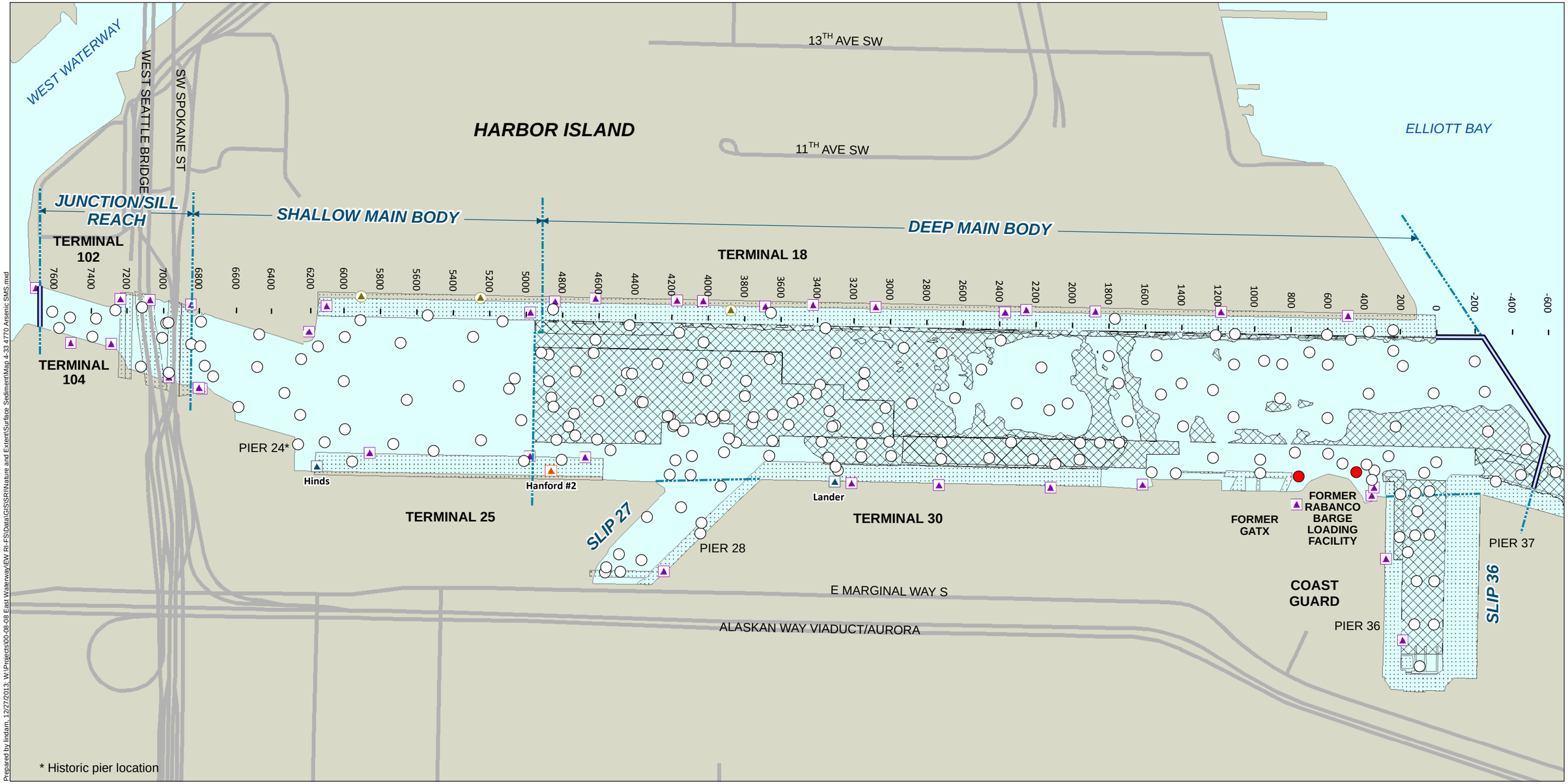
Interpolated Arsenic Concentration
mg/kg dw
CSL = 93
SQS = 57

- > 57 (> SQS)
- > 15 and ≤ 57 (≤ SQS)
- > 7.0 and ≤ 15
- ≤ 7.0
- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

0 600
Scale in feet

Map 4-32
Inverse Distance Weighted Interpolation of Arsenic Concentrations in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-32 4775 Arsenic IDW.mxd



0 600
Scale in feet

SMS Categories for Arsenic
CSL = 93 mg/kg dw
SQS = 57 mg/kg dw

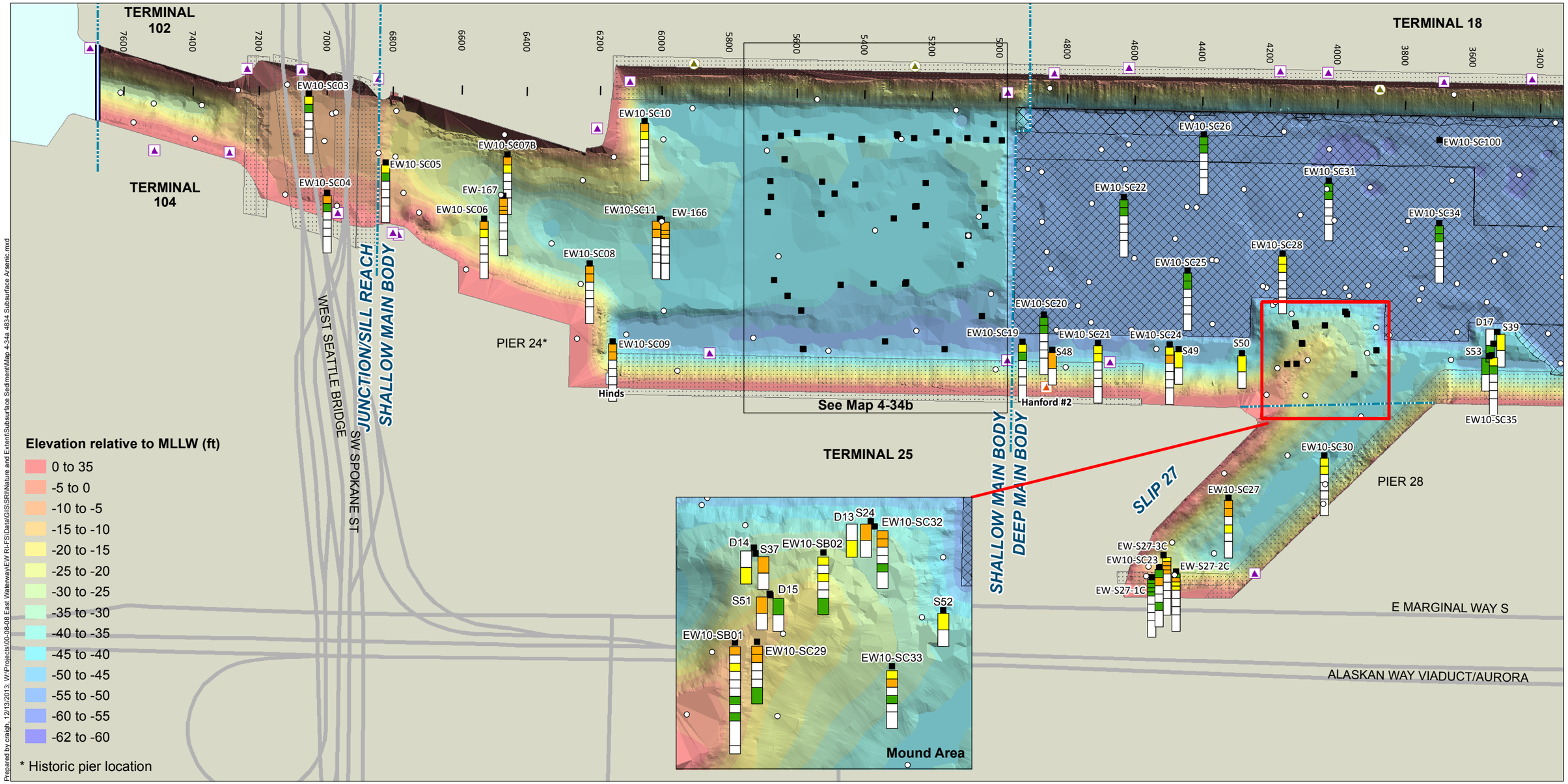
- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall

- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

Map 4-33
Exceedances of SMS Criteria (SQS or CSL) by Arsenic in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-33 4770 Arsenic SMS.mxd



Subsurface Core Depth Charts

- Subsurface Core Location

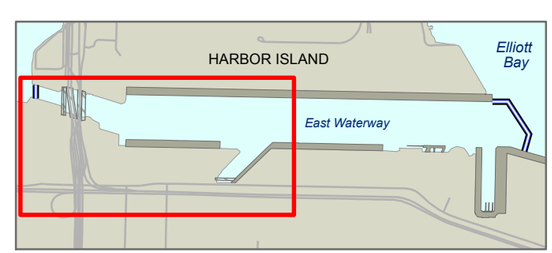
Arsenic in Subsurface Sediment (mg/kg dw)
CSL = 93; SQS = 57

- > 57 (> SQS)
- > 15 and ≤ 57 (≤ SQS)
- > 7.0 and ≤ 15
- ≤ 7.0
- Non-detect
- Not Analyzed for This Interval

0 - 2 ft: 0 - 1 ft, 1 - 2 ft
2 - 4 ft: 2 - 3 ft, 3 - 4 ft
4 - 6 ft
6 - 8 ft
8 - 10 ft
> 10 ft

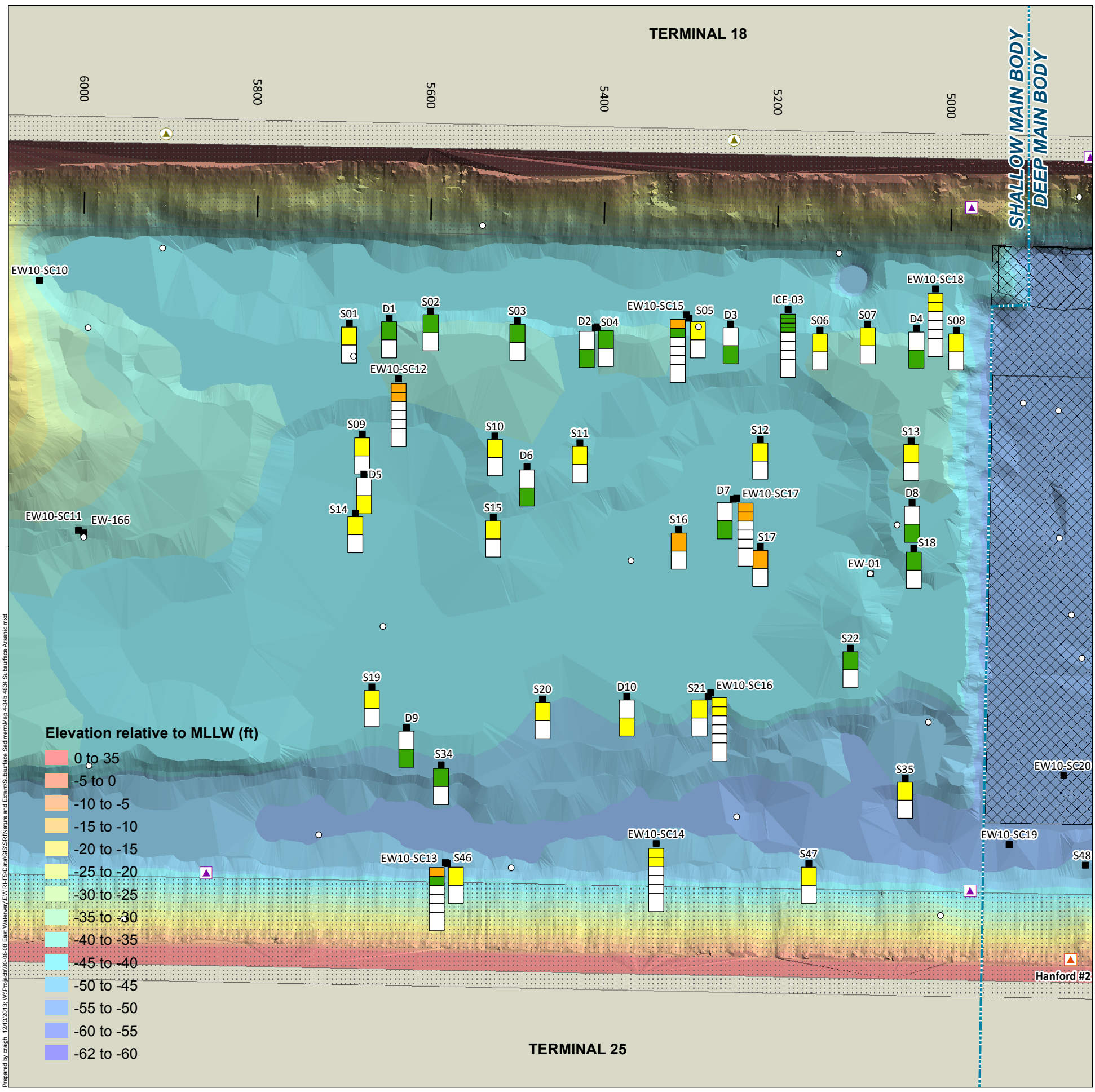
0 - 4 ft
> 4 ft

- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary



0 600
Scale in feet

Map 4-34a
Arsenic Concentrations in Subsurface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-34b 4834 Subsurface Arsenic.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

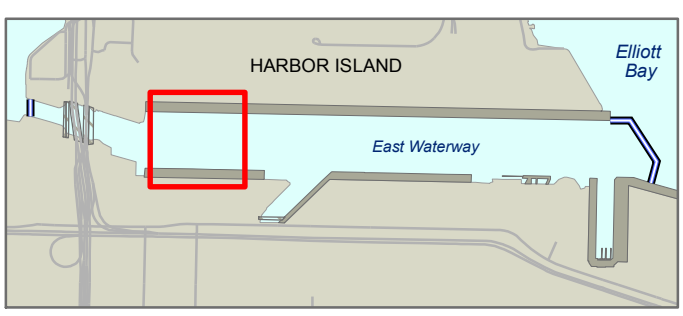
Arsenic in Subsurface Sediment (mg/kg dw)
CSL = 93; SQS = 57

- > 57 (> SQS)
- > 15 and ≤ 57 (≤ SQS)
- > 7.0 and ≤ 15
- ≤ 7.0
- Non-detect
- Not Analyzed for This Interval

0 - 2 ft: 0 - 1 ft, 1 - 2 ft
2 - 4 ft: 2 - 3 ft, 3 - 4 ft
4 - 6 ft
6 - 8 ft
8 - 10 ft
> 10 ft

0 - 4 ft
> 4 ft

- Surface Sediment Sampling Location
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- CSO
- CSO/Storm Drain
- Storm Drain
- Unknown
- East Waterway Study Area Boundary



Map 4-34b
Arsenic Concentrations in Subsurface Sediment
Supplemental Remedial Investigation
East Waterway Study Area

TERMINAL 18

3400 3200 3000 2800 2600 2400 2200 2000 1800 1600 1400 1200 1000 800 600 400 200 0 -200 -400 -600

ELLIOTT BAY

EW10-SC37
EW10-SC39
EW-165
EW10-SC36
EW10-SC38
Lander
1C12 (Ph1)
1C12 (Ph2)
EW10-SC40
1C11
EW10-SC43
EW10-SC42
4C01 (Ph1)
4C01 (Ph2)
2C07
EW10-SC41
EW10-SC44
1C07
1C08
1C08
2C06
2C06B
EW10-SC45
EW10-SC46
EW-164
2C21
EW10-SC47
EW10-SC48
S45
EW-163
EW10-SC101
EW10-SC49
EW-161
2C04
EW10-SC50
EW-160
EW10-SC52
EW-159
EW10-SC51
EW-162
EW10-SC53
EW10-SC54
EW-158
EW10-SC55
EW10-SC56
EW-156
EW10-SC61
S30
EW10-SC62
EW10-SC63
EW10-SC60
EW10-SC57
EW10-SC59
C-1/C-2
EW10-SC58

DEEP MAIN BODY

TERMINAL 30

FORMER GATX

FORMER RABANCO BARGE LOADING FACILITY

PIER 37

COAST GUARD

PIER 36

SLIP 36

E MARGINAL WAY S

ALASKAN WAY VIADUCT/AURORA

Elevation relative to MLLW (ft)

- 0 to 35
- -5 to 0
- -10 to -5
- -15 to -10
- -20 to -15
- -25 to -20
- -30 to -25
- -35 to -30
- -40 to -35
- -45 to -40
- -50 to -45
- -55 to -50
- -60 to -55
- -62 to -60

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-34c 4834 Subsurface Arsenic.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

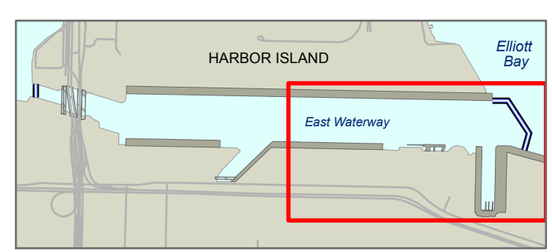
Arsenic in Subsurface Sediment (mg/kg dw)
CSL = 93; SQS = 57

- > 57 (> SQS)
- > 15 and ≤ 57 (≤ SQS)
- > 7.0 and ≤ 15
- ≤ 7.0
- Non-detect
- Not Analyzed for This Interval

0 - 2 ft: 0 - 1 ft, 1 - 2 ft
2 - 4 ft: 2 - 3 ft, 3 - 4 ft
4 - 6 ft
6 - 8 ft
8 - 10 ft
> 10 ft

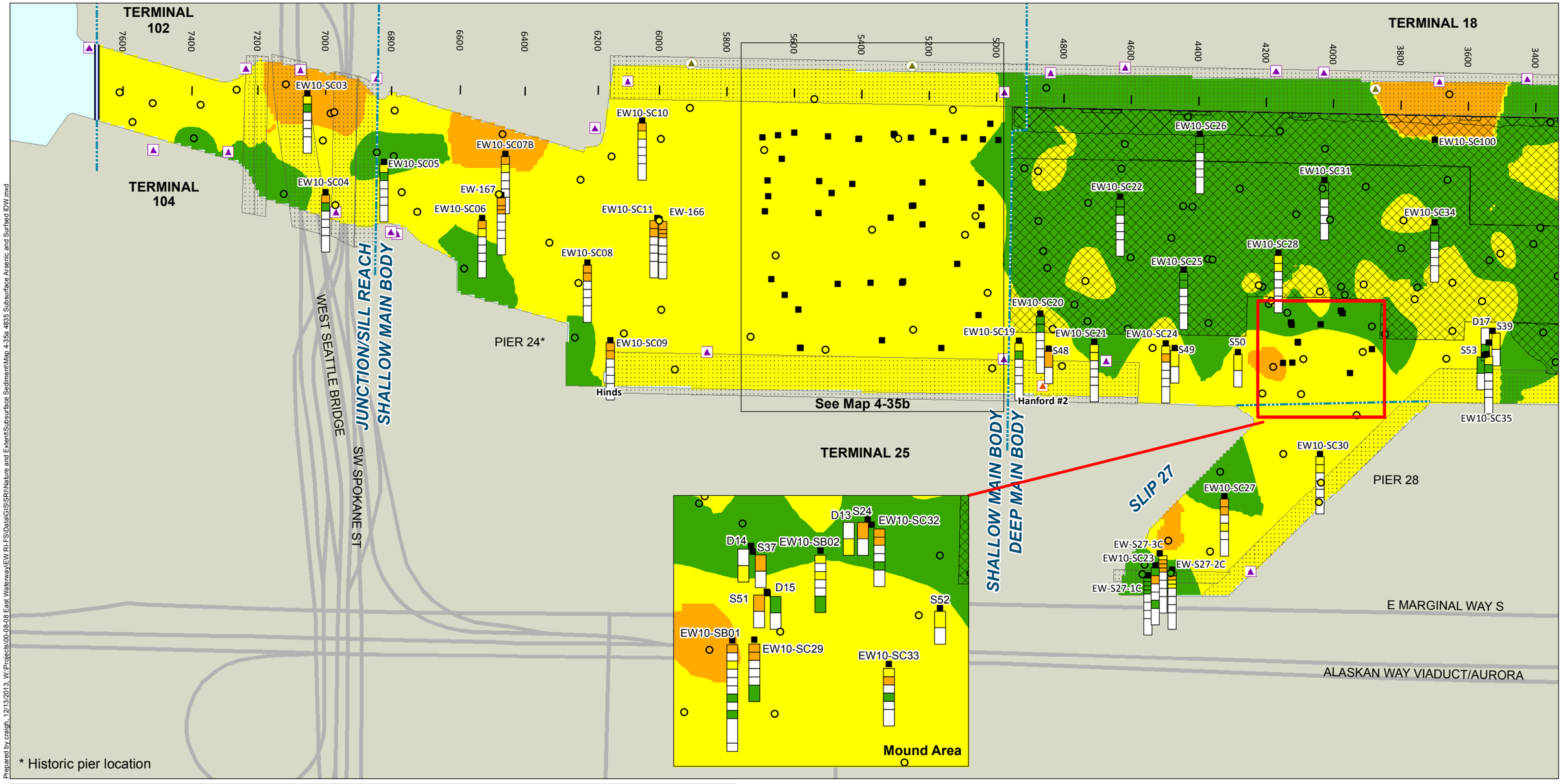
0 - 4 ft
> 4 ft

- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary



0 600
Scale in feet

Map 4-34c
Arsenic Concentrations in Subsurface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



* Historic pier location

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-35a 4835 Subsurface Arsenic and Surfsed IDW.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

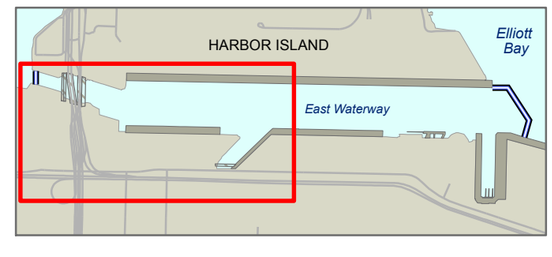
Arsenic in Subsurface and Surface Sediment (mg/kg dw)
CSL = 93; SQS = 57

- > 57 (> SQS)
- > 15 and ≤ 57 (≤ SQS)
- > 7.0 and ≤ 15
- ≤ 7.0
- Non-detect
- Not Analyzed for This Interval

0 - 2 ft: 0 - 1 ft, 1 - 2 ft
2 - 4 ft: 2 - 3 ft, 3 - 4 ft
4 - 6 ft
6 - 8 ft
8 - 10 ft
> 10 ft

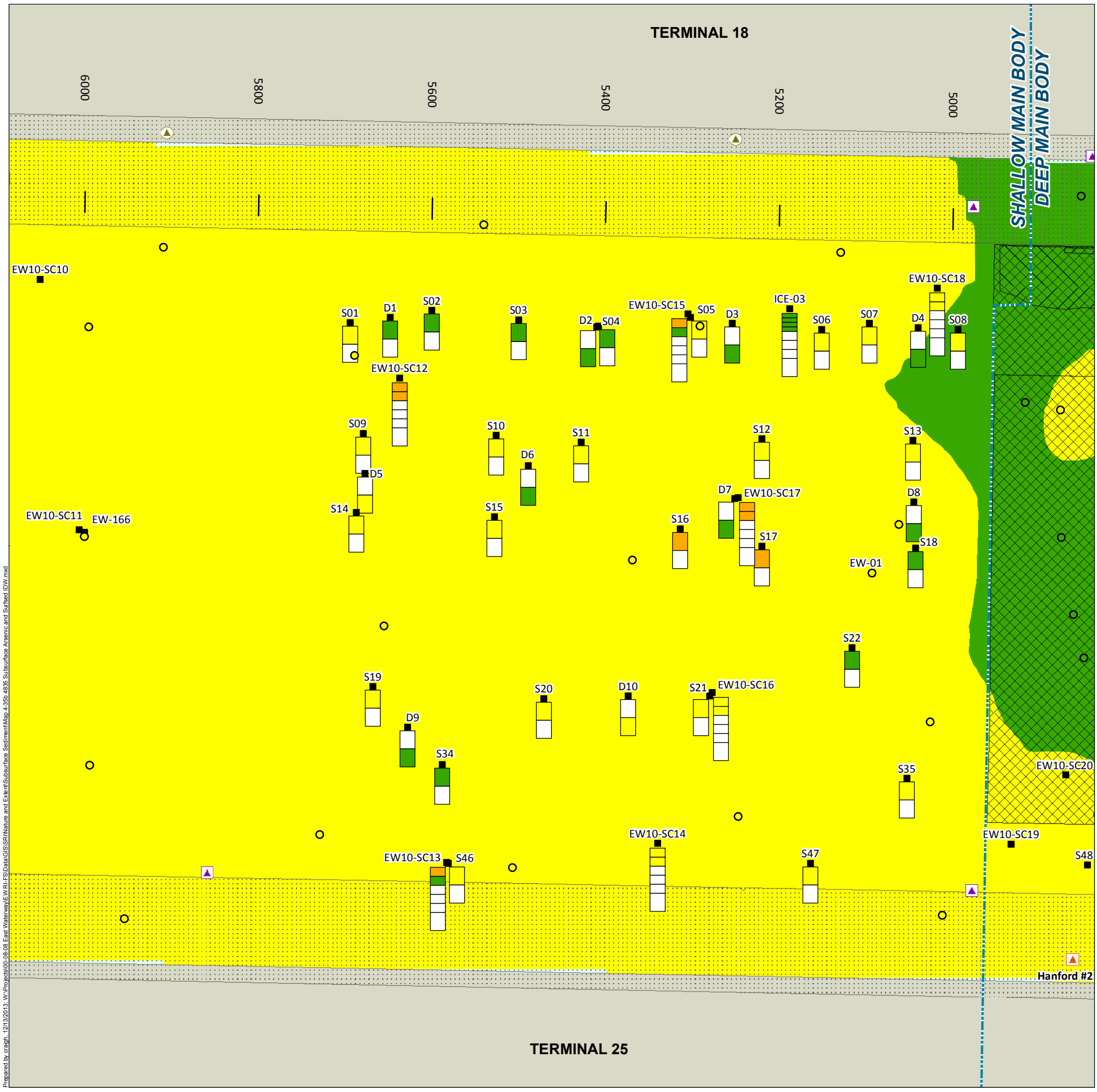
0 - 4 ft
> 4 ft

- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary



0 600
Scale in feet

Map 4-35a
Subsurface Sediment Arsenic Concentrations and
Interpolated Surface Sediment Arsenic Concentrations
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by craigh, 12/13/2013, W:\Projects\00-08-08 East Waterway\EWRI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-35b 4835 Subsurface Arsenic and Surfaced IDW.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

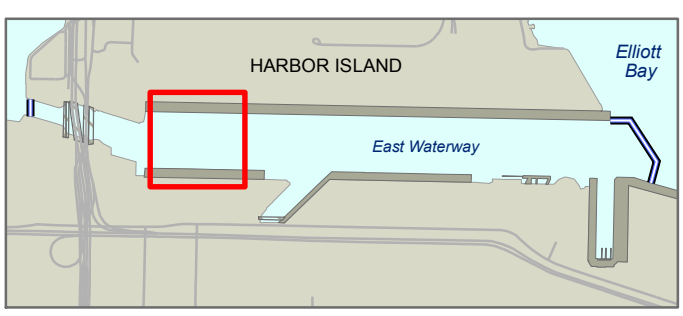
Arsenic in Subsurface and Surface Sediment (mg/kg dw)
CSL = 93; SQS = 57

- > 57 (> SQS)
- > 15 and ≤ 57 (≤ SQS)
- > 7.0 and ≤ 15
- ≤ 7.0
- Non-detect
- Not Analyzed for This Interval

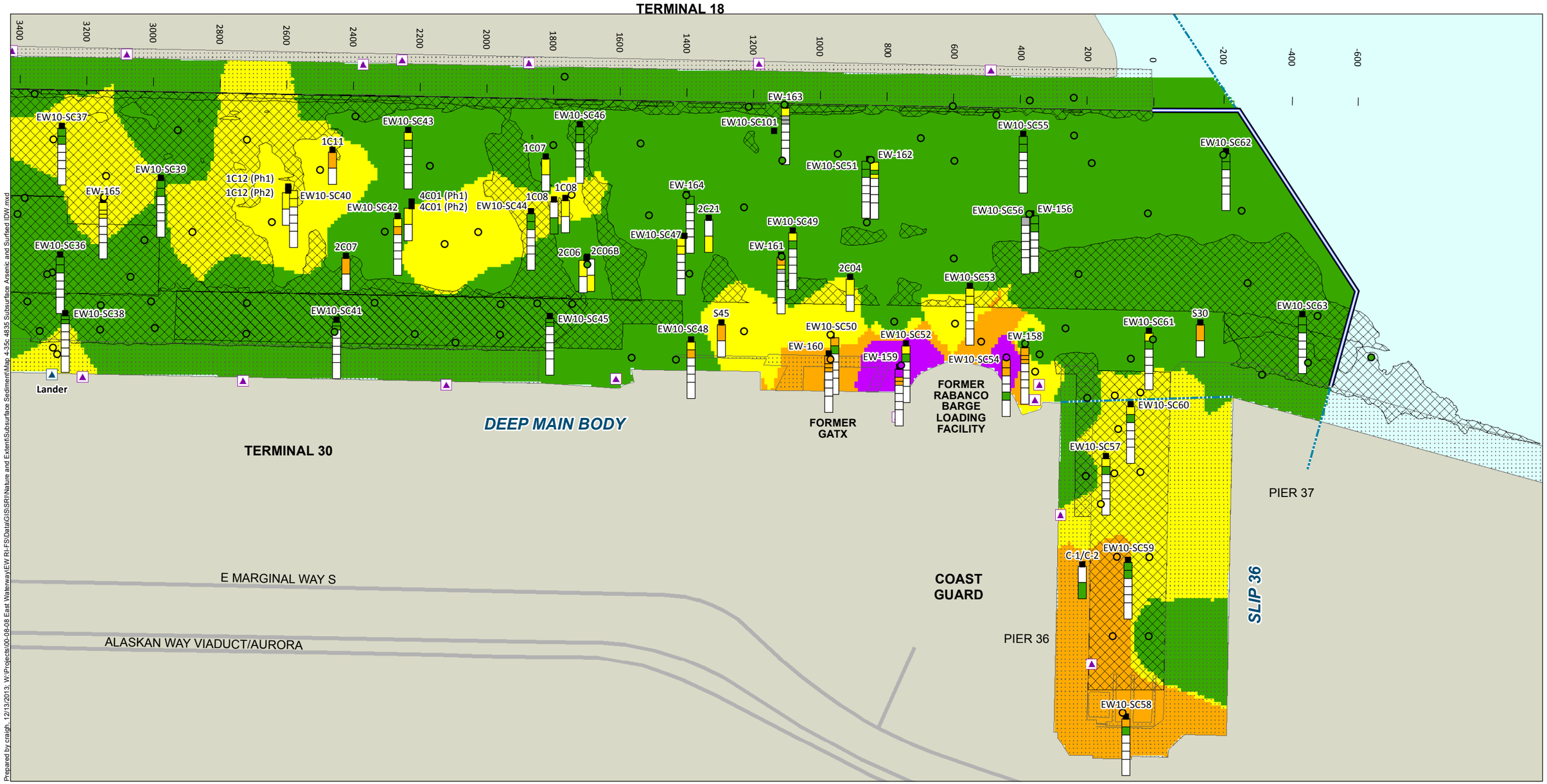
0 - 2 ft: 0 - 1 ft, 1 - 2 ft
2 - 4 ft: 2 - 3 ft, 3 - 4 ft
4 - 6 ft
6 - 8 ft
8 - 10 ft
> 10 ft

0 - 4 ft
> 4 ft

- Surface Sediment Sampling Location
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- CSO
- CSO/Storm Drain
- Storm Drain
- Unknown
- East Waterway Study Area Boundary



Map 4-35b
Subsurface Sediment Arsenic Concentrations and Interpolated Surface Sediment Arsenic Concentrations
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SR\Nature and Extent\Subsurface Sediment\Map 4-35c 4835 Subsurface Arsenic and Surfsed IDW.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

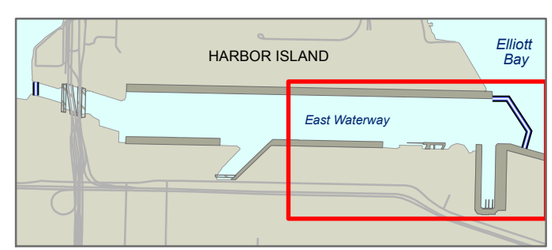
Arsenic in Subsurface and Surface Sediment (mg/kg dw)
CSL = 93; SQS = 57

- > 57 (> SQS)
- > 15 and ≤ 57 (≤ SQS)
- > 7.0 and ≤ 15
- ≤ 7.0
- Non-detect
- Not Analyzed for This Interval

0 - 2 ft: 0 - 1 ft, 1 - 2 ft
2 - 4 ft: 2 - 3 ft, 3 - 4 ft
4 - 6 ft
6 - 8 ft
8 - 10 ft
> 10 ft

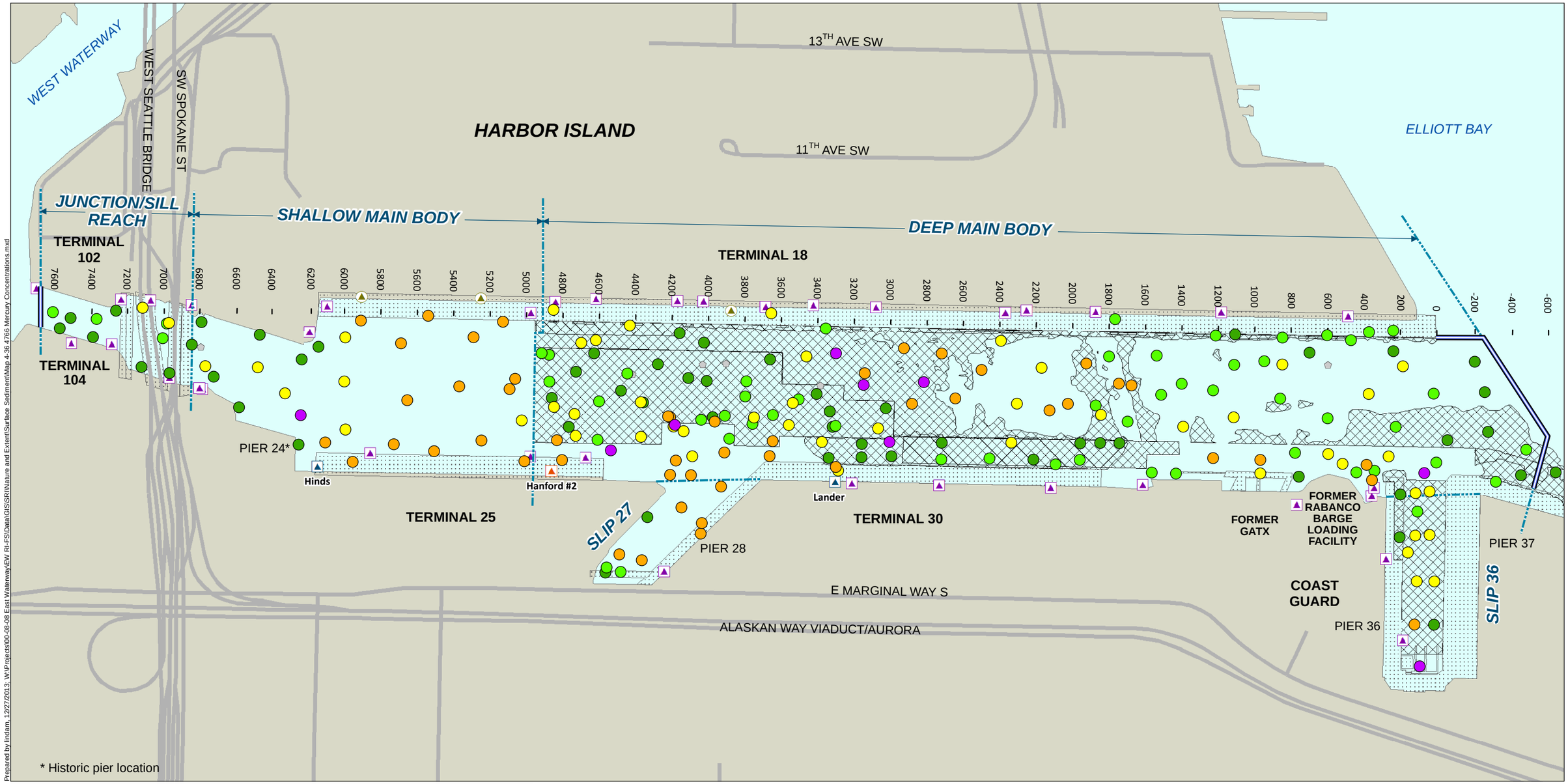
0 - 4 ft
> 4 ft

- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary



0 600
Scale in feet

Map 4-35c
Subsurface Sediment Arsenic Concentrations and Interpolated Surface Sediment Arsenic Concentrations
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-36 4766 Mercury Concentrations.mxd

Mercury Concentration*
mg/kg dw
CSL = 0.59
SQS = 0.41

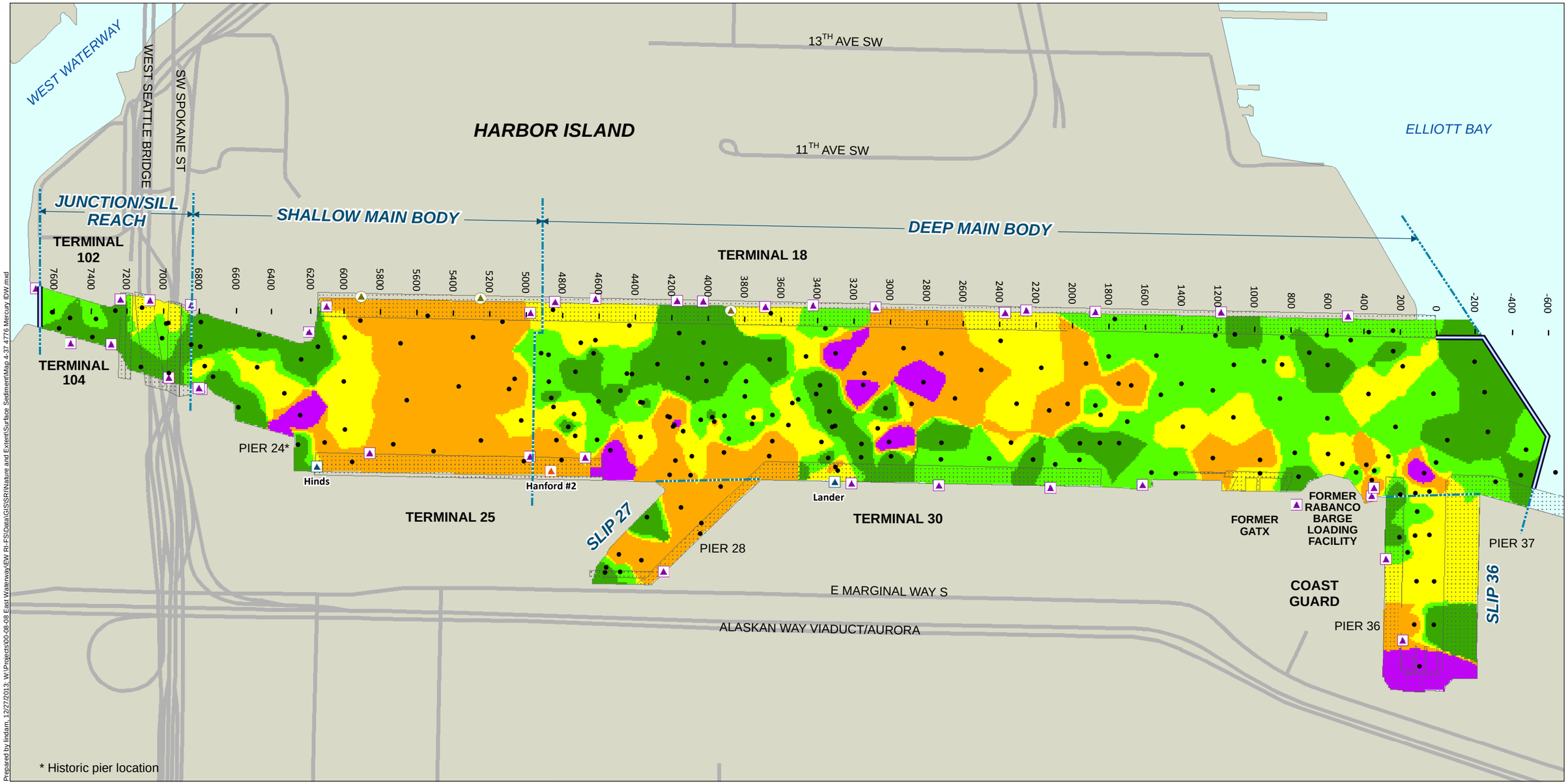
- > 0.59 (> 95th percentile)
- > 0.37 and ≤ 0.59 (≤ 95th percentile)
- > 0.24 and ≤ 0.37 (≤ 75th percentile)
- > 0.12 and ≤ 0.24 (≤ 50th percentile)
- ≤ 0.12 (≤ 25th percentile)
- Non-detect

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.

0 600
Scale in feet

Map 4-36
Mercury Concentrations in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Interpolated Mercury Concentration*
mg/kg dw
CSL = 0.59
SQS = 0.41

- > 0.59 (>95th percentile)
- > 0.37 and ≤ 0.59 (≤95th percentile)
- > 0.24 and ≤ 0.37 (≤75th percentile)
- > 0.12 and ≤ 0.24 (≤50th percentile)
- ≤ 0.12 (≤25th percentile)
- Surface Sediment Sampling Location

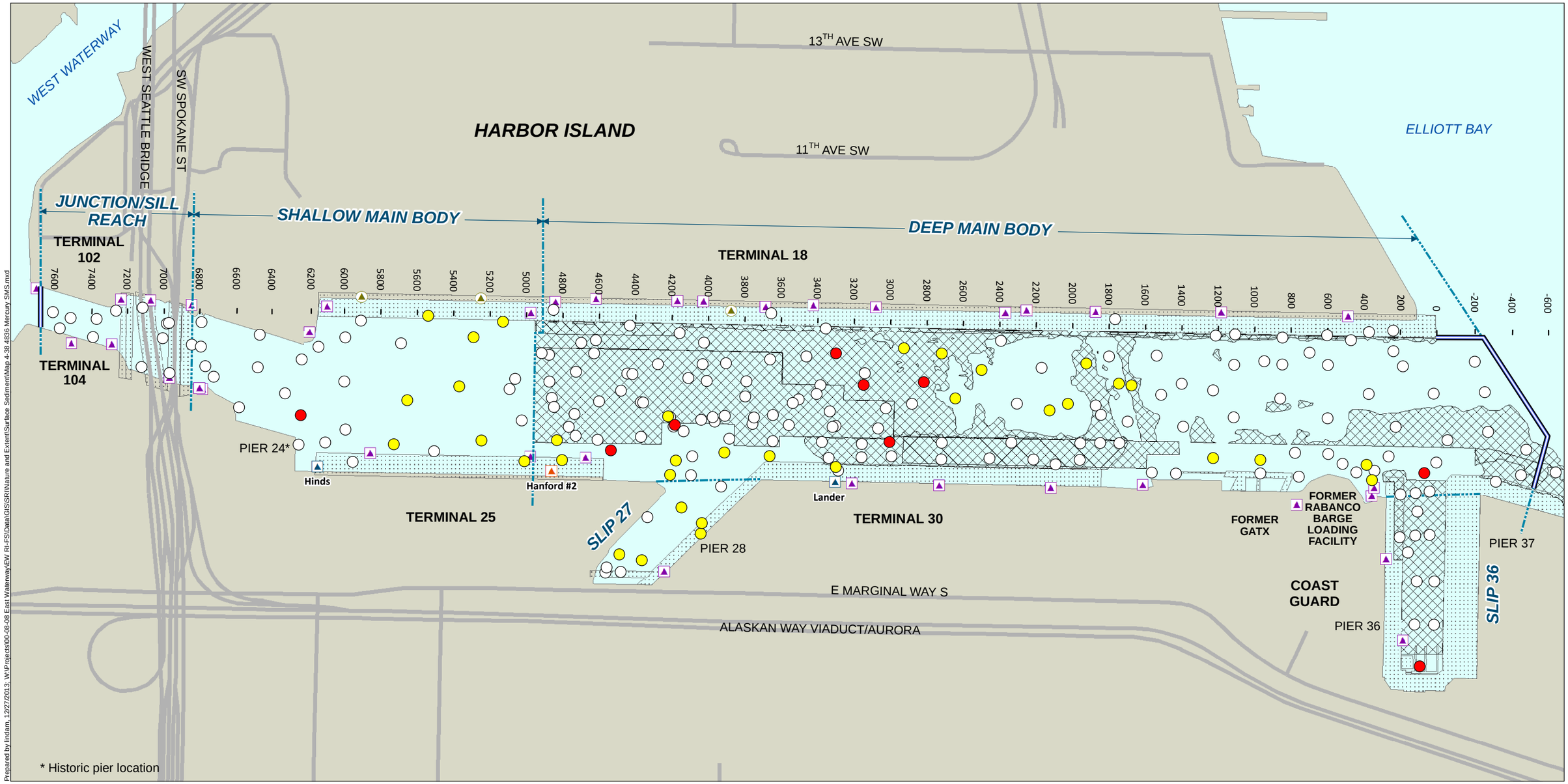
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.

0 600
Scale in feet

Map 4-37
Inverse Distance Weighted Interpolation of Mercury Concentrations in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-37 4776 Mercury IDW.mxd



0 600
Scale in feet

SMS Categories for Mercury
CSL = 0.59 mg/kg dw
SQS = 0.41 mg/kg dw

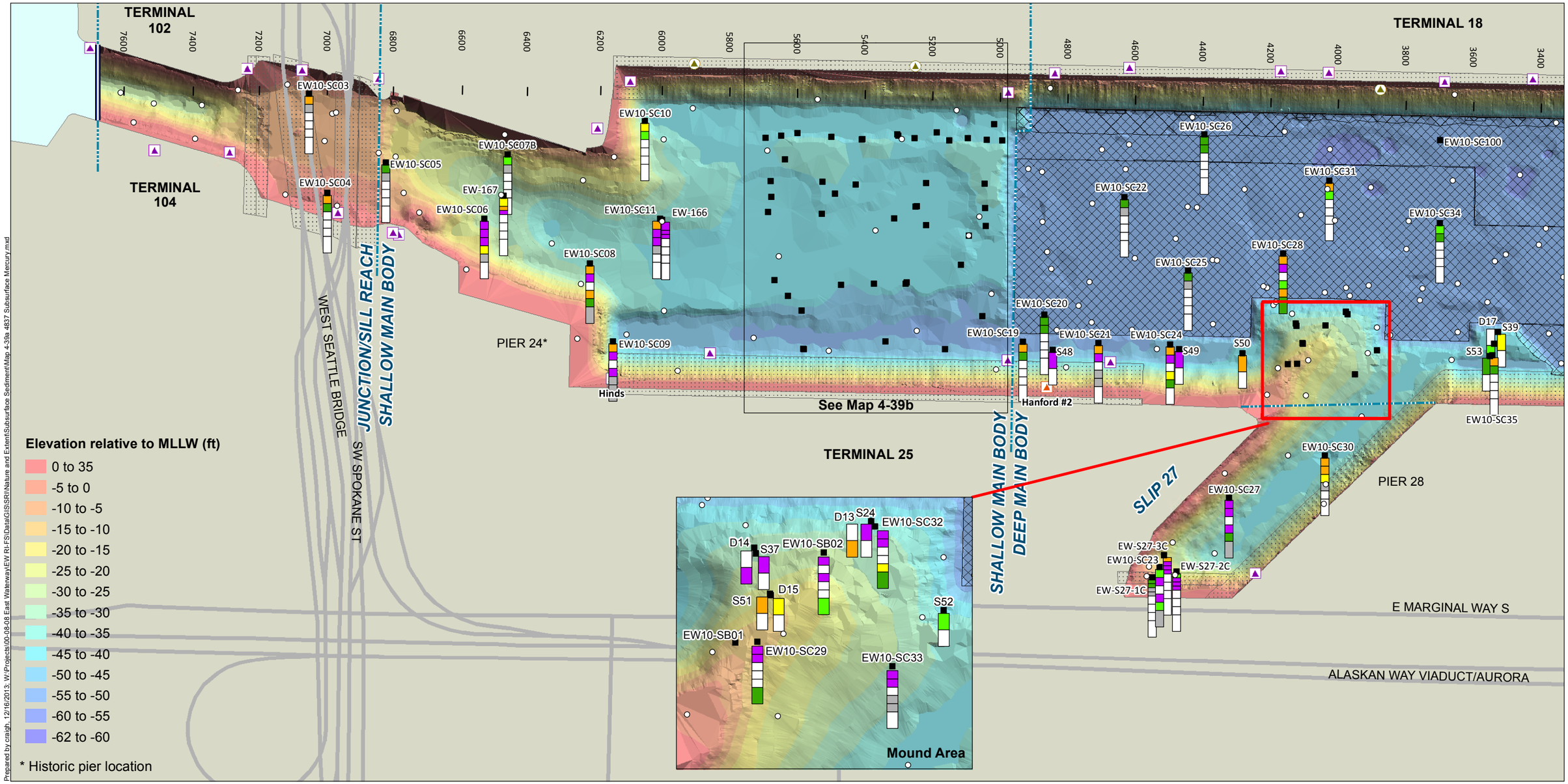
- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall

- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

Map 4-38
Exceedances of SMS criteria (SQS or CSL) by Mercury in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-38 4836 Mercury SMS.mxd



Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SR\Nature and Extent\Subsurface Sediment\Map 4-39a 4837 Subsurface Mercury.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

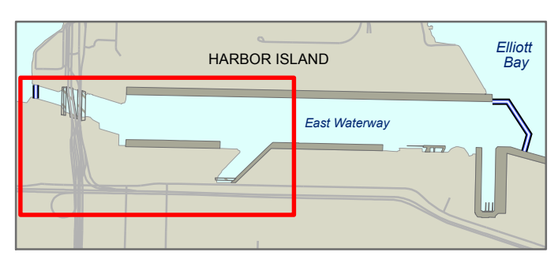
Mercury in Subsurface Sediment* (mg/kg dw)
CSL = 0.59; SQS = 0.41

- > 0.59 (> 95th percentile)
- > 0.37 and ≤ 0.59 (≤ 95th percentile)
- > 0.24 and ≤ 0.37 (≤ 75th percentile)
- > 0.12 and ≤ 0.24 (≤ 50th percentile)
- ≤ 0.12 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

0 - 2 ft; 0 - 1 ft; 1 - 2 ft; 2 - 4 ft; 2 - 3 ft; 3 - 4 ft; 4 - 6 ft; 6 - 8 ft; 8 - 10 ft; > 10 ft; 0 - 4 ft; > 4 ft

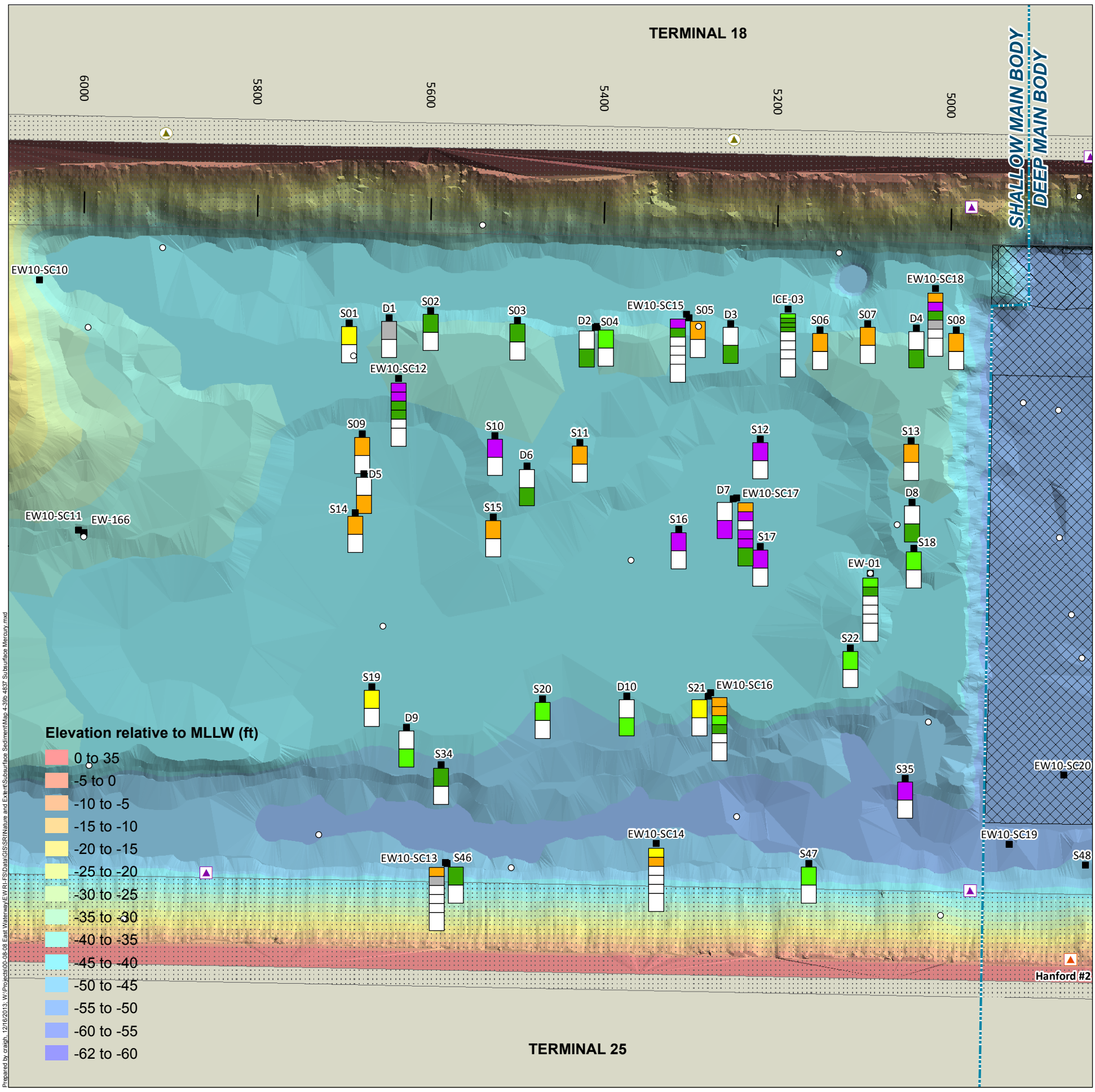
- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.



0 600
Scale in feet

Map 4-39a
Mercury Concentrations in Subsurface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



0 150
Scale in feet

Subsurface Core Depth Charts

- Subsurface Core Location

Mercury in Subsurface Sediment* (mg/kg dw)
CSL = 0.59; SQS = 0.41

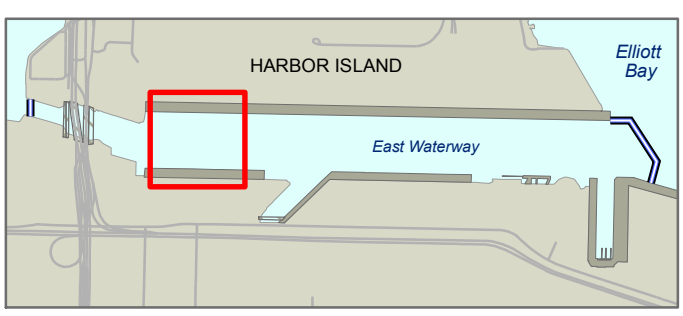
- > 0.59 (> 95th percentile)
- > 0.37 and ≤ 0.59 (≤ 95th percentile)
- > 0.24 and ≤ 0.37 (≤ 75th percentile)
- > 0.12 and ≤ 0.24 (≤ 50th percentile)
- ≤ 0.12 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

* The percentiles are all numeric percentiles of the surface sediment dataset.

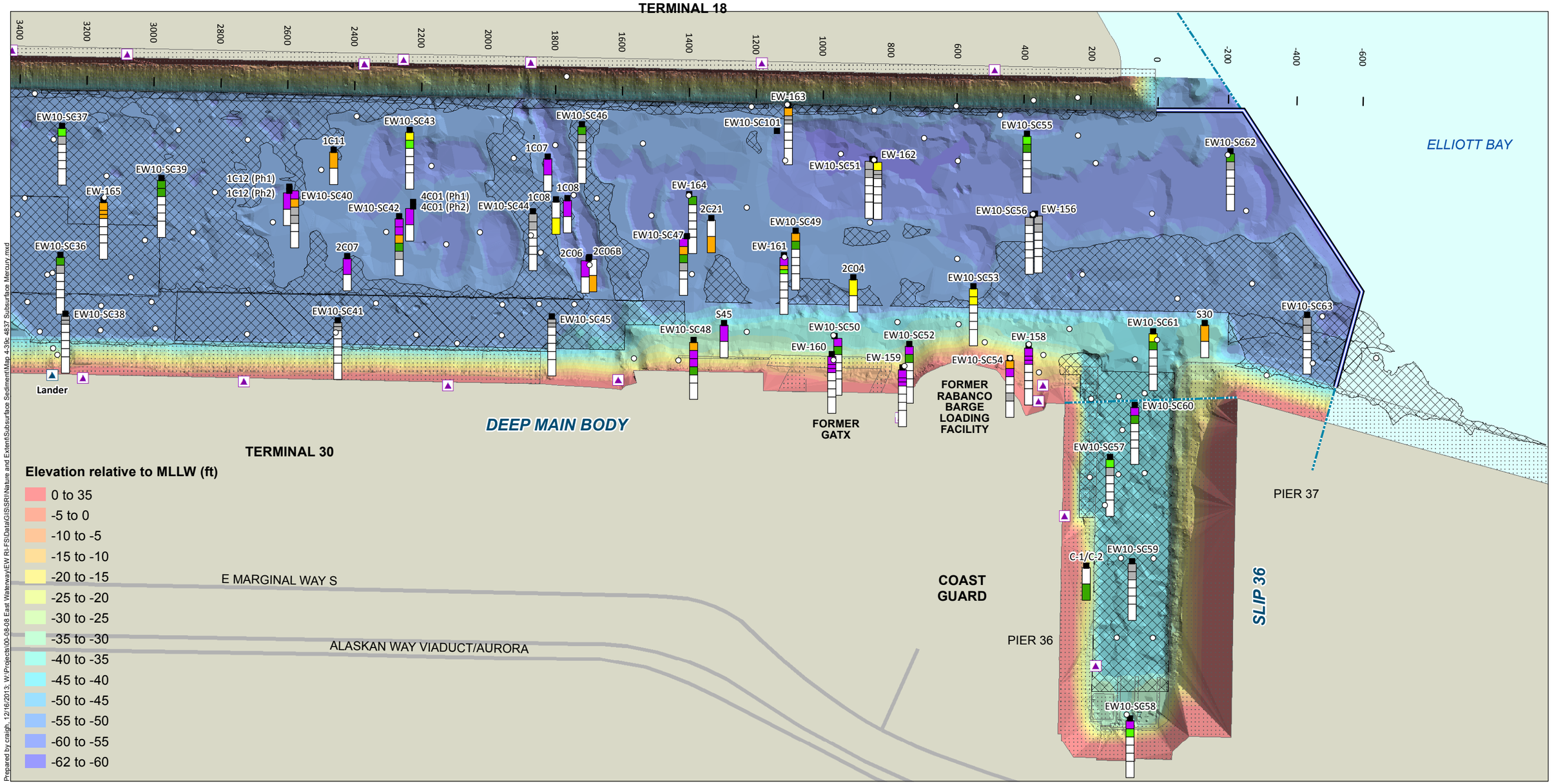
0 - 2 ft: 0 - 1 ft, 1 - 2 ft
2 - 4 ft: 2 - 3 ft, 3 - 4 ft
4 - 6 ft
6 - 8 ft
8 - 10 ft
> 10 ft

0 - 4 ft
> 4 ft

- Surface Sediment Sampling Location
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- CSO
- CSO/Storm Drain
- Storm Drain
- Unknown
- East Waterway Study Area Boundary



Map 4-39b
Mercury Concentrations
in Subsurface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SR\Nature and Extent\Subsurface Sediment\Map 4-39c 4837 Subsurface Mercury.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

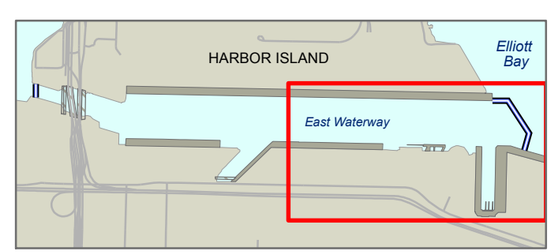
Mercury in Subsurface Sediment* (mg/kg dw)
CSL = 0.59; SQS = 0.41

- > 0.59 (> 95th percentile)
- > 0.37 and ≤ 0.59 (≤ 95th percentile)
- > 0.24 and ≤ 0.37 (≤ 75th percentile)
- > 0.12 and ≤ 0.24 (≤ 50th percentile)
- ≤ 0.12 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

0 - 2 ft; 2 - 4 ft; 4 - 6 ft; 6 - 8 ft; 8 - 10 ft; > 10 ft
0 - 1 ft; 1 - 2 ft; 2 - 3 ft; 3 - 4 ft
0 - 4 ft; > 4 ft

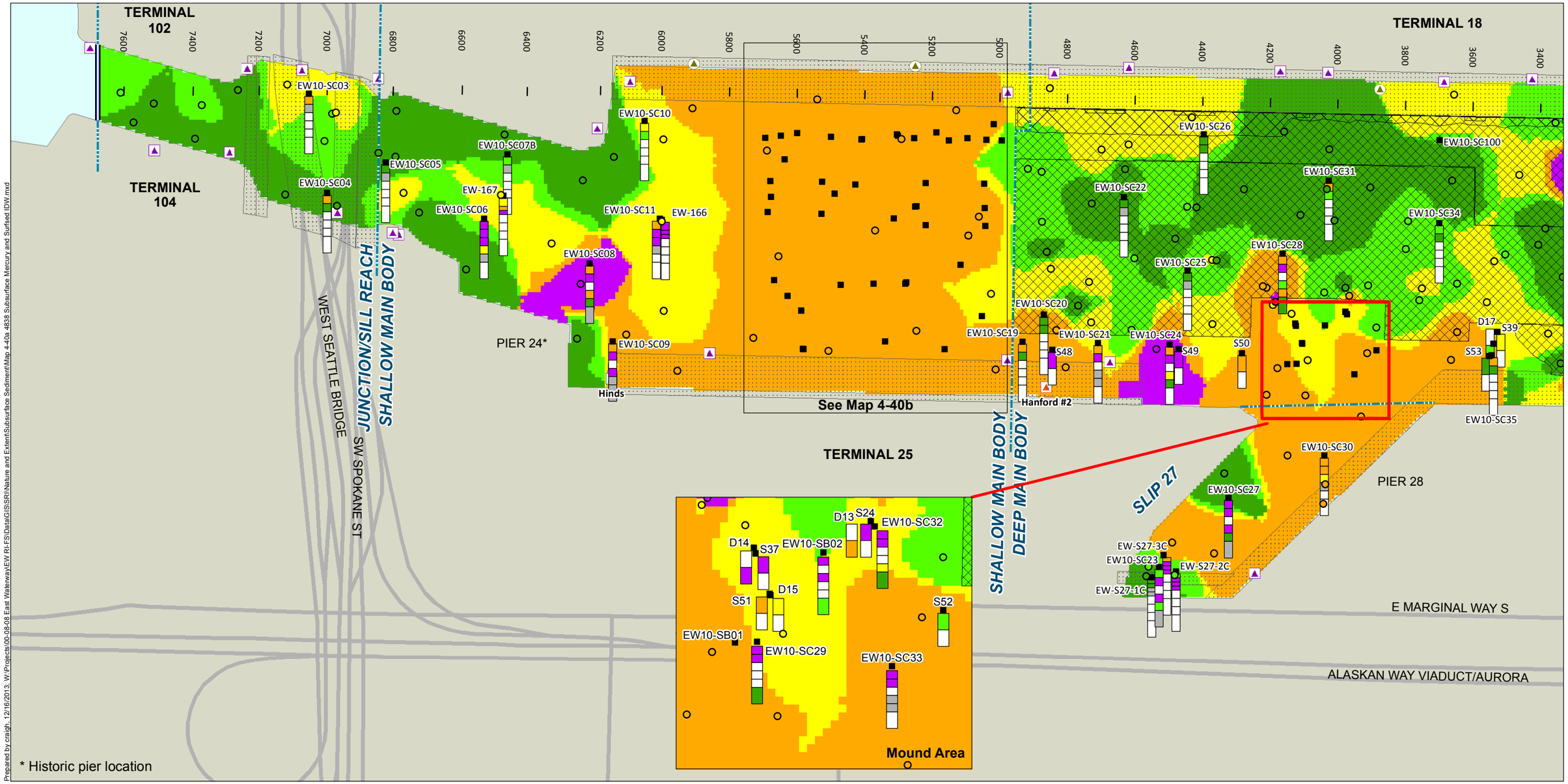
- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.



0 600
Scale in feet

Map 4-39c
Mercury Concentrations in Subsurface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



* Historic pier location

Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-40a 4838 Subsurface Mercury and Surfsed IDW.mxd

Subsurface Core Depth Charts

■ Subsurface Core Location

Mercury in Subsurface and Surface Sediment* (mg/kg dw)

CSL = 0.59; SQS = 0.41

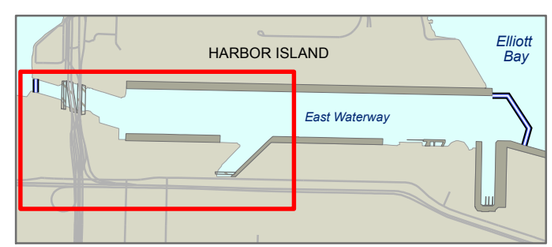
- > 0.59 (> 95th percentile)
- > 0.37 and ≤ 0.59 (≤ 95th percentile)
- > 0.24 and ≤ 0.37 (≤ 75th percentile)
- > 0.12 and ≤ 0.24 (≤ 50th percentile)
- ≤ 0.12 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

0 - 2 ft; 0 - 1 ft; 1 - 2 ft; 2 - 4 ft; 2 - 3 ft; 3 - 4 ft; 4 - 6 ft; 6 - 8 ft; 8 - 10 ft; > 10 ft

0 - 4 ft; > 4 ft

- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.



0 600

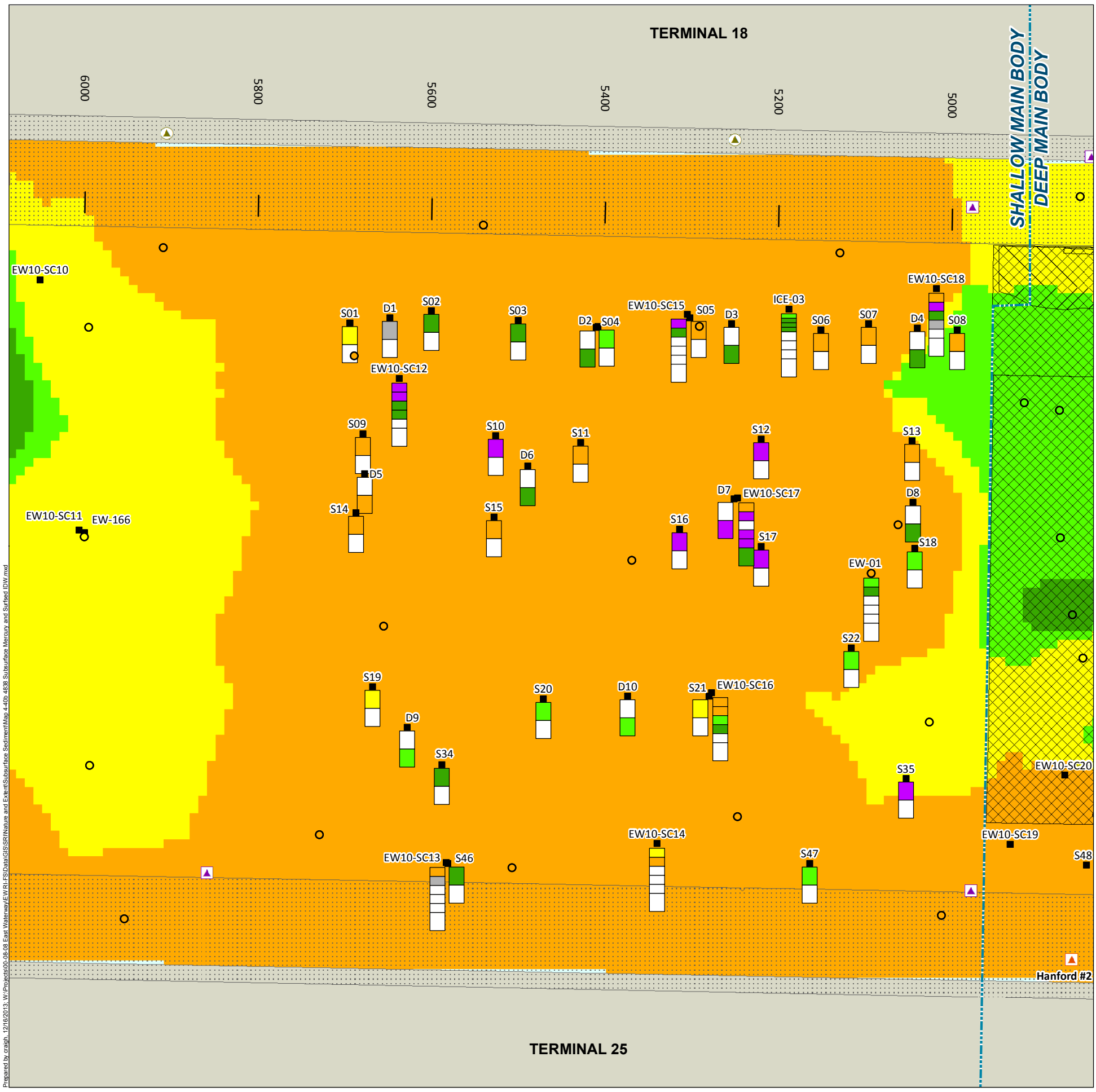
Scale in feet

Map 4-40a

Subsurface Sediment Mercury Concentrations and Interpolated Surface Sediment Mercury Concentrations

Supplemental Remedial Investigation

East Waterway Study Area



0 150
Scale in feet

Subsurface Core Depth Charts

- Subsurface Core Location

Mercury in Subsurface and Surface Sediment* (mg/kg dw)
CSL = 0.59; SQS = 0.41

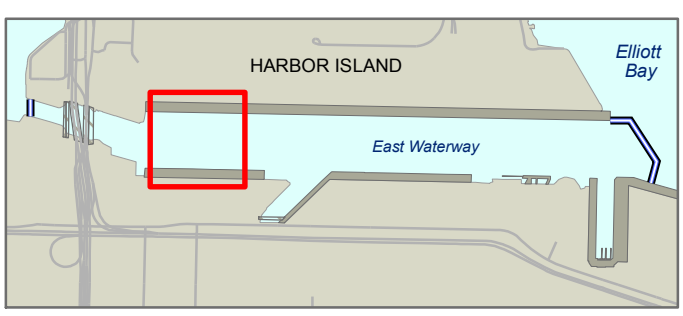
- > 0.59 (> 95th percentile)
- > 0.37 and ≤ 0.59 (≤ 95th percentile)
- > 0.24 and ≤ 0.37 (≤ 75th percentile)
- > 0.12 and ≤ 0.24 (≤ 50th percentile)
- ≤ 0.12 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

* The percentiles are all numeric percentiles of the surface sediment dataset.

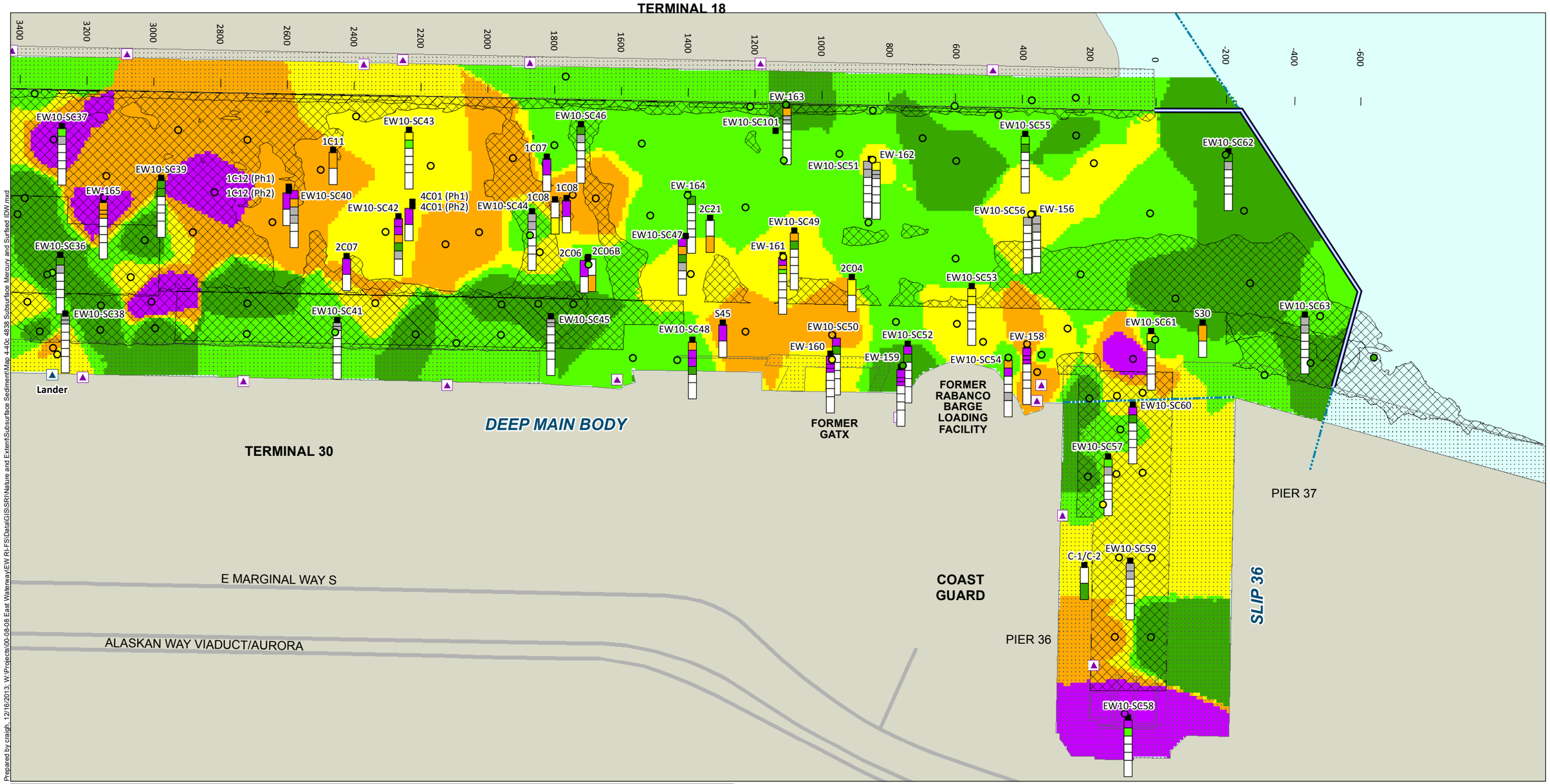
0 - 2 ft: 0 - 1 ft, 1 - 2 ft
2 - 4 ft: 2 - 3 ft, 3 - 4 ft
4 - 6 ft
6 - 8 ft
8 - 10 ft
> 10 ft

0 - 4 ft
> 4 ft

- Surface Sediment Sampling Location
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- CSO
- CSO/Storm Drain
- Storm Drain
- Unknown
- East Waterway Study Area Boundary



Map 4-40b
Subsurface Sediment Mercury Concentrations and Interpolated Surface Sediment Mercury Concentrations
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-40c 4838 Subsurface Mercury and Surfsed IDW.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

Mercury in Subsurface and Surface Sediment* (mg/kg dw)
CSL = 0.59; SQS = 0.41

- > 0.59 (> 95th percentile)
- > 0.37 and ≤ 0.59 (≤ 95th percentile)
- > 0.24 and ≤ 0.37 (≤ 75th percentile)
- > 0.12 and ≤ 0.24 (≤ 50th percentile)
- ≤ 0.12 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

0 - 2 ft; 2 - 4 ft; 4 - 6 ft; 6 - 8 ft; 8 - 10 ft; > 10 ft

0 - 1 ft; 1 - 2 ft; 2 - 3 ft; 3 - 4 ft

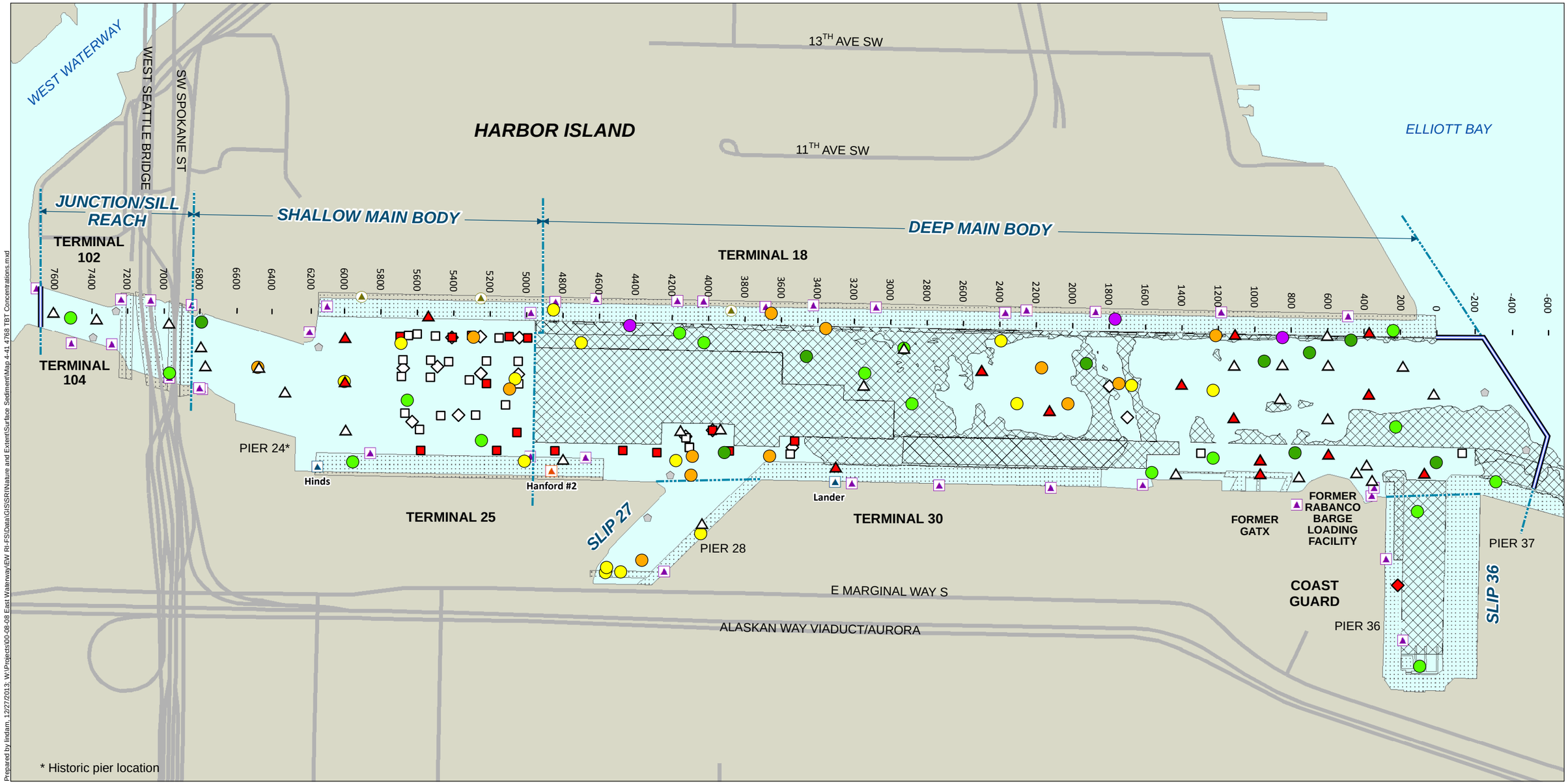
0 - 4 ft; > 4 ft

- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.

0 600
Scale in feet

Map 4-40c
Subsurface Sediment Mercury Concentrations and Interpolated Surface Sediment Mercury Concentrations
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-41 4768 TBT Concentrations.mxd

TBT Concentration in Surface Sediment*
µg/kg dw
- > 560 (> 95th percentile)
- > 79 and ≤ 560 (≤ 95th percentile)
- > 31 and ≤ 79 (≤ 75th percentile)
- > 10 and ≤ 31 (≤ 50th percentile)
- ≤ 10 (≤ 25th percentile)
- Non-detect

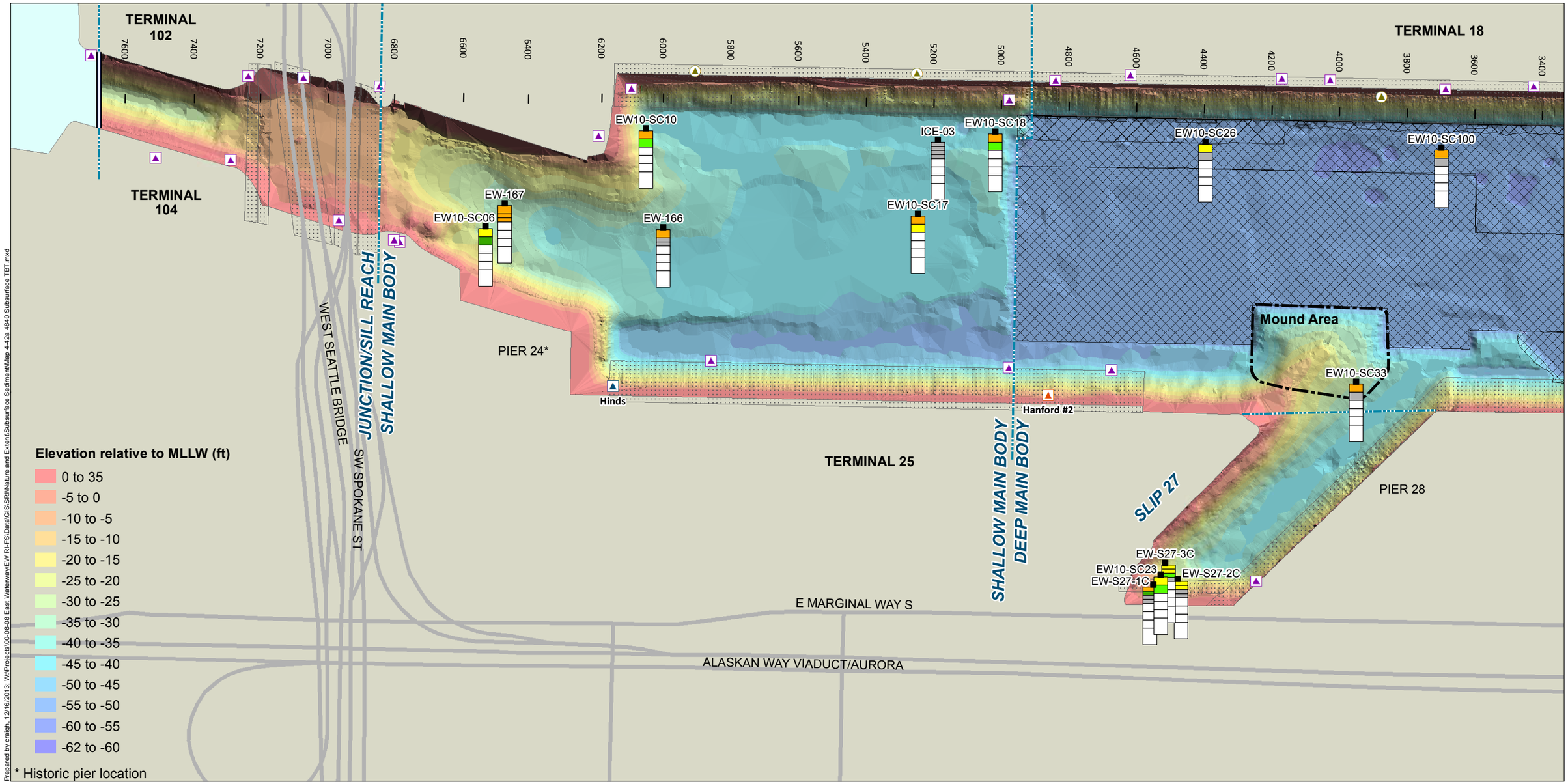
TBT Concentration in Porewater
- 0 to 10 cm, > 0.15 µg/L
- 0 to 10 cm, ≤ 0.15 µg/L
- 0 to 4 ft, > 0.15 µg/L
- 0 to 4 ft, ≤ 0.15 µg/L
- > 4 ft, > 0.15 µg/L
- > 4 ft, ≤ 0.15 µg/L

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.

0 600
Scale in feet

Map 4-41
TBT Concentrations in Surface Sediment and Porewater
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SR\Nature and Extent\Subsurface Sediment\Map 4-42a 4840 Subsurface TBT.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

TBT in Subsurface Sediment* (µg/kg dw)

- > 560 (> 95th percentile)
- > 79 and ≤ 560 (≤ 95th percentile)
- > 31 and ≤ 79 (≤ 75th percentile)
- > 10 and ≤ 31 (≤ 50th percentile)
- ≤ 10 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

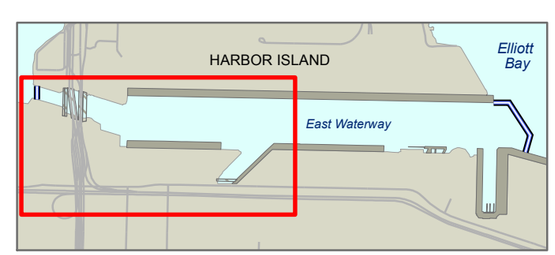
0 - 2 ft; 2 - 4 ft; 4 - 6 ft; 6 - 8 ft; 8 - 10 ft; > 10 ft

0 - 1 ft; 1 - 2 ft; 2 - 3 ft; 3 - 4 ft

0 - 4 ft; > 4 ft

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.



0 600

Scale in feet

Map 4-42a

TBT Concentrations in Subsurface Sediment

Supplemental Remedial Investigation

East Waterway Study Area

TERMINAL 18

TERMINAL 18

3800 3600 3400 3200 3000 2800 2600 2400 2200 2000 1800 1600 1400 1200 1000 800 600 400 200 0 -200 -400 -600

EW10-SC100
EW10-SC37
EW-165
EW10-SC36
1C12 (Ph1)
EW10-SC40
1C11
2C07
EW10-SC43
4C01 (Ph1)
EW10-SC46
1C07
EW10-SC44
1C08
2C06
EW-164
2C21
EW10-SC47
EW-163
EW10-SC101
EW-162
EW10-SC51
EW10-SC49
EW-161
2C04
EW-156
EW10-SC56
EW10-SC50
EW-160
EW-159
EW-158
EW10-SC59

Lander

DEEP MAIN BODY

FORMER GATX

FORMER RABANCO BARGE LOADING FACILITY

PIER 28

TERMINAL 30

PIER 37

COAST GUARD

PIER 36

SLIP 36

E MARGINAL WAY S

ALASKAN WAY VIADUCT/AURORA

Elevation relative to MLLW (ft)

- 0 to 35
- -5 to 0
- -10 to -5
- -15 to -10
- -20 to -15
- -25 to -20
- -30 to -25
- -35 to -30
- -40 to -35
- -45 to -40
- -50 to -45
- -55 to -50
- -60 to -55
- -62 to -60

Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SR\Nature and Extent\Subsurface Sediment\Map 4-42b 4840 Subsurface TBT.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

TBT in Subsurface Sediment* (µg/kg dw)

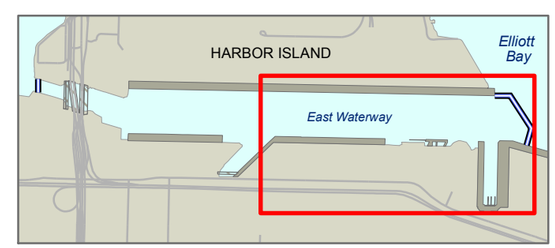
- > 560 (> 95th percentile)
- > 79 and ≤ 560 (≤ 95th percentile)
- > 31 and ≤ 79 (≤ 75th percentile)
- > 10 and ≤ 31 (≤ 50th percentile)
- ≤ 10 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

0 - 2 ft: 0 - 1 ft, 1 - 2 ft
2 - 4 ft: 2 - 3 ft, 3 - 4 ft
4 - 6 ft
6 - 8 ft
8 - 10 ft
> 10 ft

0 - 4 ft
> 4 ft

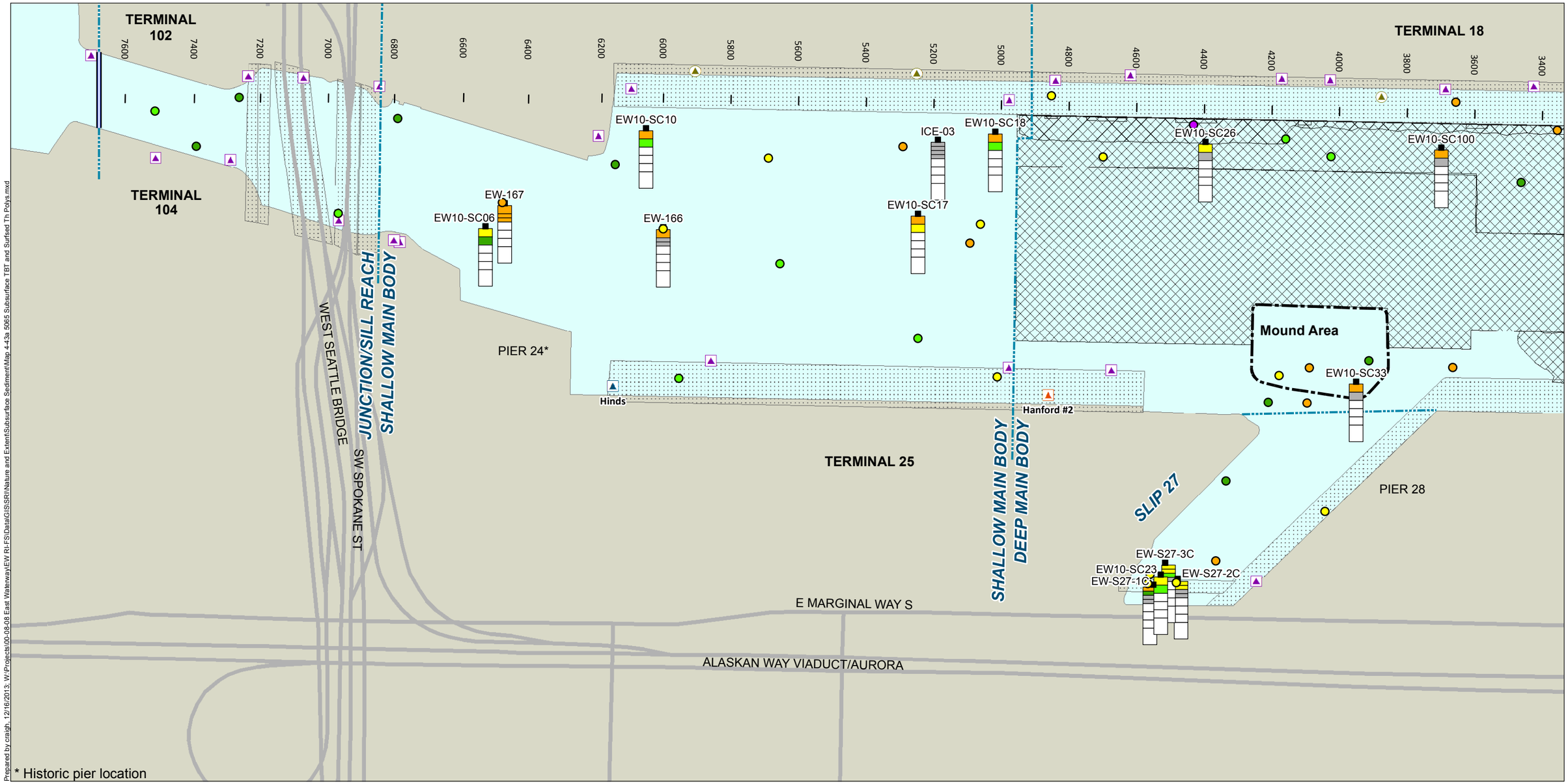
- Storm Drain
- CSO/Storm Drain
- Area Dredged in the Last 11 Years
- Dock/Pier
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.



0 600
Scale in feet

Map 4-42b
TBT Concentrations in Subsurface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SR1\Nature and Extent\Subsurface Sediment\Map 4-43a 5065 Subsurface TBT and Surfsed Th Polys.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

TBT in Subsurface and Surface Sediment* (µg/kg dw)

- > 560 (> 95th percentile)
- > 79 and ≤ 560 (≤ 95th percentile)
- > 31 and ≤ 79 (≤ 75th percentile)
- > 10 and ≤ 31 (≤ 50th percentile)
- ≤ 10 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

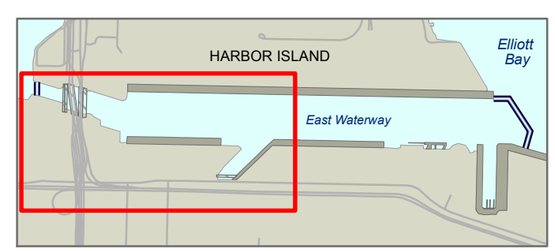
0 - 2 ft; 2 - 4 ft; 4 - 6 ft; 6 - 8 ft; 8 - 10 ft; > 10 ft

0 - 1 ft; 1 - 2 ft; 2 - 3 ft; 3 - 4 ft

0 - 4 ft; > 4 ft

- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.



0 600

Scale in feet

Map 4-43a

Subsurface Sediment TBT Concentrations and Surface Sediment TBT Concentrations

Supplemental Remedial Investigation

East Waterway Study Area

TERMINAL 18

TERMINAL 18

3800 3600 3400 3200 3000 2800 2600 2400 2200 2000 1800 1600 1400 1200 1000 800 600 400 200 0 -200 -400 -600

EW10-SC100
EW10-SC37
EW-165
EW10-SC36
1C11
1C12 (Ph1)
EW10-SC40
2C07
EW10-SC43
4C01 (Ph1)
1C07
EW10-SC44
EW10-SC46
1C08
2C06
EW10-SC47
EW-164
2C21
EW-163
EW10-SC101
EW10-SC51
EW-162
EW10-SC49
EW-161
2C04
EW-156
EW10-SC56
EW10-SC50
EW-160
EW-159
EW-158
EW10-SC59

Lander

DEEP MAIN BODY

FORMER GATX

FORMER RABANCO BARGE LOADING FACILITY

PIER 28

TERMINAL 30

PIER 37

E MARGINAL WAY S

ALASKAN WAY VIADUCT/AURORA

COAST GUARD

PIER 36

SLIP 36

Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-43b 5065 Subsurface TBT and Surfsed Th Polys.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

TBT in Subsurface and Subsurface Sediment* (µg/kg dw)

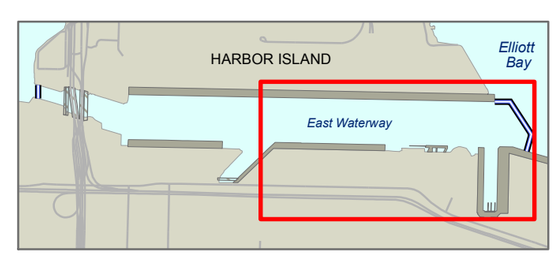
- > 560 (> 95th percentile)
- > 79 and ≤ 560 (≤ 95th percentile)
- > 31 and ≤ 79 (≤ 75th percentile)
- > 10 and ≤ 31 (≤ 50th percentile)
- ≤ 10 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

0 - 2 ft: 0 - 1 ft, 1 - 2 ft
2 - 4 ft: 2 - 3 ft, 3 - 4 ft
4 - 6 ft
6 - 8 ft
8 - 10 ft
> 10 ft

0 - 4 ft
> 4 ft

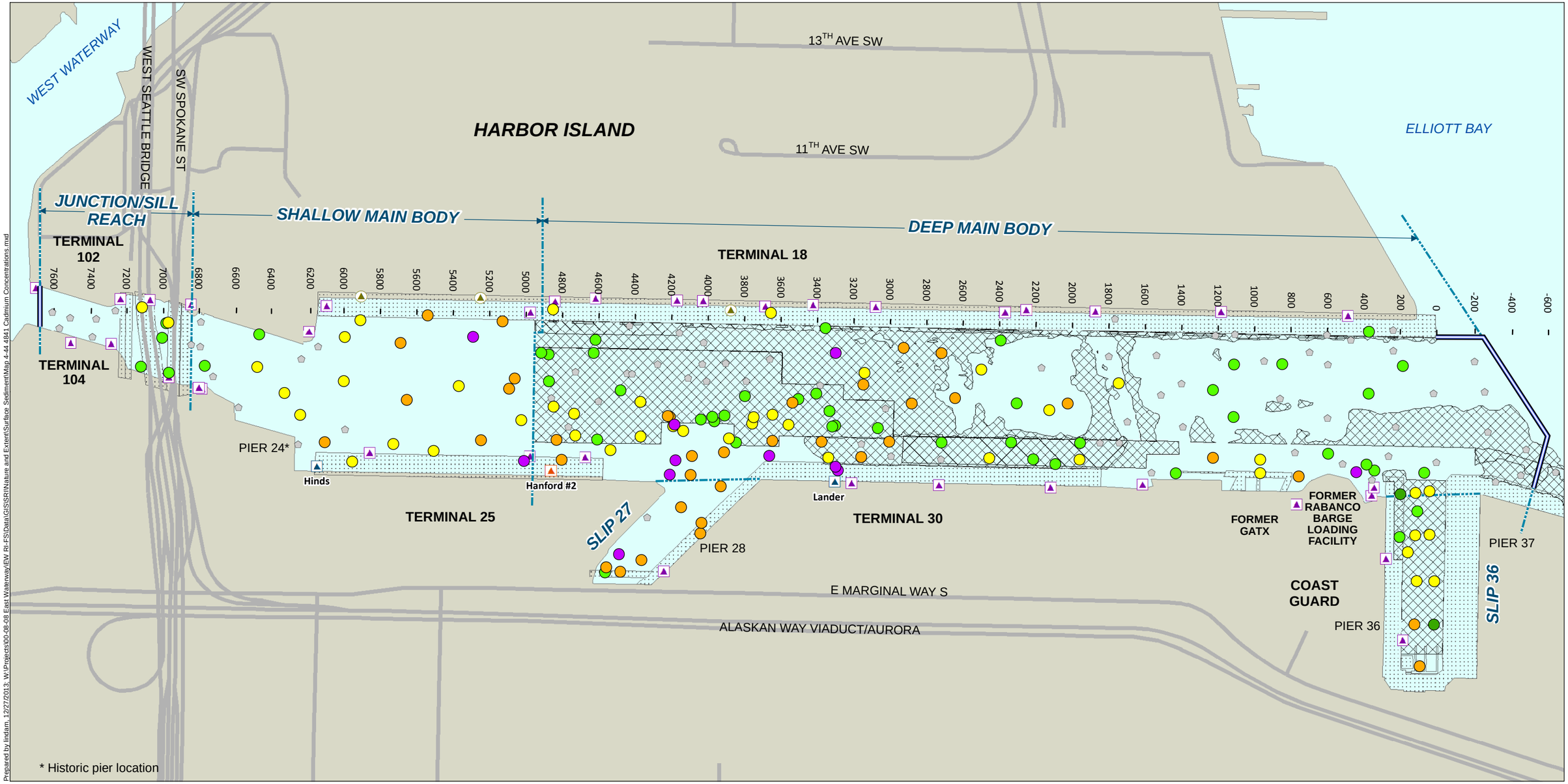
- Surface Sediment Sampling Location
- Storm Drain
- CSO/Storm Drain
- Area Dredged in the Last 11 Years
- Dock/Pier
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.



0 600
Scale in feet

Map 4-43b
Subsurface Sediment TBT Concentrations
and Surface Sediment TBT Concentrations
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-44 4841 Cadmium Concentrations.mxd

Cadmium Concentration*
mg/kg dw
CSL = 6.7; SQS = 5.1

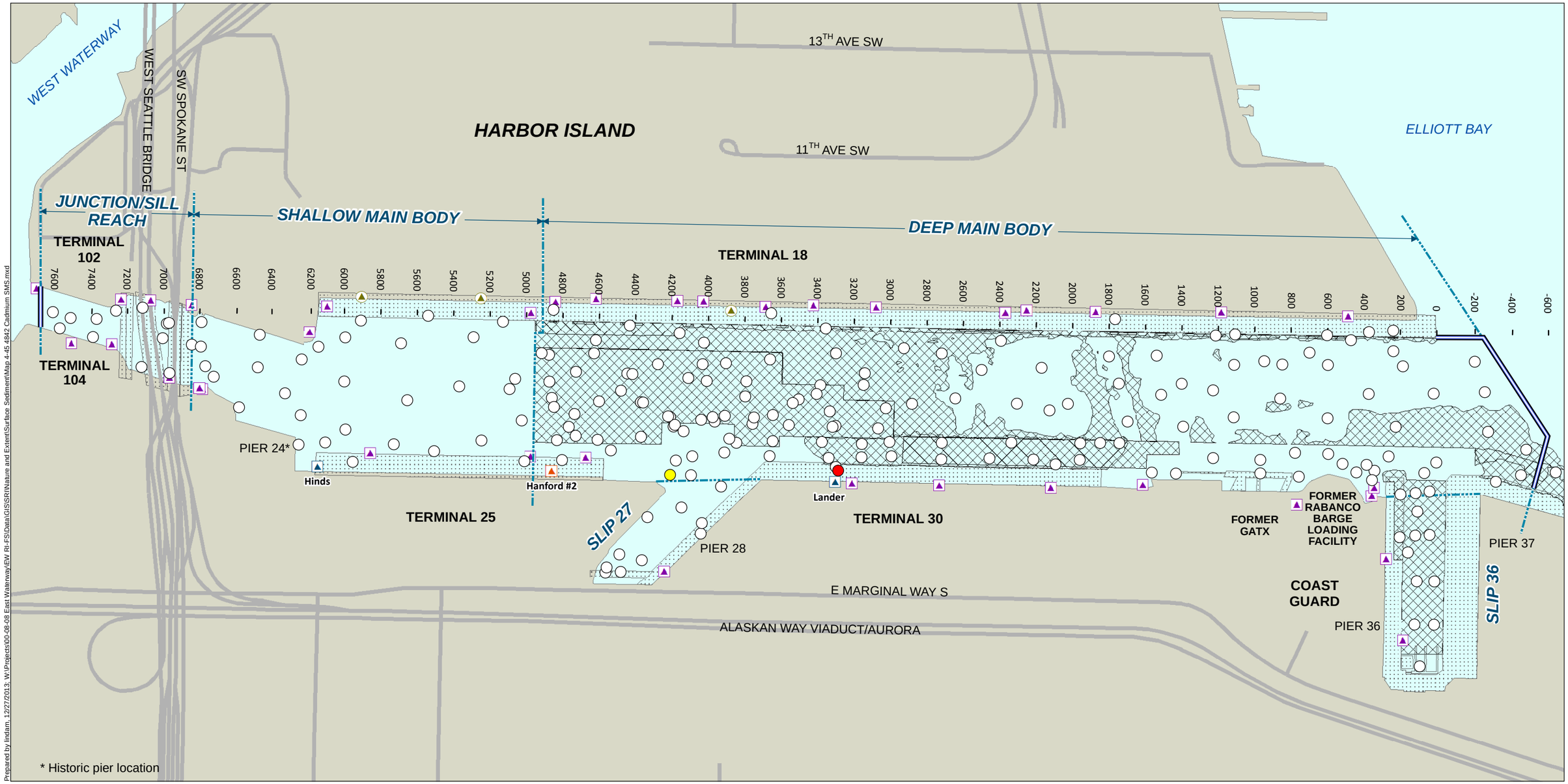
- > 1.7 (> 95th percentile)
- > 0.80 and ≤ 1.7 (≤ 95th percentile)
- > 0.50 and ≤ 0.80 (≤ 75th percentile)
- > 0.20 and ≤ 0.50 (≤ 50th percentile)
- ≤ 0.20 (≤ 25th percentile)
- Non-detect

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.

0 600
Scale in feet

Map 4-44
Cadmium Concentrations in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-45 4842 Cadmium SMS.mxd

SMS Categories for Cadmium
CSL = 6.7 mg/kg dw
SQS = 5.1 mg/kg dw

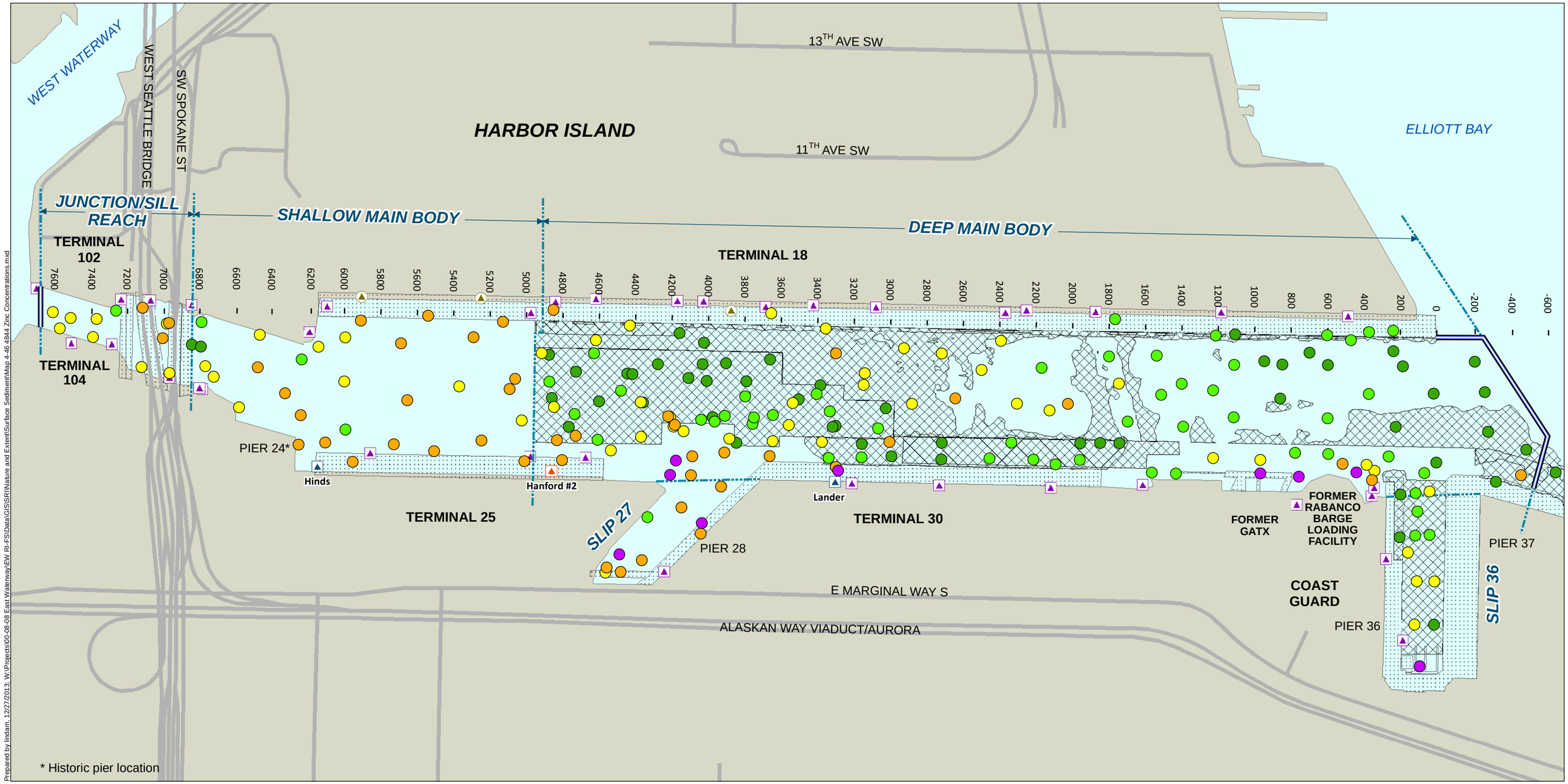
- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall

- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

0 600
Scale in feet

Map 4-45
Exceedances of SMS Criteria (SQS or CSL) by Cadmium in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-46 4844 Zinc Concentrations.mxd

Zinc Concentration*
mg/kg dw
CSL = 960; SQS = 410

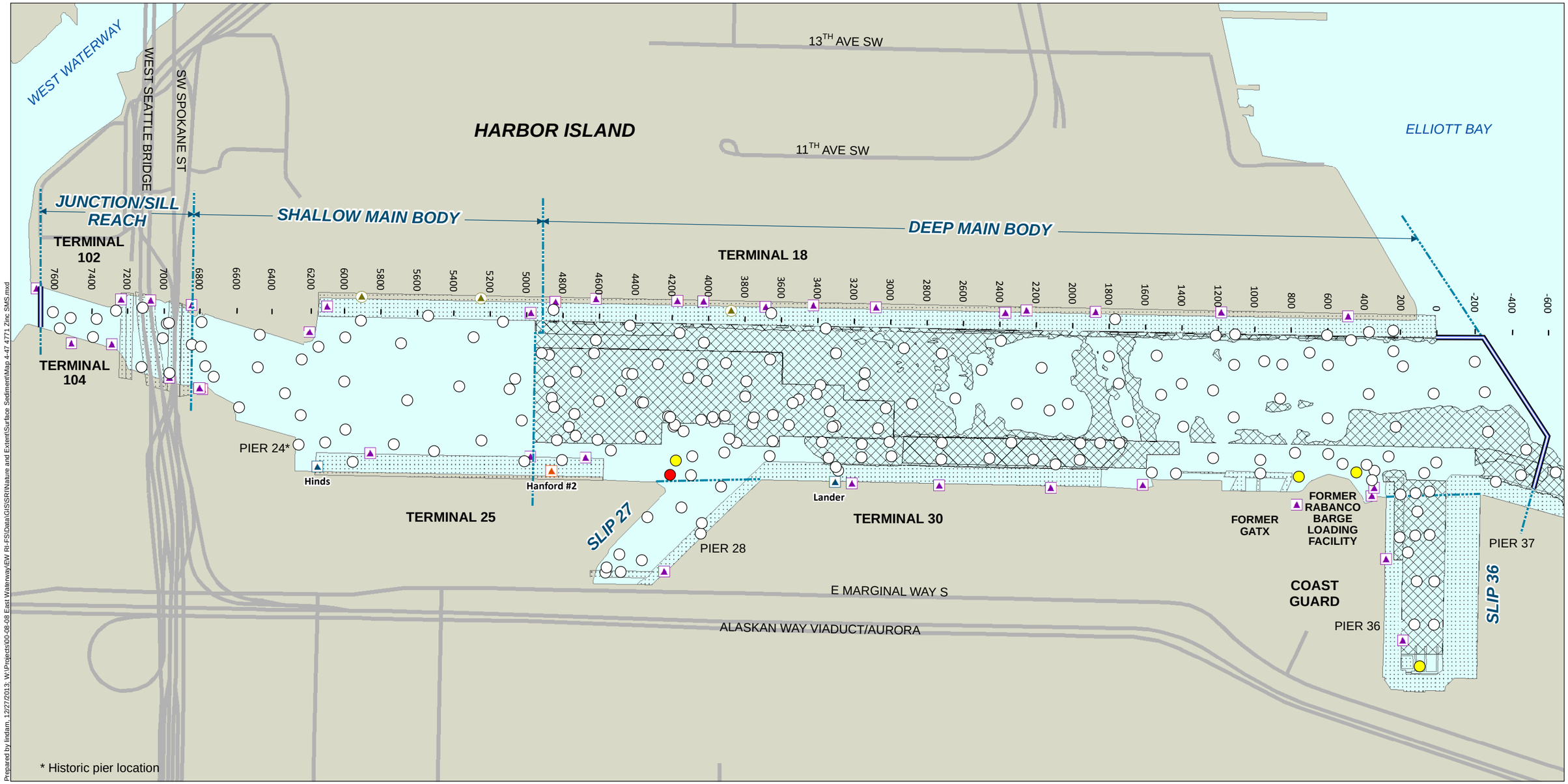
- > 250 (> 95th percentile)
- > 140 and ≤ 250 (≤ 95th percentile)
- > 88 and ≤ 140 (≤ 75th percentile)
- > 56 and ≤ 88 (≤ 50th percentile)
- ≤ 56 (≤ 25th percentile)
- Non-detect

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.

0 600
Scale in feet

Map 4-46
Zinc Concentrations in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-47 4771 Zinc SMS.mxd

SMS Categories for Zinc
CSL = 960 mg/kg dw
SQS = 410 mg/kg dw

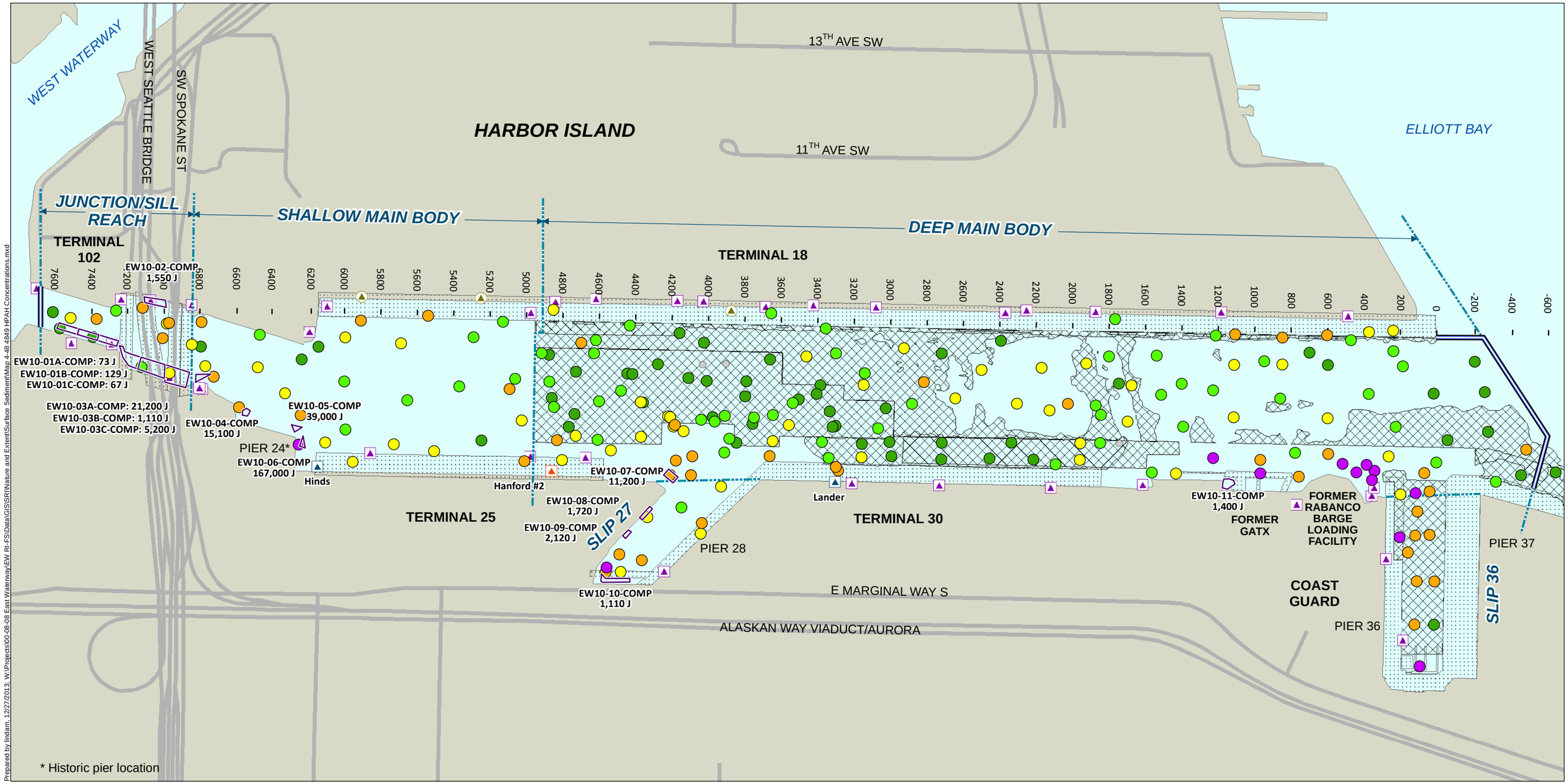
- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall

- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

0 600
Scale in feet

Map 4-47
Exceedances of SMS Criteria (SQS or CSL) by Zinc in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Total HPAH Concentration*

µg/kg dw

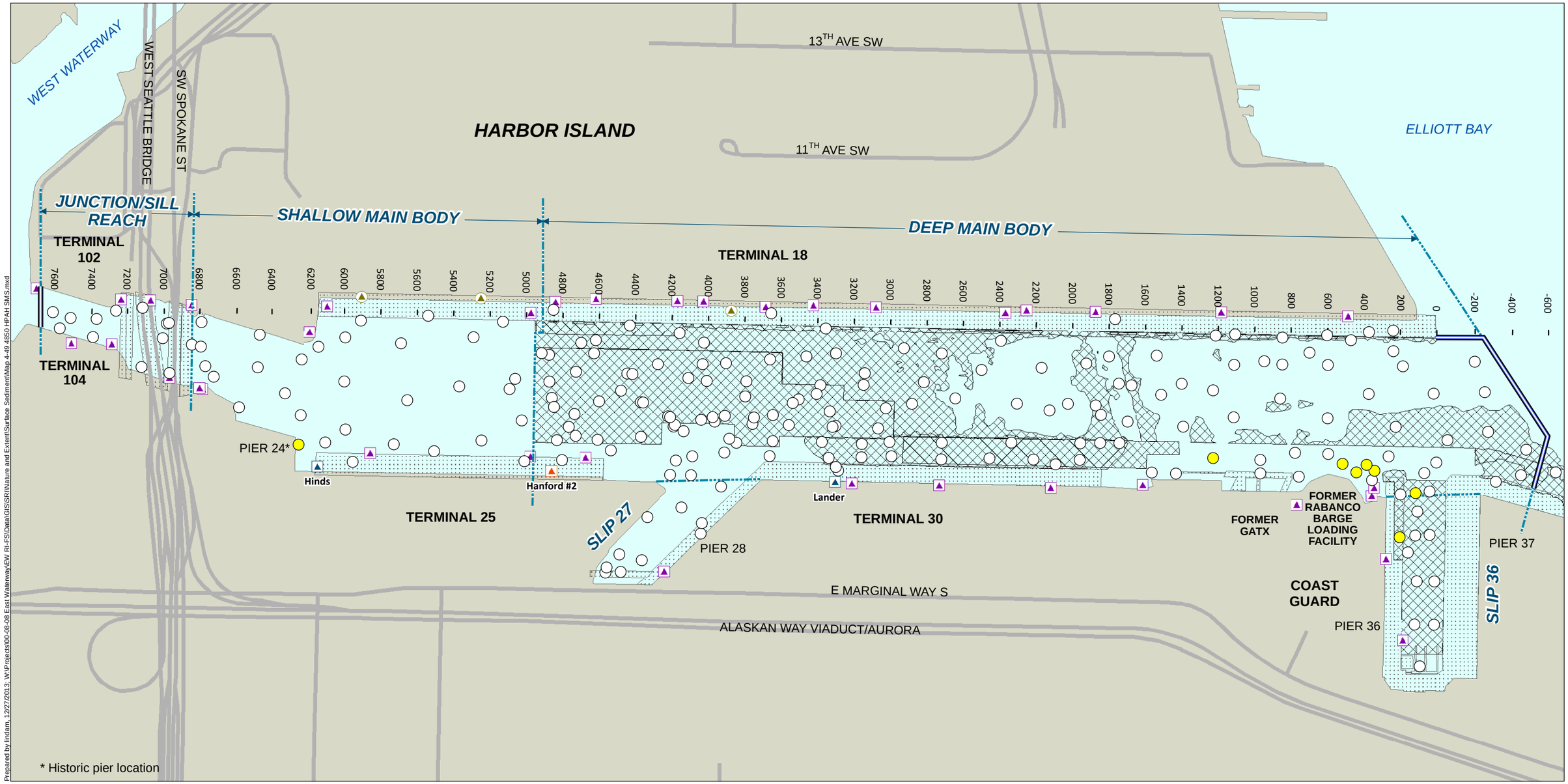
- > 13,000 (> 95th percentile)
- > 3,300 and ≤ 13,000 (≤ 95th percentile)
- > 1,700 and ≤ 3,300 (≤ 75th percentile)
- > 730 and ≤ 1,700 (≤ 50th percentile)
- ≤ 730 (≤ 25th percentile)
- Non-detect
- Intertidal PAH Composite Area[a]

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

[a] See Map 4-2 for detail on intertidal composites.
* The percentiles are all numeric percentiles of the surface sediment dataset.

0 600
Scale in feet

Map 4-48
HPAH Concentrations in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-49 4850 HPAH SMS.mxd

0 600
Scale in feet

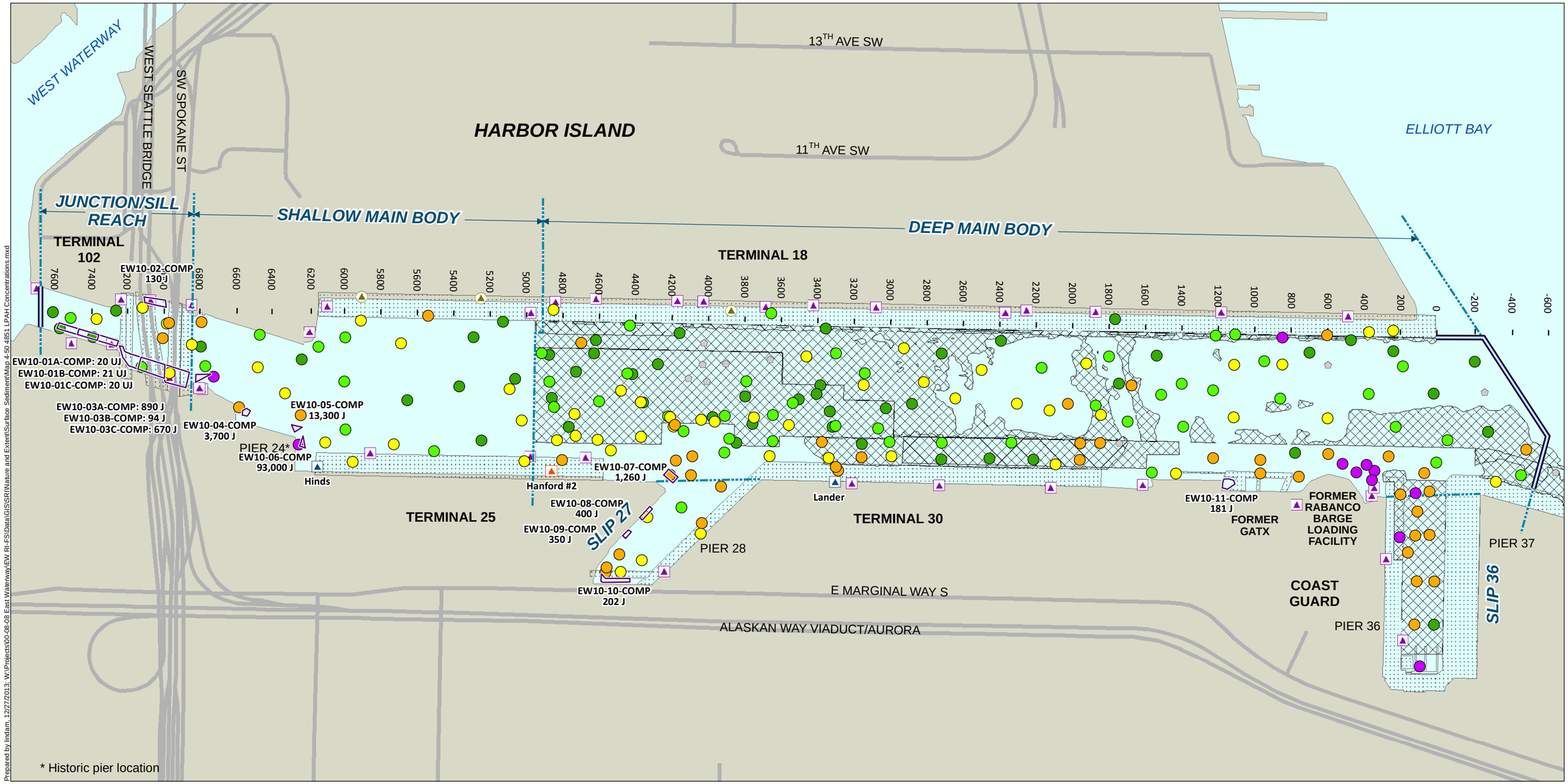
SMS Categories for Total HPAHs
CSL = 5,300 mg/kg OC
SQS = 960 mg/kg OC

- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall

- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

Map 4-49
Exceedances of SMS Criteria (SQS or CSL) by HPAHs in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Total LPAH Concentration*

µg/kg dw

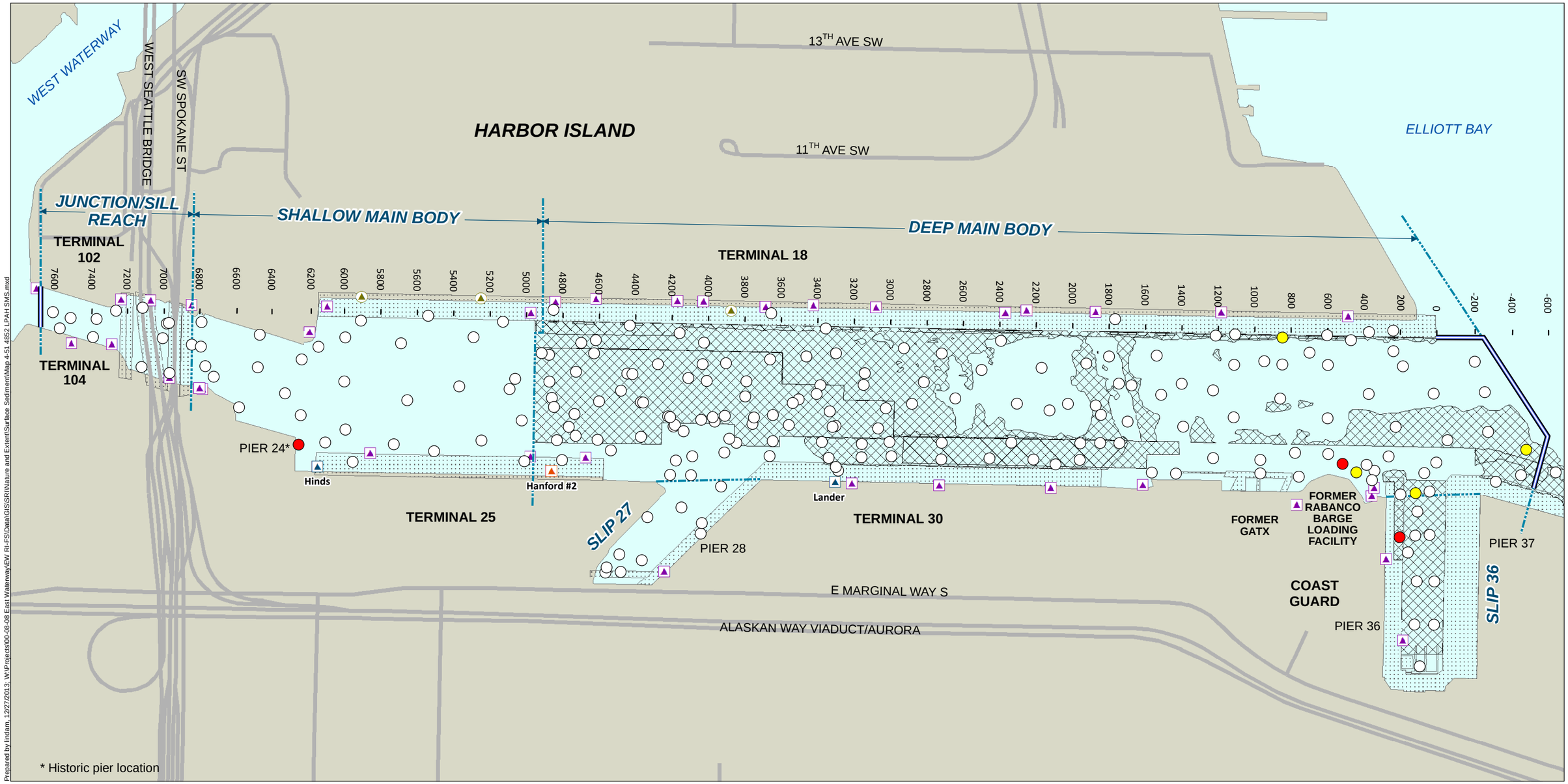
- > 4,400 (> 95th percentile)
- > 600 and ≤ 4,400 (≤ 95th percentile)
- > 260 and ≤ 600 (≤ 75th percentile)
- > 120 and ≤ 260 (≤ 50th percentile)
- ≤ 120 (≤ 25th percentile)
- Non-detect
- Intertidal PAH Composite Area[a]

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

[a] See Map 4-2 for detail on intertidal composites.
* The percentiles are all numeric percentiles of the surface sediment dataset.

0 600
Scale in feet

Map 4-50
LPAH Concentrations in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-51 4852 LPAH SMS.mxd

0 600
Scale in feet

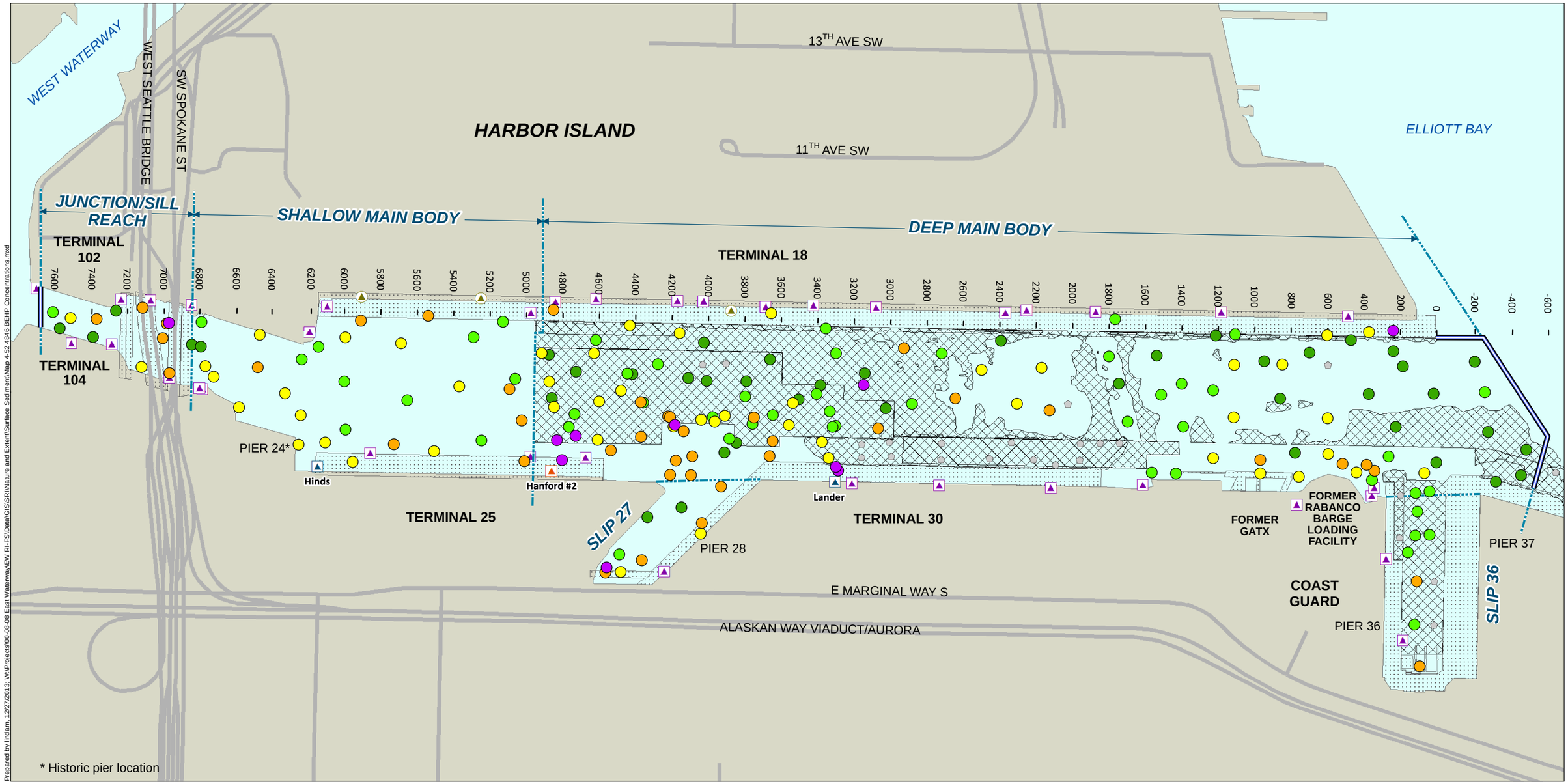
SMS Categories for Total LPAHs
CSL = 780 mg/kg OC
SQS = 370 mg/kg OC

- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall

- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

Map 4-51
Exceedances of SMS Criteria (SQS or CSL) by LPAHs in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-52 4846 BEHP Concentrations.mxd

BEHP Concentration*

µg/kg dw

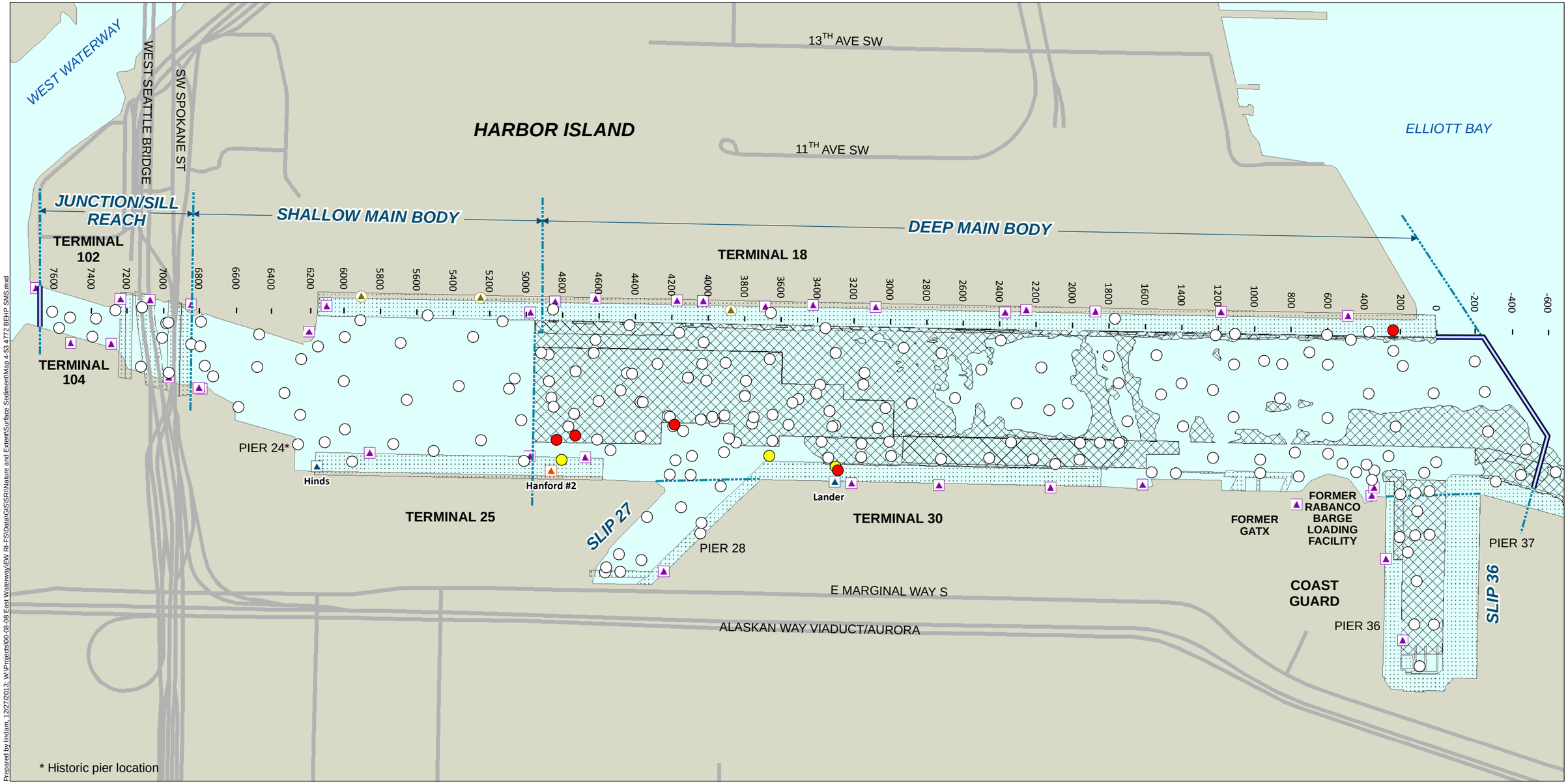
- > 760 (> 95th percentile)
- > 310 and ≤ 760 (≤ 95th percentile)
- > 160 and ≤ 310 (≤ 75th percentile)
- > 80 and ≤ 160 (≤ 50th percentile)
- ≤ 80 (≤ 25th percentile)
- Non-detect

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.

0 600
Scale in feet

Map 4-52
BEHP Concentrations in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-53 4772 BEHP SMS.mxd

0 600
Scale in feet

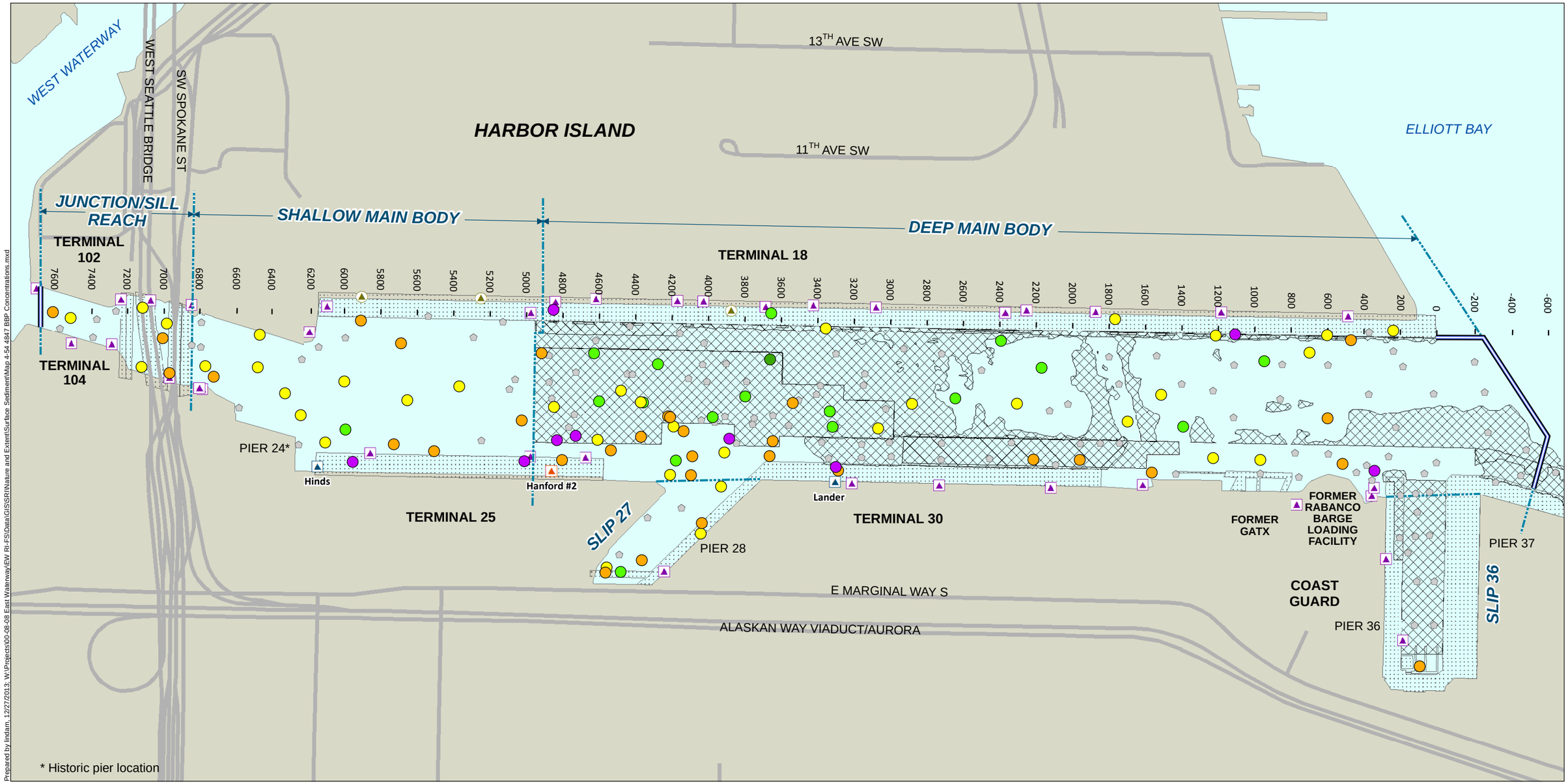
SMS Categories for BEHP
CSL = 78 mg/kg OC
SQS = 47 mg/kg OC

- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall

- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

Map 4-53
Exceedances of SMS Criteria (SQS or CSL) by BEHP in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-54 4847 BBP Concentrations.mxd

BBP Concentration*

µg/kg dw

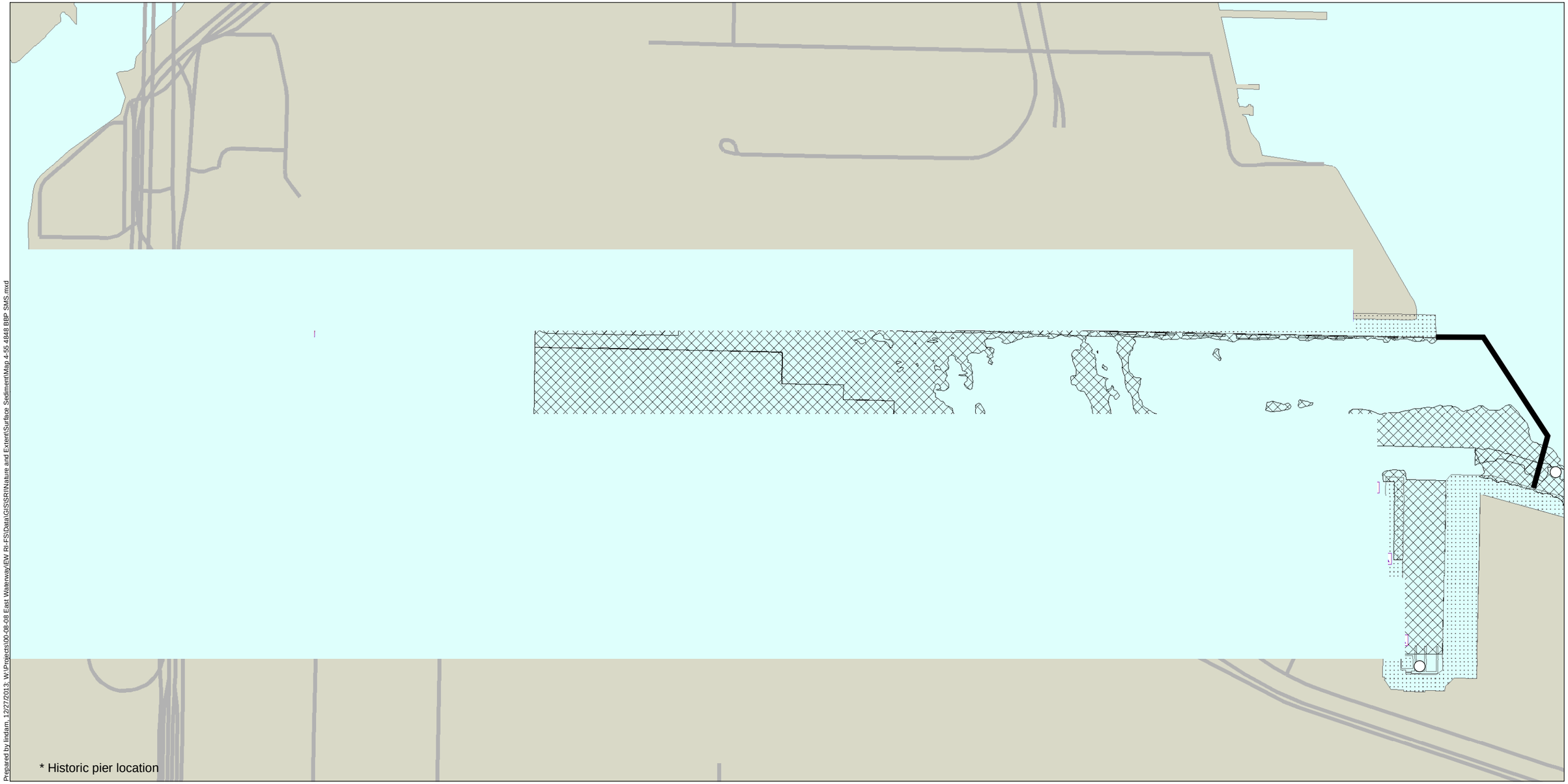
- > 84 (> 95th percentile)
- > 28 and ≤ 84 (≤ 95th percentile)
- > 17 and ≤ 28 (≤ 75th percentile)
- > 8 and ≤ 17 (≤ 50th percentile)
- ≤ 8 (≤ 25th percentile)
- Non-detect

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.

0 600
Scale in feet

Map 4-54
BBP Concentrations in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by lindam. 12/27/2013. W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-55 4848 BBP SMS.mxd

SMS Categories for BBP
CSL = 64 mg/kg OC
SQS = 4.9 mg/kg OC

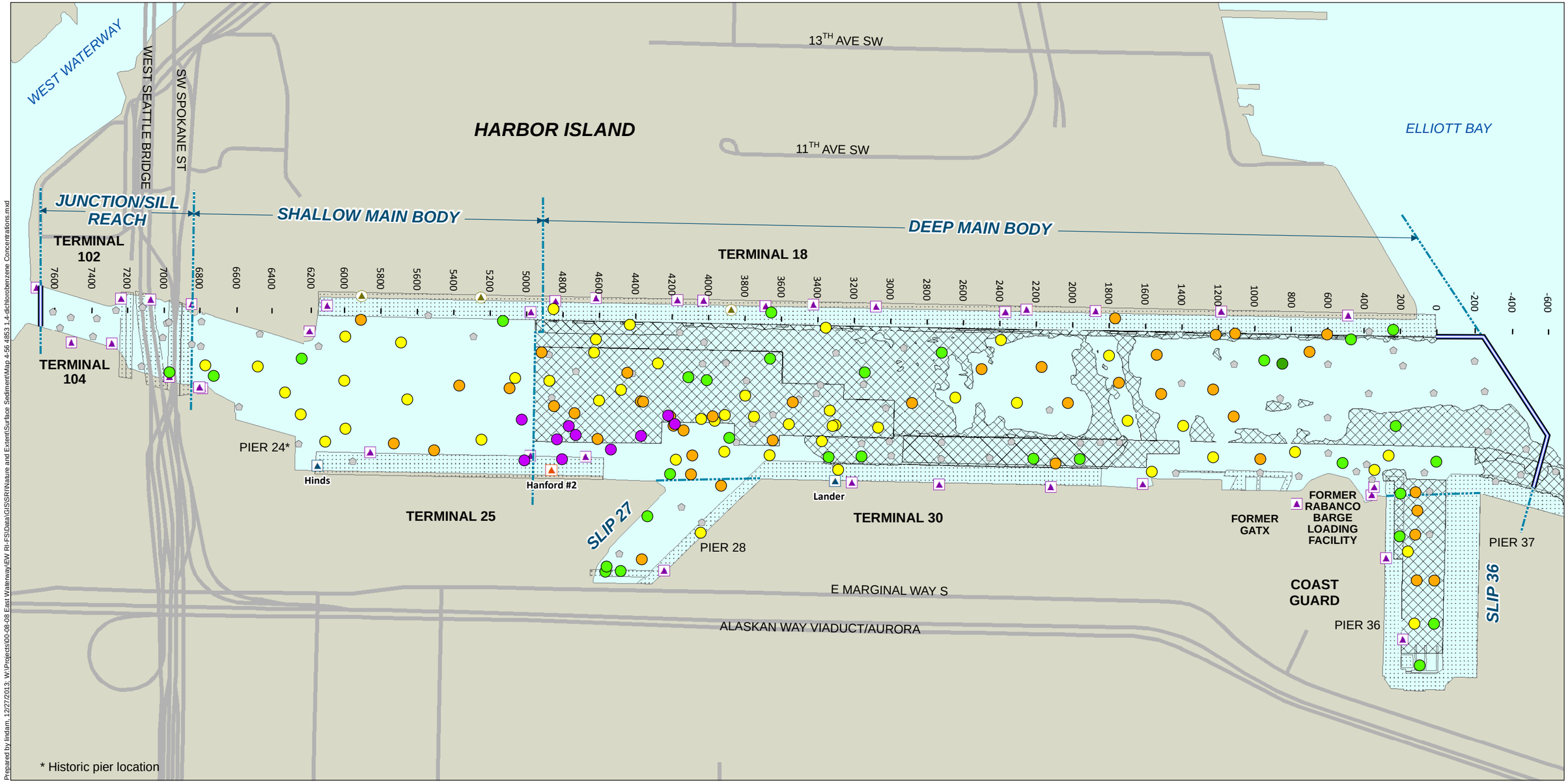
- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS Non-detect

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall

- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

0 600
Scale in feet

Map 4-55
Exceedances of SMS Criteria (SQS or CSL) by BBP in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-56 4853 1,4-dichlorobenzene Concentrations.mxd

1,4-Dichlorobenzene Concentration*

µg/kg dw

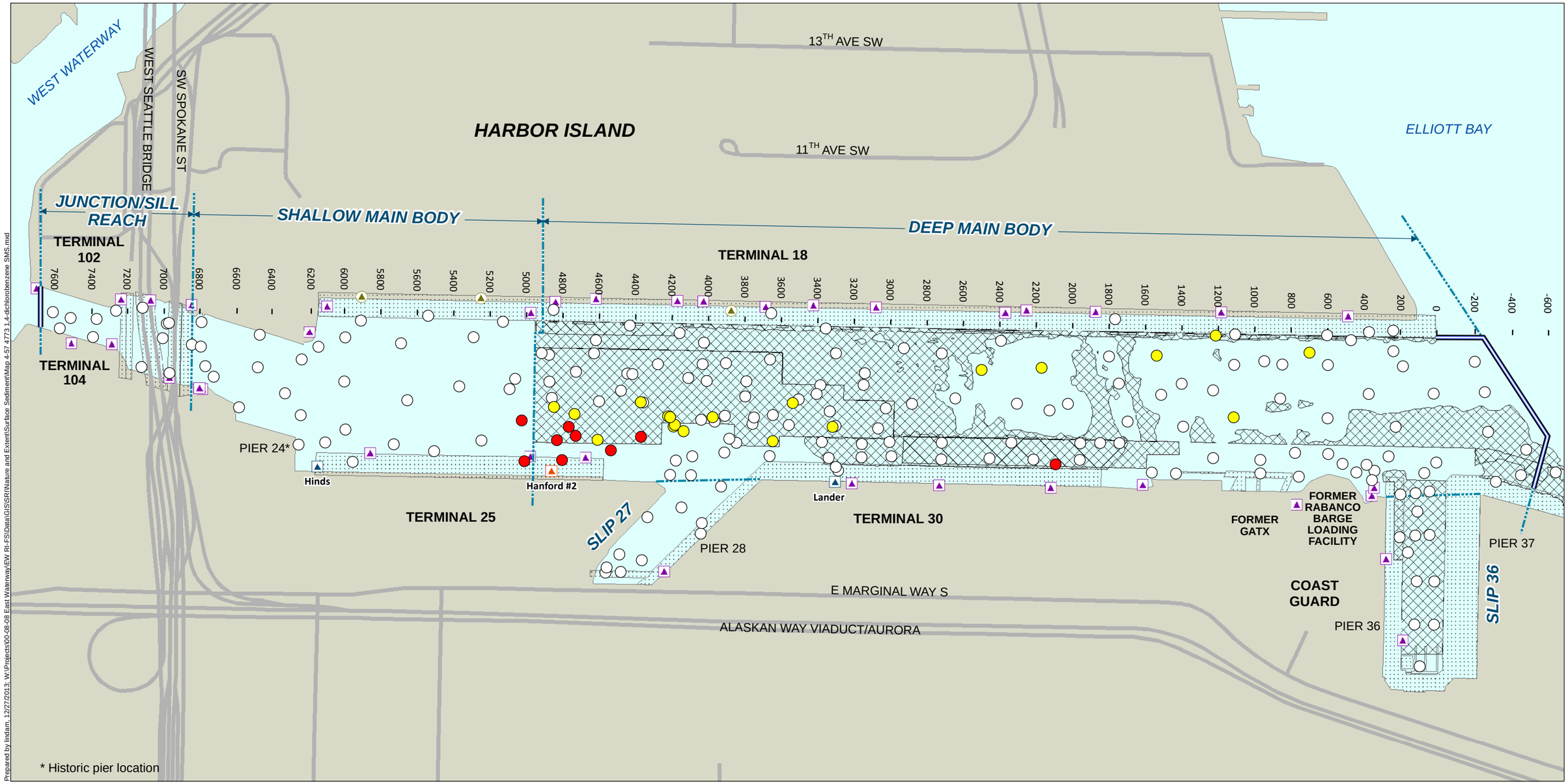
- > 120 (> 95th percentile)
- > 26 and ≤ 120 (≤ 95th percentile)
- > 10 and ≤ 26 (≤ 75th percentile)
- > 3 and ≤ 10 (≤ 50th percentile)
- ≤ 3 (≤ 25th percentile)
- Non-detect

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.

0 600
Scale in feet

Map 4-56
1,4-Dicholorobenzene Concentrations in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by lindam, 12/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Surface Sediment\Map 4-57 4773 1,4-dichlorobenzene SMS.mxd

0 600
Scale in feet

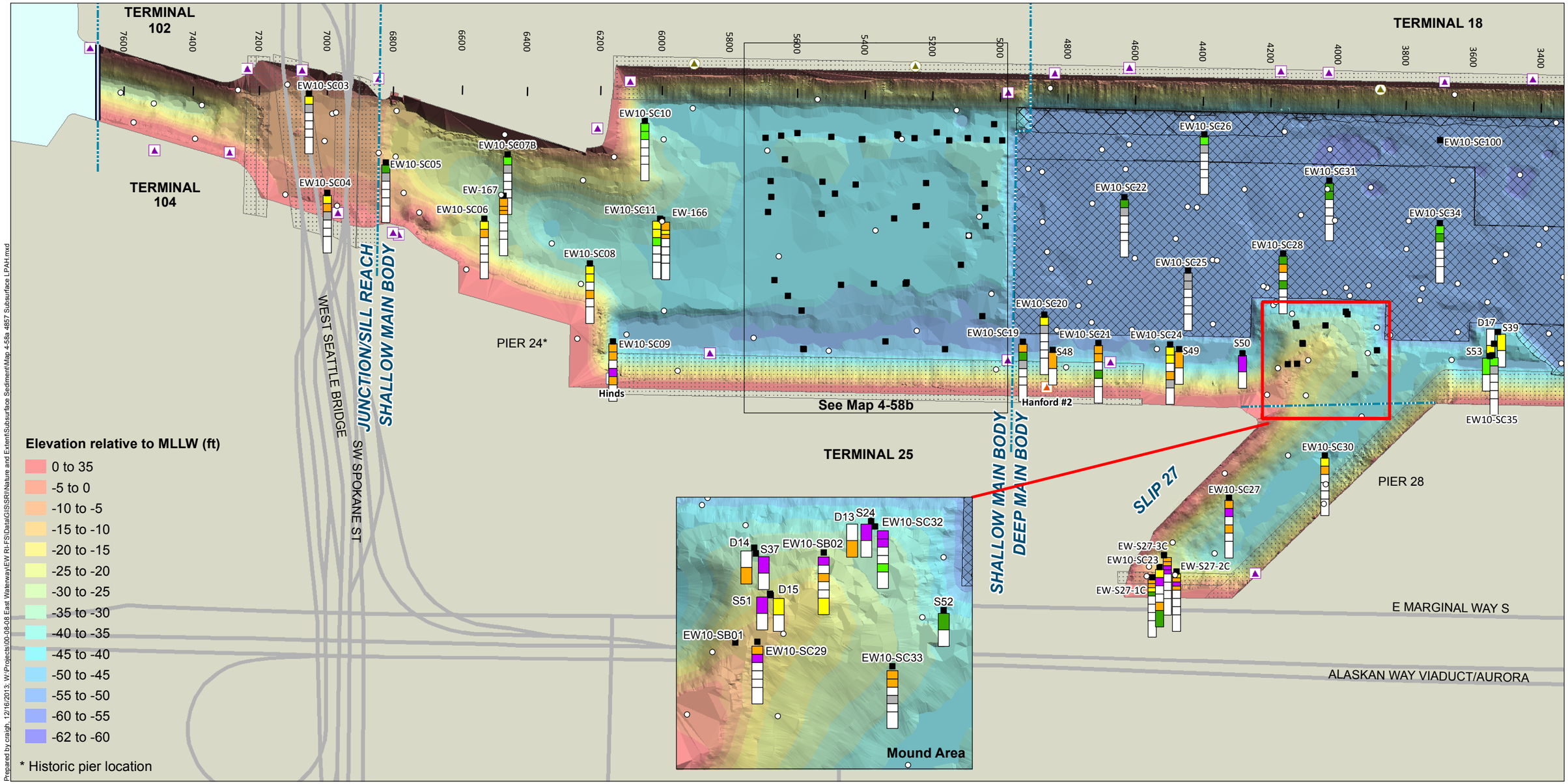
SMS Categories for 1,4-Dichlorobenzene
CSL = 9 mg/kg OC
SQS = 3.1 mg/kg OC

- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS Non-detect

- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall

- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

Map 4-57
Exceedance of SMS Criteria (SQS or CSL) by 1,4-Dichlorobenzene in Surface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SR\Nature and Extent\Subsurface Sediment\Map 4-58a 4857 Subsurface LPAH.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

Total LPAHs in Subsurface Sediment* (µg/kg dw)

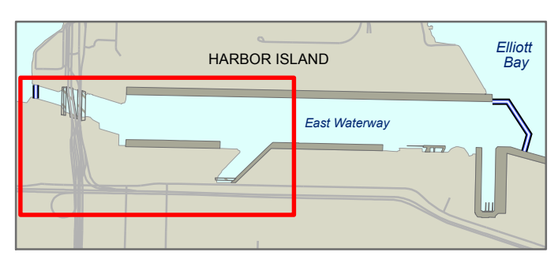
- > 4,400 (> 95th percentile)
- > 600 and ≤ 4,400 (≤ 95th percentile)
- > 260 and ≤ 600 (≤ 75th percentile)
- > 120 and ≤ 260 (≤ 50th percentile)
- ≤ 120 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

0 - 2 ft; 0 - 1 ft; 1 - 2 ft; 2 - 4 ft; 2 - 3 ft; 3 - 4 ft; 4 - 6 ft; 6 - 8 ft; 8 - 10 ft; > 10 ft

0 - 4 ft; > 4 ft

- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.



0 600

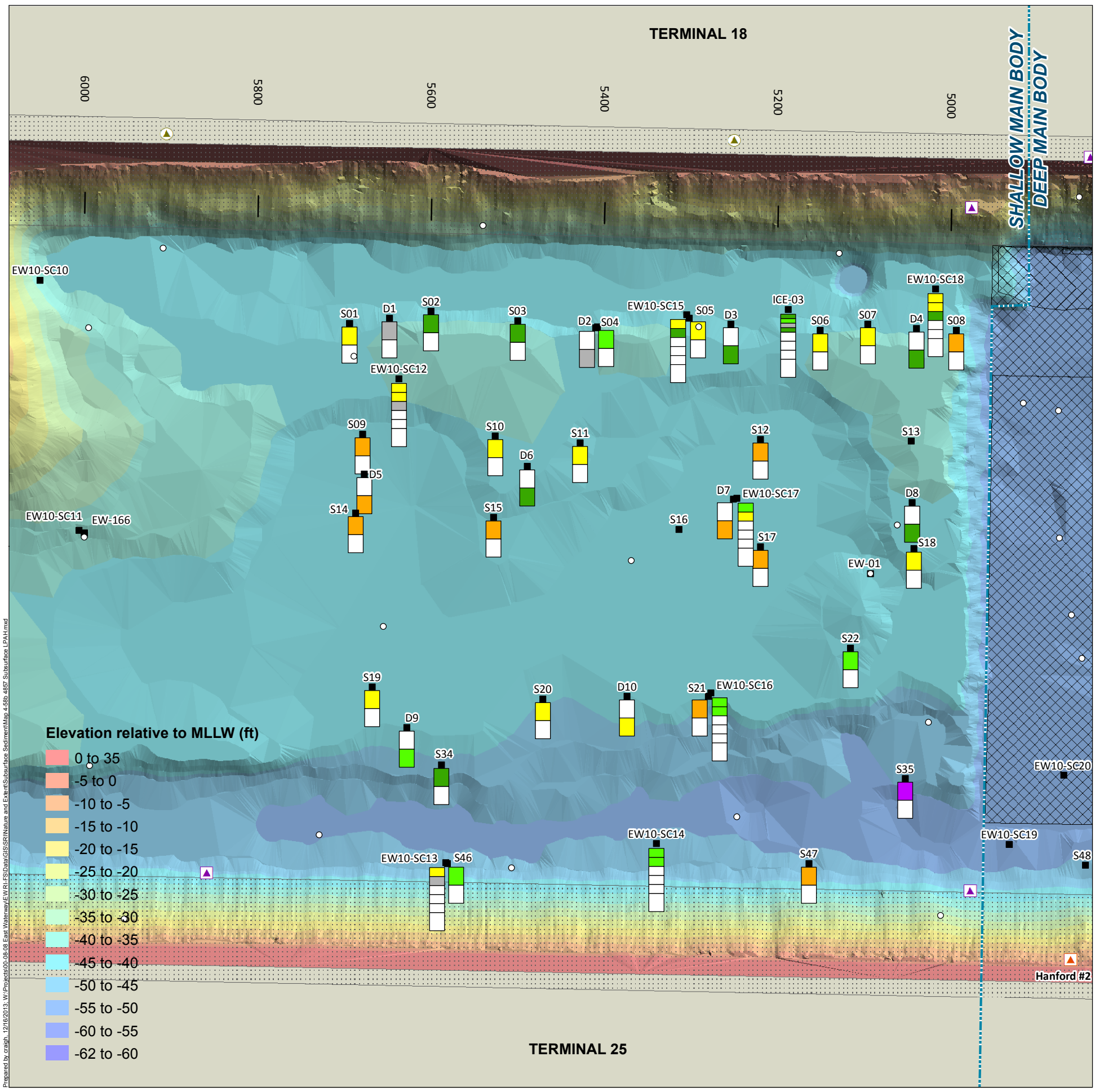
Scale in feet

Map 4-58a

LPAH Concentrations in Subsurface Sediment

Supplemental Remedial Investigation

East Waterway Study Area



Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-58b 4857 Subsurface LPAH.mxd

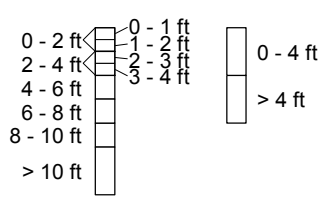
Subsurface Core Depth Charts

- Subsurface Core Location

Total LPAHs in Subsurface Sediment* (µg/kg dw)

- > 4,400 (> 95th percentile)
- > 600 and ≤ 4,400 (≤ 95th percentile)
- > 260 and ≤ 600 (≤ 75th percentile)
- > 120 and ≤ 260 (≤ 50th percentile)
- ≤ 120 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

* The percentiles are all numeric percentiles of the surface sediment dataset.



- Surface Sediment Sampling Location
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- CSO
- CSO/Storm Drain
- Storm Drain
- Unknown
- East Waterway Study Area Boundary

Map 4-58b
LPAH Concentrations in Subsurface Sediment
Supplemental Remedial Investigation
East Waterway Study Area

TERMINAL 18

TERMINAL 30

DEEP MAIN BODY

ELLIOTT BAY

FORMER GATX

FORMER RABANCO BARGE LOADING FACILITY

COAST GUARD

PIER 37

PIER 36

SLIP 36

E MARGINAL WAY S

ALASKAN WAY VIADUCT/AURORA

Lander

EW10-SC37 EW10-SC39 EW-165 EW10-SC36 EW10-SC38 EW10-SC40 1C12 (Ph1) 1C12 (Ph2) 1C11 EW10-SC42 EW10-SC43 4C01 (Ph1) 4C01 (Ph2) 2C07 EW10-SC41 EW10-SC44 1C07 1C08 1C08 EW10-SC45 EW10-SC46 2C06 2C06B EW10-SC47 EW-164 2C21 EW10-SC48 S45 EW-160 EW10-SC50 EW-159 EW10-SC52 EW-161 EW10-SC49 2C04 EW10-SC101 EW-163 EW10-SC51 EW-162 EW10-SC53 EW10-SC54 EW-158 EW10-SC55 EW10-SC56 EW-156 EW10-SC61 S30 EW10-SC62 EW10-SC63 EW10-SC60 EW10-SC57 EW10-SC59 C-1/C-2 EW10-SC58

Elevation relative to MLLW (ft)

- 0 to 35
- -5 to 0
- -10 to -5
- -15 to -10
- -20 to -15
- -25 to -20
- -30 to -25
- -35 to -30
- -40 to -35
- -45 to -40
- -50 to -45
- -55 to -50
- -60 to -55
- -62 to -60

Subsurface Core Depth Charts

- Subsurface Core Location

Total LPAHs in Subsurface Sediment* (µg/kg dw)

- > 4,400 (> 95th percentile)
- > 600 and ≤ 4,400 (≤ 95th percentile)
- > 260 and ≤ 600 (≤ 75th percentile)
- > 120 and ≤ 260 (≤ 50th percentile)
- ≤ 120 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

0 - 2 ft; 2 - 4 ft; 4 - 6 ft; 6 - 8 ft; 8 - 10 ft; > 10 ft

0 - 1 ft; 1 - 2 ft; 2 - 3 ft; 3 - 4 ft

0 - 4 ft; > 4 ft

- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.

0 600

Scale in feet

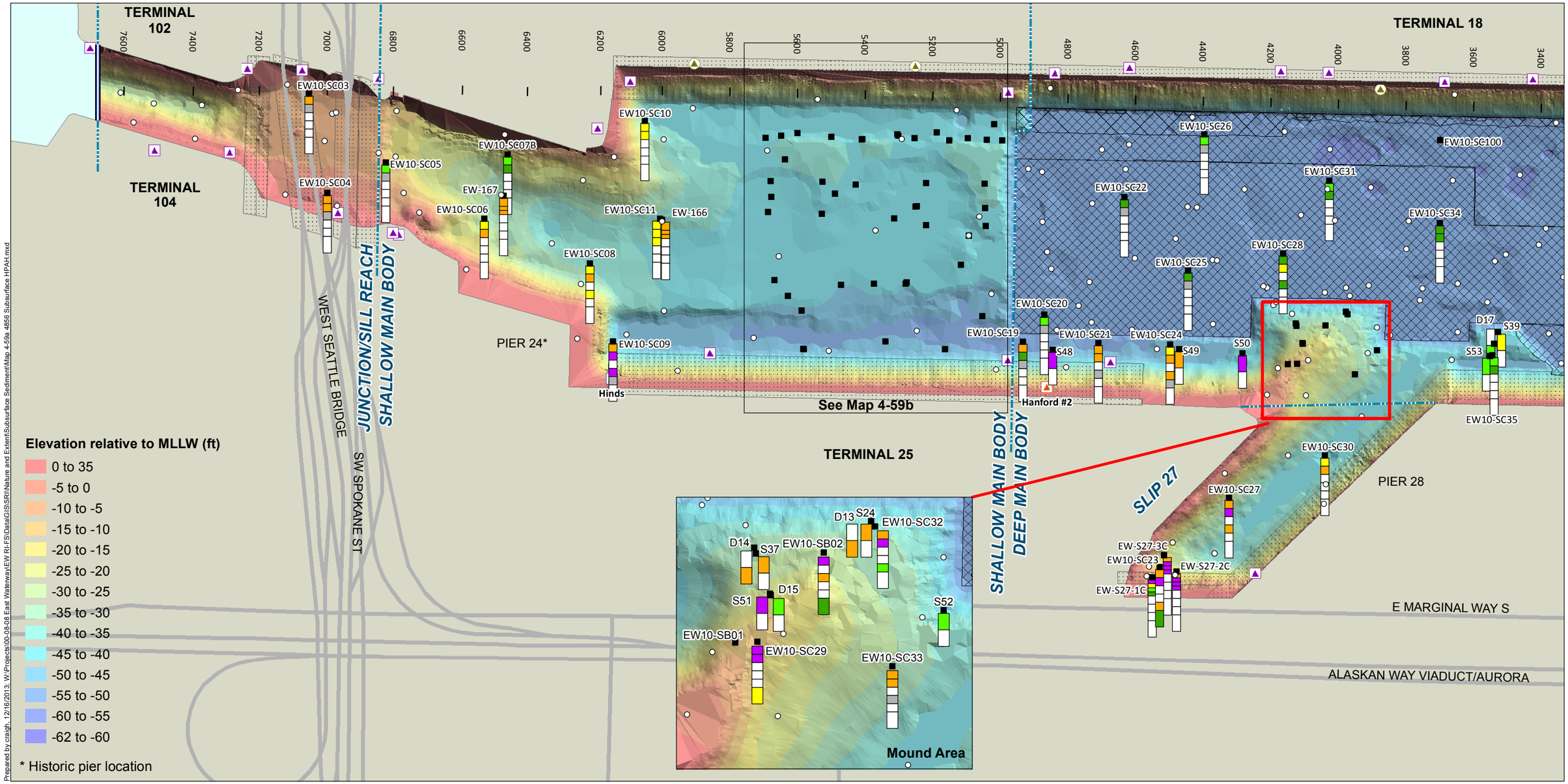
Map 4-58c

LPAH Concentrations in Subsurface Sediment

Supplemental Remedial Investigation

East Waterway Study Area

Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-58c 4857 Subsurface LPAH.mxd



Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SR\Nature and Extent\Subsurface Sediment\Map 4-59a 4856 Subsurface HPAH.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

Total HPAHs in Subsurface Sediment* (µg/kg dw)

- > 13,000 (> 95th percentile)
- > 3,300 and ≤ 13,000 (≤ 95th percentile)
- > 1,700 and ≤ 3,300 (≤ 75th percentile)
- > 730 and ≤ 1,700 (≤ 50th percentile)
- ≤ 730 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

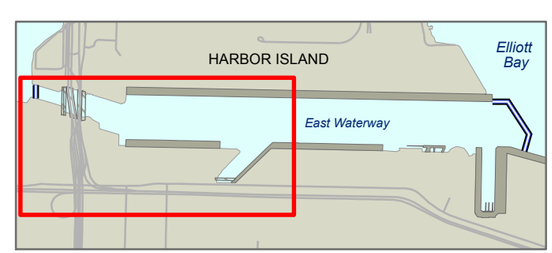
0 - 2 ft; 2 - 4 ft; 4 - 6 ft; 6 - 8 ft; 8 - 10 ft; > 10 ft

0 - 1 ft; 1 - 2 ft; 2 - 3 ft; 3 - 4 ft

0 - 4 ft; > 4 ft

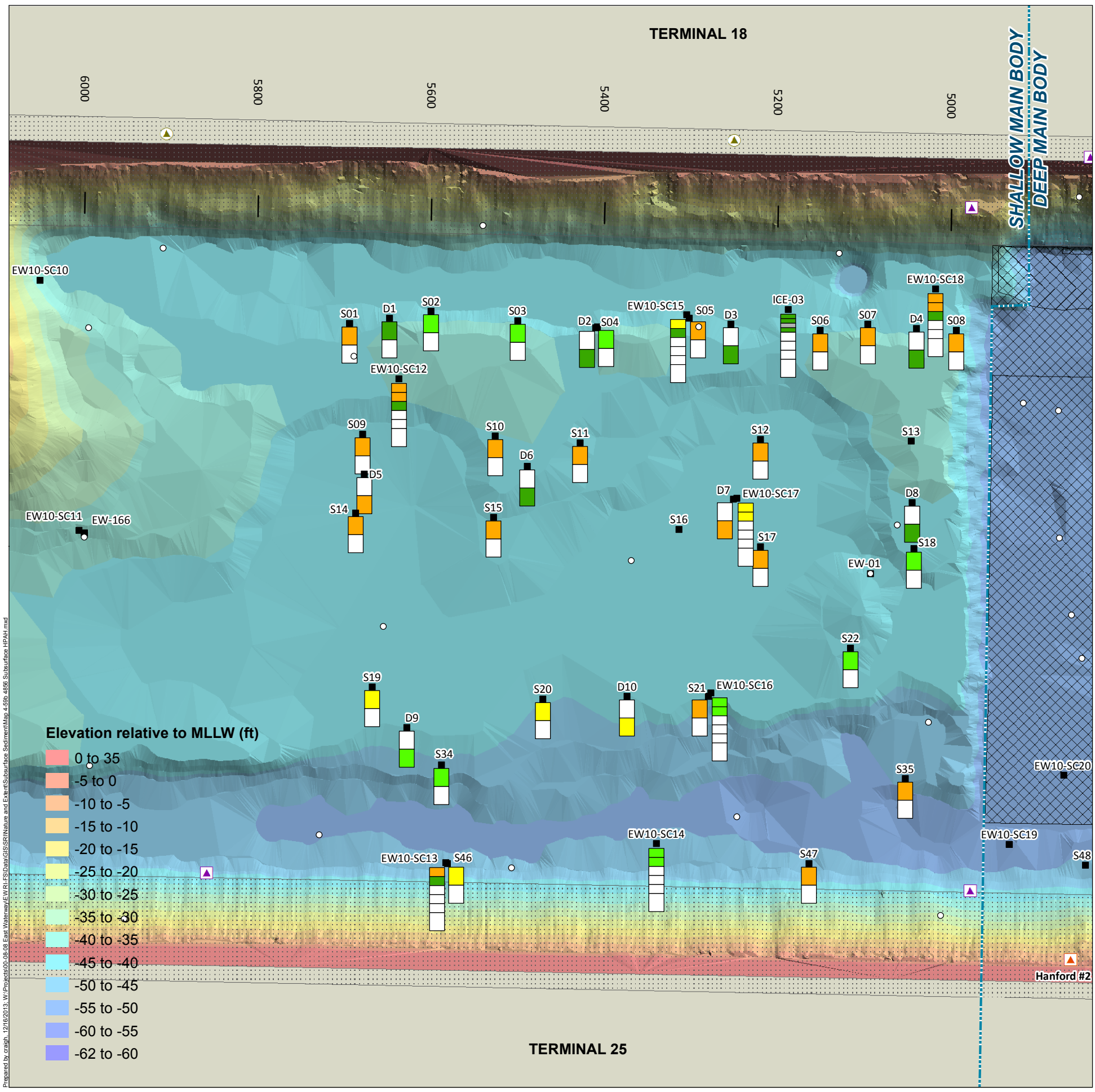
- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.



0 600
Scale in feet

Map 4-59a
HPAH Concentrations in Subsurface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-59b 4858 Subsurface HPAH.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

Total HPAHs in Subsurface Sediment* (µg/kg dw)

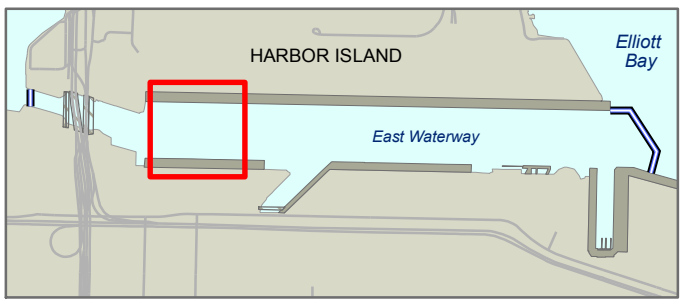
- > 13,000 (> 95th percentile)
- > 3,300 and ≤ 13,000 (≤ 95th percentile)
- > 1,700 and ≤ 3,300 (≤ 75th percentile)
- > 730 and ≤ 1,700 (≤ 50th percentile)
- ≤ 730 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

* The percentiles are all numeric percentiles of the surface sediment dataset.

0 - 2 ft: 0 - 1 ft, 1 - 2 ft
2 - 4 ft: 2 - 3 ft, 3 - 4 ft
4 - 6 ft
6 - 8 ft
8 - 10 ft
> 10 ft

0 - 4 ft
> 4 ft

- Surface Sediment Sampling Location
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- CSO
- CSO/Storm Drain
- Storm Drain
- Unknown
- East Waterway Study Area Boundary



Map 4-59b
HPAH Concentrations in Subsurface Sediment
Supplemental Remedial Investigation
East Waterway Study Area

TERMINAL 18

3400 3200 3000 2800 2600 2400 2200 2000 1800 1600 1400 1200 1000 800 600 400 200 0 -200 -400 -600

EW10-SC37
EW10-SC39
EW-165
EW10-SC36
EW10-SC38
Lander
EW10-SC43
1C11
1C12 (Ph1)
1C12 (Ph2)
EW10-SC40
EW10-SC42
4C01 (Ph1)
4C01 (Ph2)
2C07
EW10-SC41
EW10-SC46
1C07
1C08
EW10-SC44
2C06
2C06B
EW10-SC45
EW-163
EW10-SC101
EW-164
2C21
EW10-SC47
EW10-SC48
S45
EW10-SC49
EW-161
2C04
EW10-SC50
EW-160
EW10-SC52
EW-159
EW10-SC51
EW-162
EW10-SC53
EW10-SC54
EW-158
EW10-SC55
EW10-SC56
EW-156
EW10-SC61
S30
EW10-SC62
EW10-SC63
EW10-SC60
EW10-SC57
EW10-SC59
C-1/C-2
EW10-SC58

ELLIOTT BAY

DEEP MAIN BODY

TERMINAL 30

FORMER GATX

FORMER RABANCO BARGE LOADING FACILITY

PIER 37

COAST GUARD

PIER 36

SLIP 36

E MARGINAL WAY S

ALASKAN WAY VIADUCT/AURORA

Elevation relative to MLLW (ft)

- 0 to 35
- -5 to 0
- -10 to -5
- -15 to -10
- -20 to -15
- -25 to -20
- -30 to -25
- -35 to -30
- -40 to -35
- -45 to -40
- -50 to -45
- -55 to -50
- -60 to -55
- -62 to -60

Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-59c 4858 Subsurface HPAH.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

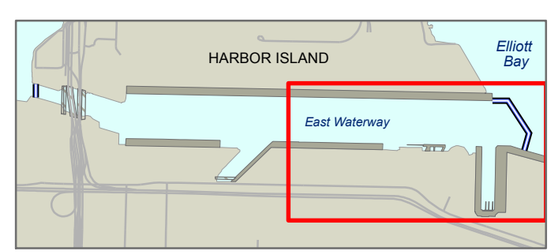
Total HPAHs in Subsurface Sediment* (µg/kg dw)

- > 13,000 (> 95th percentile)
- > 3,300 and ≤ 13,000 (≤ 95th percentile)
- > 1,700 and ≤ 3,300 (≤ 75th percentile)
- > 730 and ≤ 1,700 (≤ 50th percentile)
- ≤ 730 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

0 - 2 ft: 0 - 1 ft, 1 - 2 ft
2 - 4 ft: 2 - 3 ft, 3 - 4 ft
4 - 6 ft
6 - 8 ft
8 - 10 ft
> 10 ft

0 - 4 ft
> 4 ft

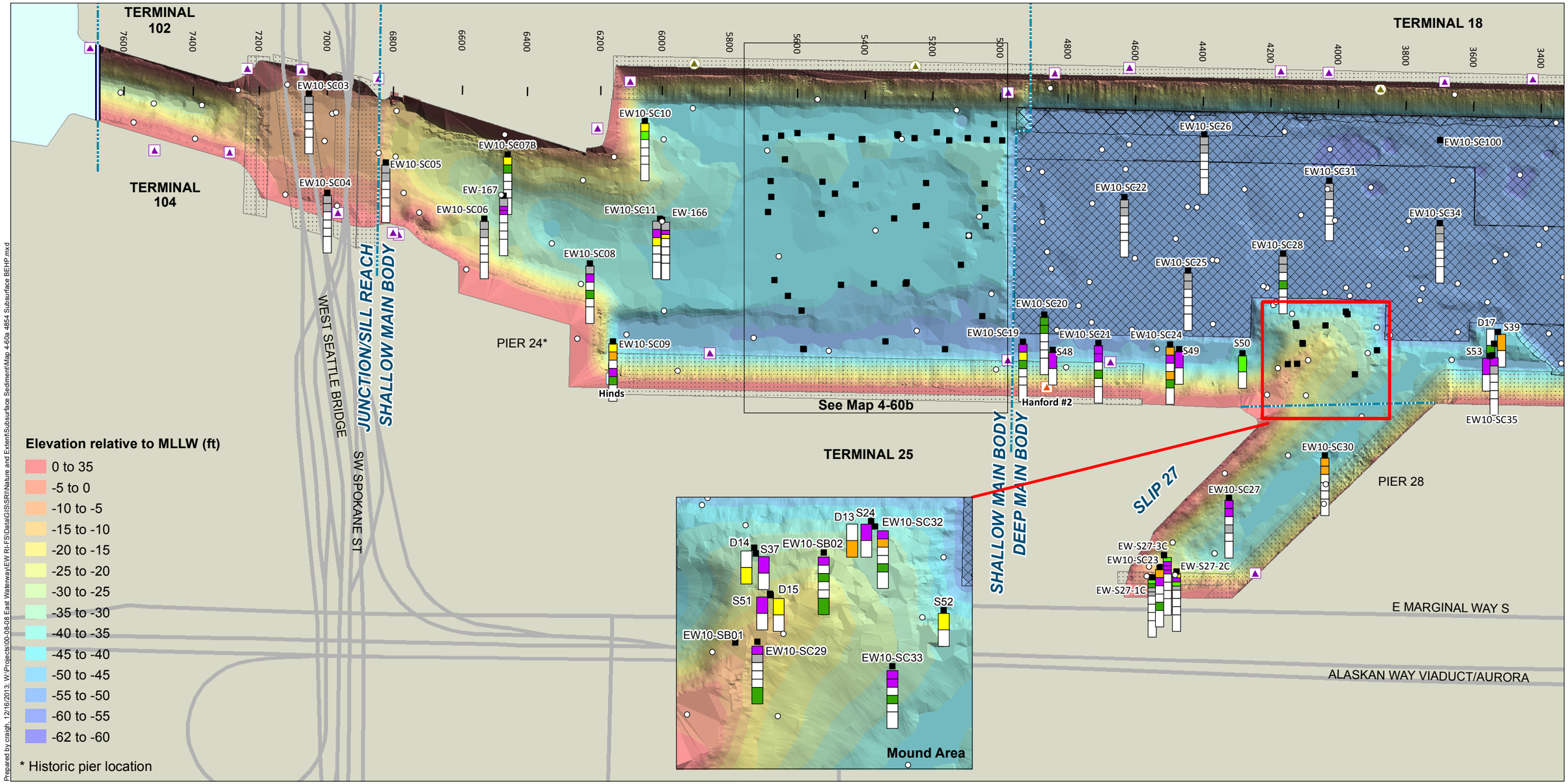
- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary



0 600
Scale in feet

Map 4-59c
HPAH Concentrations in Subsurface Sediment
Supplemental Remedial Investigation
East Waterway Study Area

* The percentiles are all numeric percentiles of the surface sediment dataset.



Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SR\Nature and Extent\Subsurface Sediment\Map 4-60a 4854 Subsurface BEHP.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

Bis(2-ethylhexyl)phthalate in Subsurface Sediment* (µg/kg dw)

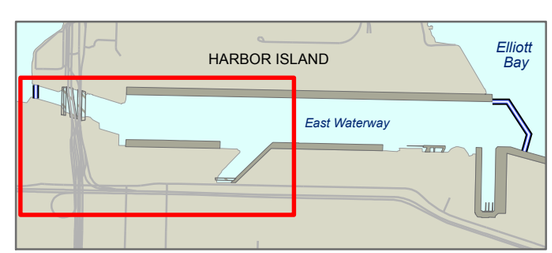
- > 760 (> 95th percentile)
- > 310 and ≤ 760 (≤ 95th percentile)
- > 160 and ≤ 310 (≤ 75th percentile)
- > 80 and ≤ 160 (≤ 50th percentile)
- ≤ 80 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

0 - 2 ft: 0 - 1 ft, 1 - 2 ft
2 - 4 ft: 2 - 3 ft, 3 - 4 ft
4 - 6 ft
6 - 8 ft
8 - 10 ft
> 10 ft

0 - 4 ft
> 4 ft

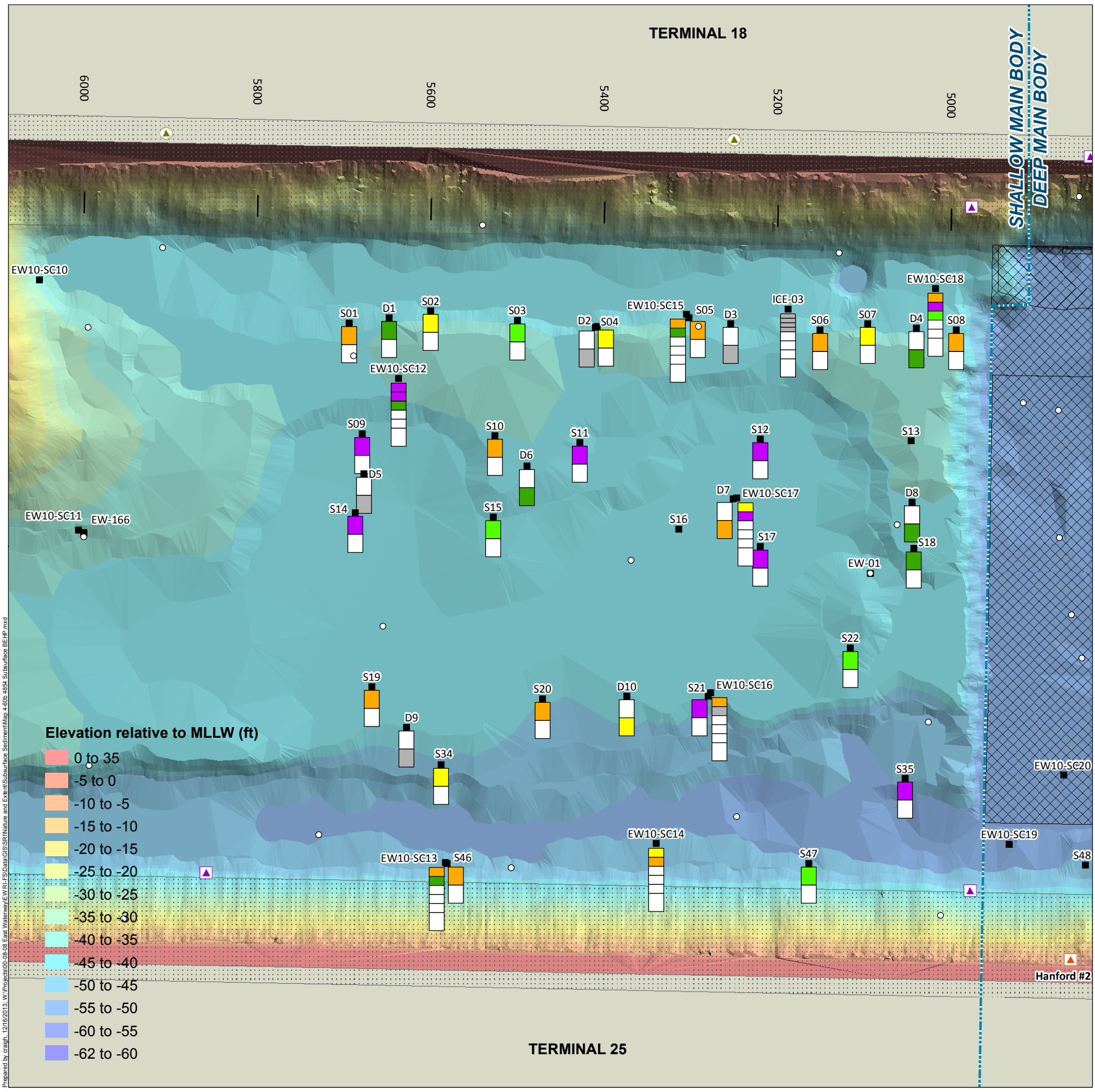
- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.



0 600
Scale in feet

Map 4-60a
BEHP Concentrations in Subsurface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



0 150
Scale in feet

Subsurface Core Depth Charts

■ Subsurface Core Location

Bis(2-ethylhexyl)phthalate in Subsurface Sediment* (µg/kg dw)

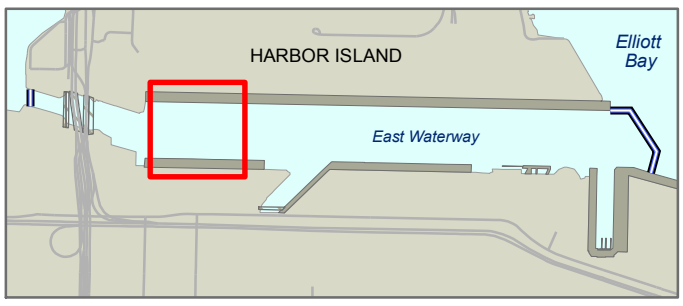
- > 760 (> 95th percentile)
- > 310 and ≤ 760 (≤ 95th percentile)
- > 160 and ≤ 310 (≤ 75th percentile)
- > 80 and ≤ 160 (≤ 50th percentile)
- ≤ 80 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

* The percentiles are all numeric percentiles of the surface sediment dataset.

0 - 2 ft: 0 - 1 ft, 1 - 2 ft
2 - 4 ft: 2 - 3 ft, 3 - 4 ft
4 - 6 ft
6 - 8 ft
8 - 10 ft
> 10 ft

0 - 4 ft
> 4 ft

- ○ Surface Sediment Sampling Location
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- CSO
- CSO/Storm Drain
- Storm Drain
- Unknown
- East Waterway Study Area Boundary



Map 4-60b
BEHP Concentrations in Subsurface Sediment
Supplemental Remedial Investigation
East Waterway Study Area

TERMINAL 18

3400 3200 3000 2800 2600 2400 2200 2000 1800 1600 1400 1200 1000 800 600 400 200 0 -200 -400 -600

EW10-SC37
EW10-SC39
EW-165
EW10-SC36
EW10-SC38
Lander
EW10-SC43
1C11
1C12 (Ph1)
1C12 (Ph2)
EW10-SC40
EW10-SC42
4C01 (Ph1)
4C01 (Ph2)
2C07
EW10-SC41
EW10-SC46
1C07
1C08
EW10-SC44
2C06
2C06B
EW10-SC45
EW-164
2C21
EW10-SC47
EW10-SC48
S45
EW-163
EW10-SC101
EW10-SC51
EW-162
EW10-SC49
EW-161
2C04
EW10-SC50
EW-160
EW10-SC52
EW-159
EW10-SC55
EW10-SC56
EW-156
EW10-SC53
EW10-SC54
EW-158
EW10-SC61
S30
EW10-SC62
EW10-SC63
EW10-SC60
EW10-SC57
EW10-SC59
C-1/C-2
EW10-SC58

ELLIOTT BAY

DEEP MAIN BODY

FORMER GATX

FORMER RABANCO BARGE LOADING FACILITY

TERMINAL 30

PIER 37

COAST GUARD

PIER 36

SLIP 36

E MARGINAL WAY S

ALASKAN WAY VIADUCT/AURORA

Elevation relative to MLLW (ft)

- 0 to 35
- -5 to 0
- -10 to -5
- -15 to -10
- -20 to -15
- -25 to -20
- -30 to -25
- -35 to -30
- -40 to -35
- -45 to -40
- -50 to -45
- -55 to -50
- -60 to -55
- -62 to -60

Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SR\Nature and Extent\Subsurface Sediment\Map 4-60c 4854 Subsurface BEHP.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

Bis(2-ethylhexyl)phthalate in Subsurface Sediment* (µg/kg dw)

- > 760 (> 95th percentile)
- > 310 and ≤ 760 (≤ 95th percentile)
- > 160 and ≤ 310 (≤ 75th percentile)
- > 80 and ≤ 160 (≤ 50th percentile)
- ≤ 80 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

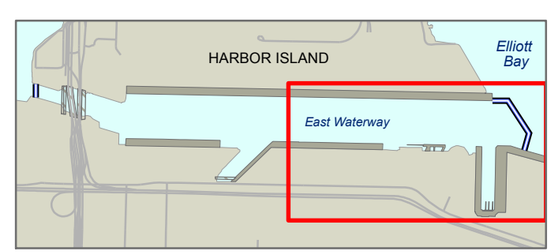
0 - 2 ft; 2 - 4 ft; 4 - 6 ft; 6 - 8 ft; 8 - 10 ft; > 10 ft

0 - 1 ft; 1 - 2 ft; 2 - 3 ft; 3 - 4 ft

0 - 4 ft; > 4 ft

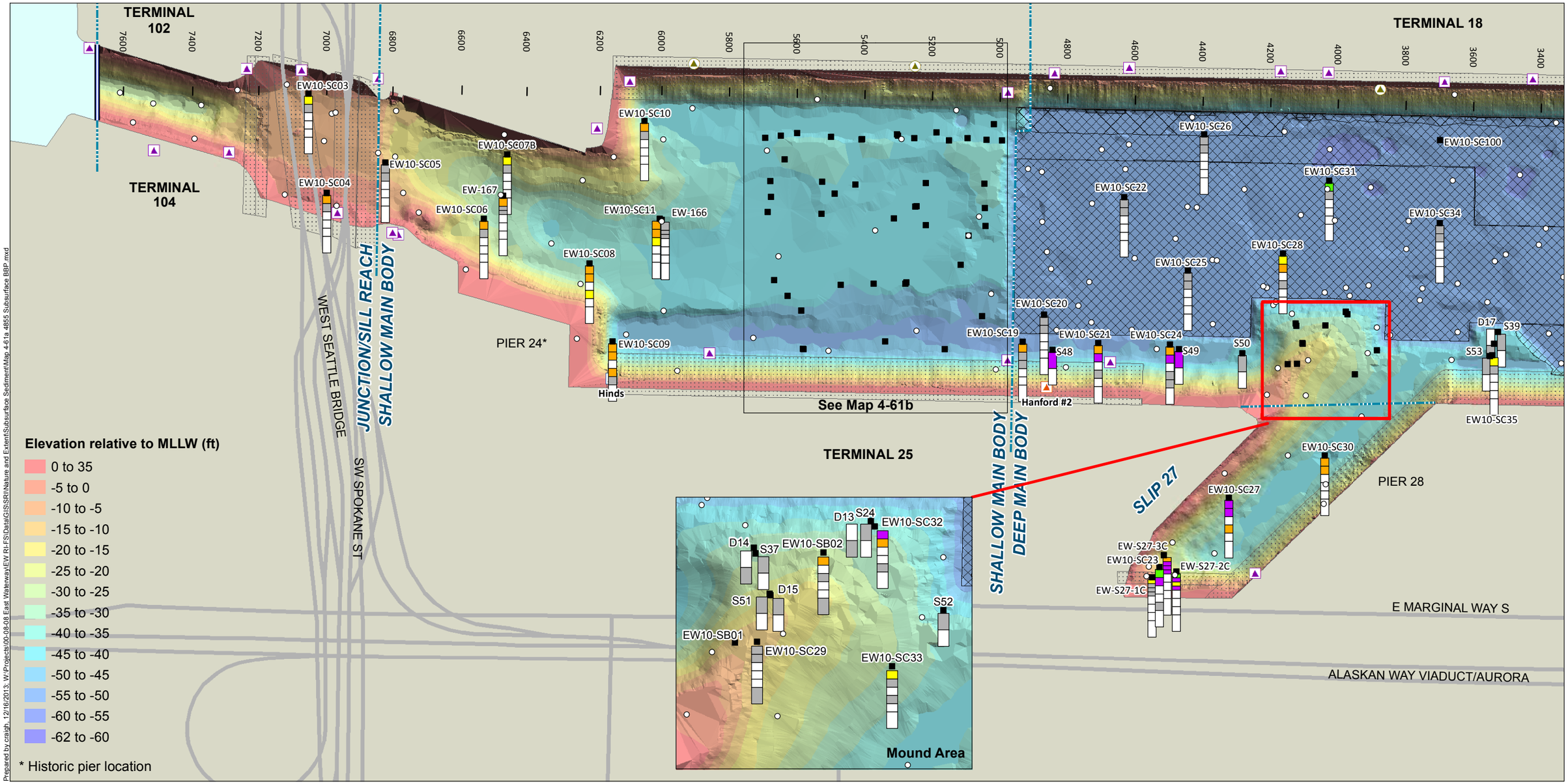
- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.



0 600
Scale in feet

Map 4-60c
BEHP Concentrations in Subsurface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SR\Nature and Extent\Subsurface Sediment\Map 4-61a 4855 Subsurface BBP.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

Butyl benzyl phthalate in Subsurface Sediment* (µg/kg dw)

- > 84 (> 95th percentile)
- > 28 and ≤ 84 (≤ 95th percentile)
- > 17 and ≤ 28 (≤ 75th percentile)
- > 7.5 and ≤ 17 (≤ 50th percentile)
- ≤ 7.5 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

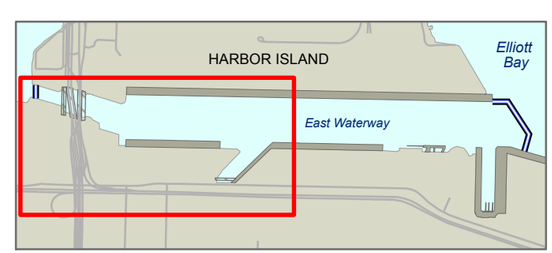
0 - 2 ft; 2 - 4 ft; 4 - 6 ft; 6 - 8 ft; 8 - 10 ft; > 10 ft

0 - 1 ft; 1 - 2 ft; 2 - 3 ft; 3 - 4 ft

0 - 4 ft; > 4 ft

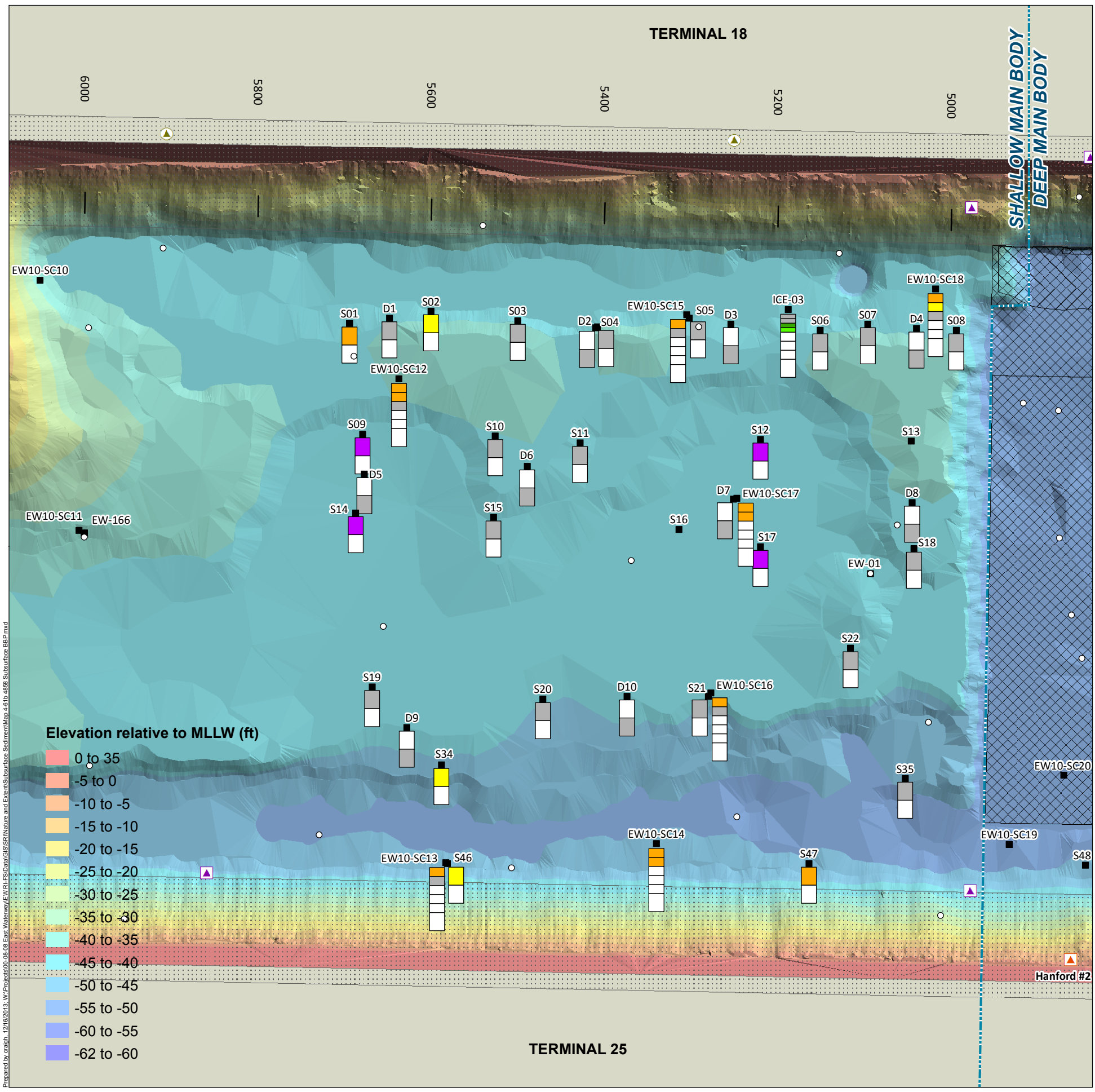
- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.



0 600
Scale in feet

Map 4-61a
BBP Concentrations in Subsurface Sediment
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-61b 4858 Subsurface BBP.mxd

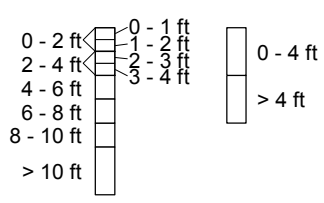
Subsurface Core Depth Charts

- Subsurface Core Location

Butyl benzyl phthalate in Subsurface Sediment* (µg/kg dw)

- > 84 (> 95th percentile)
- > 28 and ≤ 84 (≤ 95th percentile)
- > 17 and ≤ 28 (≤ 75th percentile)
- > 7.5 and ≤ 17 (≤ 50th percentile)
- ≤ 7.5 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

* The percentiles are all numeric percentiles of the surface sediment dataset.



- Surface Sediment Sampling Location
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- CSO
- CSO/Storm Drain
- Storm Drain
- Unknown
- East Waterway Study Area Boundary

Map 4-61b
BBP Concentrations in Subsurface Sediment
Supplemental Remedial Investigation
East Waterway Study Area

TERMINAL 18

3400 3200 3000 2800 2600 2400 2200 2000 1800 1600 1400 1200 1000 800 600 400 200 0 -200 -400 -600

EW10-SC37
EW10-SC39
EW-165
EW10-SC36
EW10-SC38
Lander
EW10-SC43
1C11
1C12 (Ph1)
1C12 (Ph2)
EW10-SC40
EW10-SC42
4C01 (Ph1)
4C01 (Ph2)
2C07
EW10-SC41
EW10-SC46
1C07
1C08
EW10-SC44
2C06
2C06B
EW10-SC45
EW-163
EW10-SC101
EW-164
2C21
EW10-SC47
EW10-SC48
S45
EW10-SC49
EW-161
2C04
EW10-SC50
EW-160
EW10-SC52
EW-159
EW10-SC51
EW-162
EW10-SC55
EW10-SC56
EW-156
EW10-SC53
EW10-SC54
EW-158
EW10-SC61
S30
EW10-SC62
EW10-SC63
EW10-SC60
EW10-SC57
EW10-SC59
C-1/C-2
EW10-SC58

ELLIOTT BAY

DEEP MAIN BODY

FORMER GATX

FORMER RABANCO BARGE LOADING FACILITY

TERMINAL 30

PIER 37

COAST GUARD

PIER 36

SLIP 36

E MARGINAL WAY S

ALASKAN WAY VIADUCT/AURORA

Elevation relative to MLLW (ft)

- 0 to 35
- -5 to 0
- -10 to -5
- -15 to -10
- -20 to -15
- -25 to -20
- -30 to -25
- -35 to -30
- -40 to -35
- -45 to -40
- -50 to -45
- -55 to -50
- -60 to -55
- -62 to -60

Prepared by craigh, 12/16/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Nature and Extent\Subsurface Sediment\Map 4-61c 4855 Subsurface BBP.mxd

Subsurface Core Depth Charts

- Subsurface Core Location

Butyl benzyl phthalate in Subsurface Sediment* (µg/kg dw)

- > 84 (> 95th percentile)
- > 28 and ≤ 84 (≤ 95th percentile)
- > 17 and ≤ 28 (≤ 75th percentile)
- > 7.5 and ≤ 17 (≤ 50th percentile)
- ≤ 7.5 (≤ 25th percentile)
- Non-detect
- Not Analyzed for This Interval

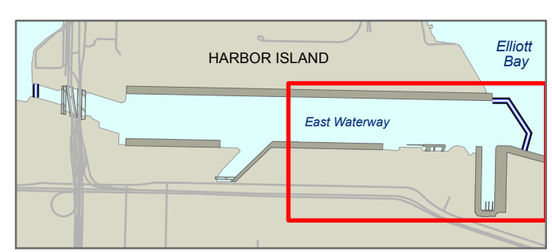
0 - 2 ft; 2 - 4 ft; 4 - 6 ft; 6 - 8 ft; 8 - 10 ft; > 10 ft

0 - 1 ft; 1 - 2 ft; 2 - 3 ft; 3 - 4 ft

0 - 4 ft; > 4 ft

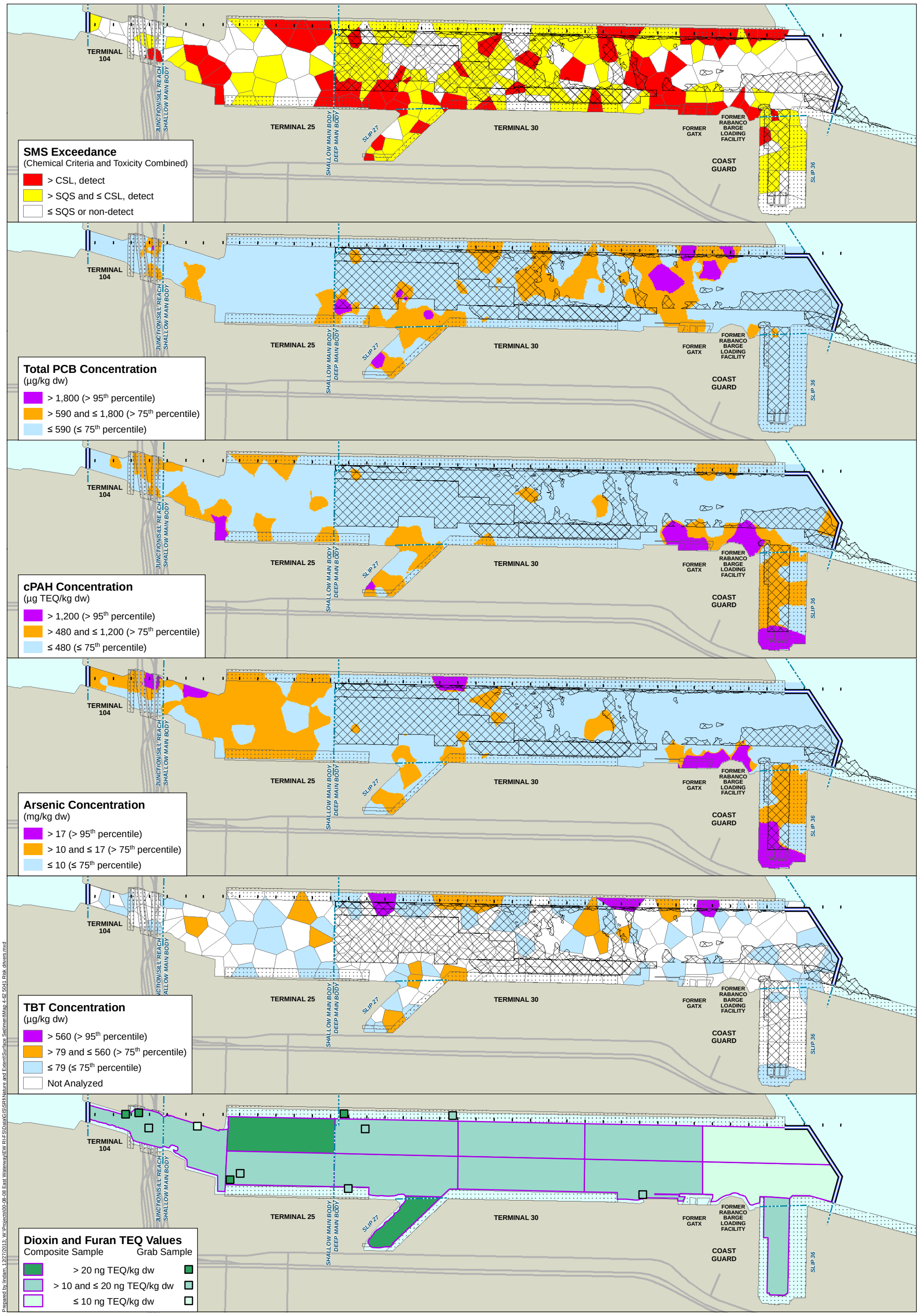
- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Area Dredged in the Last 11 Years
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

* The percentiles are all numeric percentiles of the surface sediment dataset.



0 600
Scale in feet

Map 4-61c
BBP Concentrations in Subsurface Sediment
Supplemental Remedial Investigation
East Waterway Study Area

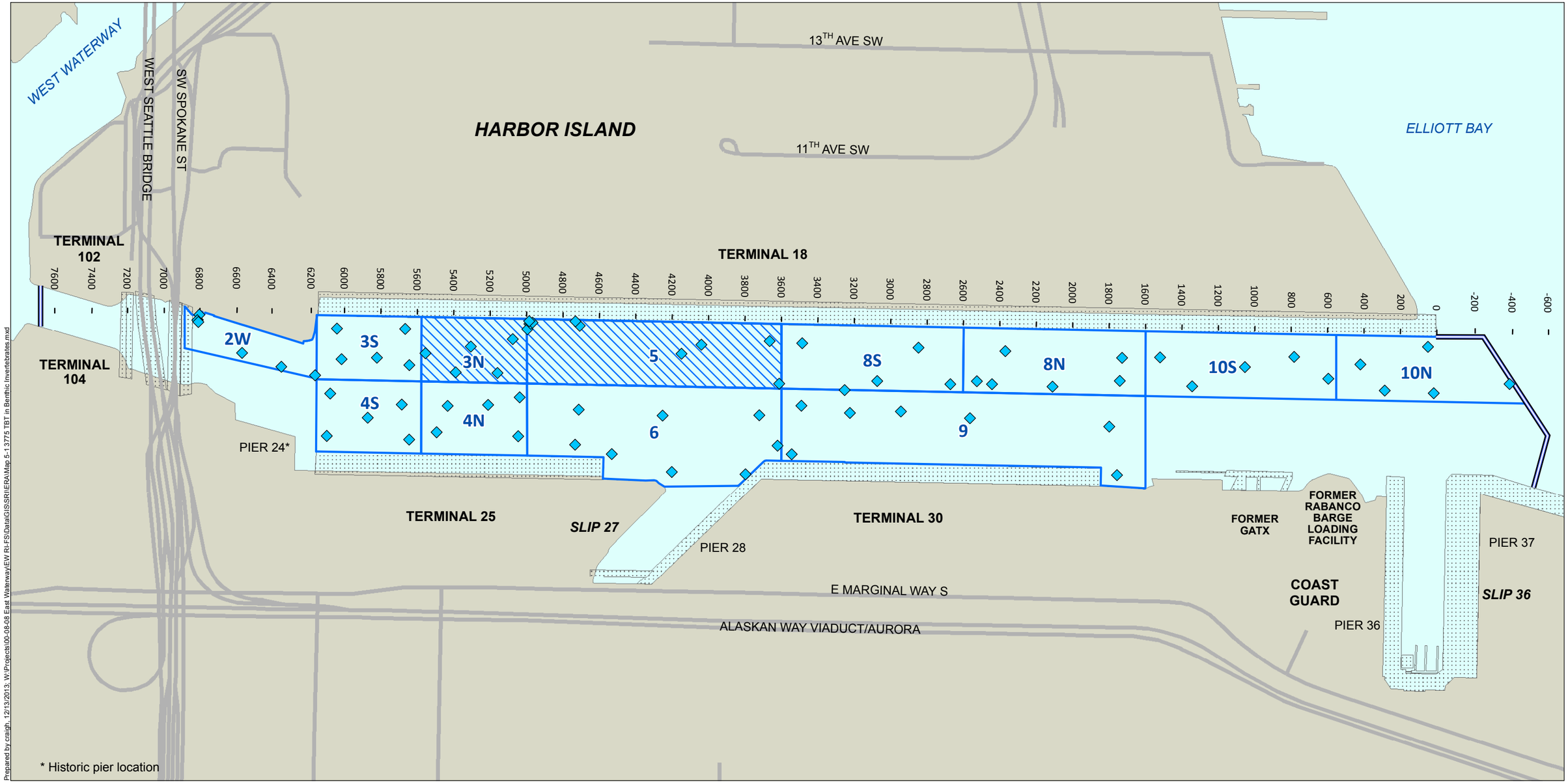


Area Dredged in the Last 11 Years
Dock/Pier/Bridge
Road
East Waterway Study Area Boundary

0 600
Scale in feet

Map 4-62
Surface Sediment Patterns of Select Contaminants
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by lindam, 1/27/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SR\Nature and Extent\Surface Sediment\Map 4-62 5041 Risk drivers.mxd

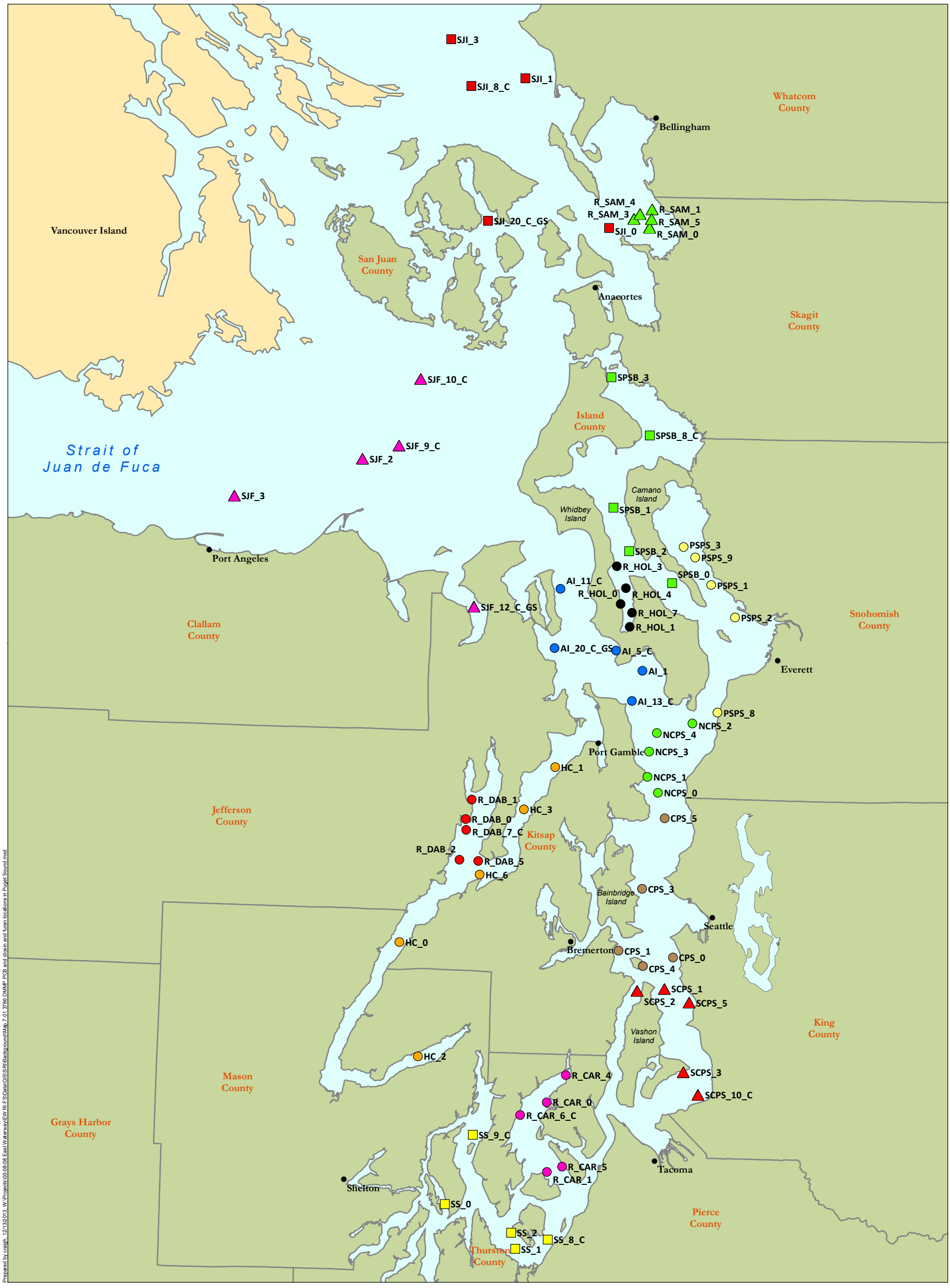


Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\ERA\Map 5-1 3775 TBT in Benthic Invertebrates.mxd

- Location of Benthic Tissue and Co-located Sediment Sample
- TBT Tissue Collection Area Boundary
- Benthic Invertebrate Tissue TBT LOAEL HQ > 1
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

0 600
Scale in feet

Map 5-1
Benthic Invertebrate Tissue Sampling Areas for TBT
Supplemental Remedial Investigation
East Waterway Study Area



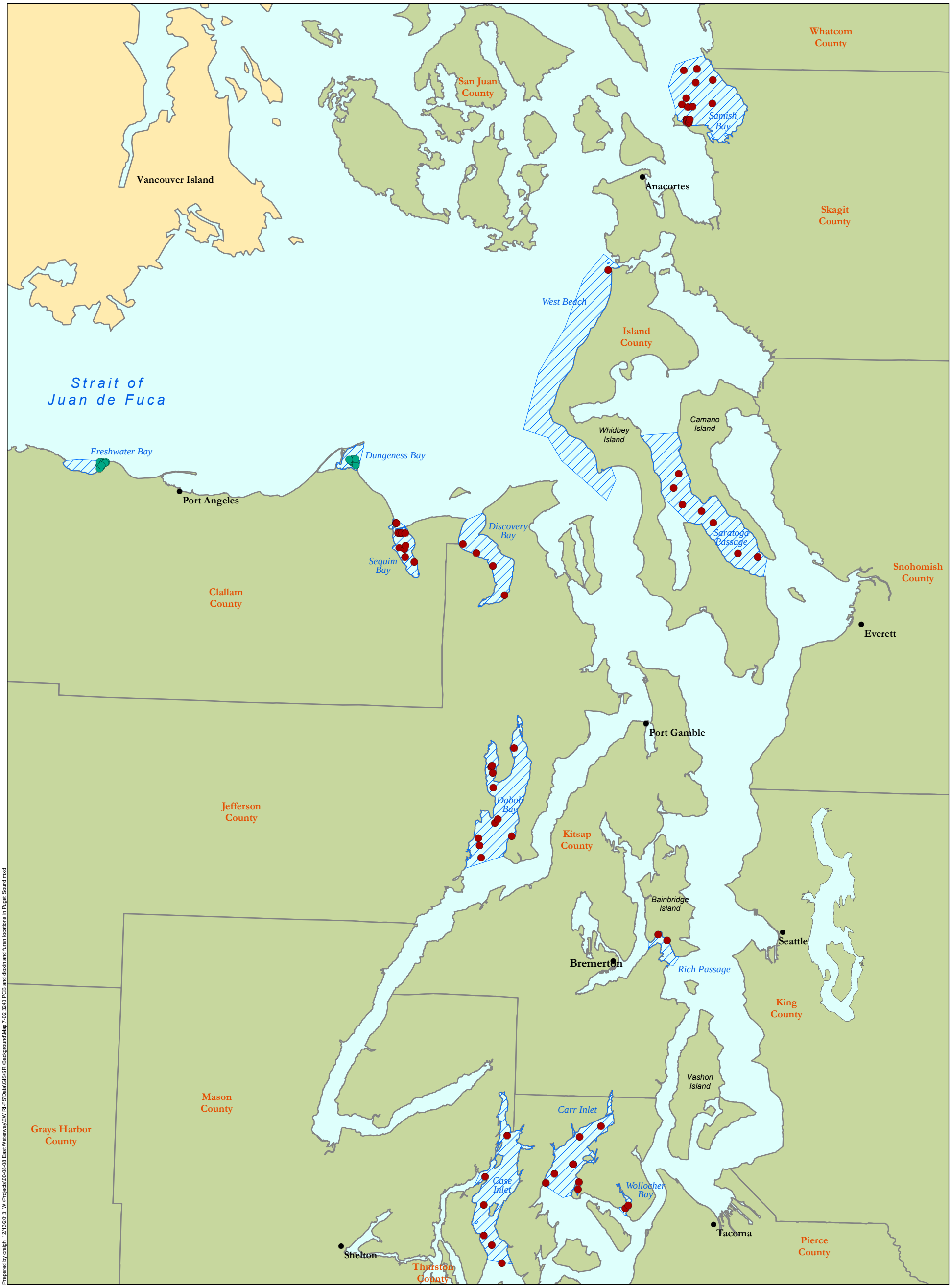
Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SR\Background\Map 7-01 3786 DNMP PCB and dioxin and furan locations in Puget Sound.mxd

Puget Sound 2008 Survey Location

- AI
- CPS
- HC
- NCPS
- PSPS
- R_CAR
- R_DAB
- R_HOL
- R_SAM
- SCPS
- SJF
- SJI
- SPSB
- SS

0 12
Miles

Map 7-1
Locations of Surface Sediment Data Available for Arsenic, PCBs, cPAHs, and Dioxins and Furans from the Puget Sound 2008 Survey for Natural Background Consideration
Supplemental Remedial Investigation
East Waterway Study Area



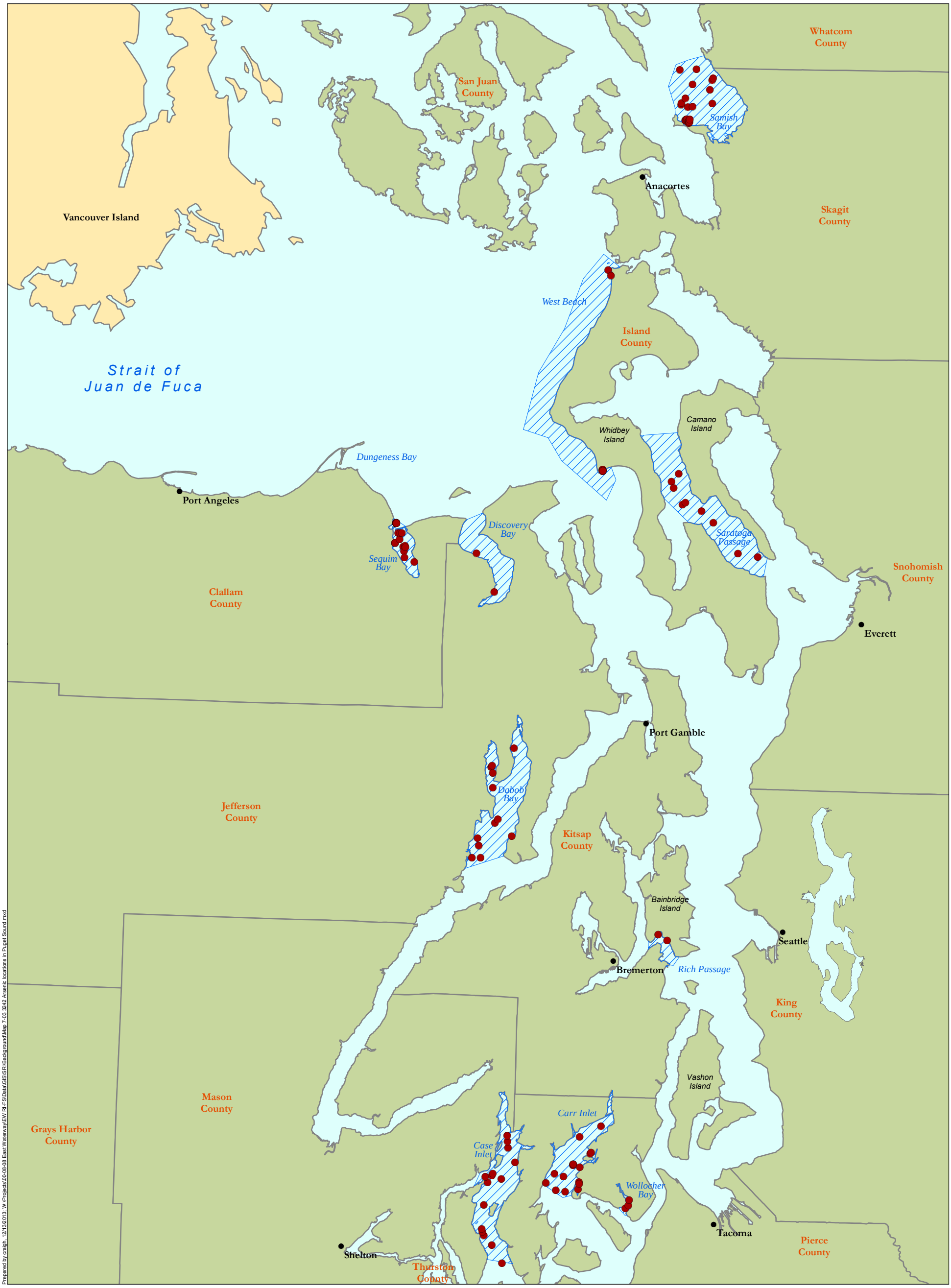
Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Background\Map 7-02 3240 PCB and dioxin and furan locations in Puget Sound.mxd

0 12
Miles

PCB and Dioxin and Furan Sediment Sample Location
PCB Sediment Sample Location
Background Sampling Area

Note: Puget Sound 2008 survey locations are shown on Map 7-1.

Map 7-2
Locations of Surface Sediment PCB and Dioxin and Furan Data
Available for Natural Background from Reference Areas Prior to 2008
Supplemental Remedial Investigation
East Waterway Study Area

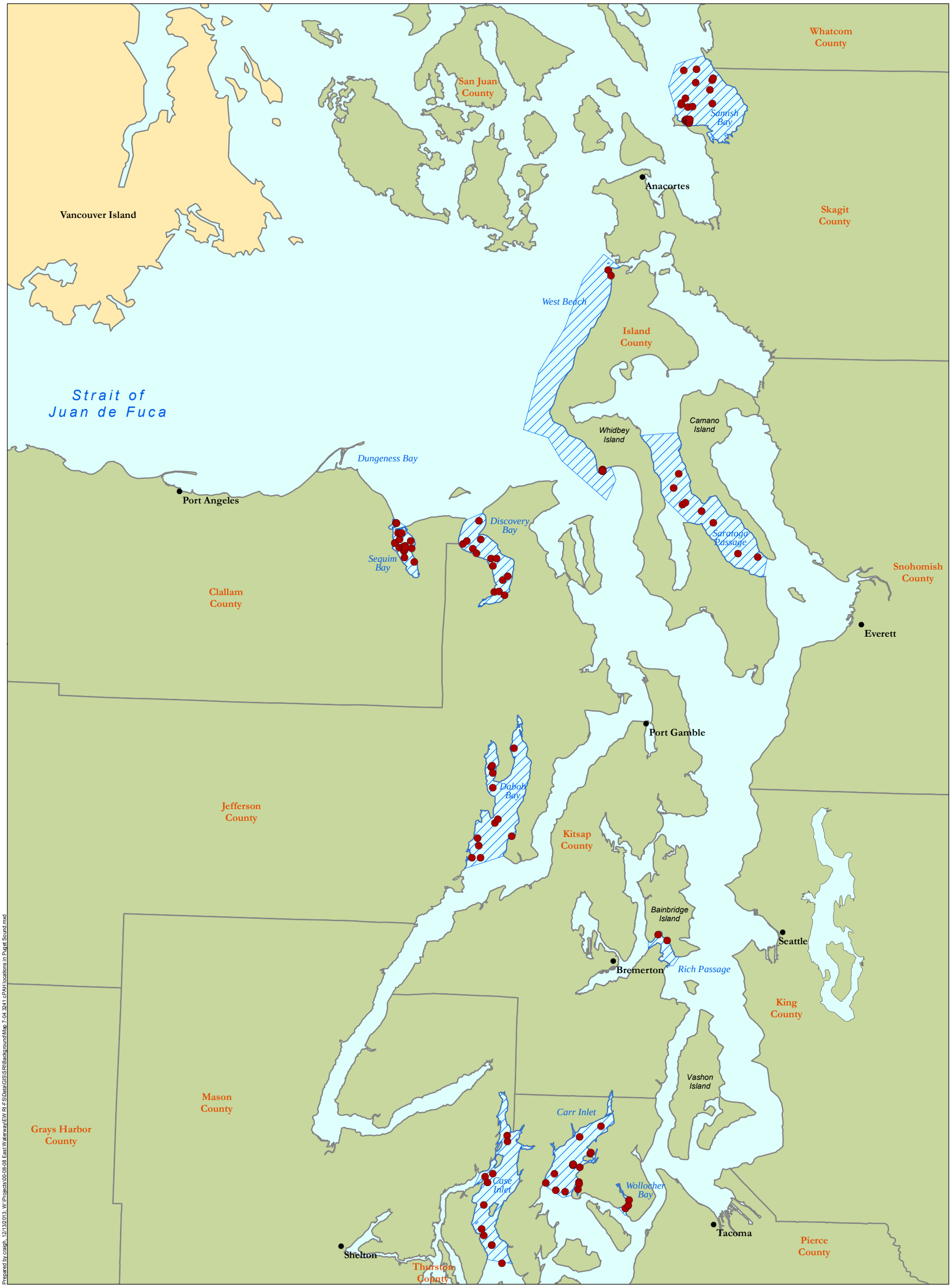


0 12
Miles

Arsenic Sediment Sample Location
Background Sampling Area

Note: Puget Sound 2008 survey locations are shown on Map 7-1.

Map 7-3
Locations of Surface Sediment Arsenic Data Available for Natural Background from Reference Areas Prior to 2008
Supplemental Remedial Investigation
East Waterway Study Area



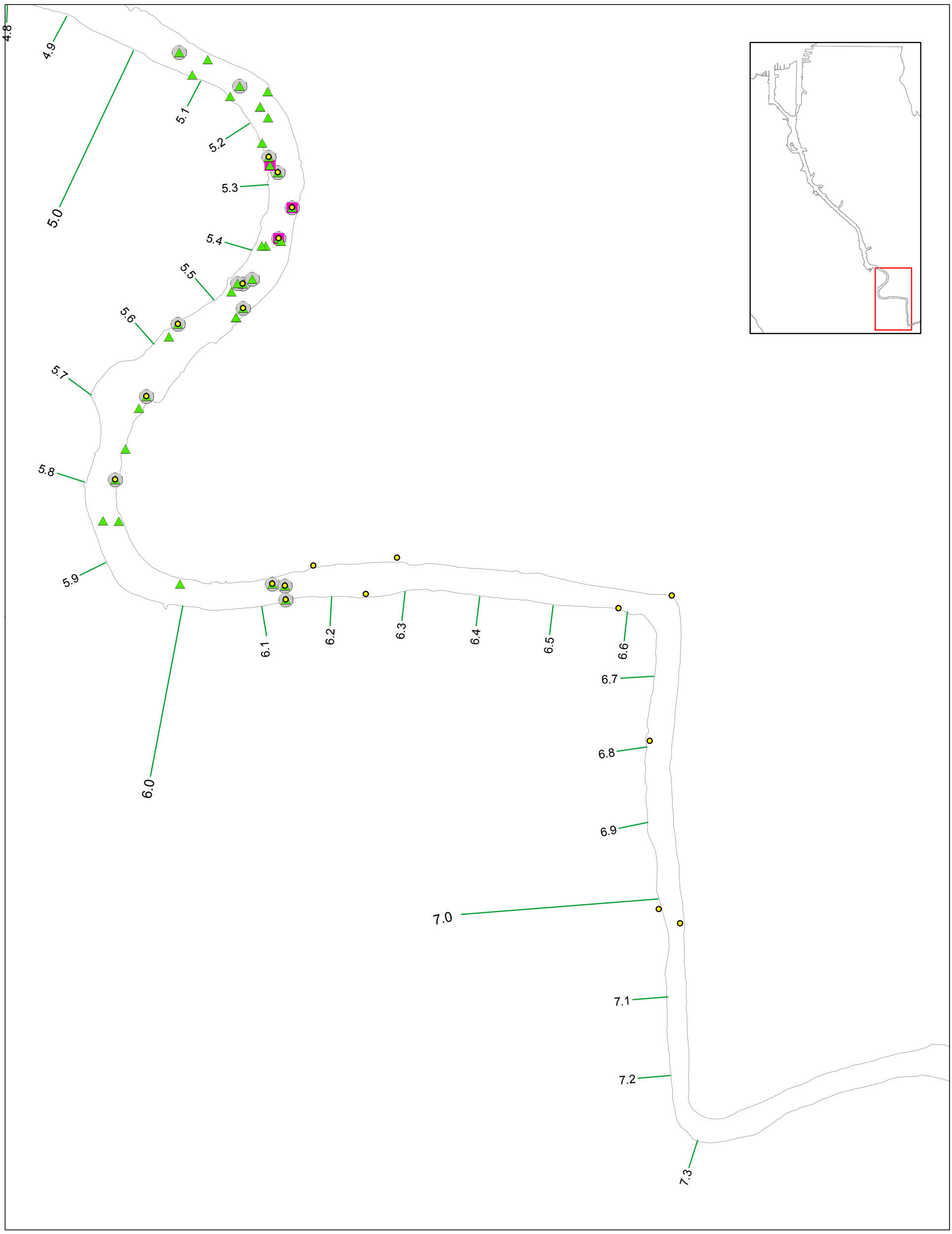
0 12
Miles

cPAH Sediment Sample Location
Background Sampling Area

Note: Puget Sound 2008 survey locations are shown on Map 7-1.

Map 7-4
Locations of Surface Sediment cPAH Data Available for Natural Background from Reference Areas Prior to 2008
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Background\Map 7-04 3241 cPAH locations in Puget Sound.mxd



Source: Windward (2010g)

0 250 500 1,000 Feet

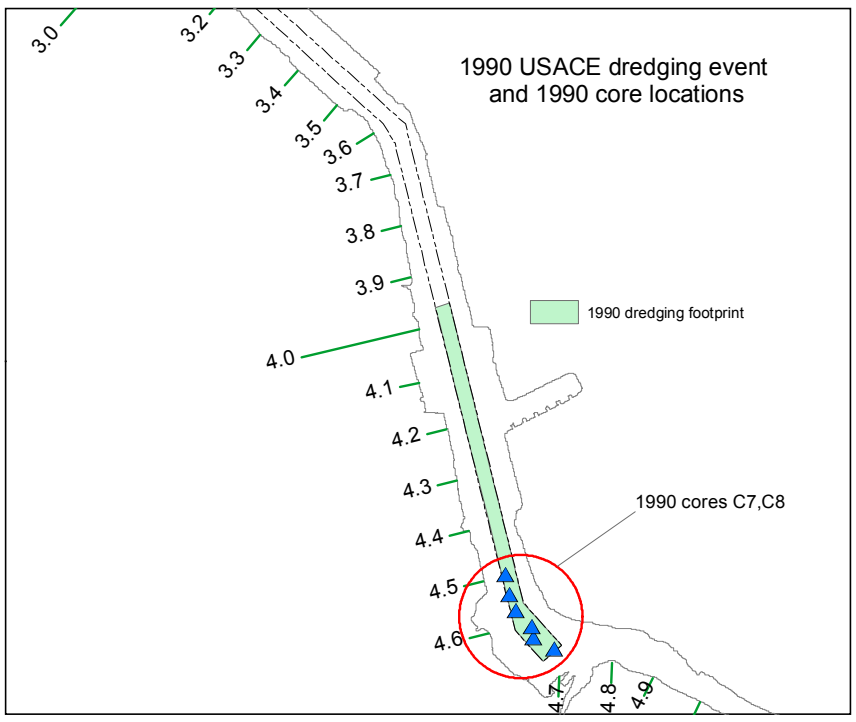
0 50 100 200 Meters

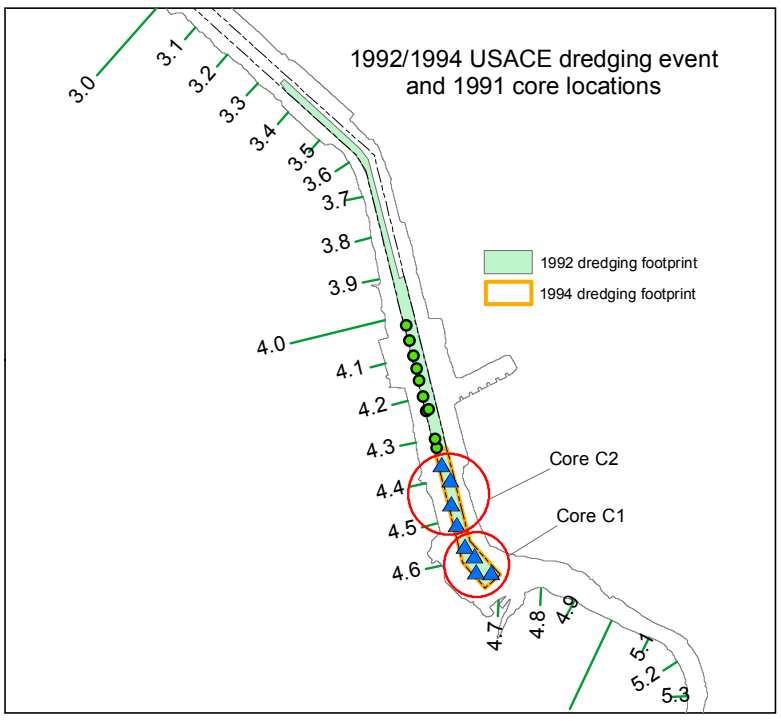
Legend

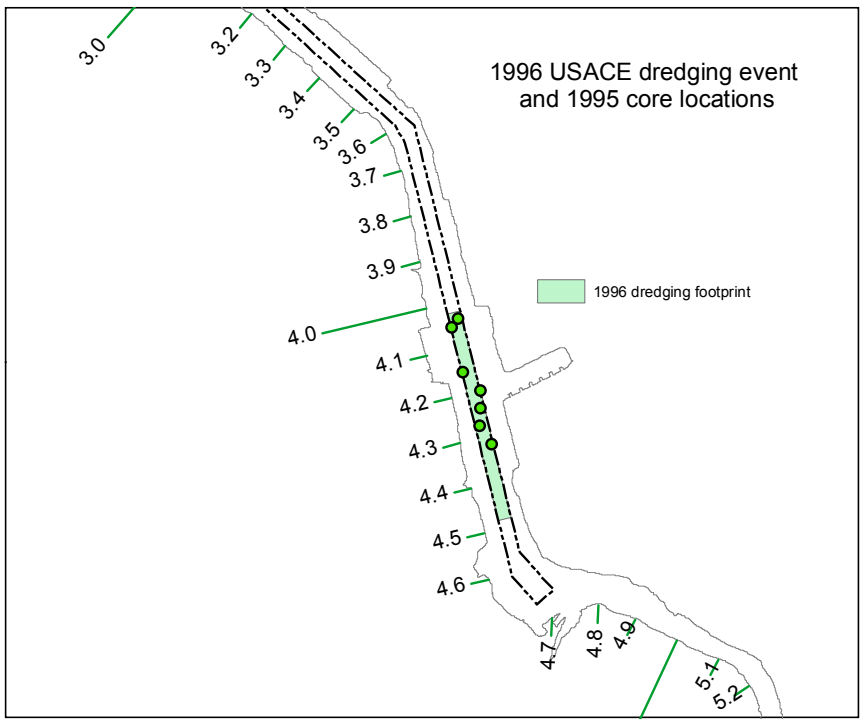
- Arsenic sample location
- PCB sample location
- cPAH sample location
- Dioxin and furan sample location
- Navigation channel
- River Mile marker

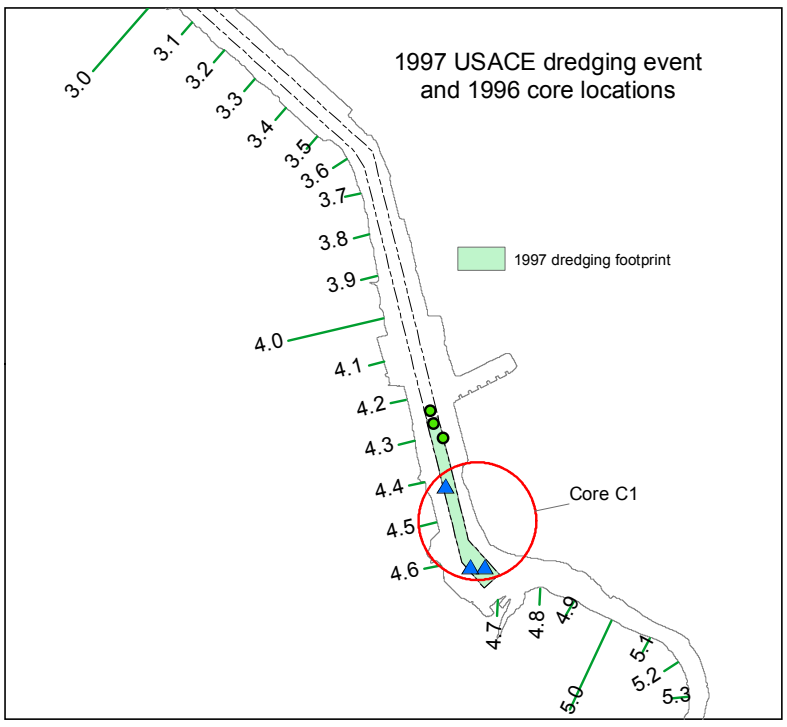
Map 7-5. Surface Sediment Sampling Locations for Arsenic, PCBs, cPAHs, or Dioxins and Furans - RM 5.0 to RM 7.0

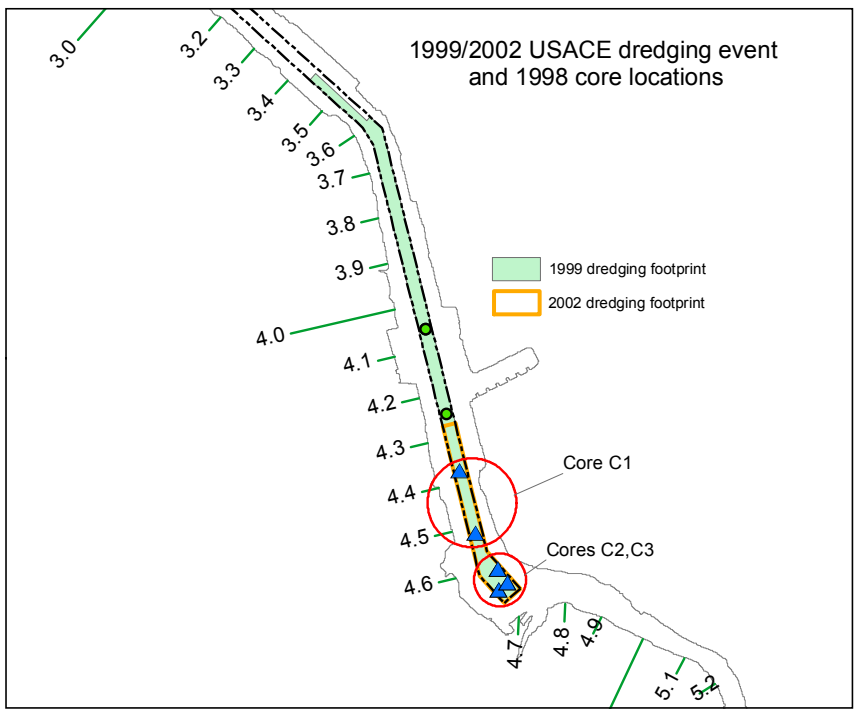
Notes:
1. An additional sample collected from Springbrook Creek (which enters the Duwamish River at RM 10.2) was included in the dioxin and furan dataset for samples from RM 5.0 - 7.0, but is not shown on this map.

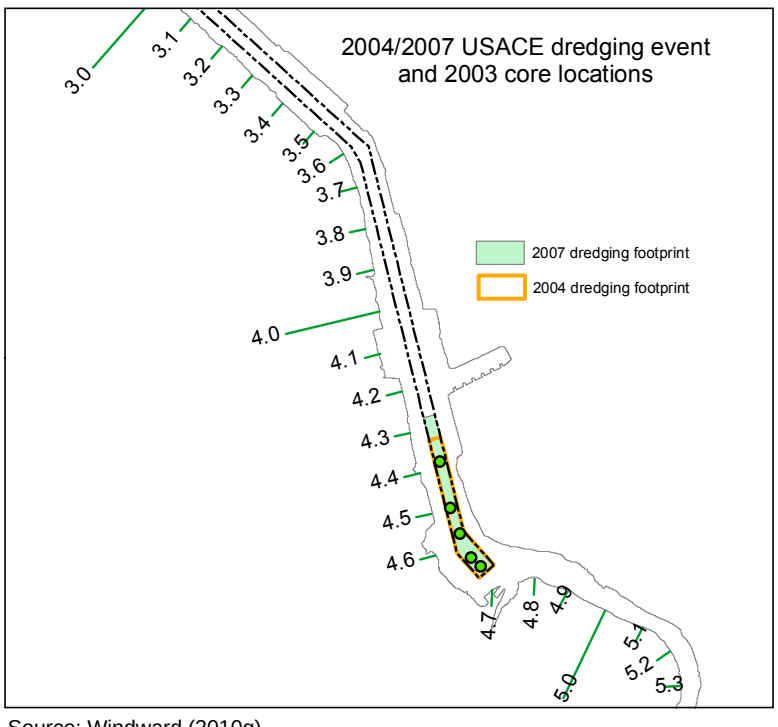












Notes:
1. Sampling data provided by USACE (2007).
2. Dredge footprints from USACE dredge summary and analysis reports.
3. Single sample locations represent stations where a single core was collected (generally from 0 to 4 ft below the mudline), composited over the length of the core, and analyzed. Composite sample locations represent stations where single cores from each of those stations (again, generally from 0 to 4 ft below the mudline) were first composited over the length of the core and then composited with the samples from the cores at other stations prior to analysis.
4. Stations downstream of RM 4.0 not shown.

Source: Windward (2010g)

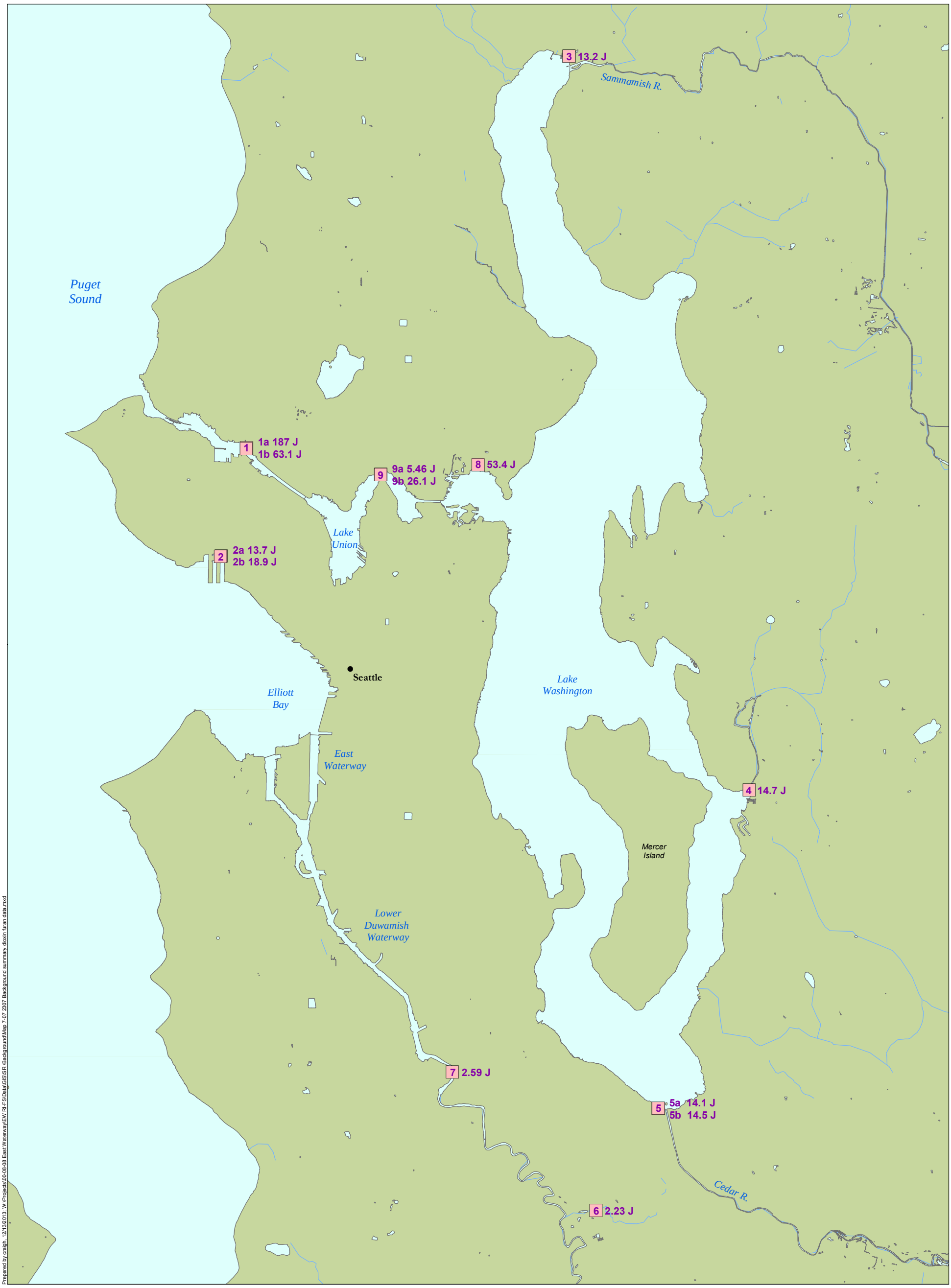
Legend

- Single core location
- Composite core location
- Navigation channel
- River mile

0 250 500 1,000 Meters

N

Map 7-6. Locations of Subsurface Sediment Samples Collected as Part of the 1990 to 2003 USACE Dredged Material Characterization Events



Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Background\Map 7-07 2307 Background summary dioxin furan data.mxd

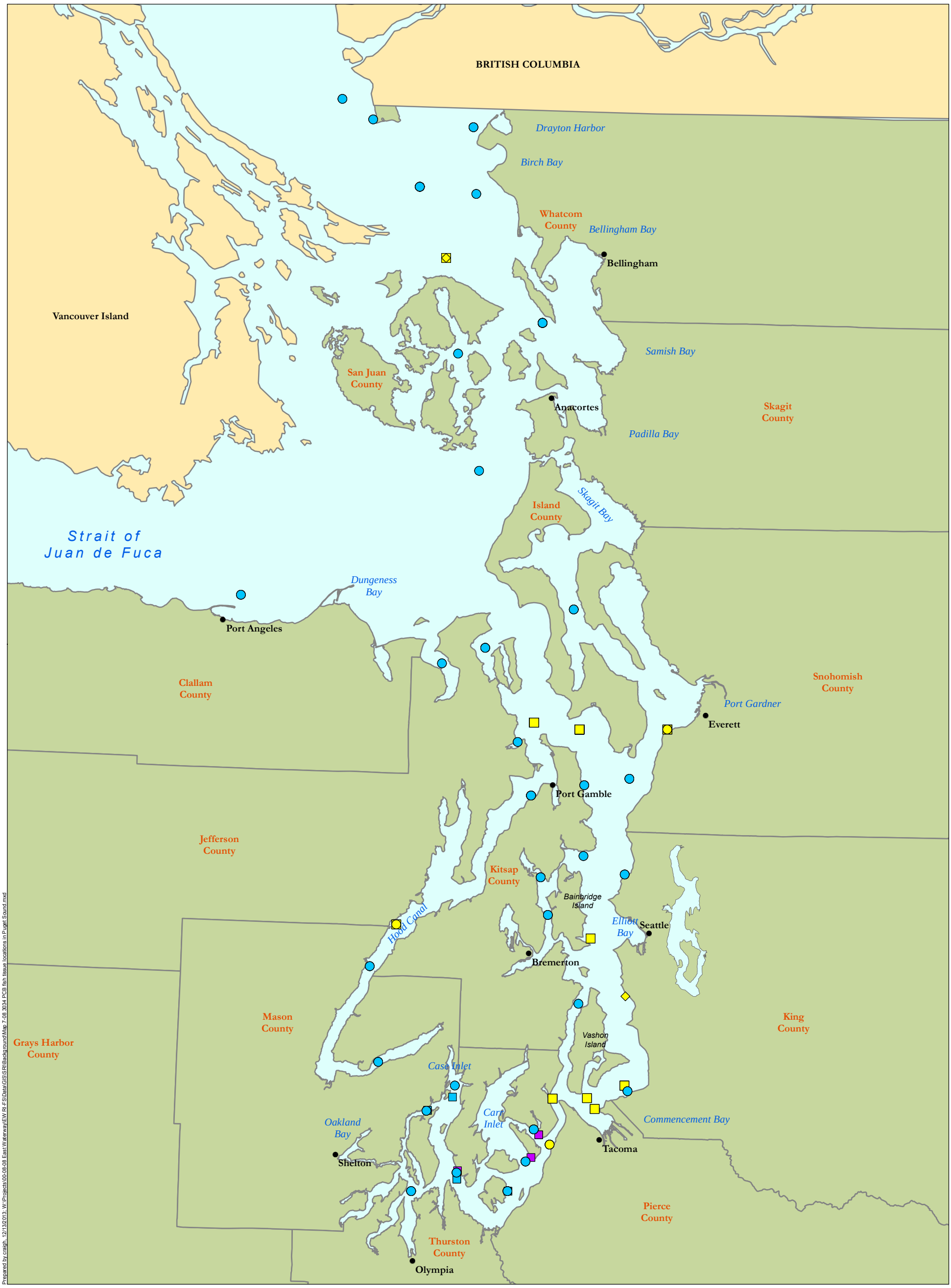
0 3
Miles

Centroid location number
Dioxin and furan TEQ (ng/kg dw)
J: estimated

3 13.2 J

Dioxin and furan TEQs were calculated from individual dioxin and furan concentrations with mammalian TEFs, using ½ the reporting limit for undetected dioxin and furan congeners. The TEQ at location 3 is the average of the original sample value and the field duplicate sample value.

Map 7-7
Dioxin and Furan TEQs in Surface Sediment Samples from the Greater Seattle Area
Supplemental Remedial Investigation
East Waterway Study Area



Fish Tissue Sampling Locations

- English Sole (West et al. 2001)
- English Sole (Era-Miller 2006)
- Rock Sole (Era-Miller 2006)
- Copper Rockfish (West et al. 2001)
- Quillback Rockfish (West et al. 2001)
- Yelloweye Rockfish (West et al. 2001)

Map 7-8
Non-Urban Puget Sound Sampling Locations for Fish Tissue Analyzed for PCBs
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Background\Map 7-08 3034 PCB fish tissue locations in Puget Sound.mxd

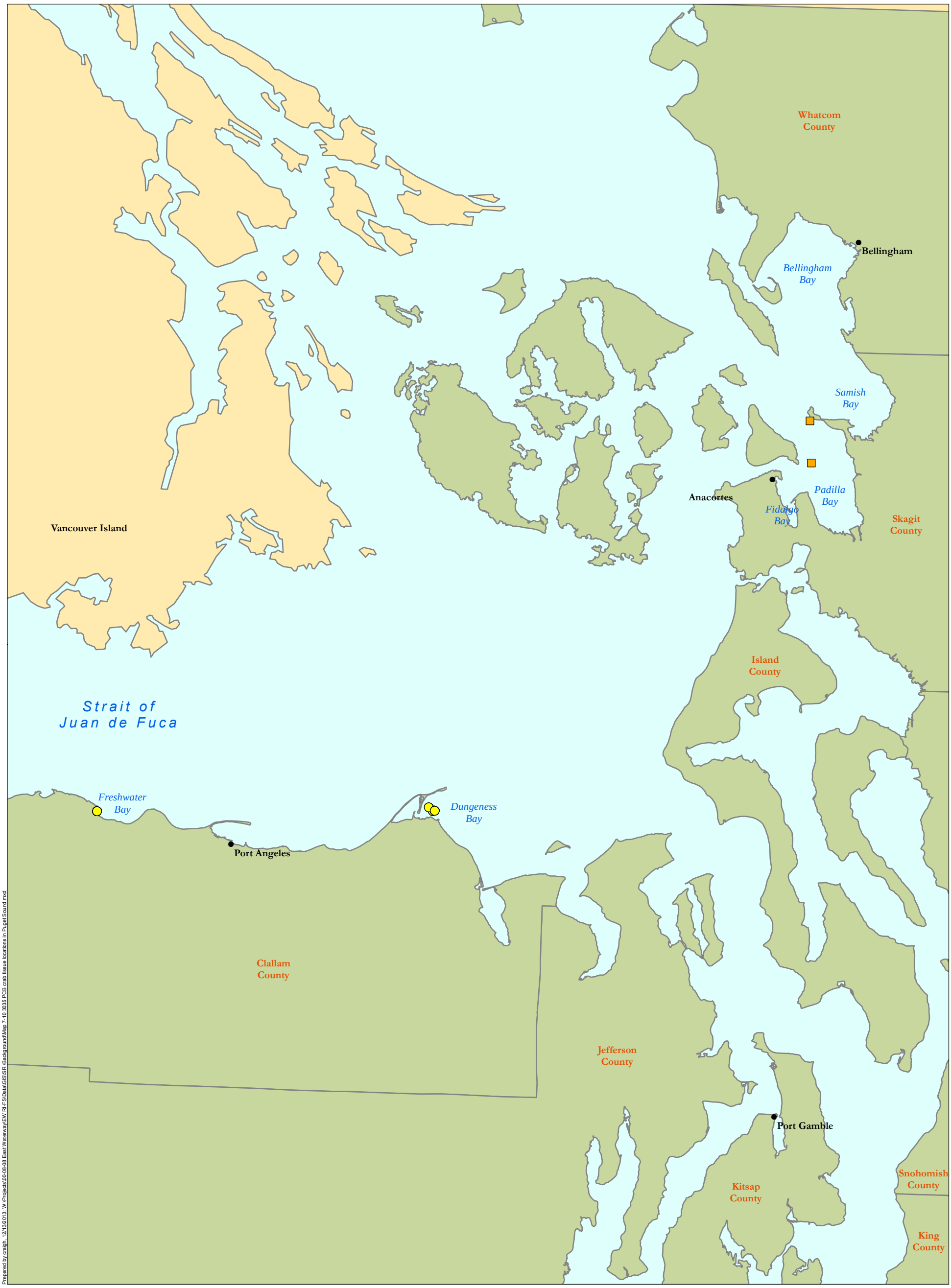
Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Background\Map 7-09 3035 PCB clam tissue locations in Puget Sound.mxd

Clam Tissue Sampling Locations

- Butter Clam (Ecology 2000)
- Littleneck Clam (Ecology 2000)
- Littleneck Clam (Parametrix 2003)
- Geoduck and Horse Clam (Malcolm Pirnie 2007)
- Butter Clam (King County 1995, 2000, 2001, 2002, 2005, 2006, 2009)

0 12
Miles

Map 7-9
Non-Urban Puget Sound Sampling Locations for Clam Tissue Analyzed for PCBs
Supplemental Remedial Investigation
East Waterway Study Area



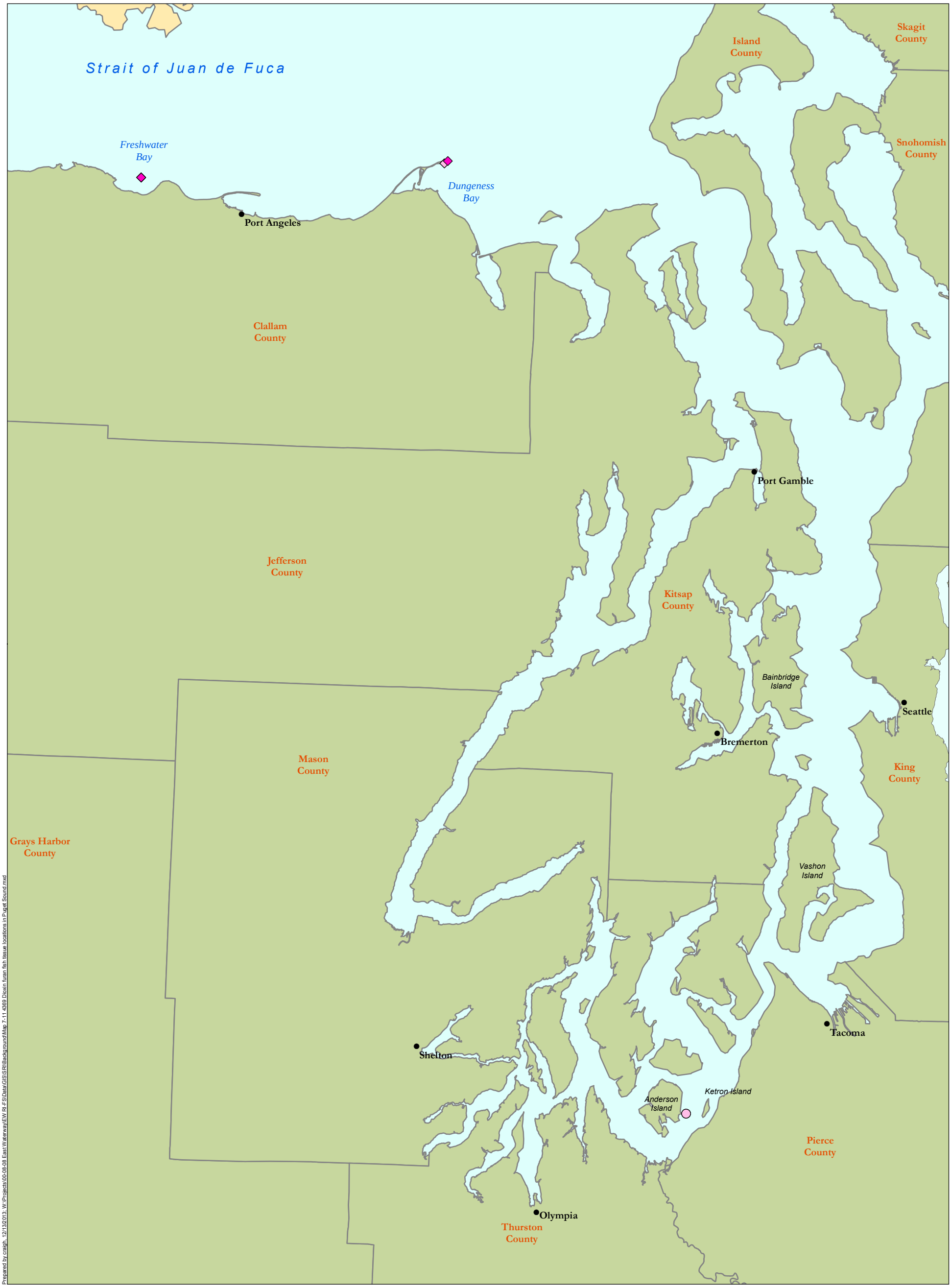
0 12
Miles

Crab Tissue Sampling Locations

- Dungeness Crab (Ecology 2000)
- Dungeness Crab (Malcolm Pirnie 2007)

Map 7-10
Non-Urban Puget Sound Sampling Locations for Crab Tissue Analyzed for PCBs
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Background\Map 7-10 3035 PCB crab tissue locations in Puget Sound.mxd



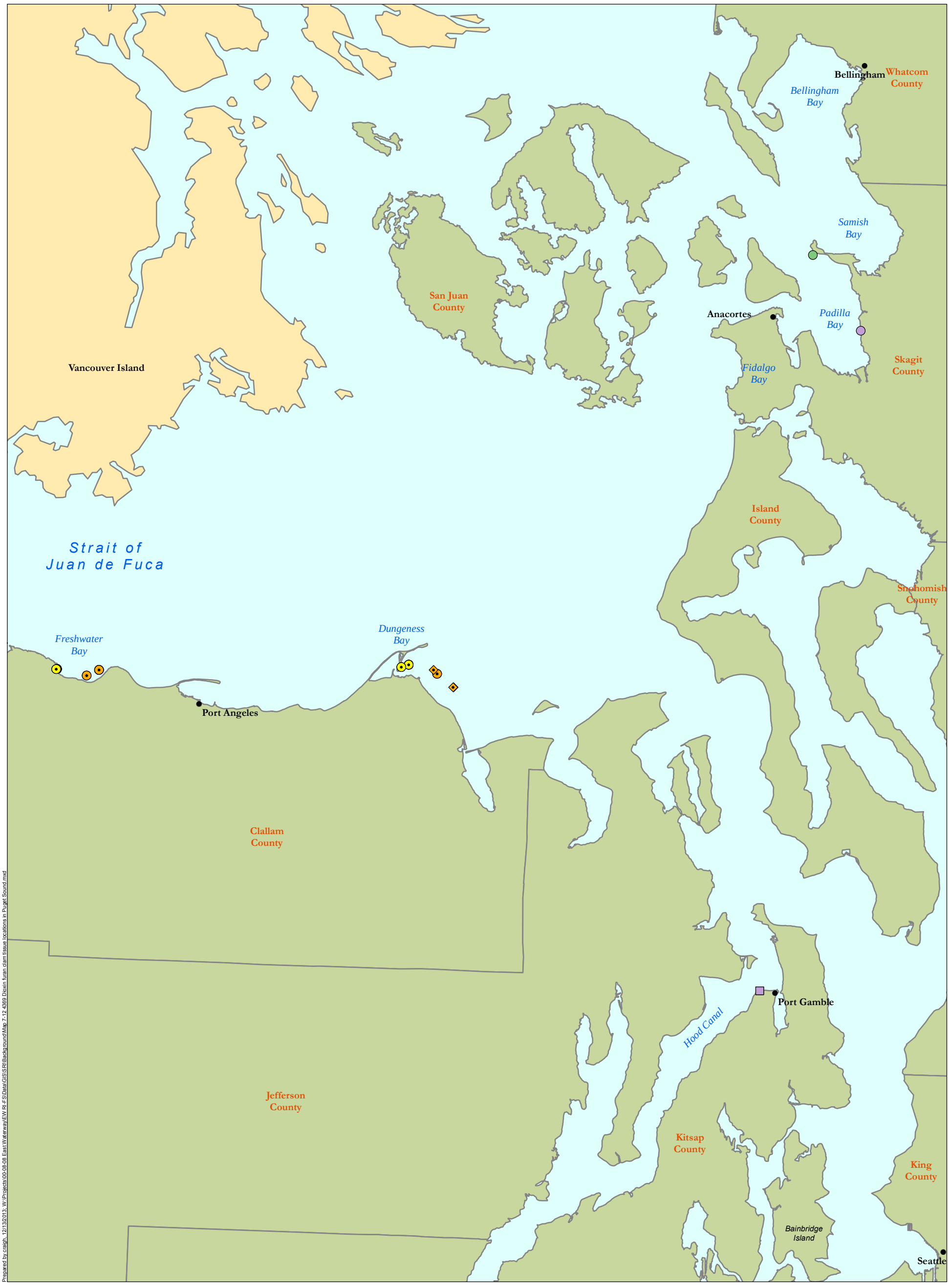
0 12
Miles

Fish Tissue Sampling Locations

- Rock Sole (Malcolm Pirnie 2007)
- Starry Flounder (Malcolm Pirnie 2007)
- English Sole (SAIC 2008b)

Map 7-11
Non-Urban Puget Sound Sampling Locations for Fish Tissue Analyzed for Dioxins/Furans
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Background\Map 7-11 4369 Dioxin furan fish tissue locations in Puget Sound.mxd

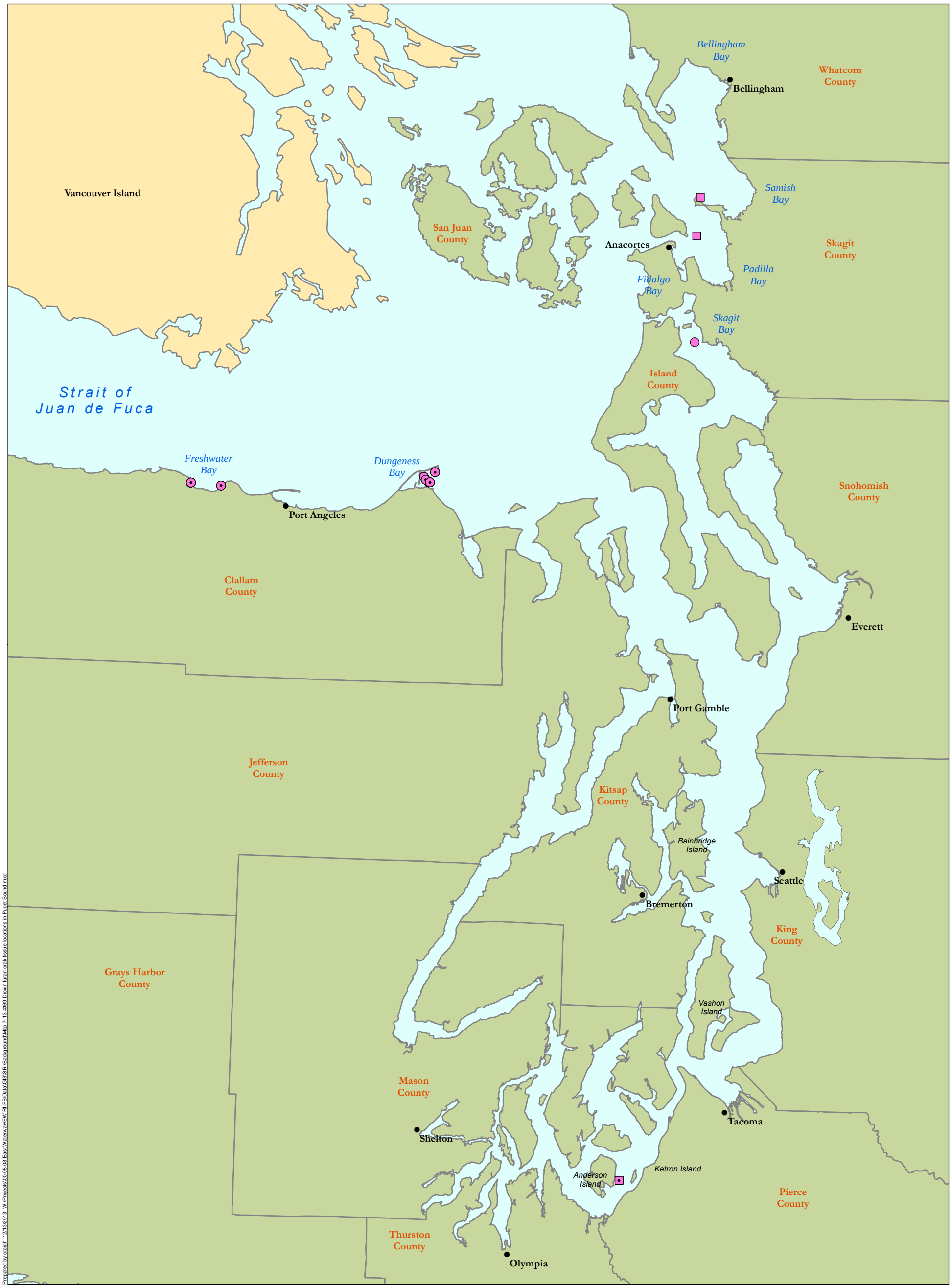


Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Background\Map 7-12 4369 Dioxin furan clam tissue locations in Puget Sound.mxd

Clam Tissue Sampling Locations

- Butter Clam (Ecology 2000)
- Littleneck Clam (Ecology 2000)
- Littleneck Clam (Parametrix 2003)
- Geoduck (Malcolm Pirnie 2007)
- Horse Clam (Malcolm Pirnie 2007)
- Geoduck and/or Horse Clam (Ecology 2009)

Map 7-12
Non-Urban Puget Sound Sampling Locations for Clam Tissue Analyzed for Dioxins/Furans
Supplemental Remedial Investigation
East Waterway Study Area



Crab Tissue Sampling Locations

- Dungeness Crab (PSEP 1991)
- Dungeness Crab (Ecology 2000)
- Dungeness Crab (Malcolm Pirnie 2007)
- Dungeness Crab (SAIC 2008b)

Map 7-13
Non-Urban Puget Sound Sampling Locations for Crab Tissue Analyzed for Dioxins/Furans
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by craigh, 12/13/2013, W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Background\Map 7-13 4369 Dioxin furan crab tissue locations in Puget Sound.mxd

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Background\Map 7-14 4581 cPAH tissue locations in Puget Sound.mxd

Clam Tissue Sampling Locations
- Butter Clam (Ecology 2000)
- Littleneck Clam (Ecology 2000)
- Littleneck Clam (Parametrix 2003)
- Geoduck (Malcolm Pirnie 2007)
- Geoduck (Ecology 2009)

Mussel Tissue Sampling Locations
- Bay Mussel (Ecology 2000)

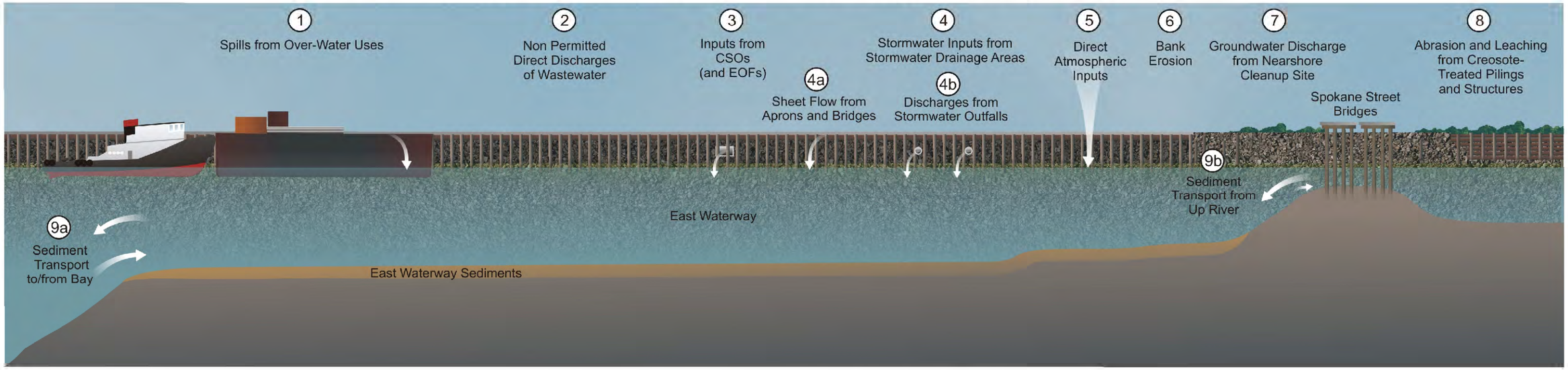
Crab Tissue Sampling Locations
- Dungeness Crab (Ecology 2000)
- Dungeness Crab (Malcolm Pirnie 2007)

Fish Tissue Sampling Locations
- Starry Flounder (Malcolm Pirnie 2007)

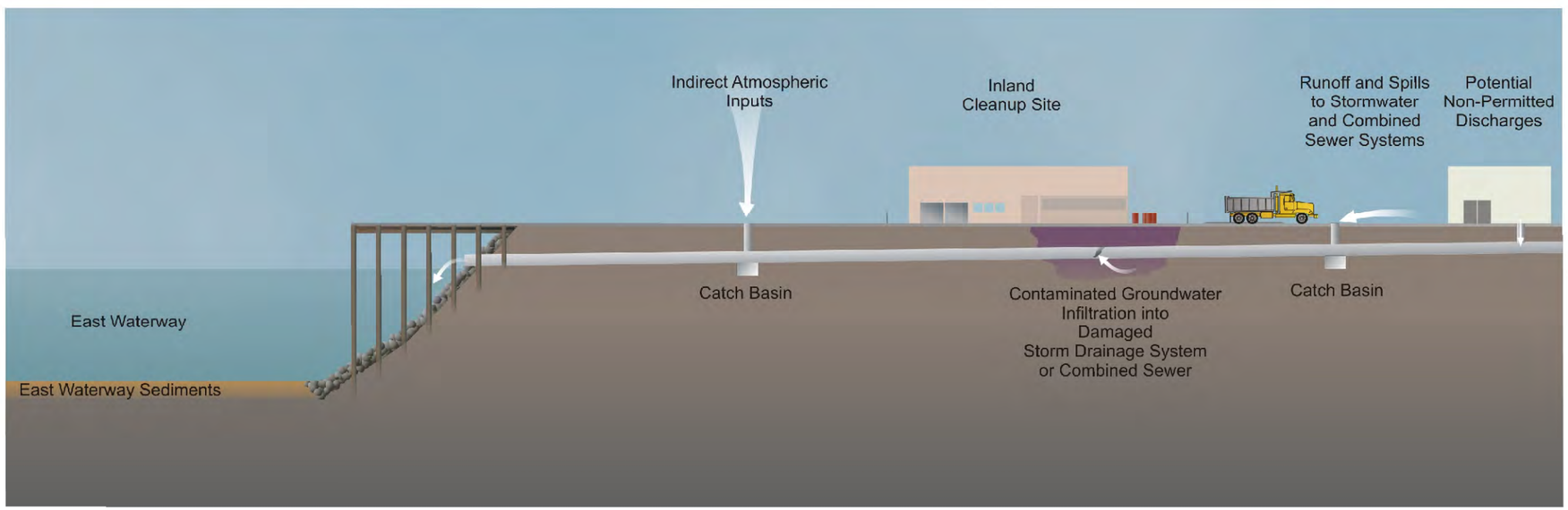
0 12
Miles

Map 7-14
Non-Urban Puget Sound Sampling Locations
for Seafood Tissue Analyzed for cPAHs
Supplemental Remedial Investigation
East Waterway Study Area

Direct Pathways Considered as Part of East Waterway Source Control Evaluation



Indirect Pathways Potentially Contributing to CSO and Stormwater Pathways



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Map 9-1
Pathways Relevant to Source Control Evaluation
Supplemental Remedial Investigation
East Waterway Operable Unit

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Harbor Island Sediment OU

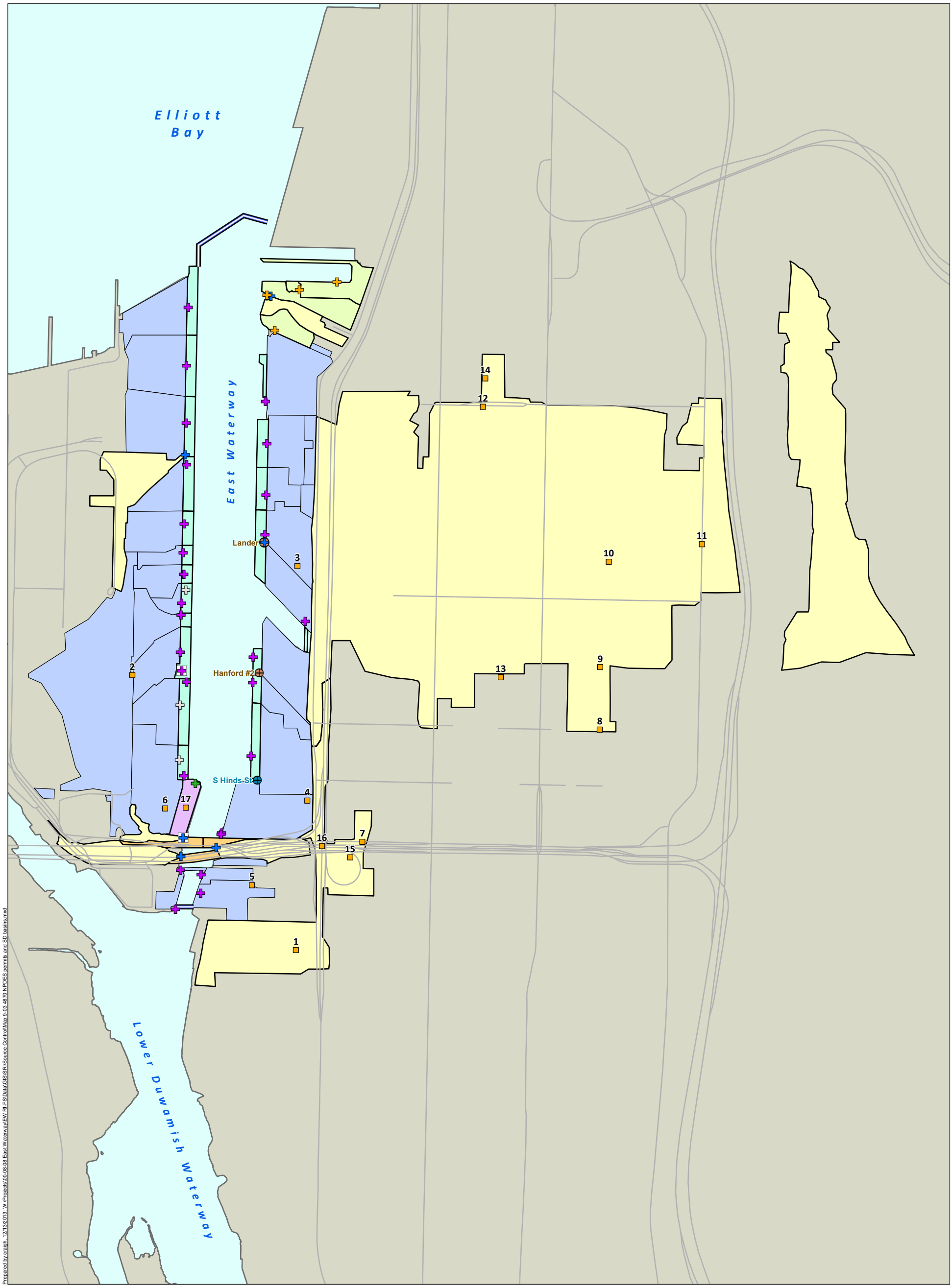
Approximate Operable Unit Boundary (OU)

Notes:
1. All locations approximate.
2, OU = Operable Unit

0 325 650 975 1,300

Scale in Feet

Map 9-2
Location of Selected Former Industrial Operations
Supplemental Remedial Investigation
East Waterway Operable Unit



Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Source Control\Map 9-03 4870 NPDES permits and SD basins.mxd

NPDES Permitted Facility[1]

Combined Sewer Overflow Outfalls

- City of Seattle CSO/SD
- King County CSO
- King County CSO/City of Seattle SD

Storm Drain Outfalls[2]

- Port of Seattle
- City of Seattle
- US Coast Guard
- City EOF/Port SD
- City EOF/City SD
- Private
- Unknown Outfall

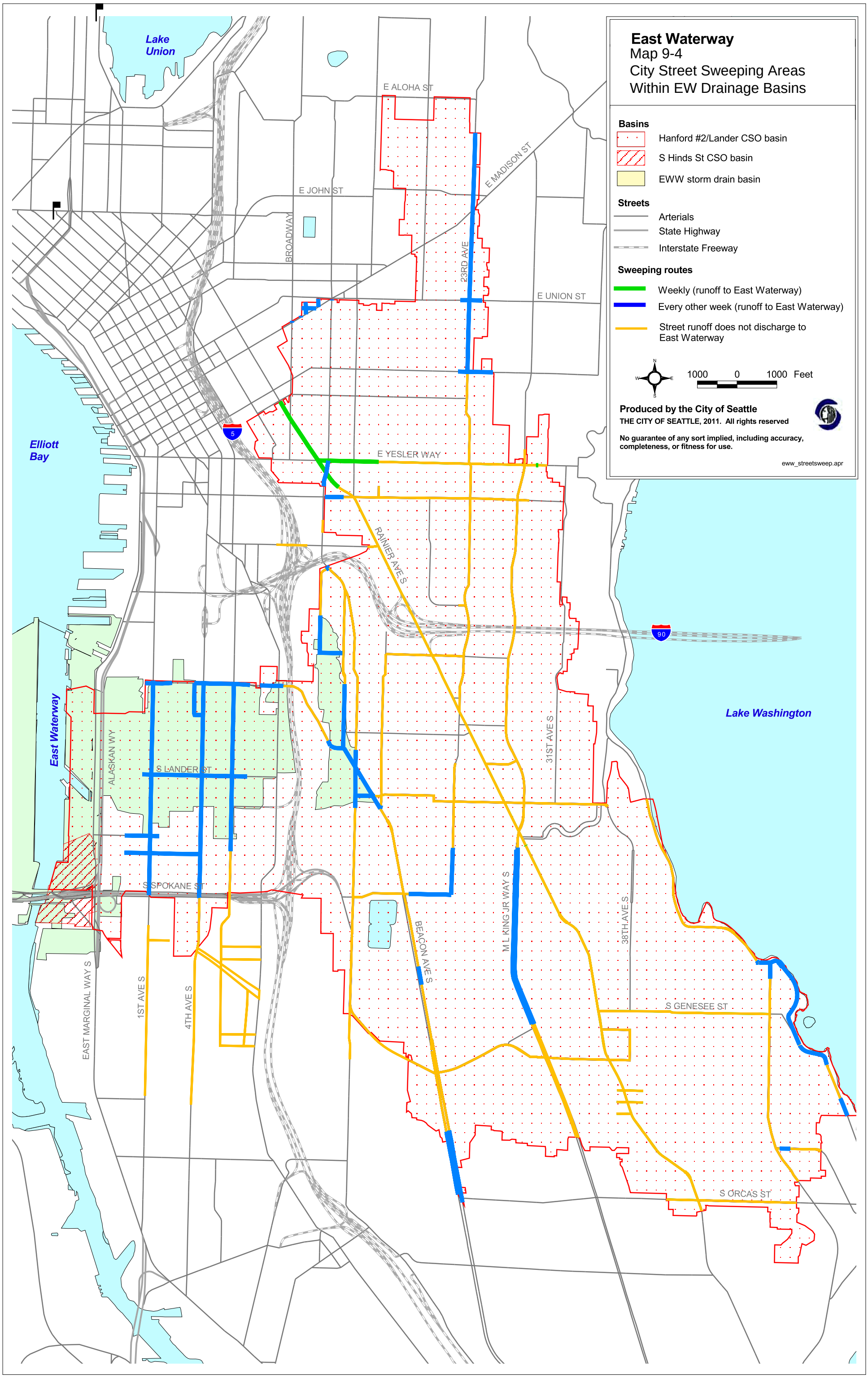
Basin/Sub-Basin

- Port of Seattle Basin
- Port of Seattle Apron or Bridge
- SPU Basin
- SPU Bridge
- Olympic Tug and Barge Basin
- Coast Guard Basin
- East Waterway Study Area Boundary

0 1,200
Scale in feet

Map 9-3
NPDES Permitted Facilities EW Storm Drain Basins
Supplemental Remedial Investigation
East Waterway Study Area

[1] Sources: 2009 Environmental Data Resources Inc. East Waterway Drainage Area. EDR DataMap™ Environmental Atlas™. Prepared for Anchor QEA, LLC. December 4, 2009; WA Dept. of Ecology PARIS database, August 29, 2011. The T-18 NPDES permit includes all discharges from T-18 from outfalls 7-24, as well as any discharge to Elliott Bay and the West Waterway.
[2] Only outfalls with active stormwater discharges from separated storm drain basins are shown on this figure.


East Waterway
Map 9-4
City Street Sweeping Areas
Within EW Drainage Basins
Basins
Hanford #2/Lander CSO basin
S Hinds St CSO basin
EWW storm drain basin
Streets
Arterials
State Highway
Interstate Freeway
Sweeping routes
Weekly (runoff to East Waterway)
Every other week (runoff to East Waterway)
Street runoff does not discharge to East Waterway
1000 0 1000 Feet
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THE CITY OF SEATTLE, 2011. All rights reserved
No guarantee of any sort implied, including accuracy, completeness, or fitness for use.
eww_streetsweep.apr
Lake Union
Elliott Bay
East Waterway
Lake Washington
E ALOHA ST
E JOHN ST
E MADISON ST
E UNION ST
E YESLER WAY
BROADWAY
23RD AVE
RAINIER AVE S
31ST AVE S
S LANDER ST
ALASKAN WY
S SPOKANE ST
EAST MARGINAL WAY S
1ST AVE S
4TH AVE S
BEACON AVE S
M L KING JR WAY S
38TH AVE S
S GENESEE ST
S ORCAS ST
5
90

Q:\Jobs\060003-01 East Waterway SRI-FS\Maps\SRI\Map 9-5 Inspection Locations.mxd ckiblinger 1/23/2014 4:52:58 PM

Combined Sewer Basins
- Hinds (City of Seattle)
- Lander (King County)
- Hanford (King County)

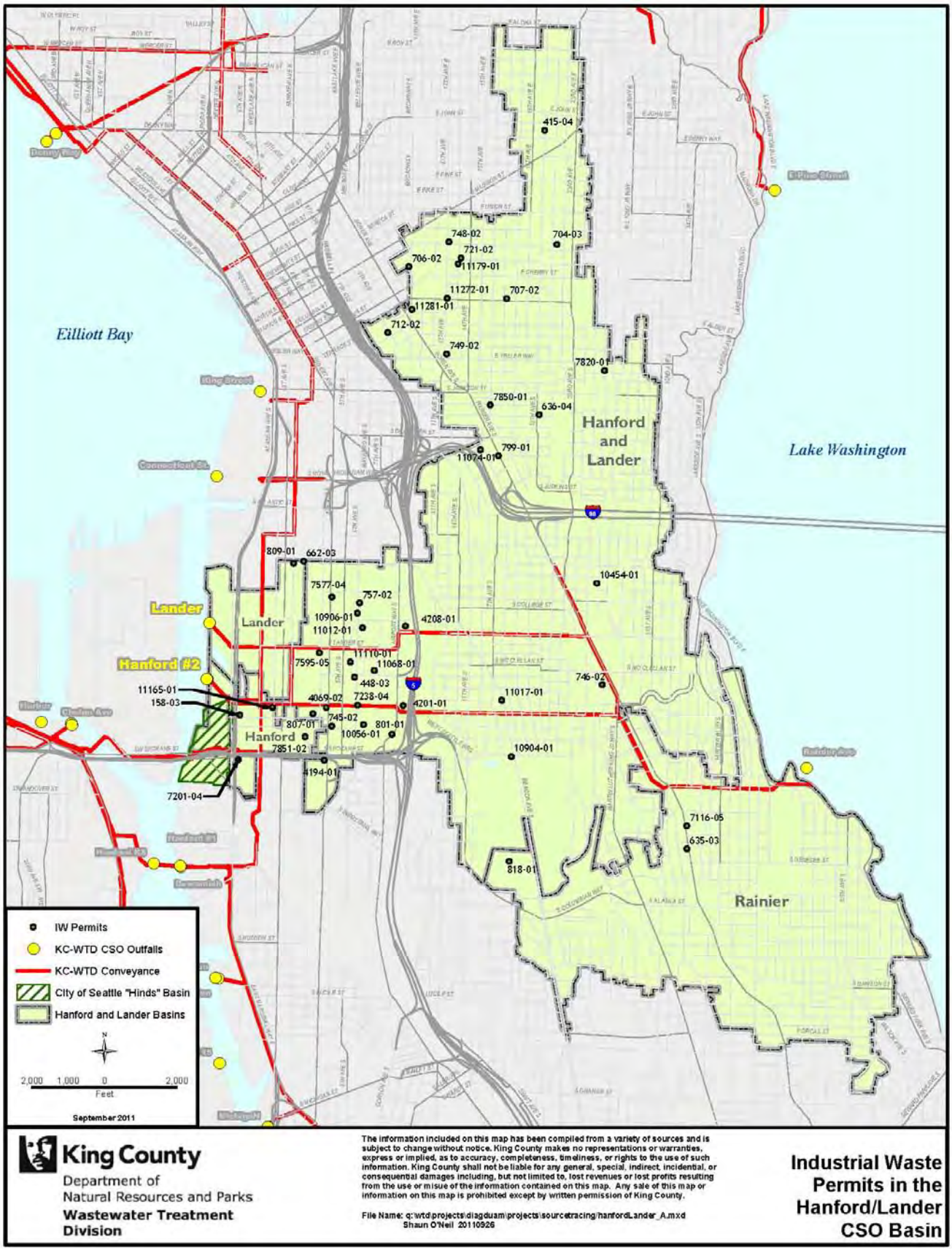
Storm Basins
- City of Seattle
- Port of Seattle
- Private
- USCG

- Port of Seattle ECAP Assessments
- Seattle Public Utilities Business Inspections
- King County Industrial Waste Inspections

N

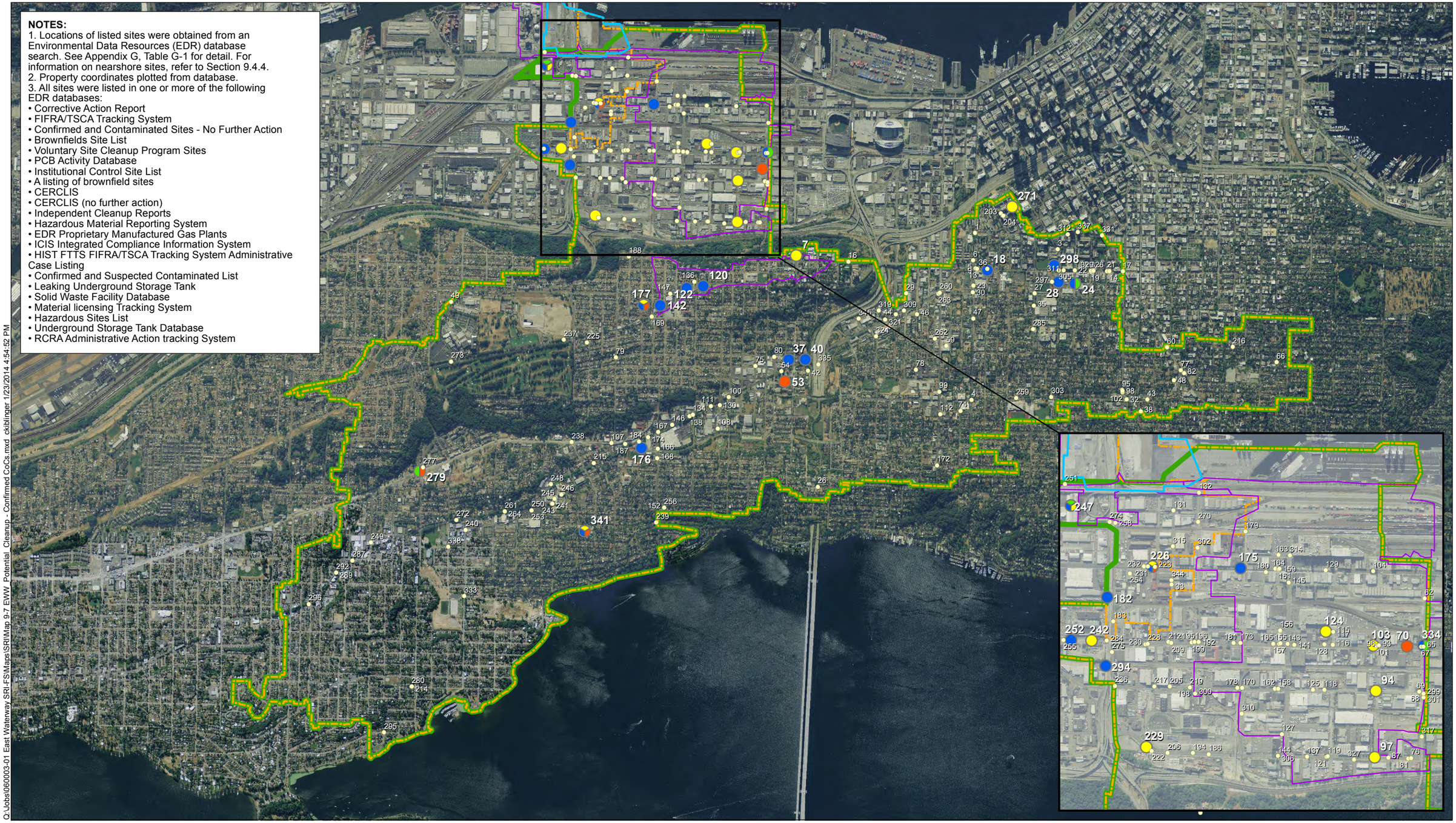
0 3,000
Scale in feet

Map 9-5
Inspection Locations
Supplemental Remedial Investigation
East Waterway Operable Unit



Map 9-6

County Industrial Waste Permits in the Hanford/Lander CSO Basin Map
Supplemental Remedial Investigation
East Waterway Operable Unit



Combined Sewer Basins
- Hinds (City of Seattle)
- Lander (King County)
- Hanford (King County)

Storm Basins
- City of Seattle

Listed Site[3]

Sites with Confirmed CoCs
- PAH
- PCB
- Arsenic
- Metals

0 2,500
Scale in feet

Map 9-7
Listed Sites Reported within EW Combined Sewer and Inland Storm Drainage Basins
Supplemental Remedial Investigation
East Waterway Operable Unit

Q:\Jobs\060003-01 East Waterway SRI-FS\Maps\SRI\Map 9-8 EWW_Spill.mxd ckitblinger 1/23/2014 4:58:50 PM

Spill Site
Spills Directly to East Waterway

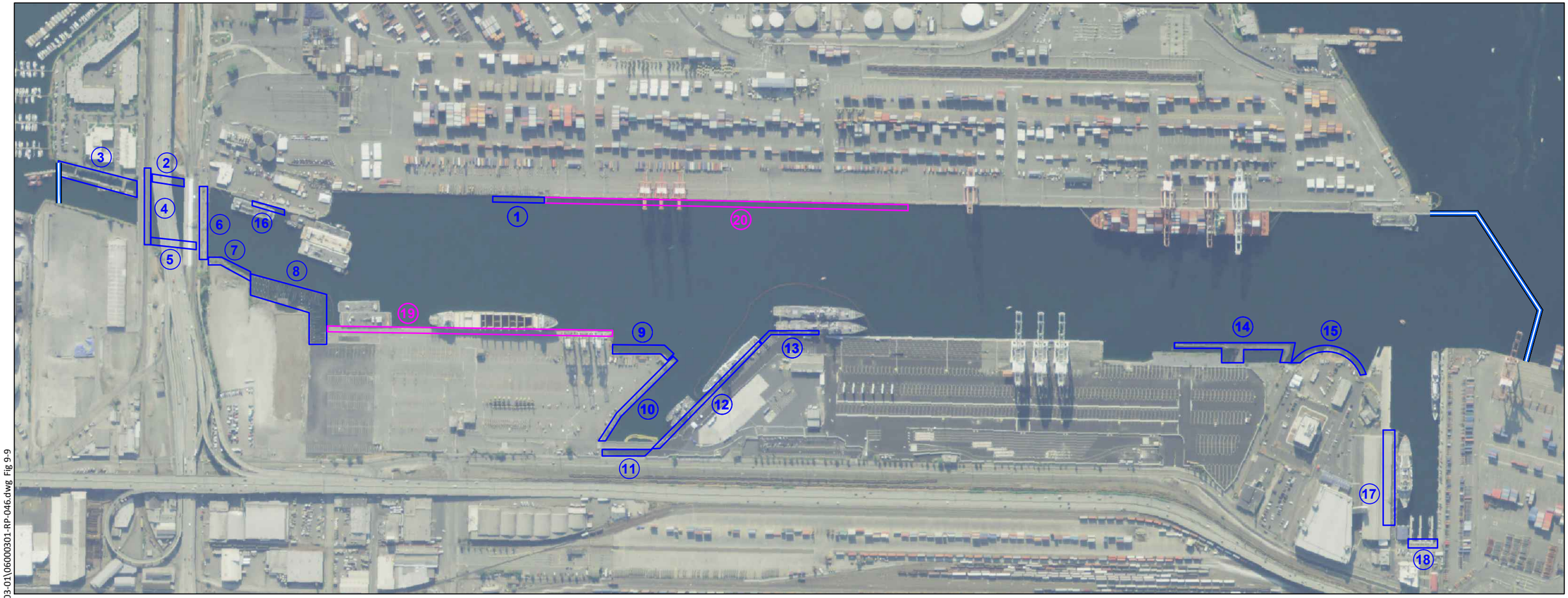
Combined Sewer Basins
Hinds (City of Seattle)
Lander (King County)
Hanford (King County)

Storm Basins
City of Seattle
Port of Seattle
Private
USCG

N

0 3,000
Scale in feet

Map 9-8
Reported Spill Sites
Supplemental Remedial Investigation
East Waterway Operable Unit



Creosoted Bulkheads, Pile and Fender Pile Areas:

1. **Terminal 18B**
   ~ 20 Fender Piles
2. **Bank 10**
   ~ 5 Stub Piles
   ~ 10 Lineal Foot Bulkhead
3. **Bank 9B**
   ~ 20 Dock and Walkway Piles
4. **Rail Bridge**
   ~ 270 Foundation Piles
5. **Bank 8**
   ~ 100 Lineal Foot Bulkhead
6. **Spokane Street Pedestrian Bridge**
   ~ 300 Foundation Piles
7. **Bank 7A**
   ~ 5 Piles
8. **Bank 7B and 7C**
   ~ 1,700 Piles
9. **Bank 6**
   ~ 5 Stub Piles
10. **Bank 5 - Slip 27 South Side**
    ~ 40 Stub Piles
11. **Bank 4**
    ~ 20 Stub Piles
12. **Slip 27**
    ~ 85 Fender Piles
13. **Terminal 30**
    ~ 20 Fender Piles
14. **Pipe Rack and Dock**
    ~ 750 Foundation Piles
15. **Bank 2**
    ~ 50 Piles (some Stub)
    ~ 20 Lineal Foot Bulkhead
16. **Olympic Tug and Barge Bulkhead**
    ~ 5 Fender Piles
17. **USCG Southeast Pier**
    ~ 1400 Foundation Piles
18. **USCG East Pier**
    ~ 40-50 Stub Piles

Chromated Copper Arsenate (CCA) Pile and Fender Pile Areas[5]:

19. **Terminal 25**
    ~ CCA Fender Piles
    ~ Concrete Structural Piling
20. **Terminal 18A**
    ~ CCA Fender Piles
    ~ Concrete Structural Piling

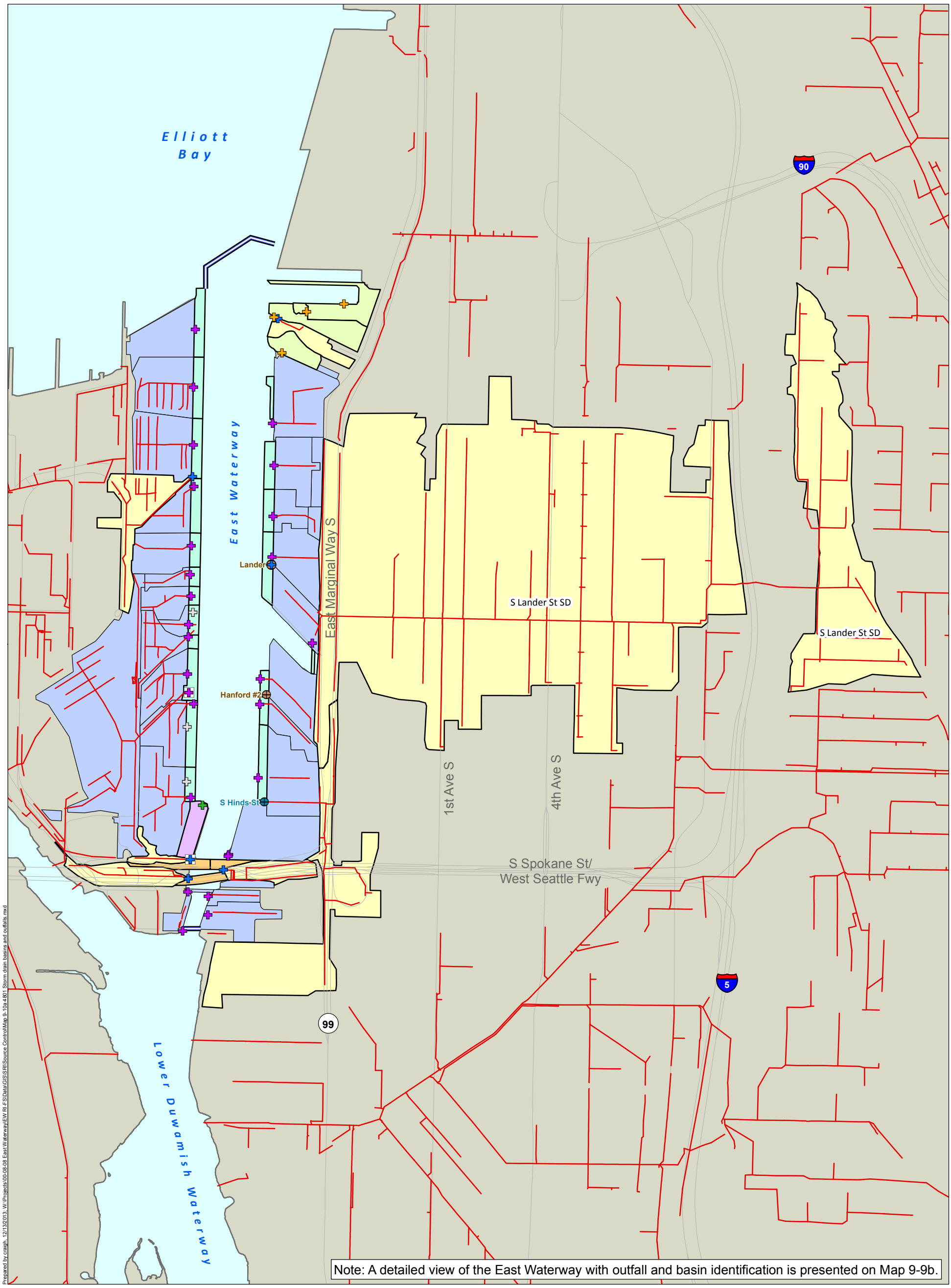
East Waterway Study Area Boundary

0 550
Scale in Feet

NOTES:
1. Stub Pile: Pile that extends 3 feet or less above the surface.
2. Pile counts based on visual observations made at low tide on 5/27/2010. Pile counts approximate (+/- 10%).
3. Pipe rack and dock structure pile counts approximate (+/- 20%).
4. Coast Guard area inspected on 6/8/2010.
5. Terminal 18 Pile Counts updated on 1/9/12 based on Port improvements.
6. Fender Pile: Non-structural protective mooring piling.

Jan 24, 2014 9:04am chewett K:\Jobs\060003-PORT OF SEATTLE\060003-01\06000301-RP-046.dwg Fig 9-9

Map 9-9
Current Location of Creosote and CCA Treated Structures
Supplemental Remedial Investigation
East Waterway Operable Unit



Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Source Control\Map 9-10a 4801 Storm drain basins and outfalls.mxd

Storm Drain Outfalls[1]
- Port of Seattle
- City of Seattle
- US Coast Guard
- City EOF/Port SD
- City EOF/City SD
- Private
- Unknown Outfall

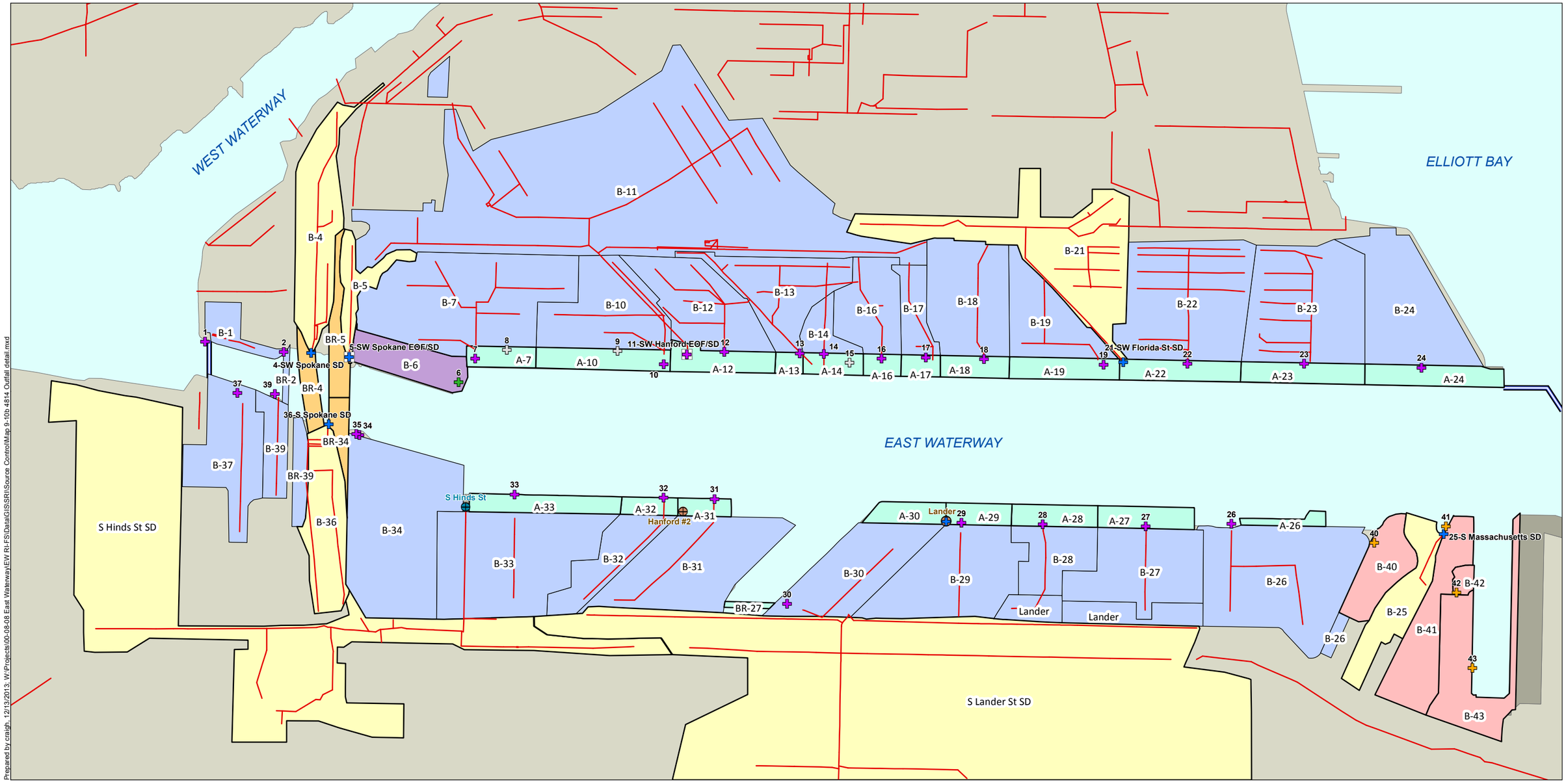
Combined Sewer Overflow Outfalls
- City of Seattle CSO/SD
- King County CSO
- King County CSO/City of Seattle SD
- Storm Water Line
- Road
- East Waterway Study Area Boundary

Basin/Sub-Basin
Labeled with sub-basin ID
- Port of Seattle Basin
- Port of Seattle Apron or Bridge
- SPU Basin
- SPU Bridge
- Olympic Tug and Barge Basin
- Coast Guard Basin

[1] Only outfalls with active stormwater discharges from separated storm drain basins are shown on this figure.

0 1,200
Scale in feet

Map 9-10a
EW Storm Drain System Overview
Supplemental Remedial Investigation
East Waterway Study Area



Storm Drain Outfalls[1]

- Port of Seattle
- City of Seattle
- US Coast Guard
- City EOF/Port SD
- City EOF/City SD
- Private
- Unknown Outfall

Combined Sewer Overflow Outfalls

- City of Seattle CSO/SD
- King County CSO
- King County CSO/City of Seattle SD
- Storm Water Line
- East Waterway Study Area Boundary

Basin/Sub-Basin

Labeled with sub-basin ID

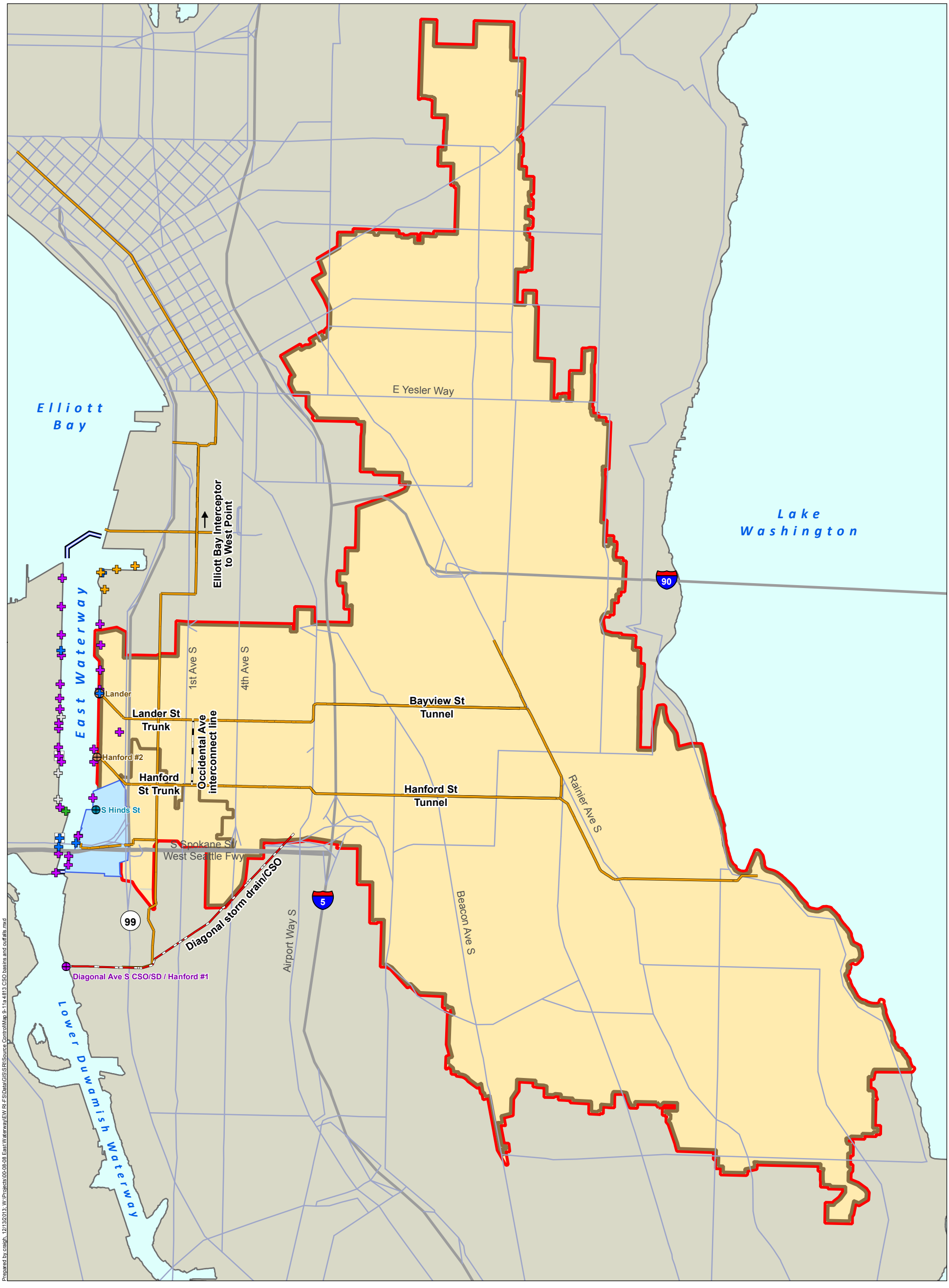
- Port of Seattle Basin
- Port of Seattle Apron or Bridge
- SPU Basin
- SPU Bridge
- Olympic Tug and Barge Basin
- Coast Guard Basin

[1] Only outfalls with active stormwater discharges from separated storm drain basins are shown on this figure.

0 600
Scale in feet

Map 9-10b
EW Storm Drain Outfall Detail
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Source Control\Map 9-10b 4814 Outfall detail.mxd



Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Source Control\Map 9-11a 4813 CSO basins and outfalls.mxd

S Hinds CSO Basin[1]
Lander CSO Basin[2]
Hanford #2 CSO Basin[2]
Combined Sewer Trunk Line
Diagonal Storm Drain

Combined Sewer Overflow Outfalls

- City of Seattle CSO/SD
- King County CSO
- King County CSO/City of Seattle SD
- King County CSO/City of Seattle CSO/SD

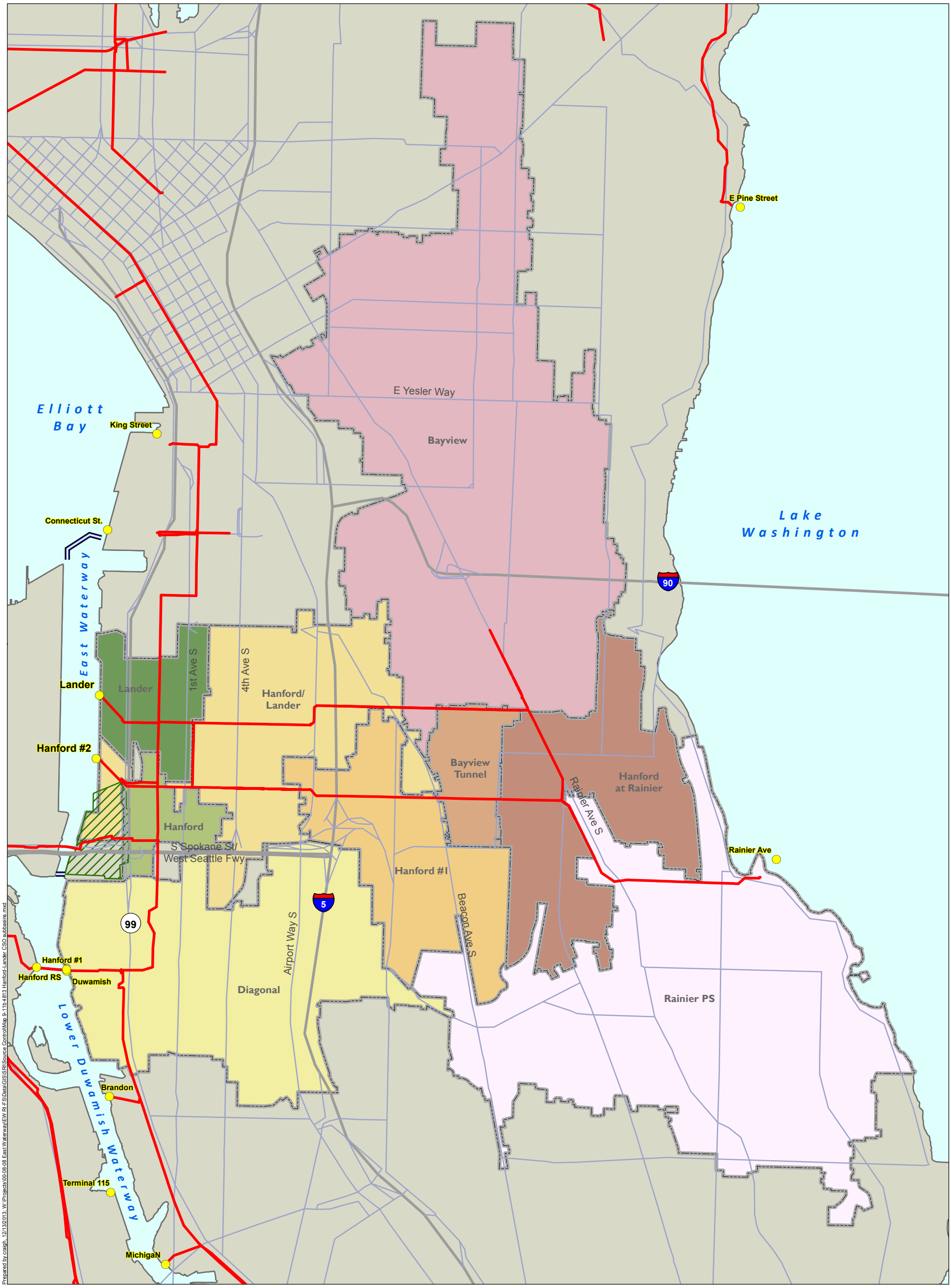
Storm Drain Outfalls

- Port of Seattle
- City of Seattle
- US Coast Guard
- City EOF/Port SD
- City EOF/City SD
- Private
- Unknown Outfall
- East Waterway Study Area Boundary

0 1,800
Scale in feet

Map 9-11a
EW CSO Basins and Outfalls
Supplemental Remedial Investigation
East Waterway Study Area

[1] Source: City of Seattle. The City's Hinds CSO discharges to the Hinds CSO/SD outfall owned by the City of Seattle.
[2] Source: King County. The Lander and Hanford No. 2 CSO basins are largely coincident. The Lander CSO discharges to a CSO/SD outfall owned by King County; the City is responsible for operating and maintaining the separated SD system. The Hanford No. 2 CSO discharges to a CSO outfall owned by King County.
Note: Service area boundaries have not been completely validated.



Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Source Control\Map 9-11b 4813 Hanford-Lander CSO subbasins.mxd

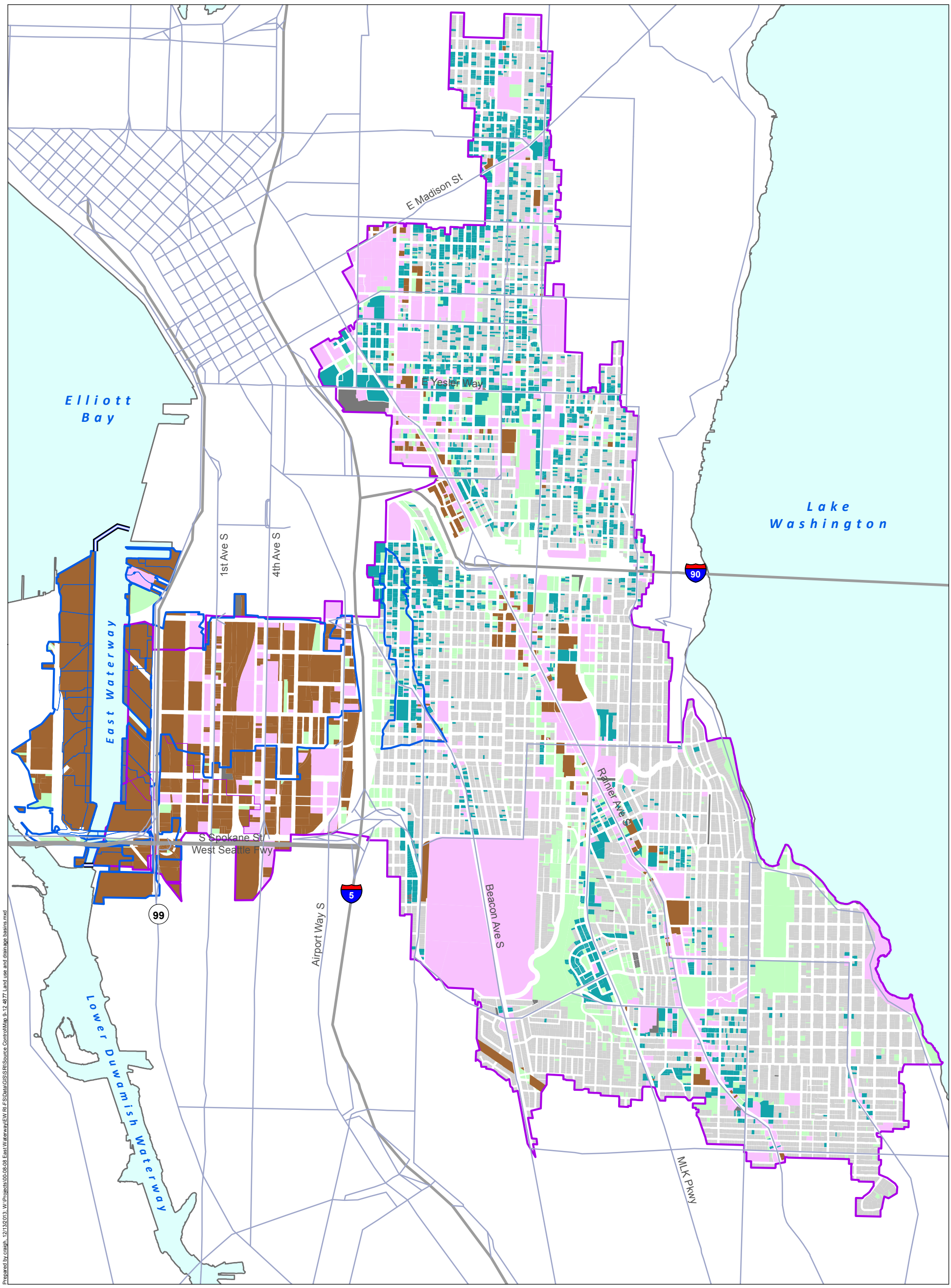
Hanford and Lander Basins

- Lander RS
- Hanford RS
- Diagonal
- Hanford/Lander
- Hanford #1 RS
- Lander post Bayview
- Hanford/Rainier
- Bayview
- Rainier PS
- City of Seattle "Hinds" Basin
- KC-WTD CSO Outfalls
- KC-WTD Conveyance
- East Waterway Study Area Boundary

0 1,800
Scale in feet

Source: King County. Note: Service area boundaries have not been completely validated.

Map 9-11b
Hanford/Lander CSO Basin with Subbasins
Supplemental Remedial Investigation
East Waterway Study Area



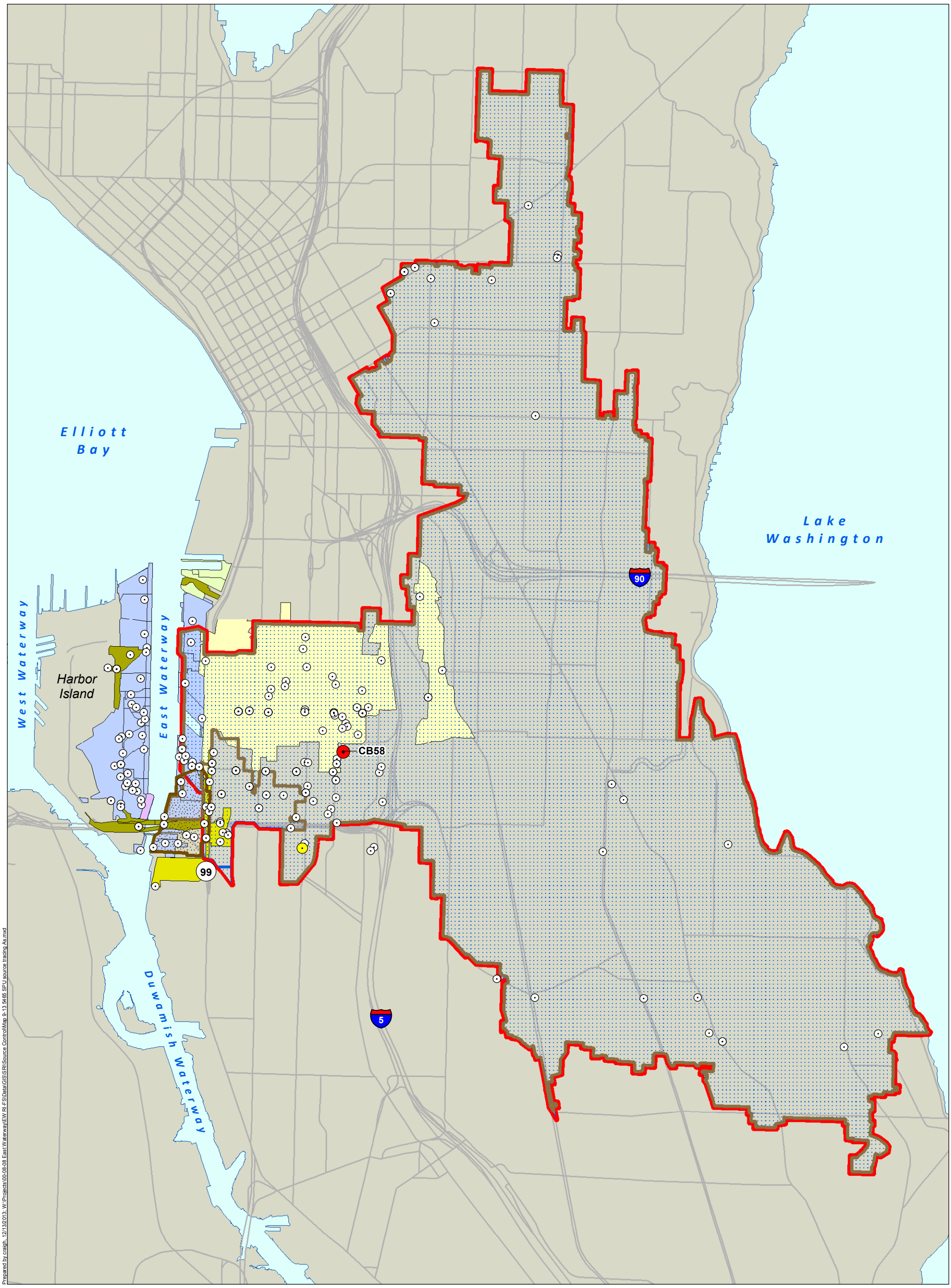
Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Source Control\Map 9-12 4877 Land use and drainage basins.mxd

Land Use
- Commercial
- Industrial
- Single-Family Residential
- Multi-Family Residential
- Parks/Open Space/Vacant
- Other
- Right-of-Way

- SD Basin Area
- CSO Basin Area
- East Waterway Study Area Boundary

0 1,800
Scale in feet

Map 9-12
EW Land Use and Drainage Basins
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Source Control\Map 9-13 5465 SPU source tracing As.mxd

Arsenic[a]

- > 2LAET
- > LAET
- No Exceedance/Non-Detect

CSO Basins

- Combined Sewer Service Area
- S Hinds CSO
- Lander CSO
- Hanford #2 CSO

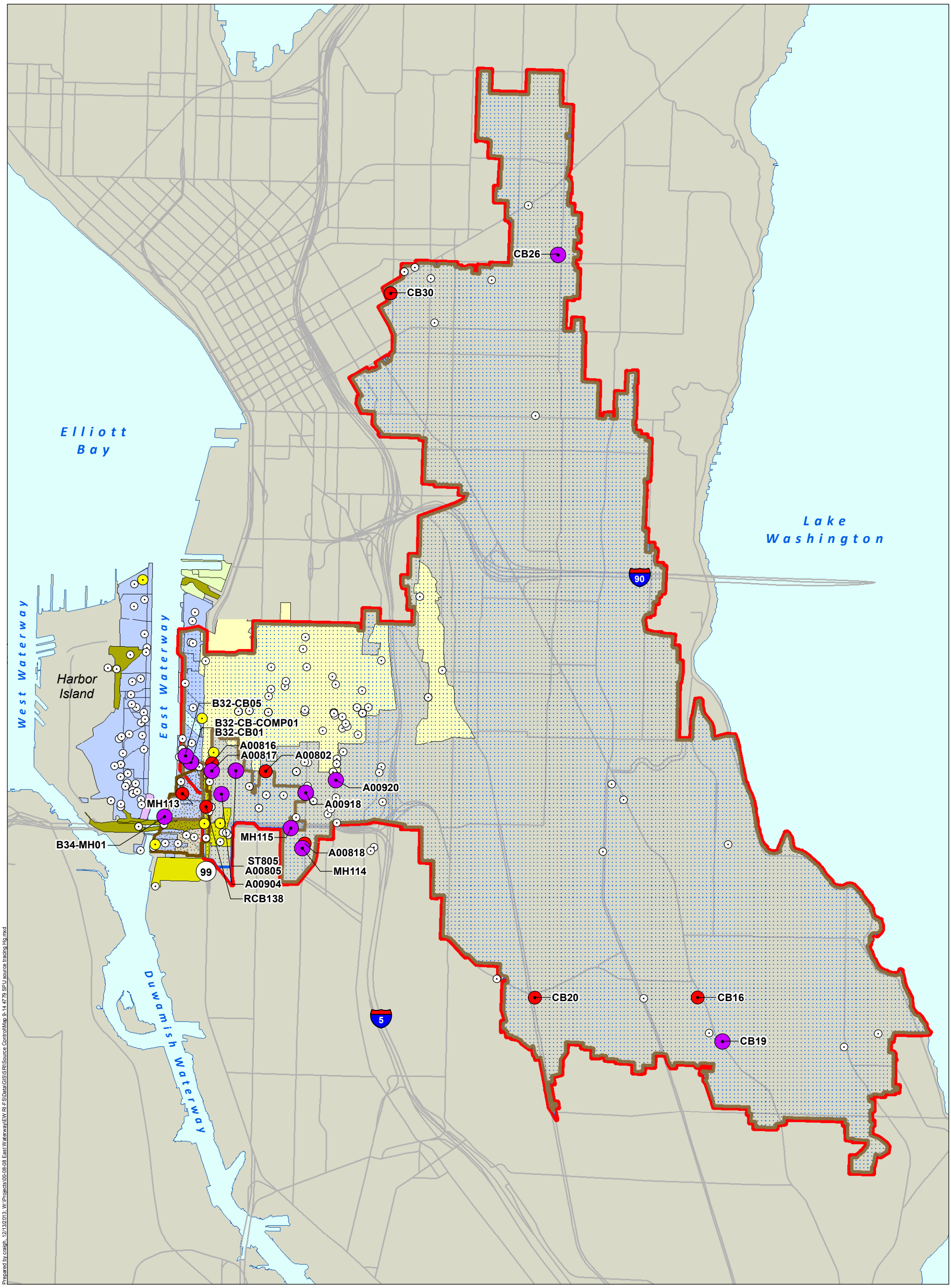
Storm Drainage Basins

- Port Nearshore SD
- S Lander St SD
- S Hinds St SD
- SPU Nearshore SD
- Olympic Tug and Barge
- Coast Guard

[a] Results are based on SD and CSO solids data. Basin composite samples shown in centroid of basin for Port Nearshore SD basins. For co-located samples, most recent data is shown on top of older data; for multiple samples taken on the same date from different locations in the pipe, lesser exceedance categories are shown on top of greater exceedance categories.

0 1,500
Scale in feet

Map 9-13
Source Tracing Results, Arsenic
Supplemental Remedial Investigation
East Waterway Study Area



Mercury[a]

- > 2x 2LAET
- > 2LAET
- > LAET
- No Exceedance/Non-Detect

CSO Basins

- Combined Sewer Service Area
- S Hinds CSO
- Lander CSO
- Hanford #2 CSO

Storm Drainage Basins

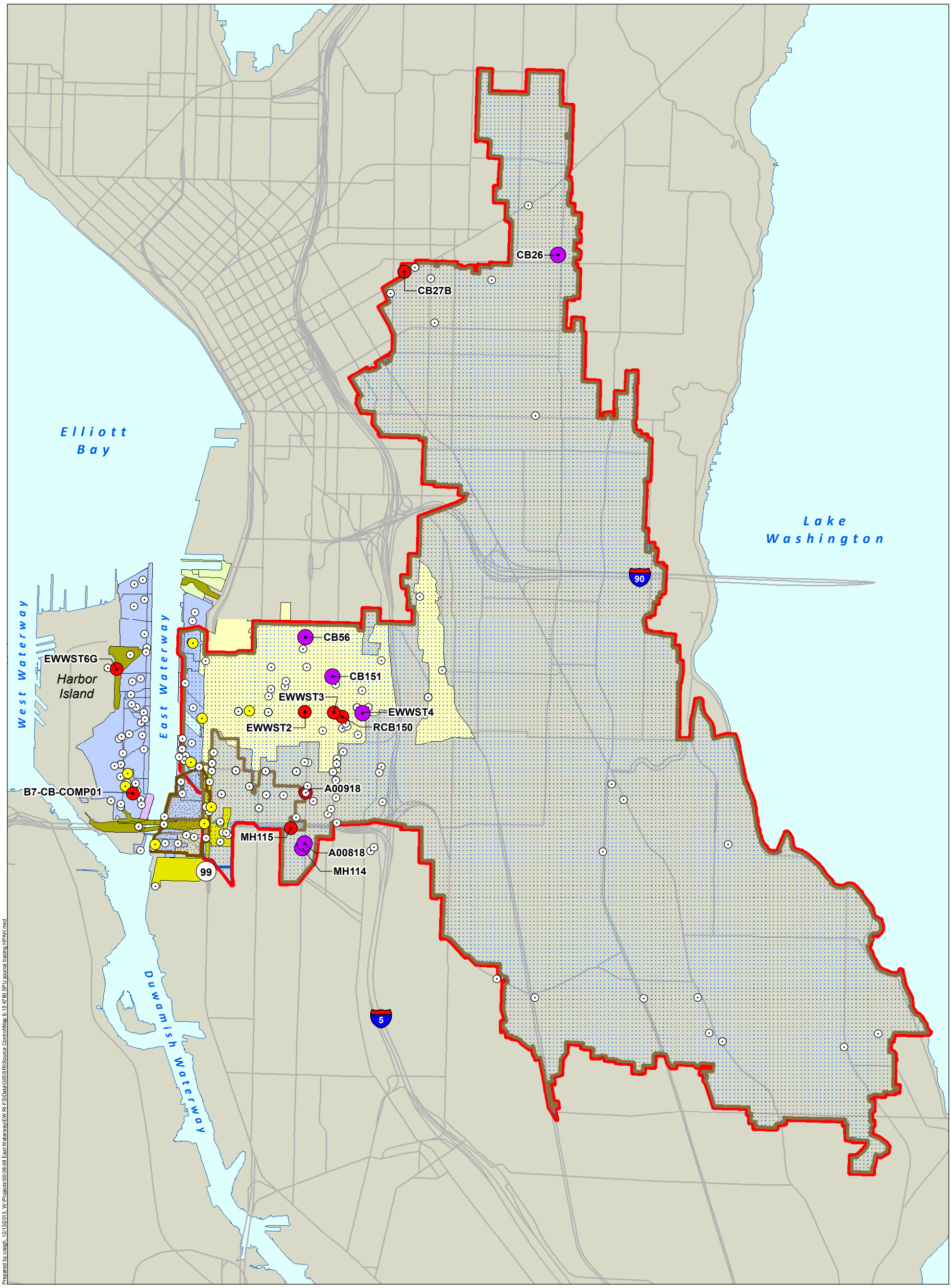
- Port Nearshore SD
- S Lander St SD
- S Hinds St SD
- SPU Nearshore SD
- Olympic Tug and Barge
- Coast Guard

[a] Results are based on SD and CSO solids data. Basin composite samples shown in centroid of basin for Port Nearshore SD basins. For co-located samples, most recent data is shown on top of older data; for multiple samples taken on the same date from different locations in the pipe, lesser exceedance categories are shown on top of greater exceedance categories.

0 1,500
Scale in feet

Map 9-14
Source Tracing Results, Mercury
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Source Control\Map 9-14 4779 SPU source tracing Hg.mxd



HPAH[a]

- > 2x 2LAET
- > 2LAET
- > LAET
- No Exceedance/Non-Detect

CSO Basins

- Combined Sewer Service Area
- S Hinds CSO
- Lander CSO
- Hanford #2 CSO

Storm Drainage Basins

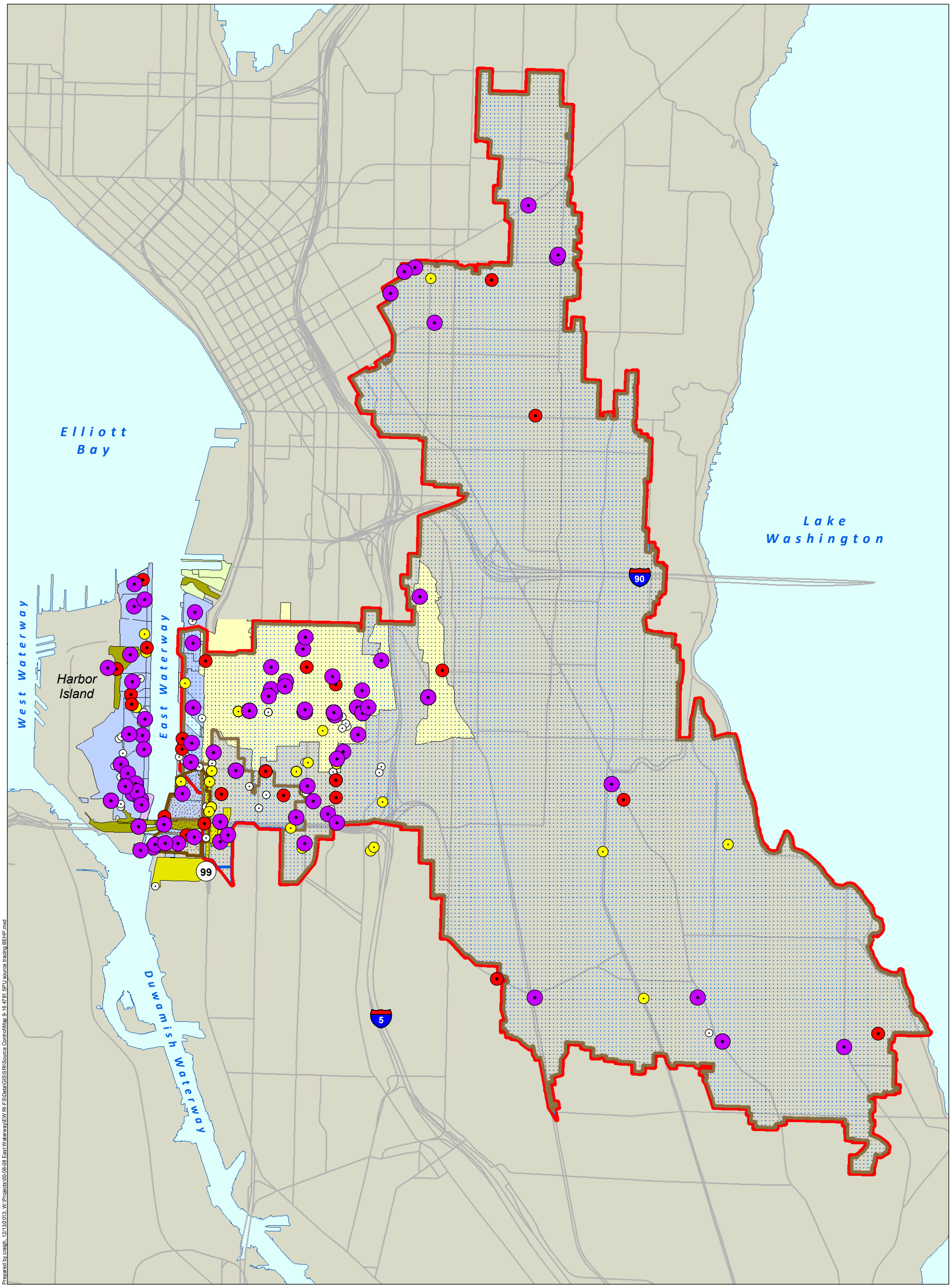
- Port Nearshore SD
- S Lander St SD
- S Hinds St SD
- SPU Nearshore SD
- Olympic Tug and Barge
- Coast Guard

[a] Results are based on SD and CSO solids data. Basin composite samples shown in centroid of basin for Port Nearshore SD basins. For co-located samples, most recent data is shown on top of older data; for multiple samples taken on the same date from different locations in the pipe, lesser exceedance categories are shown on top of greater exceedance categories.

0 1,500
Scale in feet

Map 9-15
Source Tracing Results, HPAH
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Source Control\Map 9-15 4780 SPU source tracing HPAH.mxd



BEHP[a]

- > 2x 2LAET
- > 2LAET
- > LAET
- No Exceedance/Non-Detect

CSO Basins

- Combined Sewer Service Area
- S Hinds CSO
- Lander CSO
- Hanford #2 CSO

Storm Drainage Basins

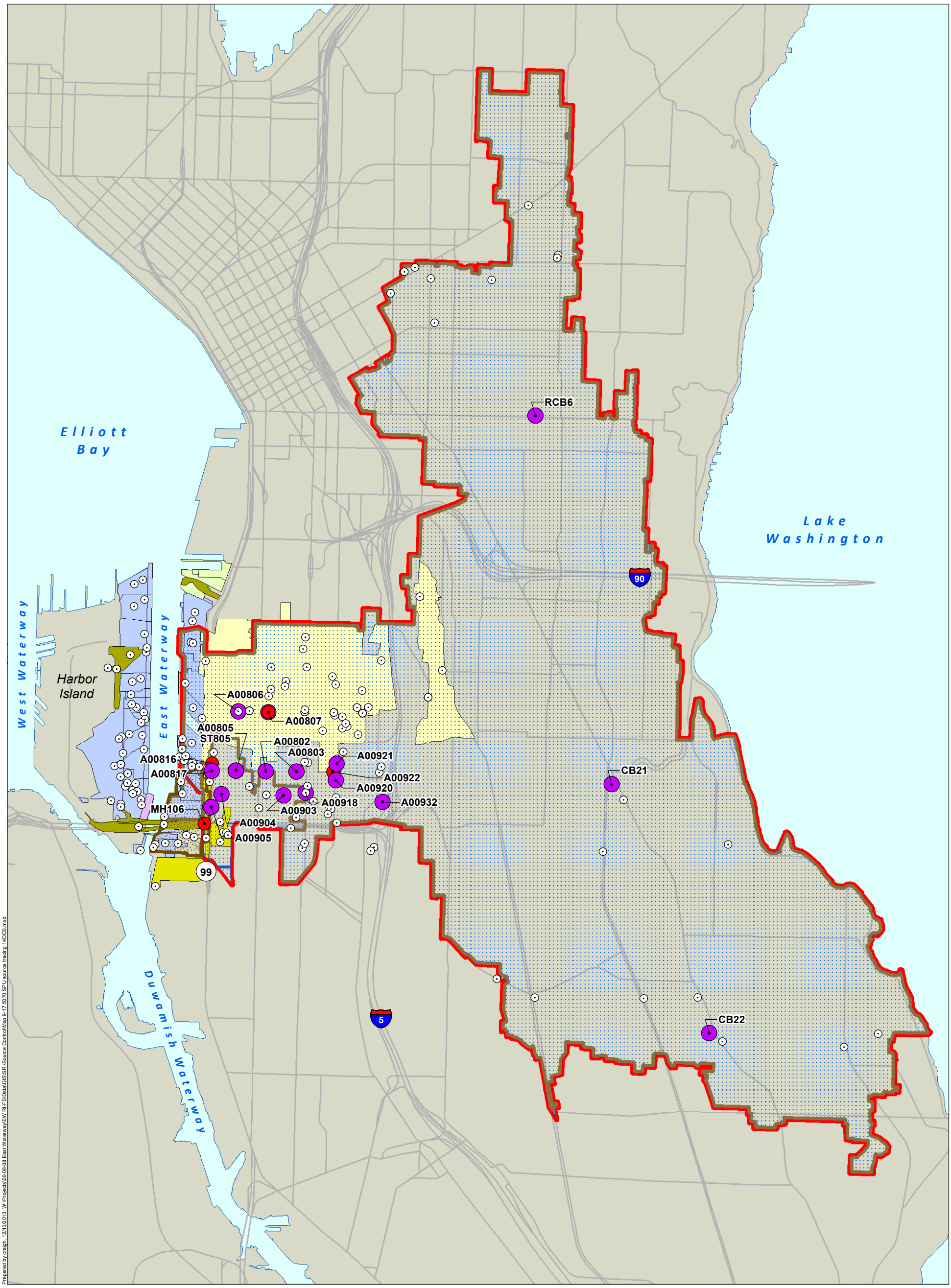
- Port Nearshore SD
- S Lander St SD
- S Hinds St SD
- SPU Nearshore SD
- Olympic Tug and Barge
- Coast Guard

[a] Results are based on SD and CSO solids data. Basin composite samples shown in centroid of basin for Port Nearshore SD basins. For co-located samples, most recent data is shown on top of older data; for multiple samples taken on the same date from different locations in the pipe, lesser exceedance categories are shown on top of greater exceedance categories.

0 1,500
Scale in feet

Map 9-16
Source Tracing Results, BEHP
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Source Control\Map 9-16 4781 SPU source tracing BEHP.mxd



Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Source Control\Map 9-17 5070 SPU source tracing 14DCB.mxd

1,4-Dichlorobenzene[a]

- > 2x 2LAET
- > 2LAET
- > LAET
- No Exceedance/Non-Detect

CSO Basins

- Combined Sewer Service Area
- S Hinds CSO
- Lander CSO
- Hanford #2 CSO

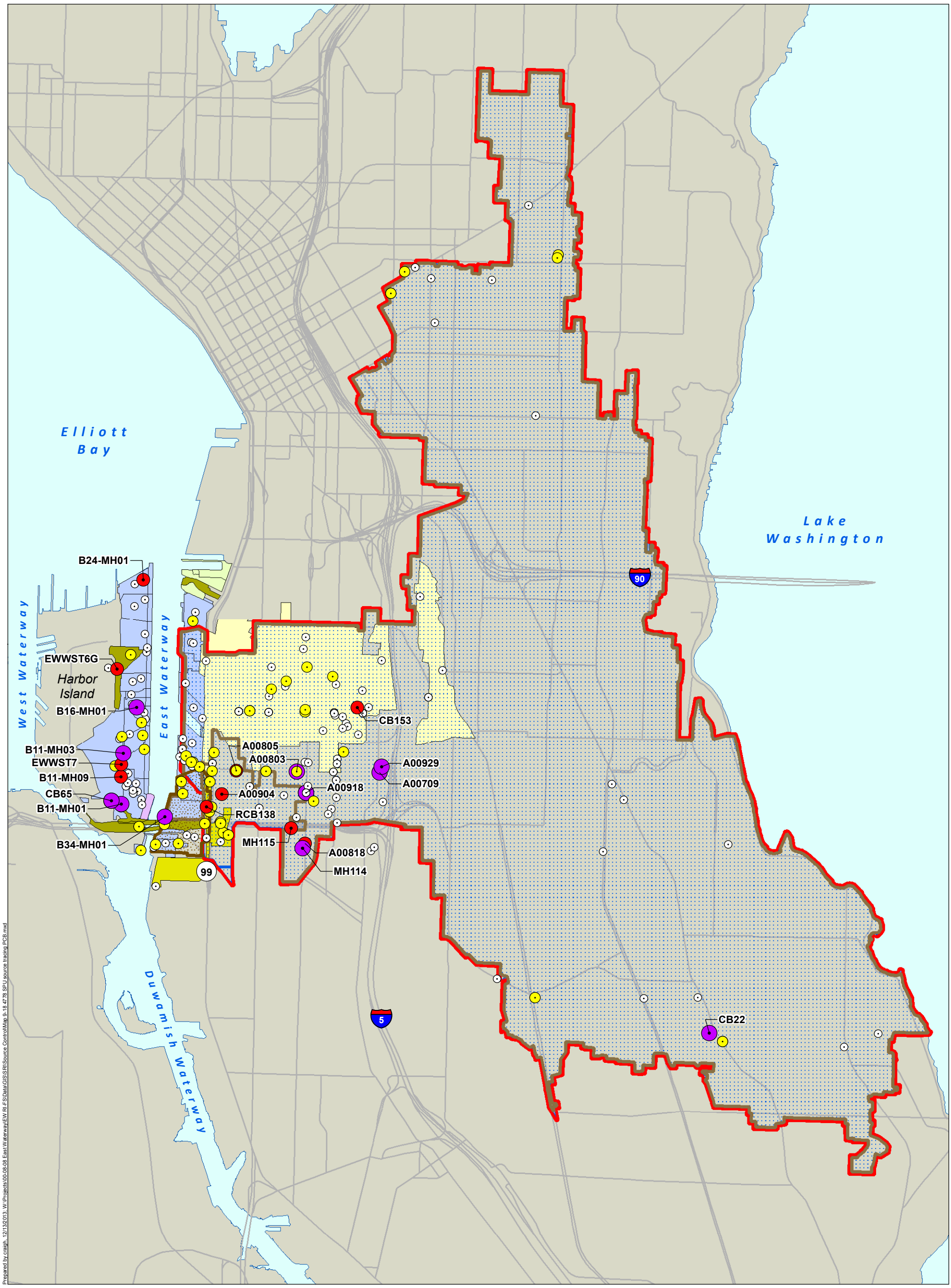
Storm Drainage Basins

- Port Nearshore SD
- S Lander St SD
- S Hinds St SD
- SPU Nearshore SD
- Olympic Tug and Barge
- Coast Guard

[a] Results are based on SD and CSO solids data. Basin composite samples shown in centroid of basin for Port Nearshore SD basins. For co-located samples, most recent data is shown on top of older data; for multiple samples taken on the same date from different locations in the pipe, lesser exceedance categories are shown on top of greater exceedance categories. 1,4-Dichlorobenzene had a very low frequency of detections in the vast majority of samples. See Table 9-16 for frequency of detections.

0 1,500
Scale in feet

Map 9-17
Source Tracing Results, 1,4-Dichlorobenzene
Supplemental Remedial Investigation
East Waterway Study Area



Total PCBs[a]

- > 2x 2LAET
- > 2LAET
- > LAET
- No Exceedance/Non-Detect

CSO Basins

- Combined Sewer Service Area
- S Hinds CSO
- Lander CSO
- Hanford #2 CSO

Storm Drainage Basins

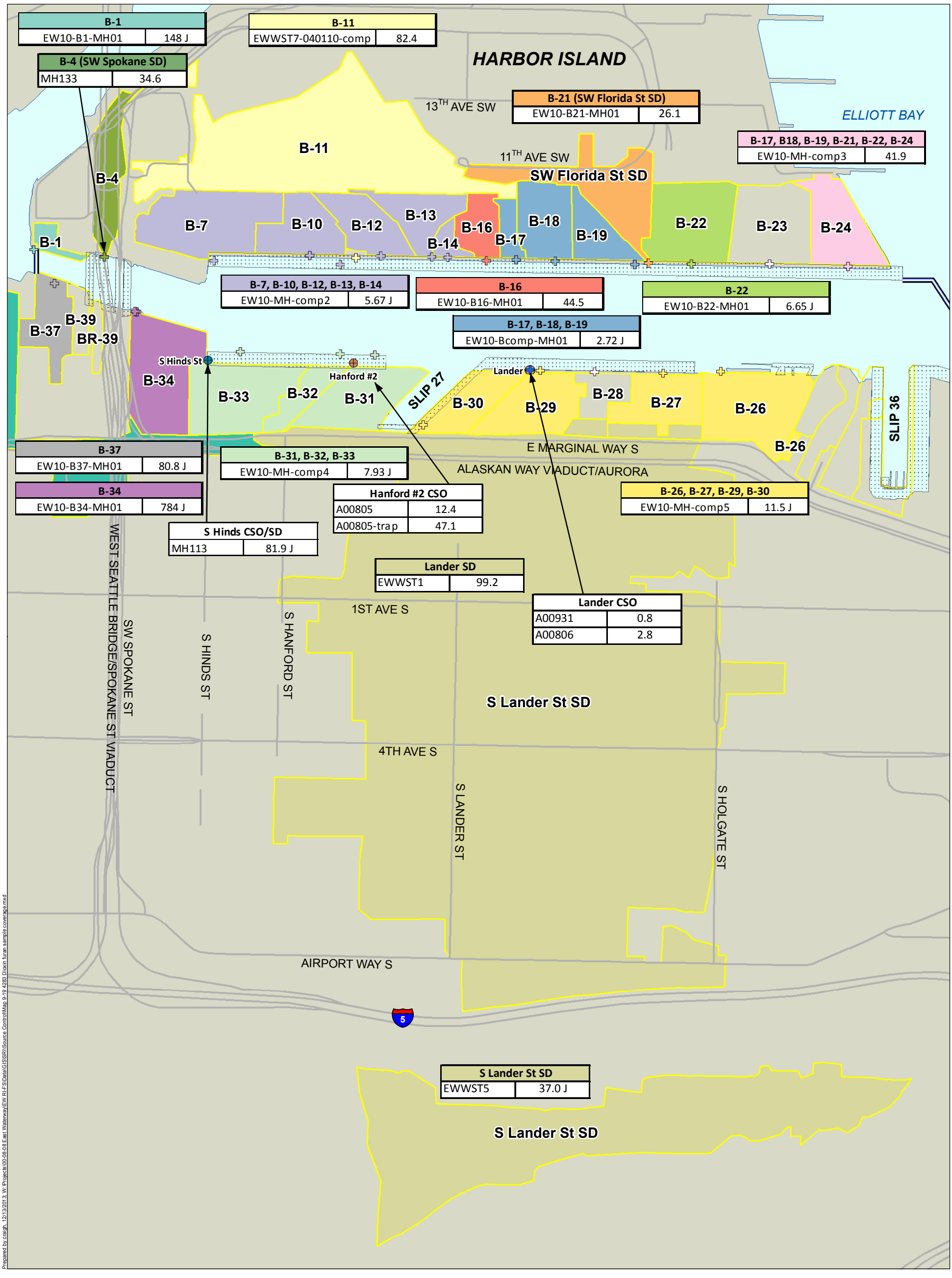
- Port Nearshore SD
- S Lander St SD
- S Hinds St SD
- SPU Nearshore SD
- Olympic Tug and Barge
- Coast Guard

[a] Results are based on SD and CSO solids data. Basin composite samples shown in centroid of basin for Port Nearshore SD basins. For co-located samples, most recent data is shown on top of older data; for multiple samples taken on the same date from different locations in the pipe, lesser exceedance categories are shown on top of greater exceedance categories.

0 1,500
Scale in feet

Map 9-18
Source Tracing Results, Total PCBs
Supplemental Remedial Investigation
East Waterway Study Area

Prepared by craigh, 12/13/2013; W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Source Control\Map 9-18 4778 SPU source tracing PCB.mxd



Source Tracing Basins[a]

- Basin Boundary
- Basin B-34
- Composite Group 4
- Basin B-37
- Composite Group 5
- Hinds
- S Lander St SD
- Basin B-1
- B-4, SW Spokane SD
- Basin B-11
- Composite Group 2
- Basin B-16
- Composite Group 6
- B-21, SW Florida SD
- Basin B-22
- Composite Group 3

Outfalls

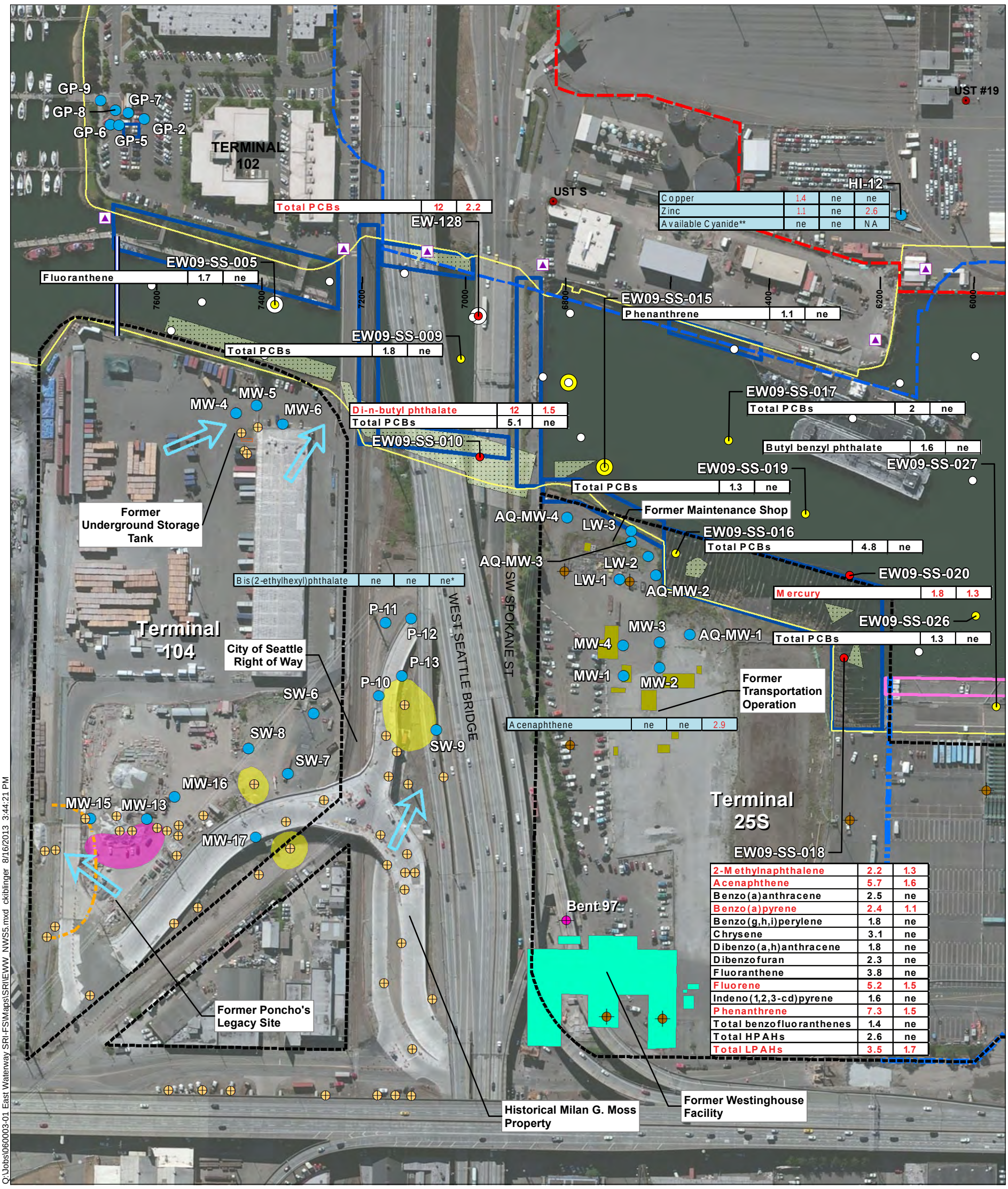
- City of Seattle CSO/SD
- King County CSO
- King County CSO/City of Seattle SD
- Storm Drain Outfall, Sampled[b]
- Road
- Dock/Pier/Bridge
- East Waterway Study Area Boundary

0 1,500
Scale in feet

Map 9-19
Source Tracing Results, Dioxins/Furans
Supplemental Remedial Investigation
East Waterway Study Area

[a] All results shown in ng TEQ/kg dw.
[b] Storm drains are colored according to their corresponding basin sample group; sampled storm drains not associated with a basin sample group are white.
Note: Basins B-23,B-28,B-39, and BR-39 either had no sediment or did not have sufficient sediment volume to analyze for Dioxin/Furans. CSO basins are not shown because of the scale of the map - see Map 9.4.3-2.

Prepared by craigh, 12/13/2013, W:\Projects\00-08-08 East Waterway\EW RI-FS\Data\GIS\SRI\Source Control\Map 9-19 4283 Dioxin furan sample coverage.mxd



Surface Sediment SMS Status

- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect

Toxicity Test Results[a]

- Fails CSL
- Fails SQS
- Pass
- Evaluated Groundwater Sampling Location
- Other Groundwater Sample Location
- Storm Drain
- Approximate location of USTs removed from Terminal 18
- PCB Soil Removal Area (Bent 97)
- Historical Boring
- Harbor Island Soil and Groundwater OU Boundary
- Historical Turning Basin
- MHHW Line
- Reported Groundwater Flow Direction
- Intertidal Surface Sediment Sampling Areas
- Portion of Terminal 18 where capping or other environmental work was completed during terminal expansion
- Nearshore Properties

[a] Toxicity test results on Map 4-11.
[b] For more detailed piling information see Map 9-9.

- TCE
- TPH
- Arsenic Concentration Contour
- Creosoted Bulkheads, Pile and Fender Pile Areas[b]
- CCA Pile and Fender Pile Areas[b]
- Former Transportation Operation
- Former Westinghouse Property
- East Waterway Study Area Boundary

Sediment Analyte	Sediment Exceedance Factor	
	SQS	CSL
PCBs	15	2.8

Chemicals in red exceeded CSL. The EF has no regulatory relevance and is presented here to provide an indication of the general magnitude of the concentration. Sampling locations were analyzed for all SMS chemicals. "ne" = not exceeded.

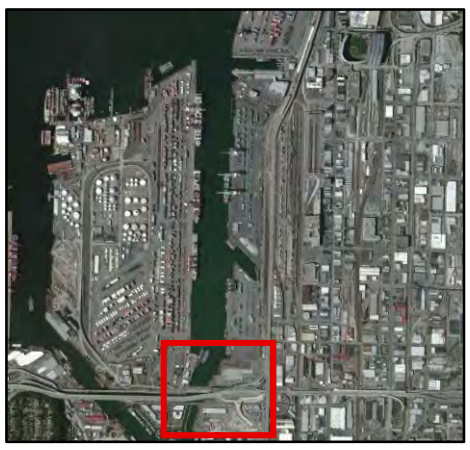
Groundwater Analyte	Groundwater Exceedance Factor		
	AWQC		Groundwater Reference Value
	Chronic	Acute	
Arsenic	5	2.6	6.5

1. Values in red exceeded the Groundwater Reference Values and/or Ambient Water Quality Criteria (AWQC)
2. The EF has no regulatory significance and is presented here to provide an indication of the general magnitude of the concentration
3. ne = not exceeded
4. Only maximum EF is shown, if applicable
5. Evaluated groundwater data is presented in Appendix J
6. NA = not applicable

* One duplicate result detected Bis(2-ehtylexyl)phthalate. All other samples analyzed at the well including the parent of the duplicate did not detect the compound and therefore is not an exceedance.
** Total cyanide was detected however all available cyanide were below the AWQC

N

0 200
Scale in Feet



Map 9-20
Southern Nearshore Cleanup Site
Supplemental Remedial Investigation
East Waterway Study Area

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Prepared by ckitlinger, 8/16/2013; Q:\Jobs\060003-01 East Waterway SRI-FS\Maps\SRI\EWW_NWS3.mxd

Sediment Analyte	Sediment Exceedance Factor	
	SQS	CSL
PCBs	15	2.8

Chemicals in red exceeded CSL. The EF has no regulatory relevance and is presented here to provide an indication of the general magnitude of the concentration. Sampling locations were analyzed for all SMS chemicals. "ne" = not exceeded.

Groundwater Analyte	Groundwater Exceedance Factor		
	AWQC		Sediment Reference Value
	Chronic	Acute	
Arsenic	5	2.6	6.5

1. Values in red exceeded the Groundwater Reference Values and/or Ambient Water Quality Criteria (AWQC)
2. The EF has no regulatory significance and is presented here to provide an indication of the general magnitude of the concentration
3. ne = not exceeded
4. Only maximum EF is shown, if applicable
5. Evaluated groundwater data is presented in Appendix J
6. NA = not applicable

Surface Sediment SMS Status
- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect

Toxicity Test Results[a]
- Fails CSL
- Fails SQS
- Pass

[a] Toxicity test results on Map 4-11.

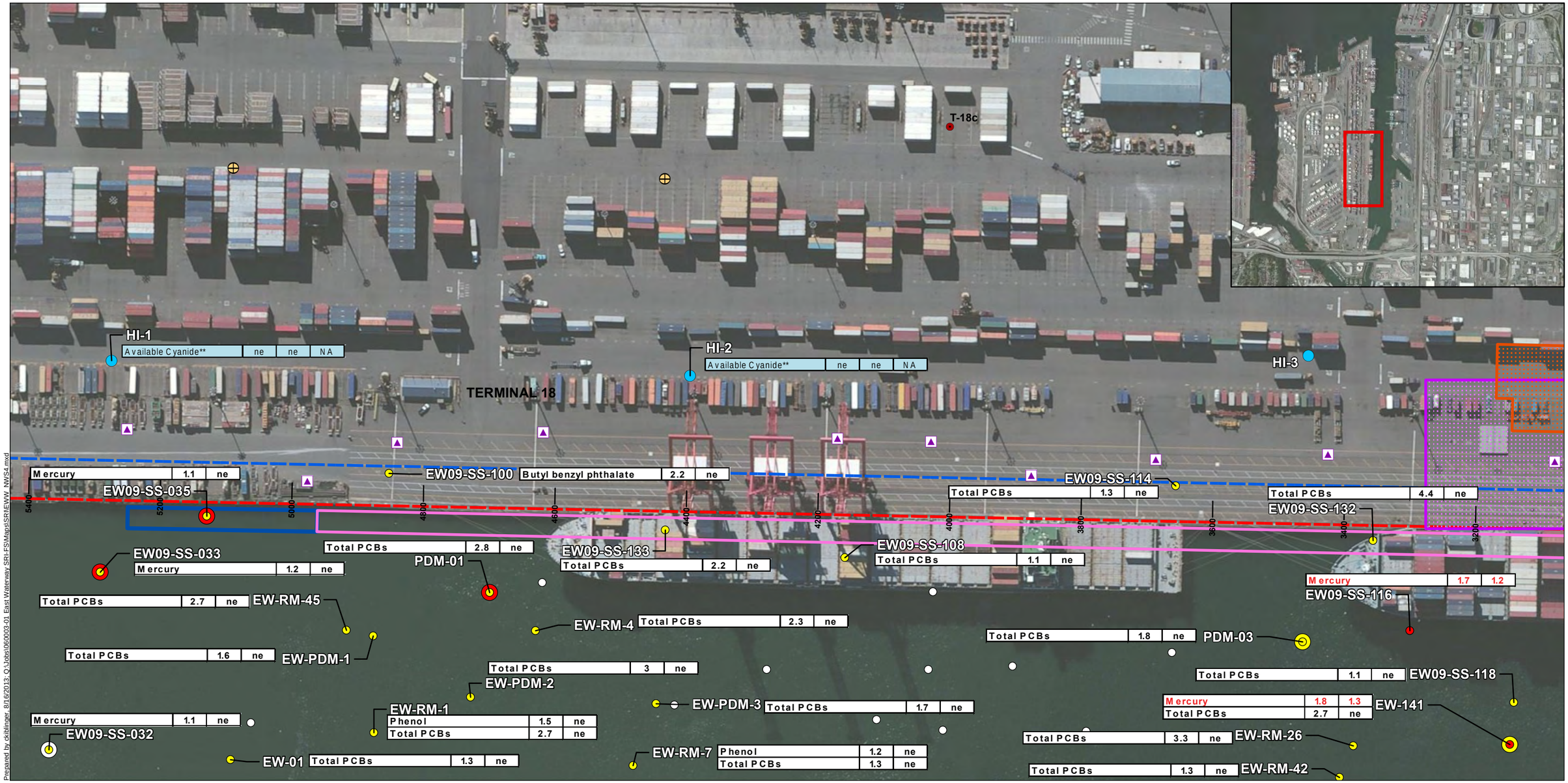
- Harbor Island Groundwater Operable Unit (OU) compliance monitoring well[1]
- Harbor Island Groundwater OU inland monitoring well[2]
- Storm Drain
- Approximate location of USTs removed from Terminal 18
- Station
- Harbor Island Soil and Groundwater OU Boundary
- CCA Pile and Fender Pile Areas[4]
- Former Terminal 18 hot spot[3]
- Approximate location of Terminal 18 dock pipeline spill[3]
- Portion of Terminal 18 where capping or other environmental work was completed during terminal expansion

NOTES:
1. "Compliance" is defined for the purposes of this report as wells closest to the East Waterway and does not reflect any well designations based on the Harbor Island Soil and Groundwater OU or related reports and agreements.
2. "Inland" is defined for the purposes of this report as wells farther away from the East Waterway shoreline.
3. Sources for these investigations are presented in Section 9 and results are presented in Appendix J.
4. For more detailed piling information see Map 9-9.
** Total cyanide was detected however all available cyanide were below the AWQC.

N

0 150
Scale in feet

Map 9-21
Northern Harbor Island Nearshore Cleanup Site
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by ckiblinger, 8/16/2013; Q:\Jobs\060003-01 East Waterway SRI-FS\Maps\SRI\EWW_NWS4.mxd

Sediment Analyte	Sediment Exceedance Factor	
	SQS	CSL
PCBs	15	2.8

Chemicals in red exceeded CSL. The EF has no regulatory relevance and is presented here to provide an indication of the general magnitude of the concentration. Sampling locations were analyzed for all SMS chemicals. "ne" = not exceeded.

Groundwater Analyte	Groundwater Exceedance Factor		
	AWQC		Sediment Reference Value
	Chronic	Acute	
Arsenic	5	2.6	6.5

1. Values in red exceeded the Groundwater Reference Values and/or Ambient Water Quality Criteria (AWQC)
2. The EF has no regulatory significance and is presented here to provide an indication of the general magnitude of the concentration
3. ne = not exceeded
4. Only maximum EF is shown, if applicable
5. Evaluated groundwater data is presented in Appendix J
6. NA = not applicable

Surface Sediment SMS Status
- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect

Toxicity Test Results[a]
- Fails CSL
- Fails SQS
- Pass

[a] Toxicity test results on Map 4-11.

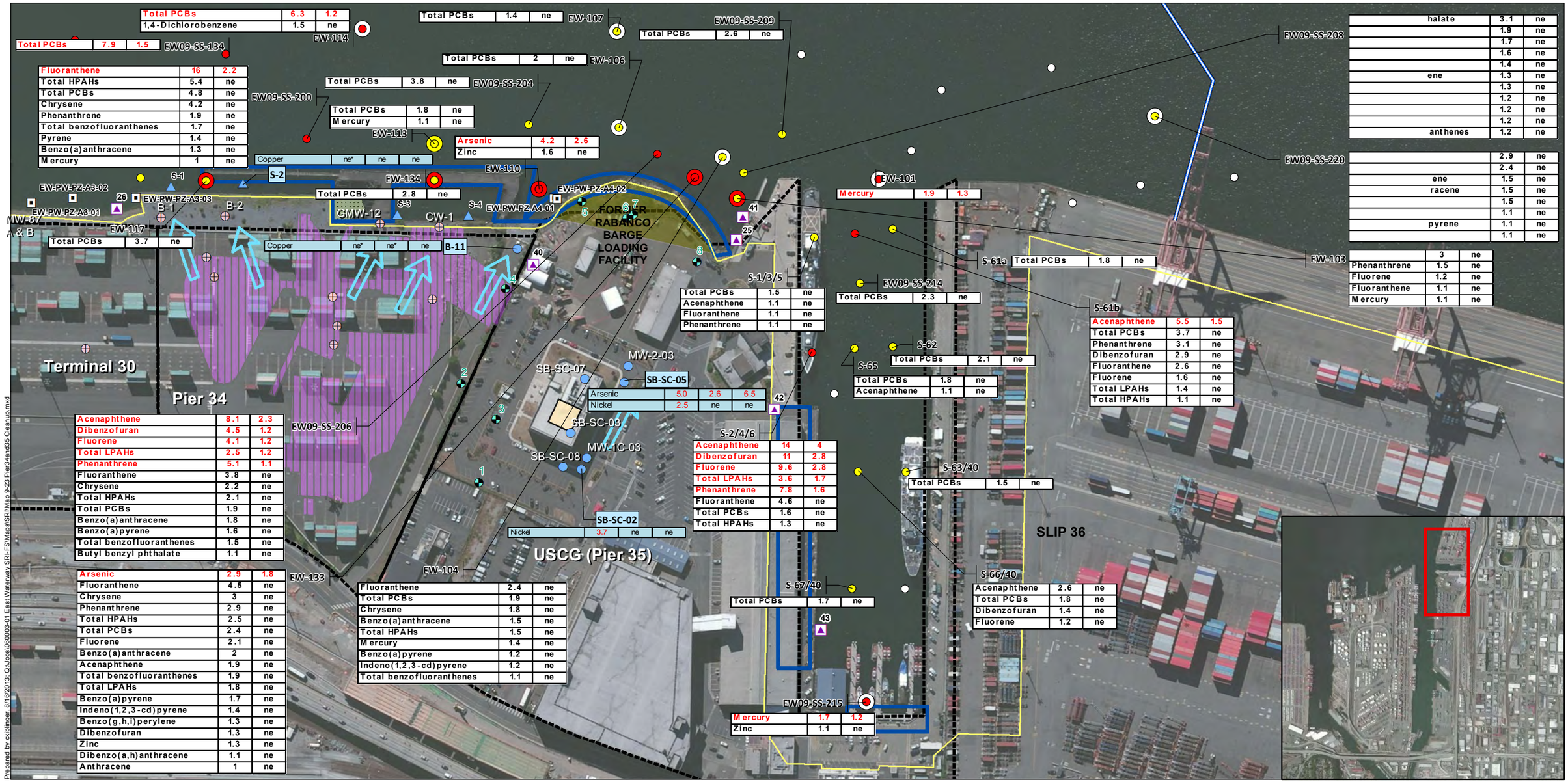
- Harbor Island Groundwater Operable Unit (OU) compliance monitoring well[1]
- Harbor Island Groundwater OU inland monitoring well[2]
- Storm Drain
- Approximate location of USTs removed from Terminal 18
- Station
- Harbor Island Soil and Groundwater OU Boundary
- Creosoted Bulkheads, Pile and Fender Pile Areas[4]
- CCA Pile and Fender Pile Areas[4]
- Former Terminal 18 hot spot[3]
- Approximate location of Terminal 18 dock pipeline spill[3]
- Portion of Terminal 18 where capping or other environmental work was completed during terminal expansion

NOTES:
1. "Compliance" is defined for the purposes of this report as wells closest to the East Waterway and does not reflect any well designations based on the Harbor Island Soil and Groundwater OU or related reports and agreements.
2. "Inland" is defined for the purposes of this report as wells farther away from the East Waterway shoreline.
3. Sources for these investigations are presented in Section 9 and results are presented in Appendix J.
4. For more detailed piling information see Map 9-9.
** Total cyanide was detected however all available cyanide were below the AWQC.

N

0 150
Scale in feet

Map 9-22
Middle Harbor Island Nearshore Cleanup Site
Supplemental Remedial Investigation
East Waterway Study Area



Sediment Analyte	Sediment Exceedance Factor	
	SQS	CSL
PCBs	15	2.8

Chemicals in red exceeded CSL. The EF has no regulatory relevance and is presented here to provide an indication of the general magnitude of the concentration. Sampling locations were analyzed for all SMS chemicals. "ne" = not exceeded.

Groundwater Analyte	Groundwater Exceedance Factor		
	AWQC		Sediment Reference Value
	Chronic	Acute	
Arsenic	5	2.6	6.5

1. Values in red exceeded the Groundwater Reference Values and/or Ambient Water Quality Criteria (AWQC)
2. The EF has no regulatory significance and is presented here to provide an indication of the general magnitude of the concentration
3. ne = not exceeded
4. Only maximum EF is shown, if applicable
5. Evaluated groundwater data is presented in Appendix J
6. NA = not applicable
* Cleanup goals for seeps included comparison to background surface water metals concentrations. Detected values in nearshore seeps and nearshore wells did not exceed measured values in surface water

- Evaluated Seep Sample Location
- Evaluated Groundwater Sample Location
- Other Groundwater Sample Location
- Former GW and Well Locations (Dames & Moore, 1989)[1]
- Porewater Sample Location
- Storm Drain
- Creosoted Bulkheads, Pile and Fender Pile Areas[2]
- East Waterway Study Area Boundary

[1]Data quality for these locations is insufficient for inclusion in the SRI dataset.

[2]For more detailed piling information see Map 9-9.

- Bulkhead
- MHHW Line
- Reported Groundwater Flow Direction
- Former Boiler House
- Intertidal Surface Sediment Sampling Areas
- Recent Nearshore Fill
- GATX Soil Excavation
- Nearshore Properties

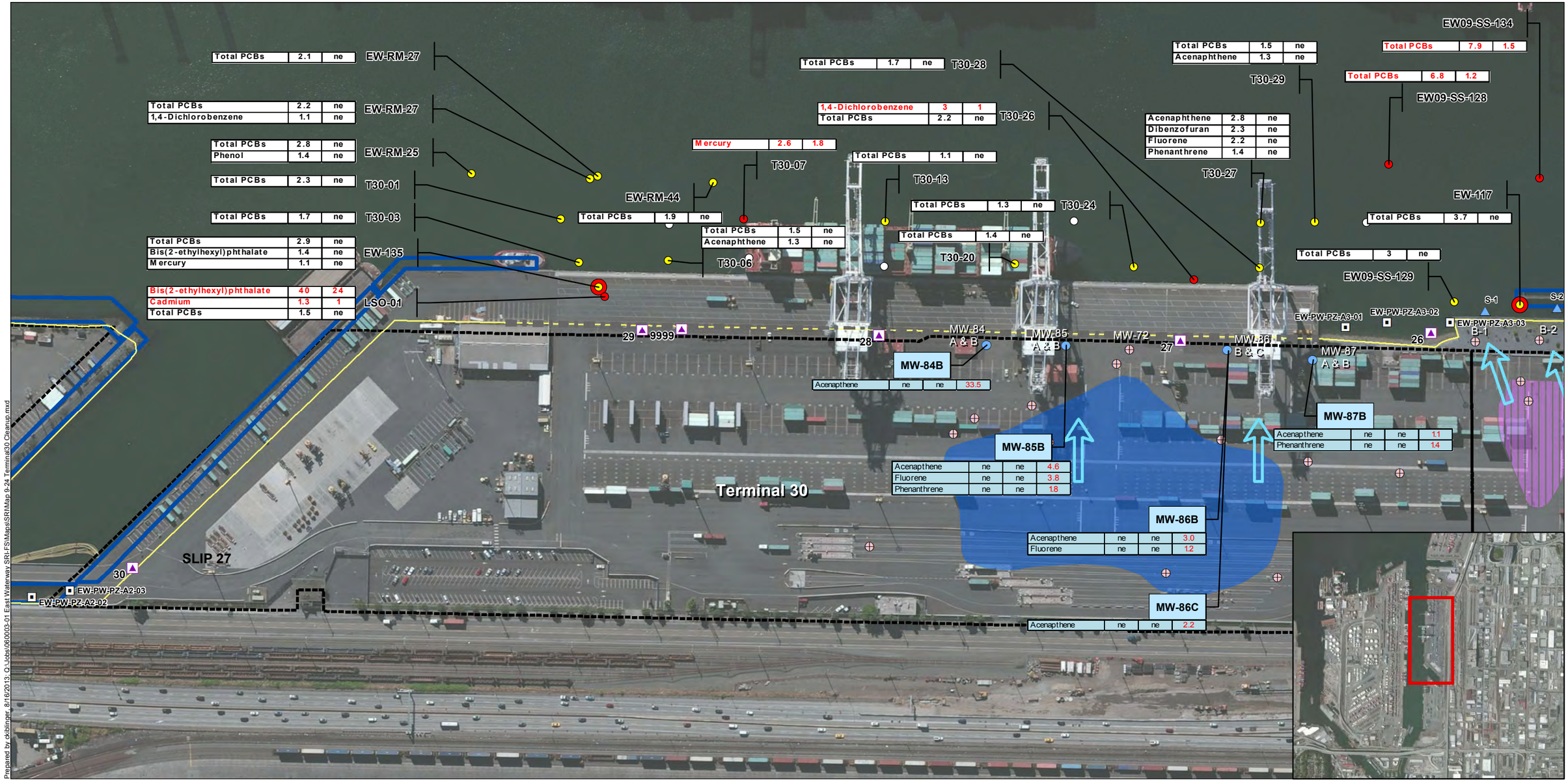
Surface Sediment SMS Status
- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect

Toxicity Test Results[a]
- Fails CSL
- Fails SQS
- Pass

[a] Toxicity test results on Map 4-11.

0 200
Scale in feet

Map 9-23
Pier 34 and 35 Nearshore Cleanup Site
Supplemental Remedial Investigation
East Waterway Study Area



Prepared by dkiblinger, 8/16/2013; Q:\Jobs\060003-01 East Waterway SRI-FS\Maps\SRI\Map 9-24 Terminal30 Cleanup.mxd

Sediment Analyte	Sediment Exceedance Factor	
	SQS	CSL
PCBs	15	2.8

Chemicals in red exceeded CSL. The EF has no regulatory relevance and is presented here to provide an indication of the general magnitude of the concentration. Sampling locations were analyzed for all SMS chemicals. "ne" = not exceeded.

Groundwater Analyte	Groundwater Exceedance Factor		
	AWQC		Sediment Reference Value
	Chronic	Acute	
Arsenic	5	2.6	6.5

1. Values in red exceeded the Groundwater Reference Values and/or Ambient Water Quality Criteria (AWQC)
2. The EF has no regulatory significance and is presented here to provide an indication of the general magnitude of the concentration
3. ne = not exceeded
4. Only maximum EF is shown, if applicable
5. Evaluated groundwater data is presented in Appendix J

- Evaluated Seep Sample Location
- Evaluated Groundwater Sample Location
- Other Groundwater Sample Location
- Former GW and Well Locations (Dames & Moore, 1989)[1]
- Porewater Sample Location
- Storm Drain
- East Waterway Study Area Boundary

[1]Data quality for these locations is insufficient for inclusion in the SRI dataset.

- Bulkhead
- Creosoted Bulkheads, Pile and Fender Pile Areas[2]
- MHHW Line
- Reported Groundwater Flow Direction
- GATX Soil Excavation
- Nearshore Properties
- Maximum Extent of Historical Diesel Product

[2]For more detailed piling information see Map 9-9.

Surface Sediment SMS Status
- > CSL, Detect
- > SQS and ≤ CSL, Detect
- ≤ SQS or Non-detect

Toxicity Test Results[a]
- Fails CSL
- Fails SQS
- Pass

[a] Toxicity test results on Map 4-11.

N

0 200
Scale in feet

Map 9-24
Terminal 30 Nearshore Cleanup Site
Supplemental Remedial Investigation
East Waterway Study Area

Type A Engineered Bank[1]

1. Terminal 18A Bulkhead
2. Terminal 18B Bulkhead
3. Bank 9A
4. Terminal 25
5. Bank 6A
6. Bank 5
7. Slip 27
8. Terminal 30
9. Bank 3A
10. Bank 3B
11. Bank 3C
12. USCG Slip 36
13. USCG East Pier
14. USCG North Pier
15. USCG Southeast Pier
16. USCG Southwest

Type B Engineered Bank[2]

17. Bank 11
18. Olympic Tug and Barge
19. Bank 10
20. Bank 9B
21. Bank 8A
22. Bank 7A
23. Bank 7B
24. Bank 7C
25. Bank 6B
26. Bank 4
27. Bank 2A

Type C Non-Engineered Bank[3]

28. Bank 8B
29. Bank 2B
30. Bank 1

Type D Non-Engineered Bank[4]

None

East Waterway Study Area Boundary

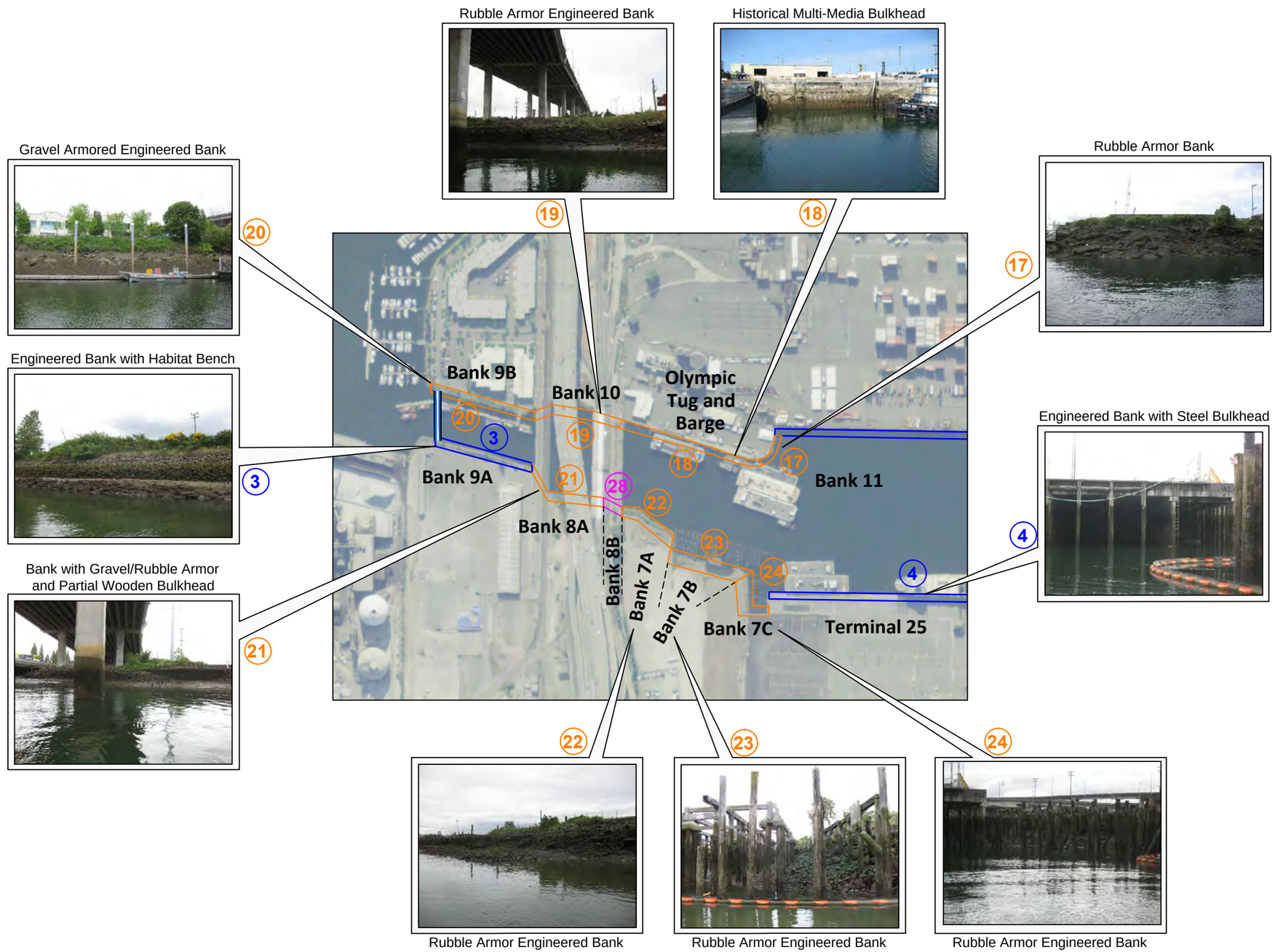
0 600
Scale in Feet

NOTES:

1. Type A: Engineered bank with armor stone and/or metal bulkhead.
2. Type B: Engineered bank with rubble or gravel armor and/or wooden or concrete bulkhead.
3. Type C: Non-engineered rubble armored slope or non-engineered mud/gravel bank.
4. Type D: Non-engineered steep bank, higher potential for bank erosion.

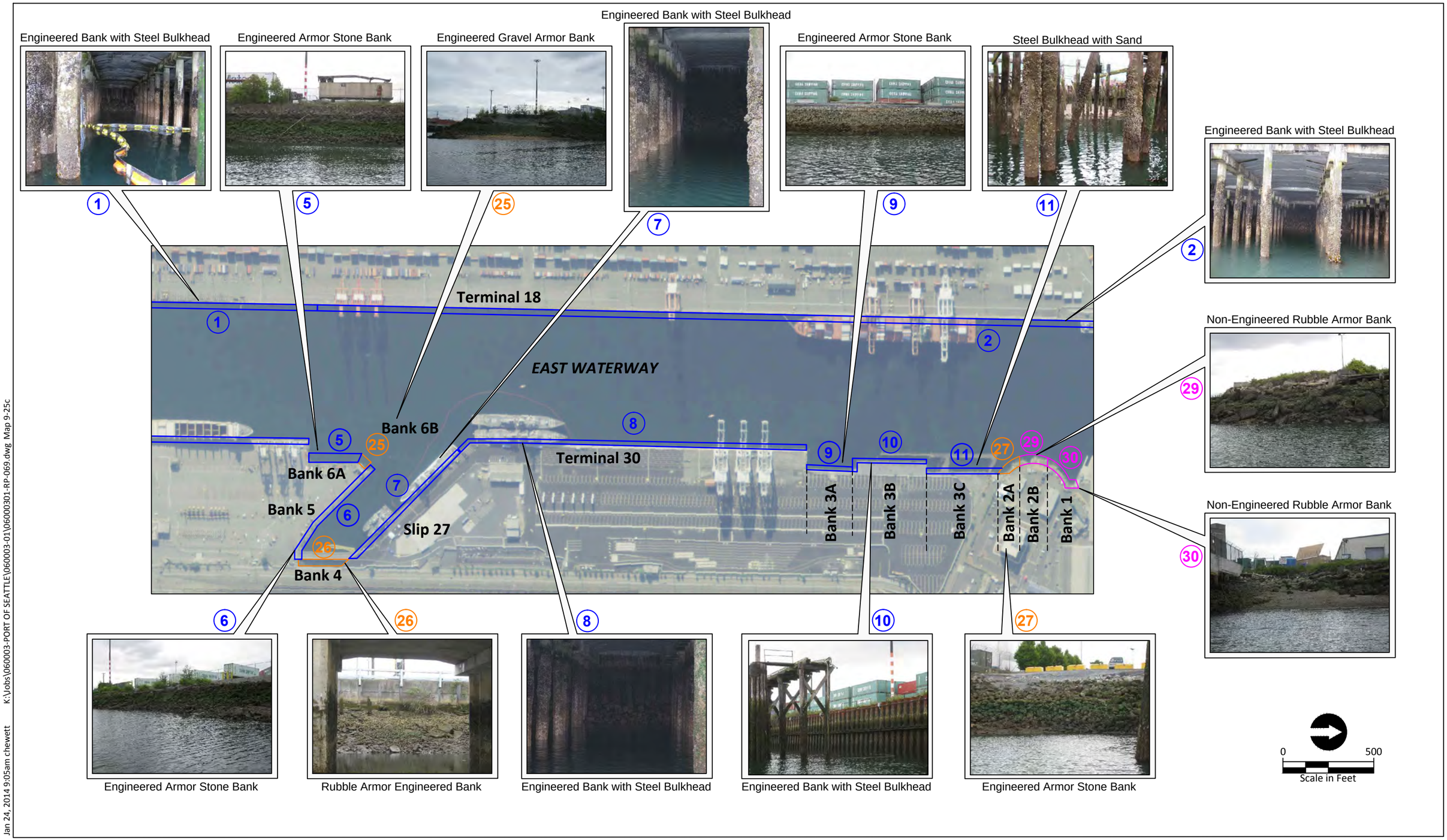
Map 9-25a
Bank Construction Types
Supplemental Remedial Investigation
East Waterway Operable Unit

K:\Jobs\060003-PORT OF SEATTLE\060003-01\06000301-RP-069.dwg Map 9-25a
Jan 24, 2014 9:05am chewett



Jan 24, 2014 9:05am chewett K:\Jobs\060003-PORT OF SEATTLE\060003-01\06000301-RP-069.dwg Map 9-25b

Map 9-25b
Bank Construction Types
Supplemental Remedial Investigation
East Waterway Operable Unit



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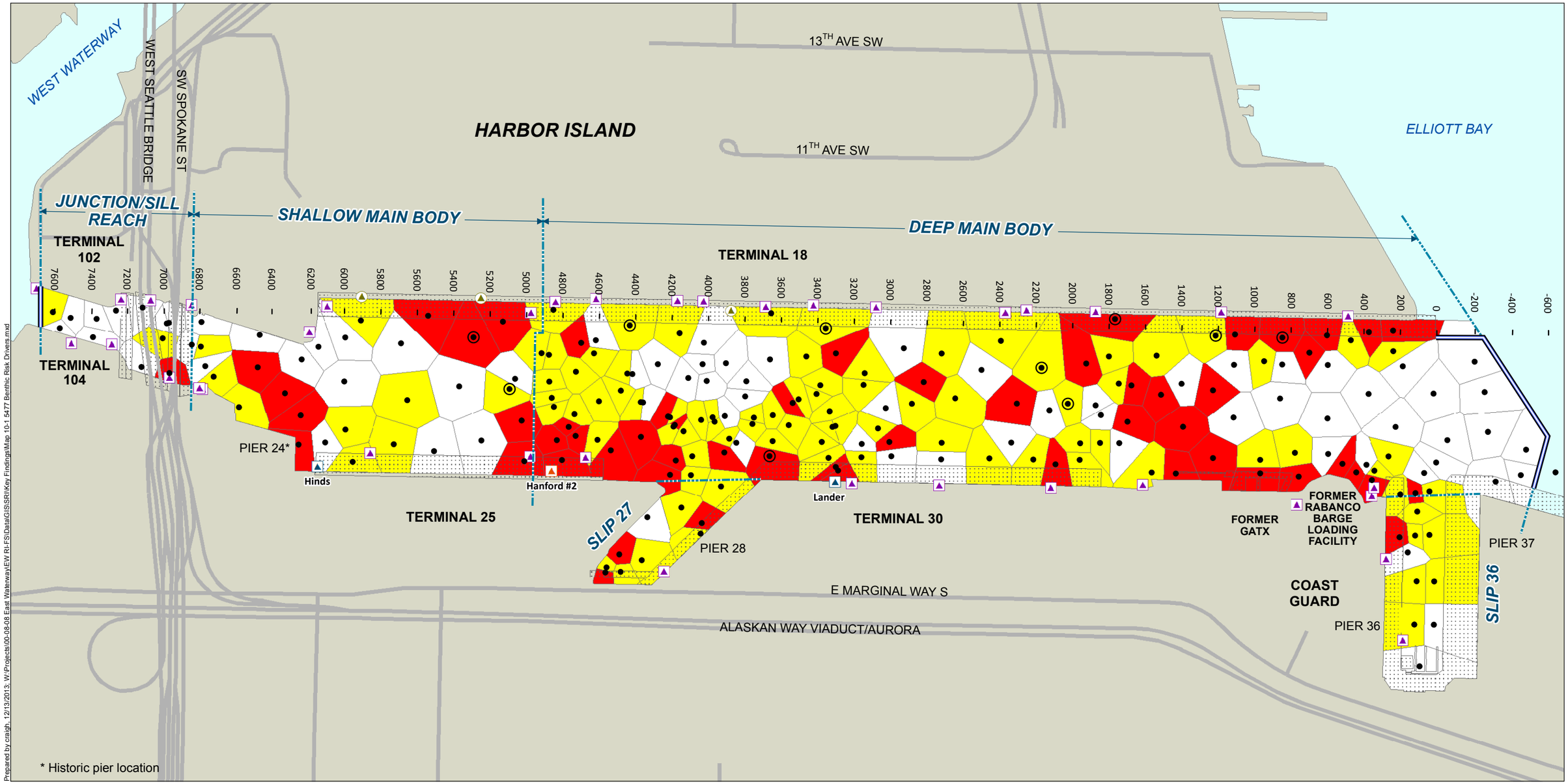
Map 9-25c
Bank Construction Types
Supplemental Remedial Investigation
East Waterway Operable Unit



Final SMS Status (Chemical Criteria and Toxicity Combined) in Surface Sediment

- > CSL
- > SQS and ≤ CSL
- ≤ SQS
- TBT Exceedance Location
- Surface Sediment Sampling Location
- CSO
- Storm Drain
- CSO/Storm Drain
- Unknown Outfall
- Dock/Pier/Bridge
- Road
- East Waterway Study Area Boundary

0 600
Scale in feet

Map 10-1
Benthic Risk Drivers
Supplemental Remedial Investigation
East Waterway Study Area