



**EAST WATERWAY OPERABLE UNIT
EXISTING INFORMATION SUMMARY REPORT
FIGURES**

For submittal to

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

March 2008

Prepared by



1423 3rd Avenue • Suite 300
Seattle, Washington • 98101



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

Battelle Memorial Institute | KPFF | Coast and Harbor Engineering

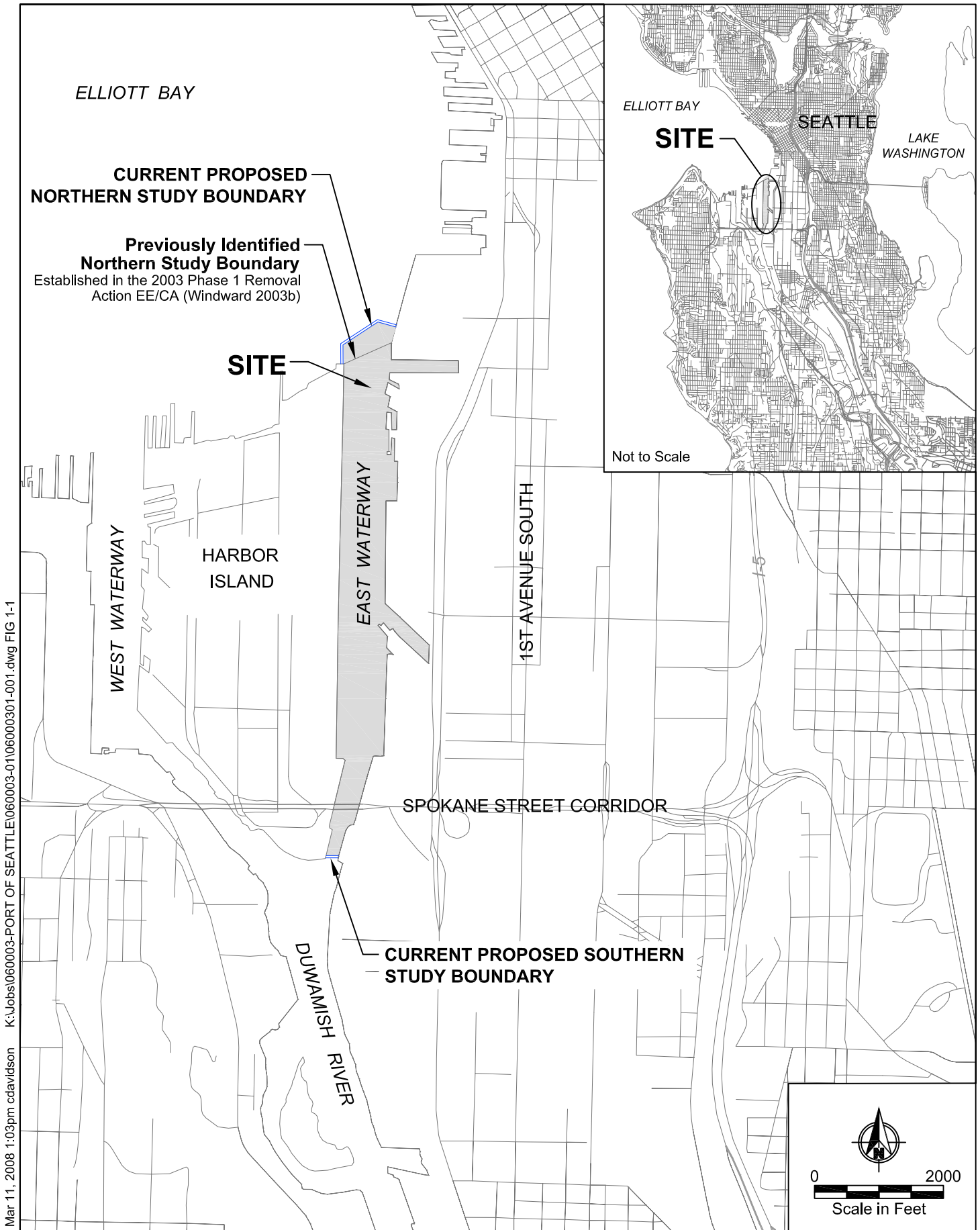
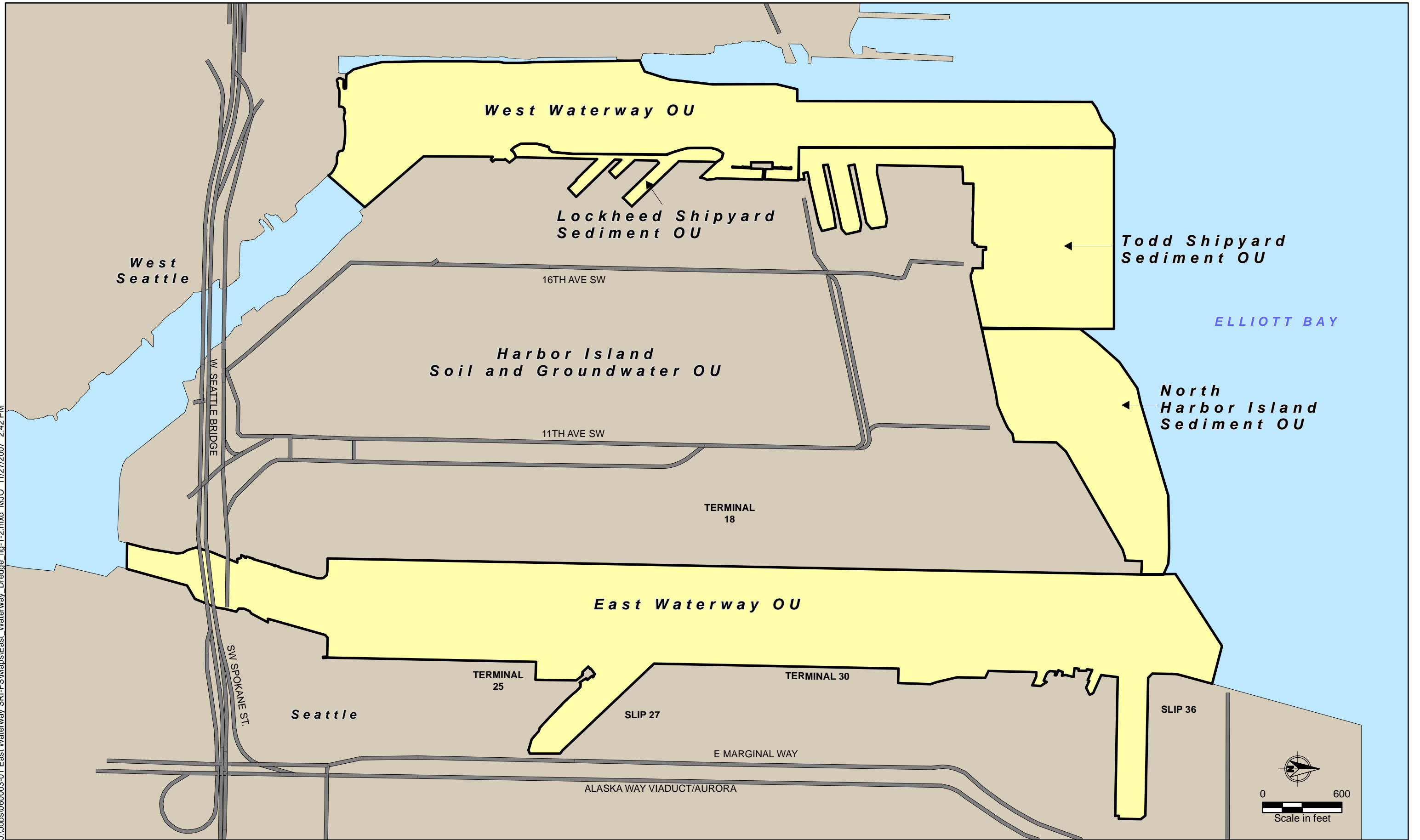


Figure 1-1
Vicinity Map and Proposed East Waterway Operable Unit Study Boundary
Existing Information Summary Report
East Waterway Operable Unit

J:\Jobs\060003-01 East Waterway SRI-FSI\Maps\East Waterway Dredge fig-1-2.mxd_MJO 11/27/2007 2:42 PM





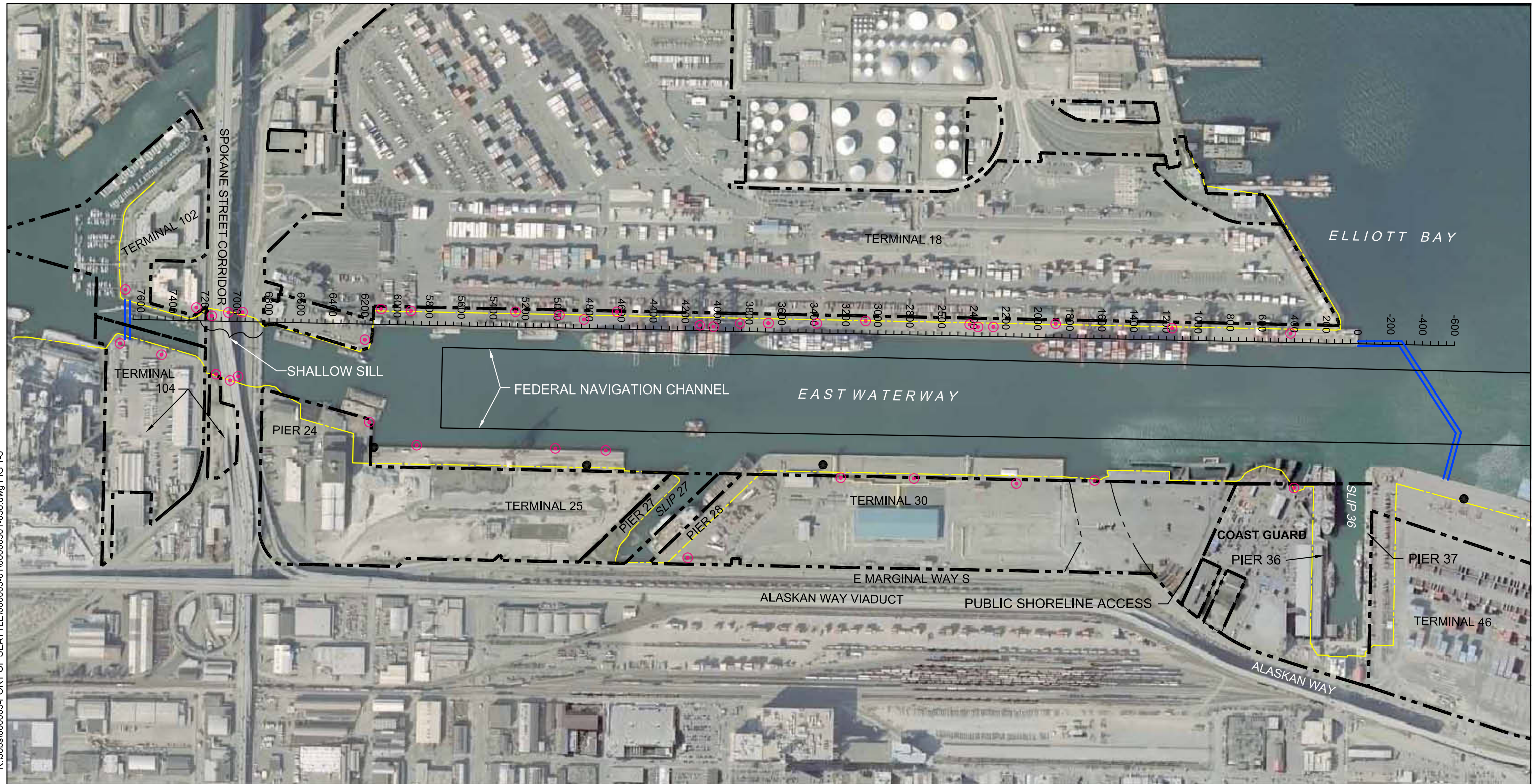
 Approximate Operable Unit Study Boundary
 Harbor Island Sediment OU

Figure 1-2
 Harbor Island Superfund Site Operable Units
 Existing Information Summary Report
 East Waterway Operable Unit

Mar 02, 2008 9:38am cdavidson K:\Jobs\060003-PORT OF SEATTLE\060003-01\06000301-038.dwg FIG 1-3



LEGEND

- INNER HARBOR LINE/PROPERTY LINE
- PROPOSED EAST WATERWAY OPERABLE UNIT STUDY BOUNDARY
- MHHW LINE
- CSO LOCATION
- APPROXIMATE STORM DRAIN LOCATION

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

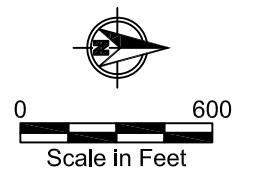
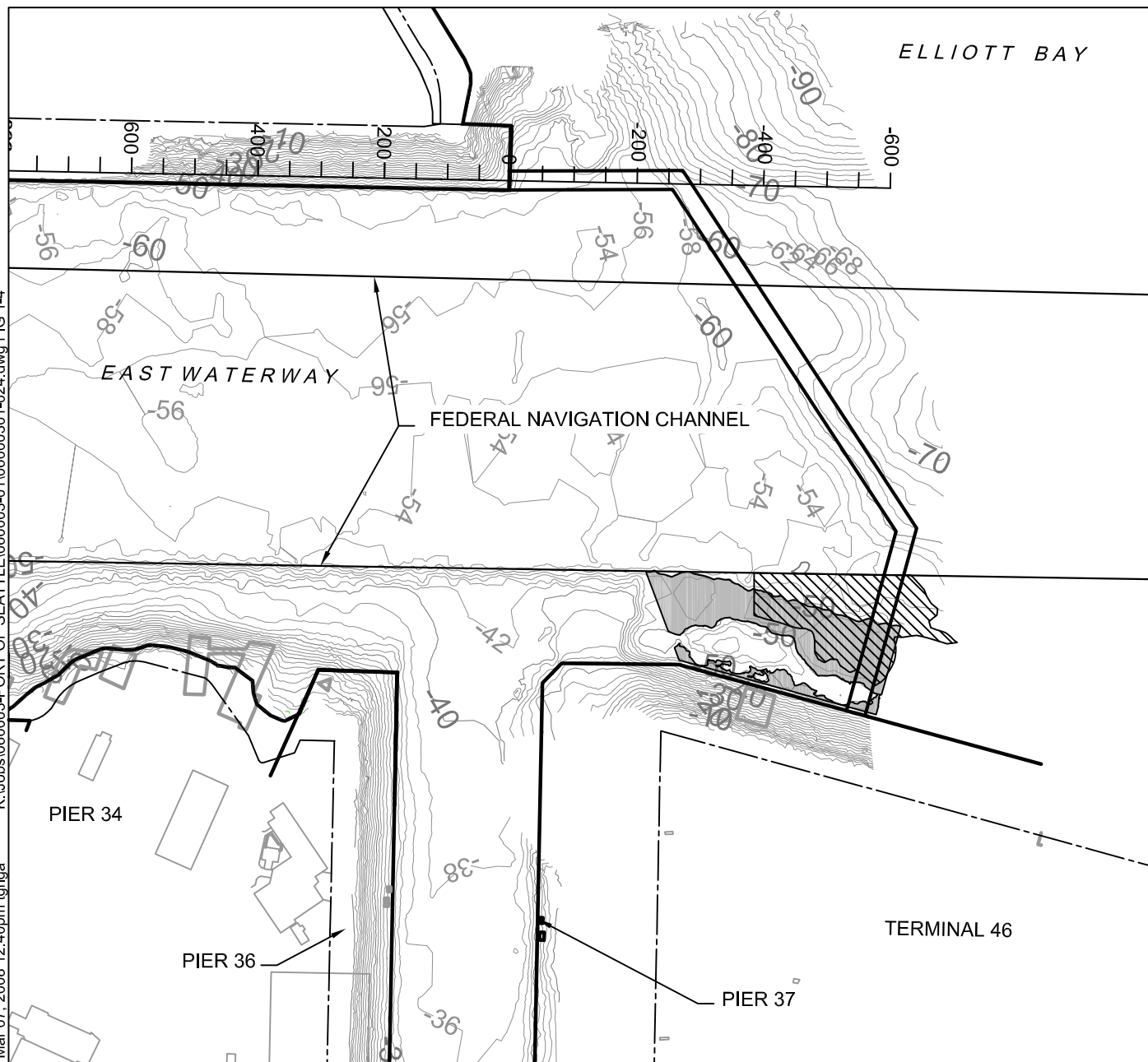

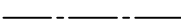




Figure 1-3
Major East Waterway Features
Existing Information Summary Report
East Waterway Operable Unit

K:\Jobs\060003-PORT OF SEATTLE\060003-01\06000301-024.dwg FIG 1-4
Mar 07, 2008 12:40pm tgriga



LEGEND

-  PROPOSED EAST WATERWAY OPERABLE UNIT STUDY BOUNDARY
-  MHHW LINE
-  SEDIMENT APPROVED FOR OPEN WATER DISPOSAL AND REMOVED TO -45 FEET MLLW IN 2000 (STAGE 1 DREDGING)
-  SEDIMENT APPROVED FOR OPEN WATER DISPOSAL AND REMOVED TO -51 FEET MLLW IN 2005 (T-46 DREDGING)

- Notes:
1. Existing bathymetry from David Evans Associates dated 2003 and Blue Water Engineering dated 2004.
 2. Bathymetry contours shown at 2-foot intervals (MLLW).
 3. Only dredge units that are bisected by the proposed northern study area boundary are shown.

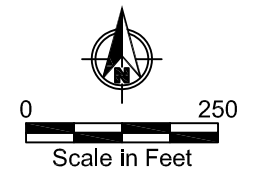
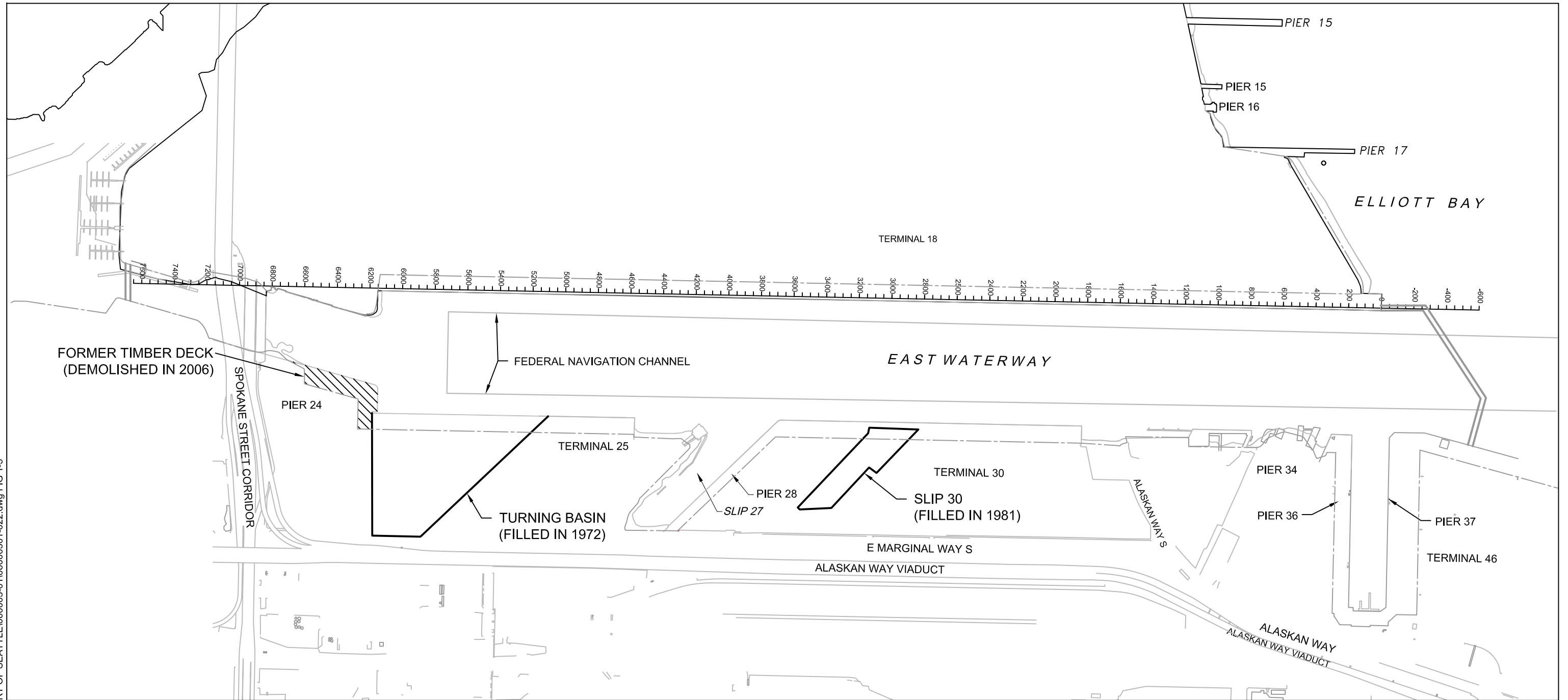


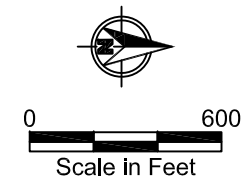
Figure 1-4
Northern Proposed East Waterway Operable Unit Study Boundary
Existing Information Summary Report
East Waterway Operable Unit

Mar 02, 2008 9:37am cdavidson K:\Jobs\060003-PORT OF SEATTLE\060003-0106000301-022.dwg FIG 1-5



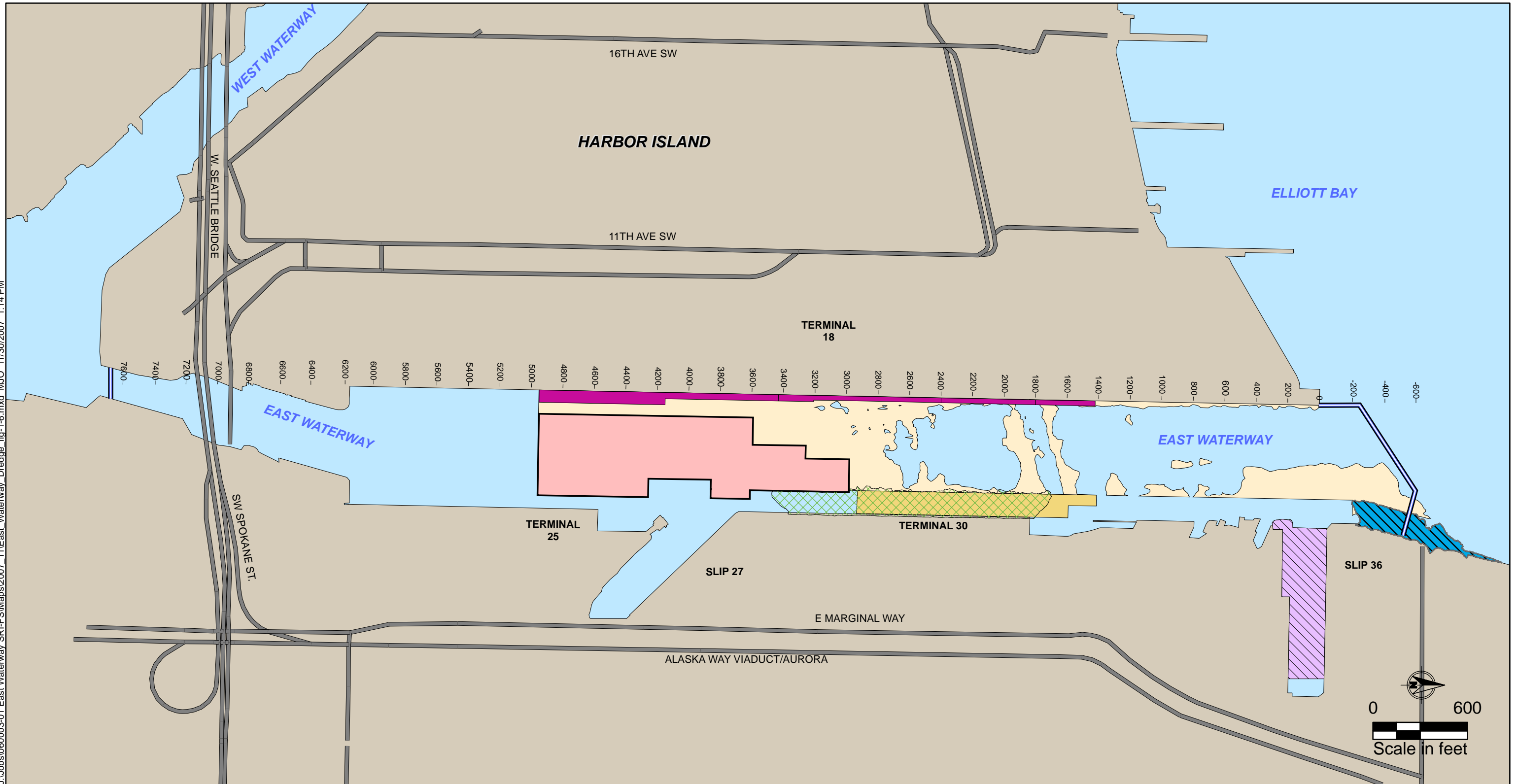
LEGEND

- ==== PROPOSED EAST WATERWAY OPERABLE UNIT STUDY BOUNDARY
- MHHW LINE



NOTE: PREVIOUSLY ESTABLISHED STATION LOCATIONS FOR THE EAST WATERWAY ARE SHOWN ALONG THE WESTERN SHORELINE FOR REFERENCE.

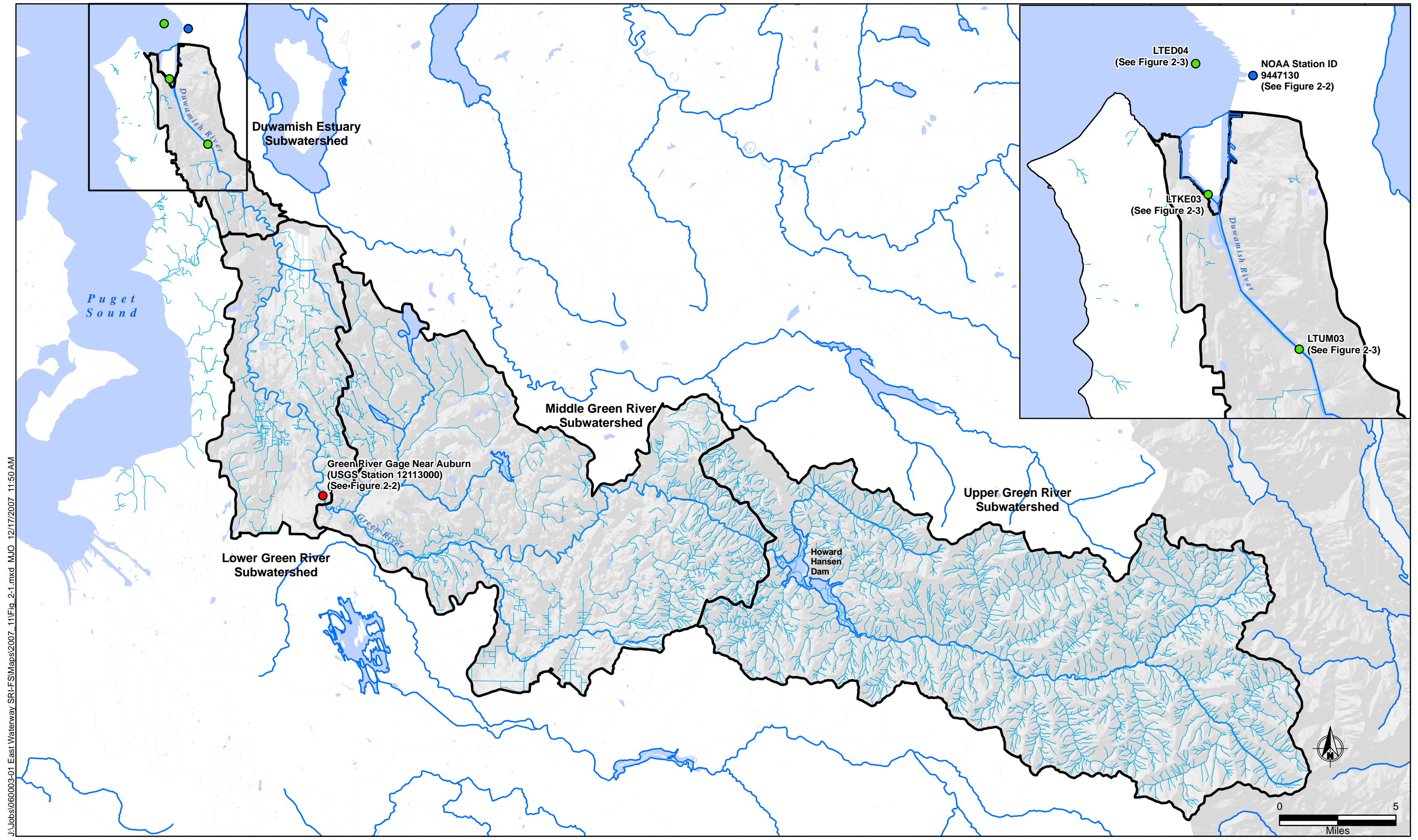
J:\Jobs\060003-01 East Waterway SRI-FS\Maps\2007_11\East Waterway_Dredge_fig-1-6.mxd MJO 11/30/2007 1:14 PM



- PROPOSED EAST WATERWAY OPERABLE UNIT STUDY BOUNDARY
- ▨ T-46 DREDGING (COMPLETED 2005, -51 ft MLLW)
- ▨ T-30 DREDGING (PROPOSED 2008, -51 ft MLLW)
- ▨ PHASE 1 REMOVAL ACTION BOUNDARY (COMPLETED 2005, -51 ft MLLW)
- ▨ COAST GUARD DREDGE (COMPLETED 2005, -40 ft MLLW)
- ▨ STAGE 1A (COMPLETED 2006, -51 ft MLLW)
- ▨ STAGE 1 (COMPLETED 2000, -51 ft MLLW)
- ▨ T-30 INTERIM DREDGING (COMPLETED 2002, -44 ft MLLW)

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

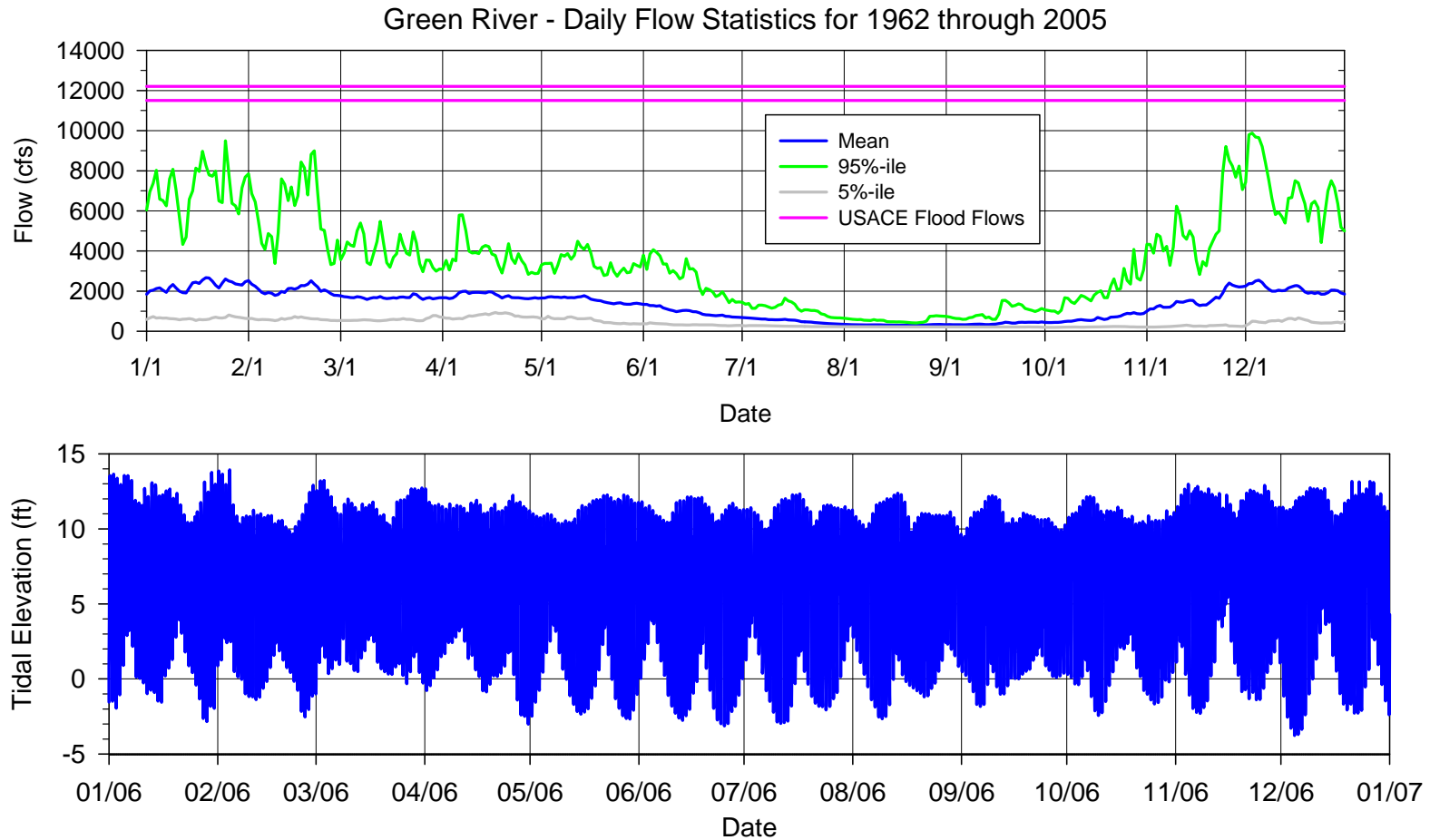
Figure 1-6
Recent East Waterway Dredge History
Existing Information Summary Report
East Waterway Operable Unit



J:\Jobs\060003-01 East Waterway SRI-FSM\Maps\2007_11\Fig_2-1.mxd MJU 12/17/2007 11:50 AM

- River
- Basin Boundary
- Salinity Profile Sampling Location
- Tidal Monitoring Location
- Flow Monitoring Location

Figure 2-1
Flow, Tide, and Salinity Monitoring Locations within the Green/Duwamish River Watershed
Existing Information Summary Report
East Waterway Operable Unit



Notes:

- River flow was measured by USGS at Auburn, WA (USGS 12113000)
- Flood flows from Brettman (2007)
- Elevations were measured by NOAA (Station 9447130) and referenced to Mean Lower Low Water Level (MLLW)
- Locations of flow and tidal measurements shown on Figure 2-1

Figure 2-2
 Flow Statistics in the Green River and Tide Elevation in Elliott Bay for 2006
 Existing Information Summary Report
 East Waterway Operable Unit

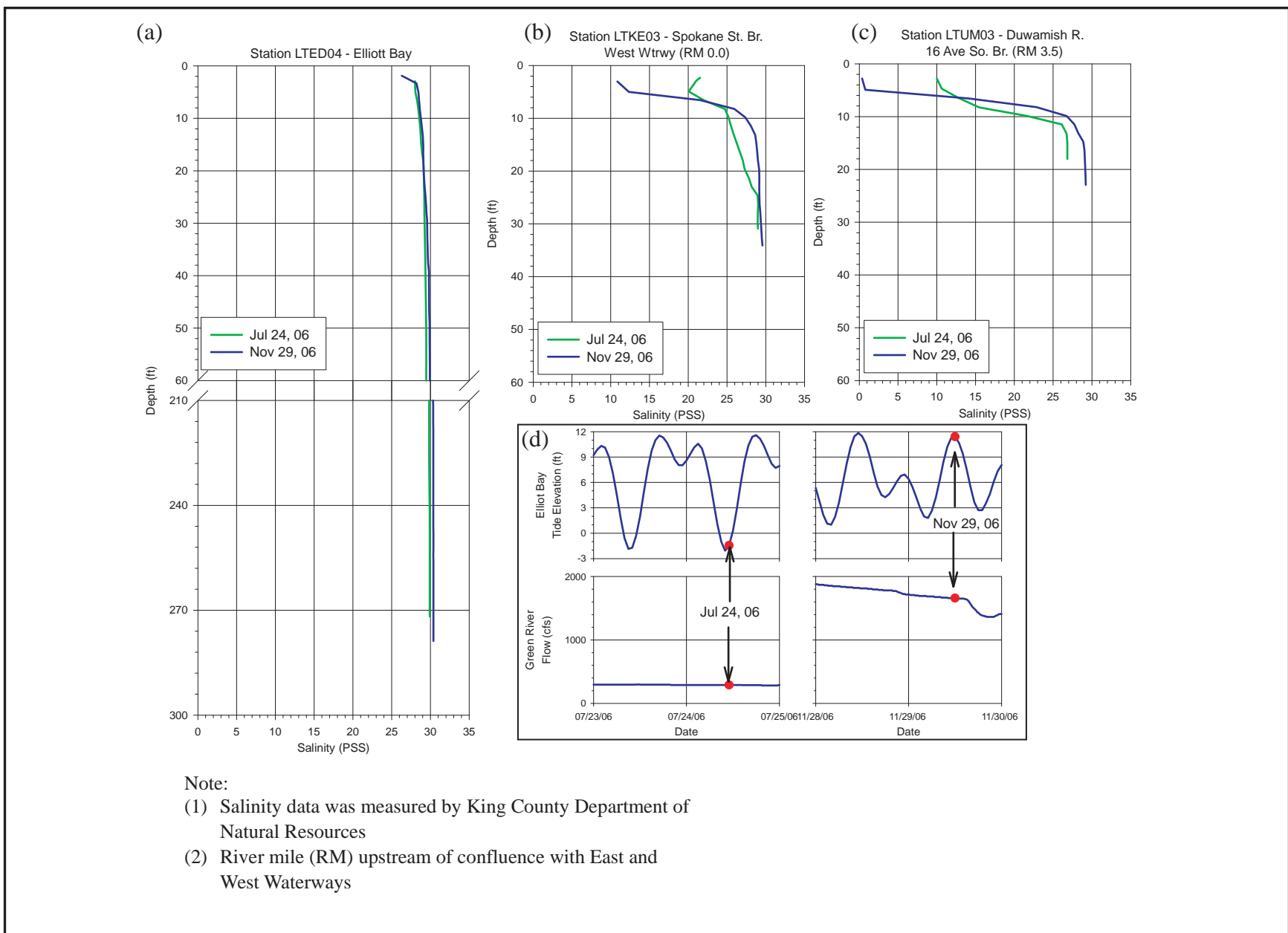
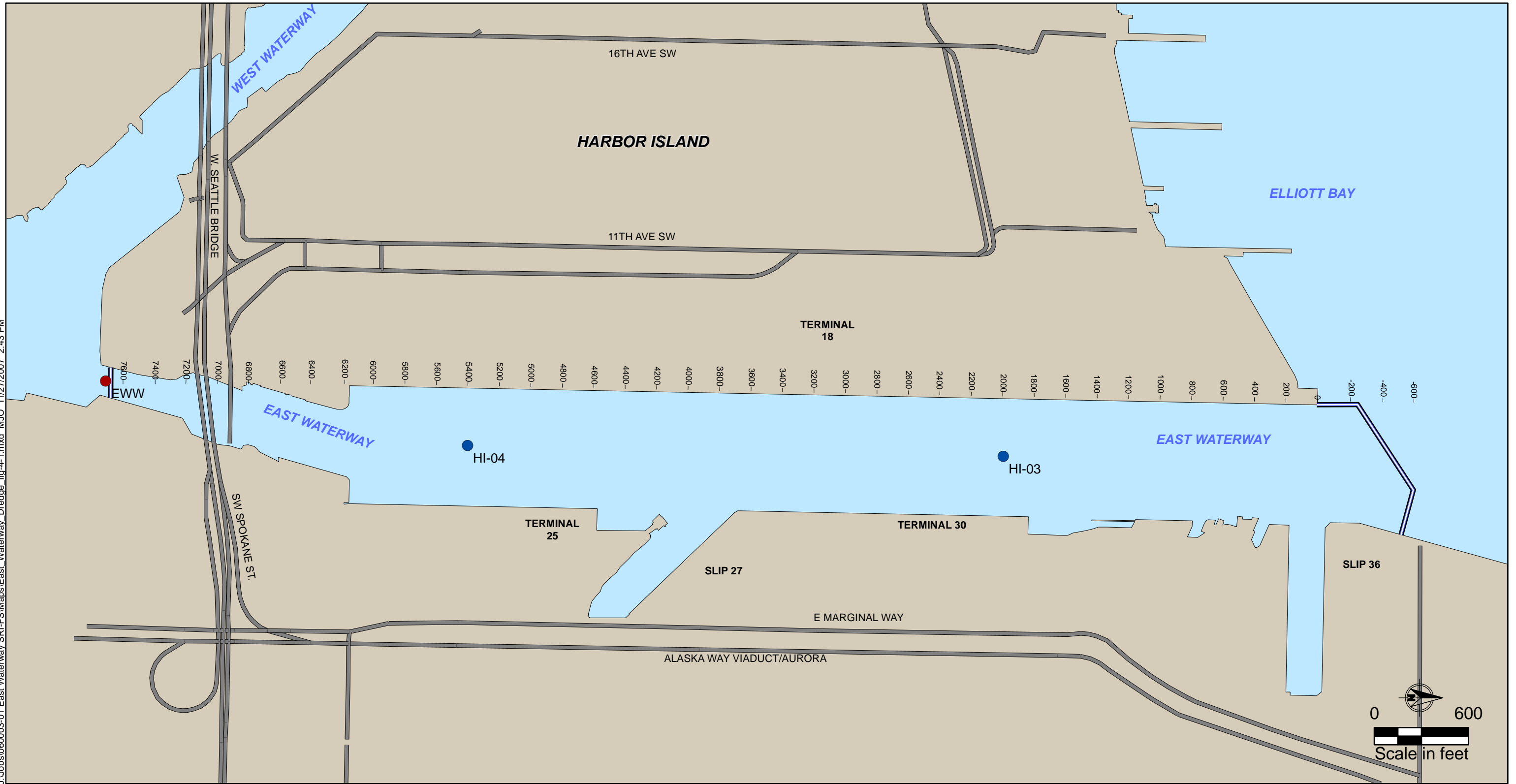


Figure 2-3
 Example Salinity Profile Data from Elliott Bay and the Duwamish River from 2006
 East Waterway Operable Unit
 Existing Information Summary Report

J:\Jobs\060003-01 East Waterway SRI-FSI\Maps\East Waterway Dredge_fig-4-1.mxd MJO 11/27/2007 2:43 PM

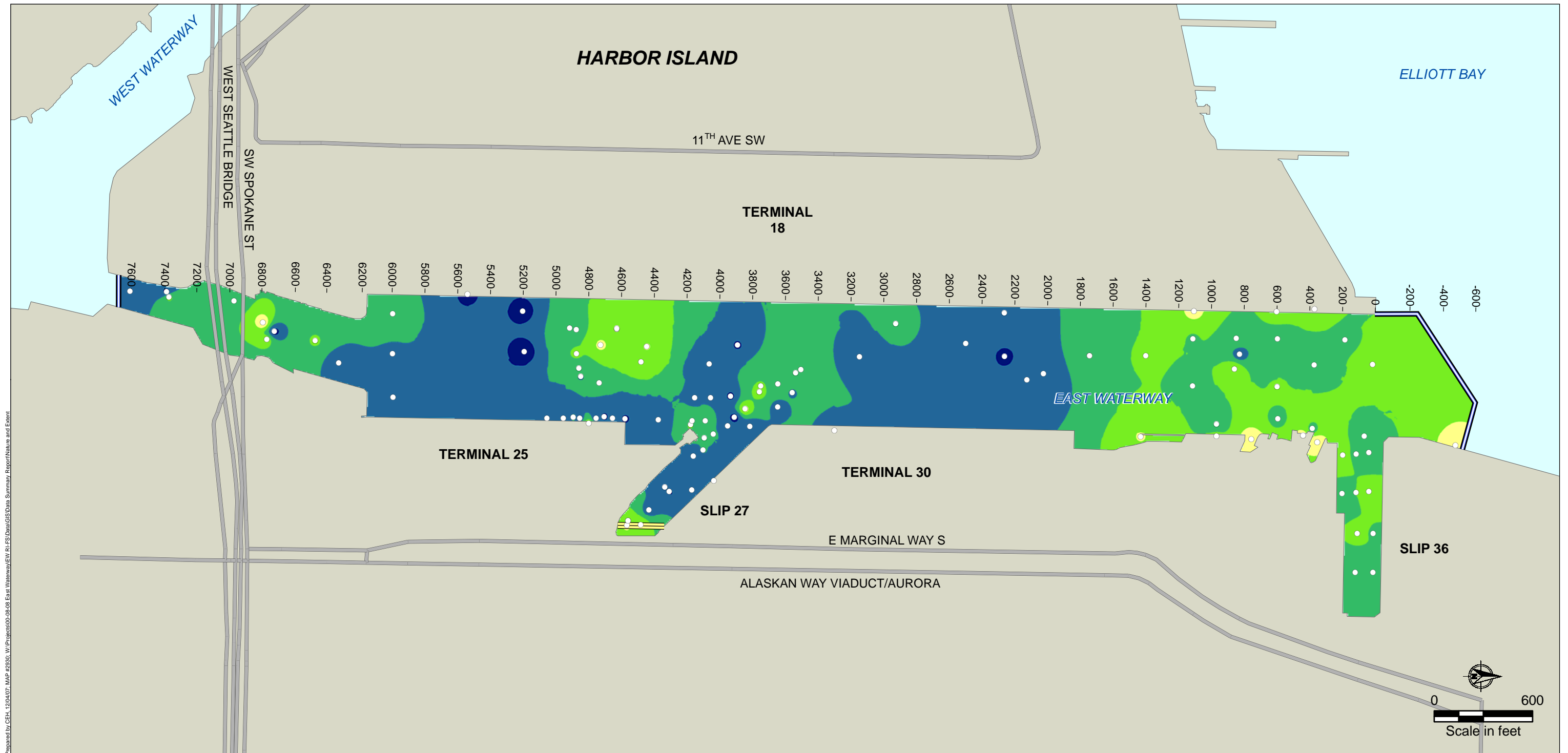


Notes

1. Previously established station locations for the East Waterway are shown along the western shoreline for reference.
2. Current meters and sediment trap deployed during Spring 1995.
3. King county WQA velocity sampling conducted in 1996.

●	King County WQA velocity sampling location
●	Sediment trap and near-bottom velocity sampling locations

Figure 2-4
Near-Bottom Velocity and Sediment Trap Sampling Locations
Existing Information Summary Report
East Waterway Operable Unit



Prepared by CEH 12/04/07 MAP #2950 V:\Projects\00-08-08 East Waterway\EV R\FIS\Quail\S Data Summary Report\Map and Extent

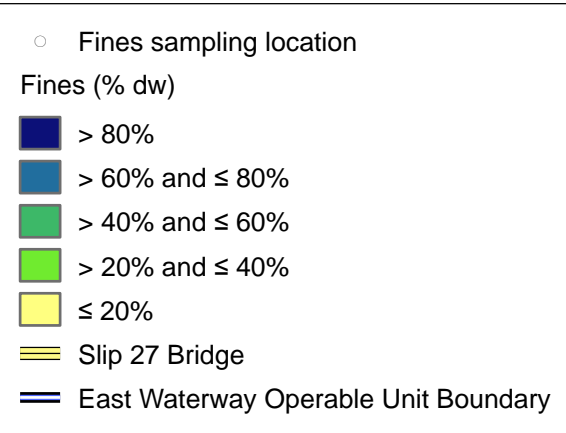
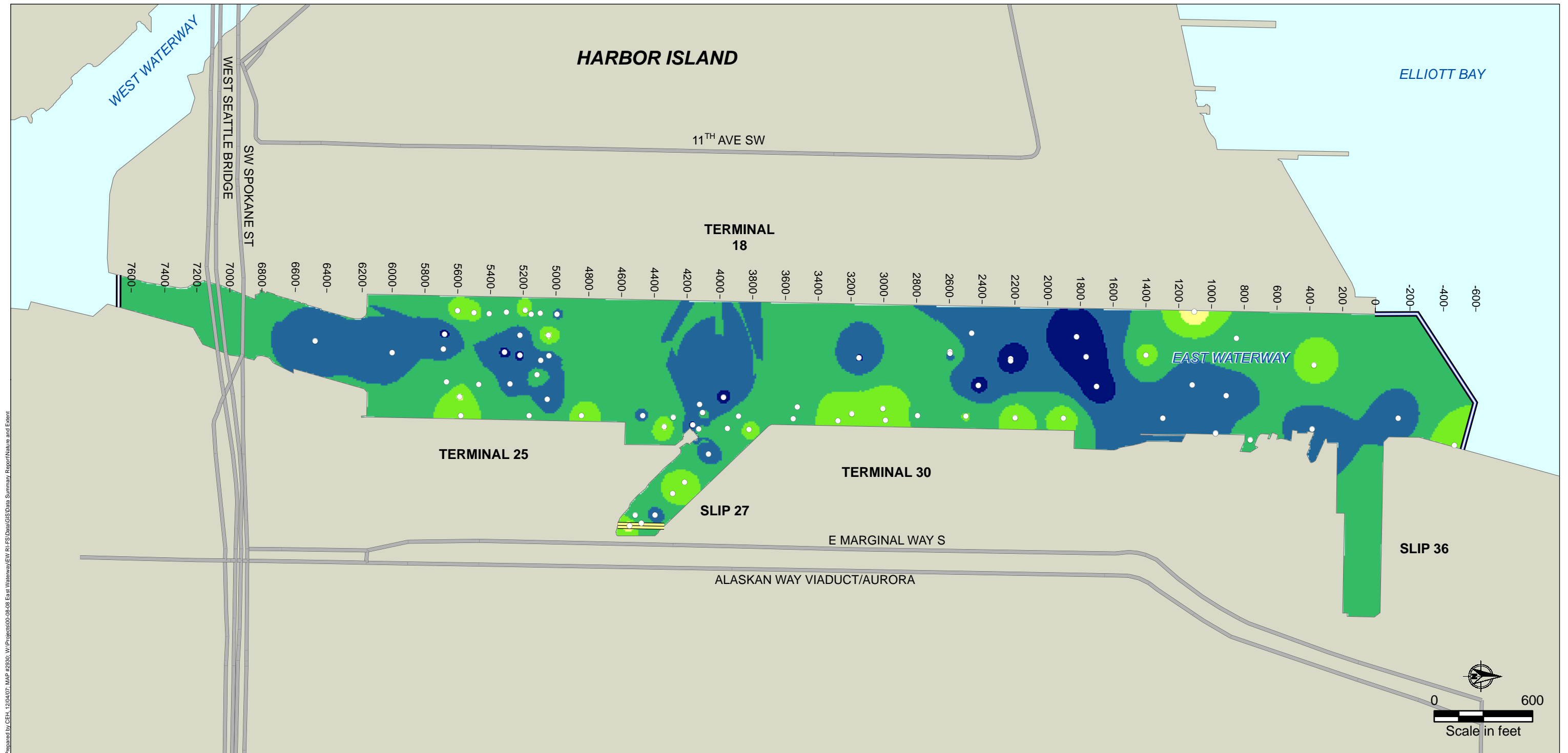


Figure 2-5
 Percent Fines in Surface Sediment
 (0-10 cm) in the East Waterway
 Existing Information Summary Report
 East Waterway Operable Unit



Prepared by CEH 12/04/07 MAP #2950 W\Project\00-08-08 East Waterway\EV R\FS\Qua\ES Data Summary Report\Map and Extent

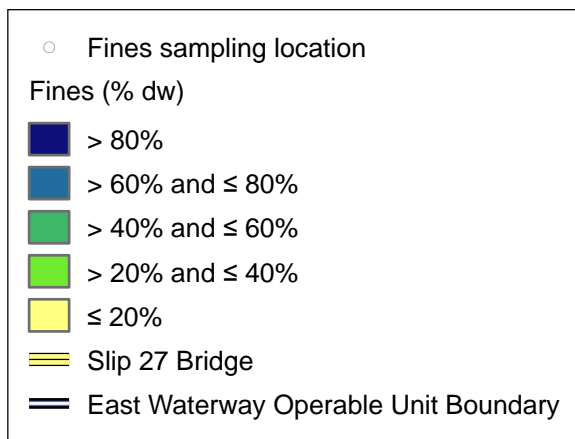
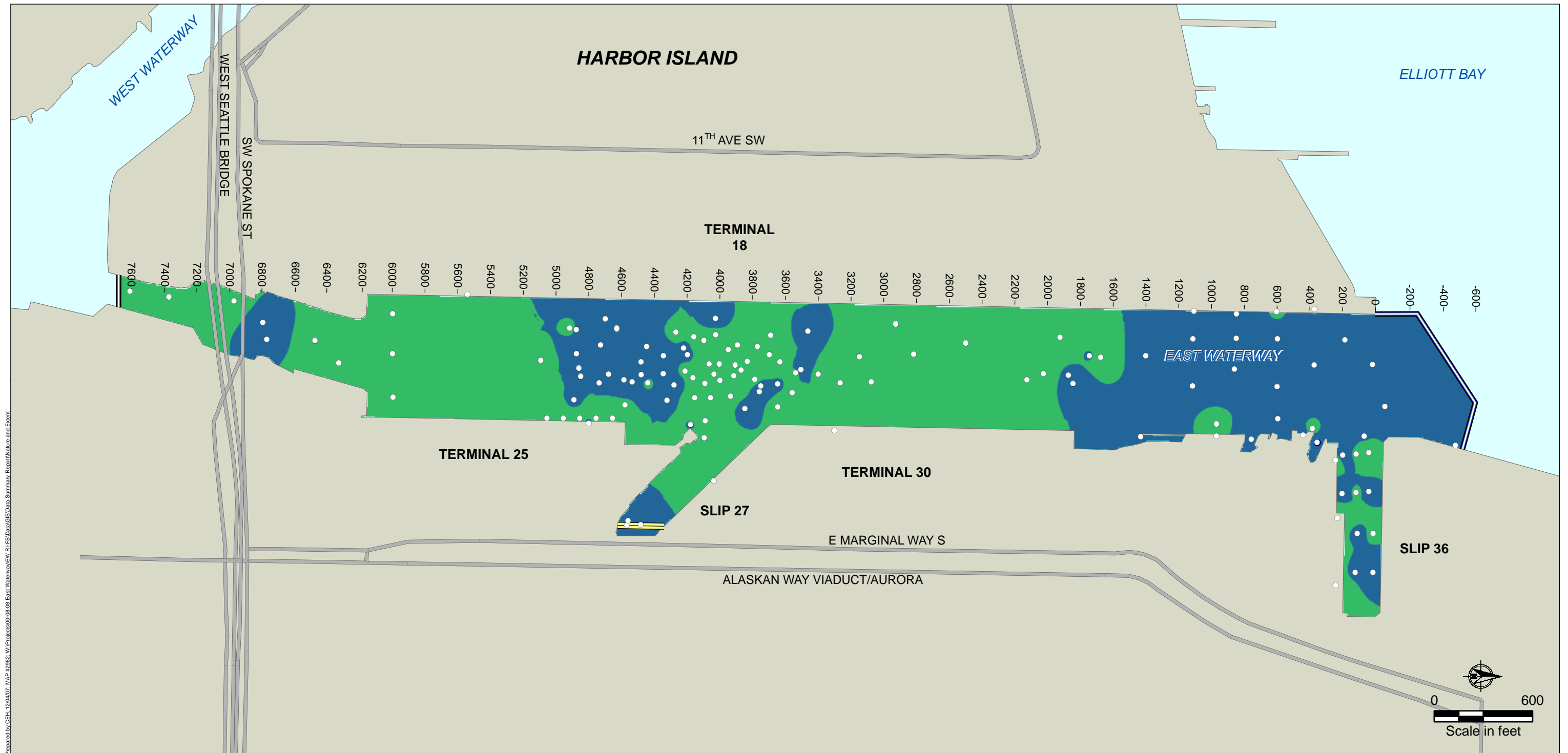


Figure 2-6
Percent Fines in Subsurface Sediment
(0-4 ft) in the East Waterway
Existing Information Summary Report
East Waterway Operable Unit



Prepared by CEH 12/04/07 MAP #2962 V:\Project\00-08-08 East Waterway\REV R\FIS\Quail\S Data Summary Report\Map and Extent

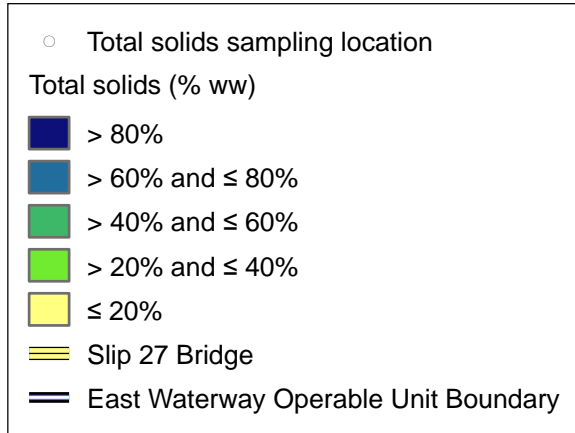
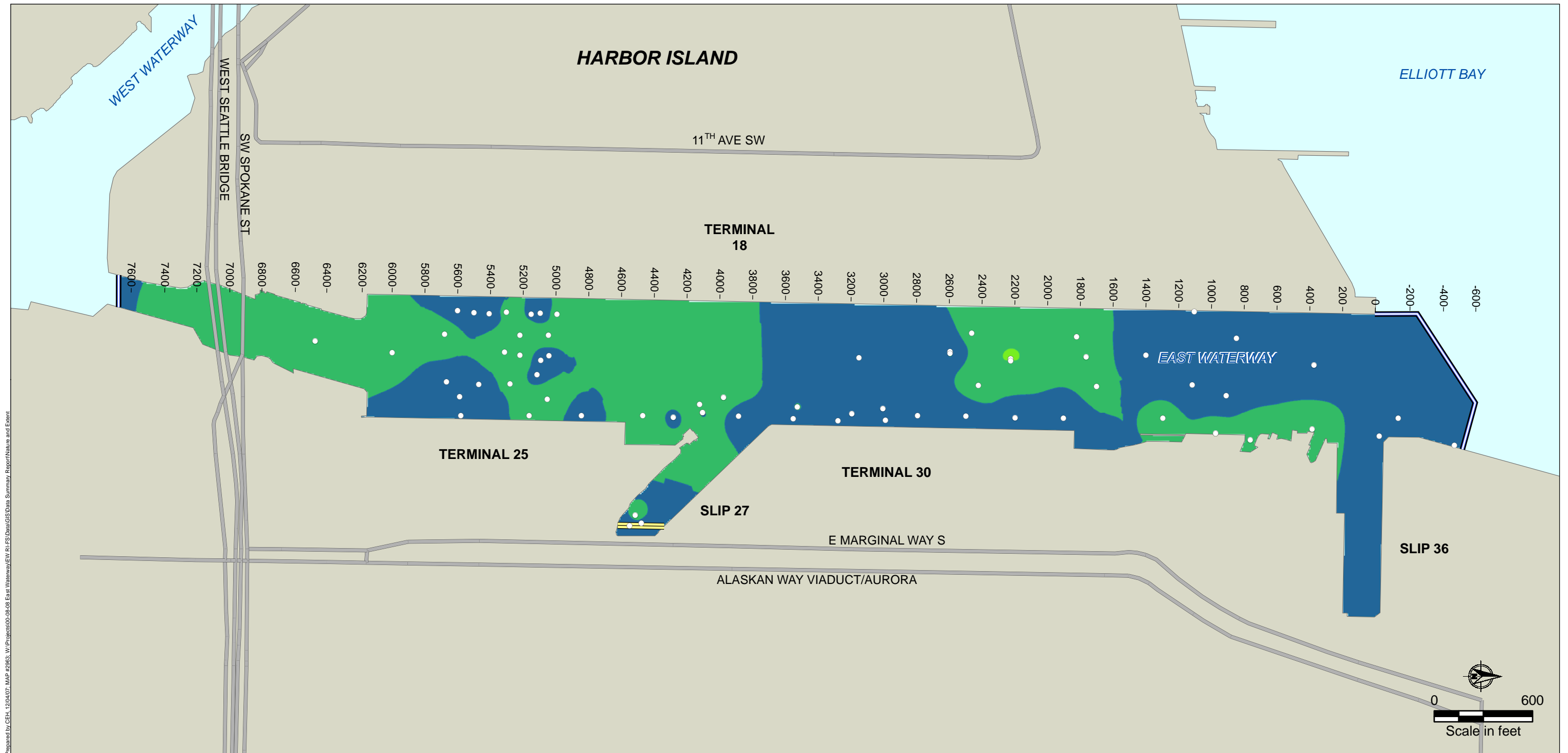


Figure 2-7
 Percent Solids in Surface Sediment
 (0-10 cm) in the East Waterway
 Existing Information Summary Report
 East Waterway Operable Unit



Prepared by CEH 12/04/07 MAP #2963 V:\Projects\00-08-08 East Waterway\REV R\FIS\Quail\IS Data Summary Report\Map and Extent

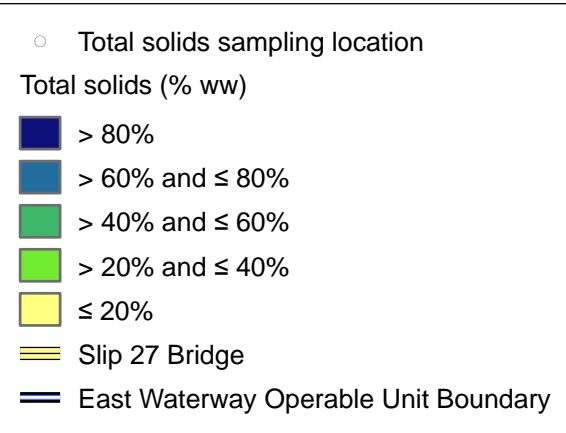
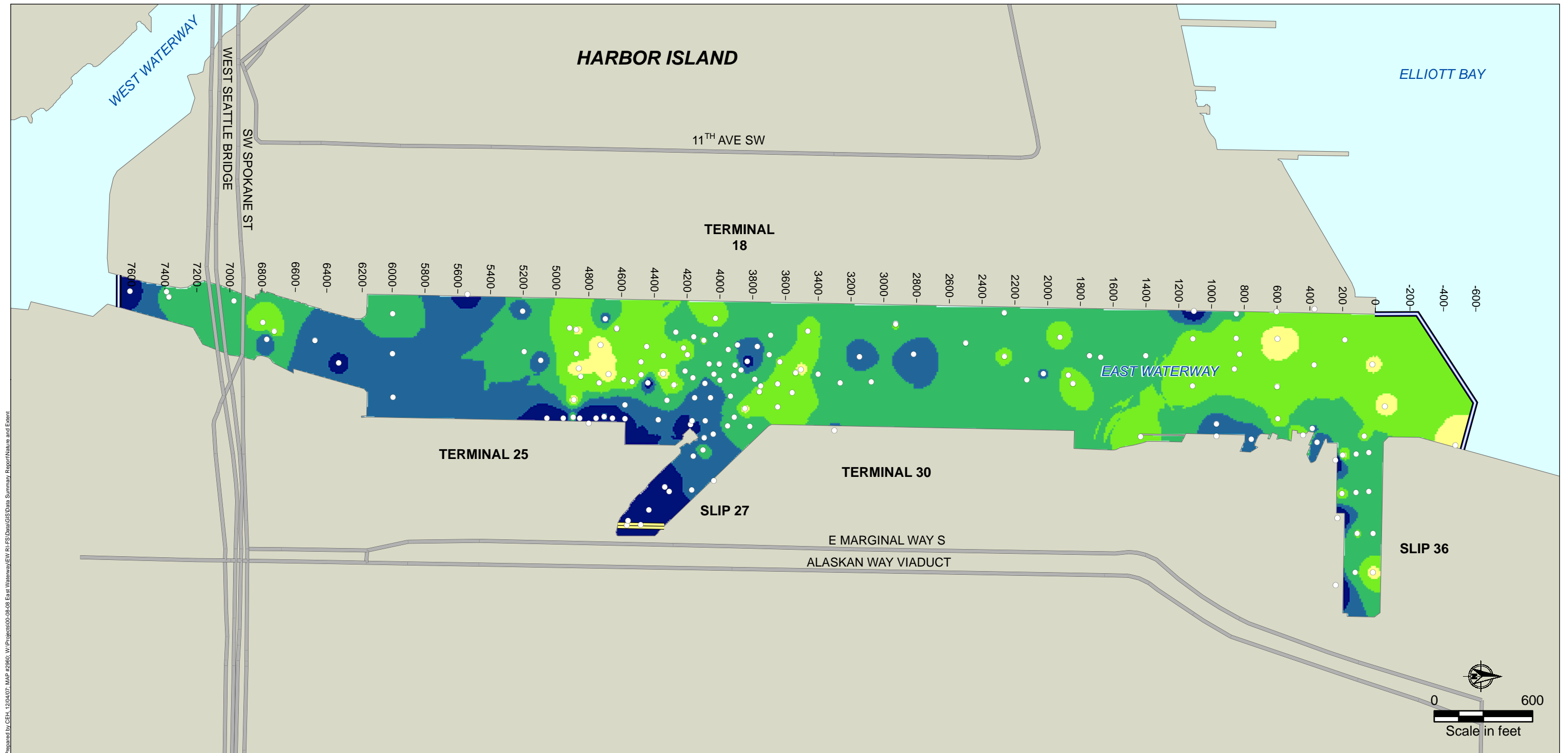


Figure 2-8
 Percent Solids in Subsurface Sediment
 (0-4 ft) in the East Waterway
 Existing Information Summary Report
 East Waterway Operable Unit



Prepared by CEH 12/04/07 MAP #2960 V:\Project\00-08-08 East Waterway\REV R\FIS\Quail\S Data Summary Report\Map and Extent

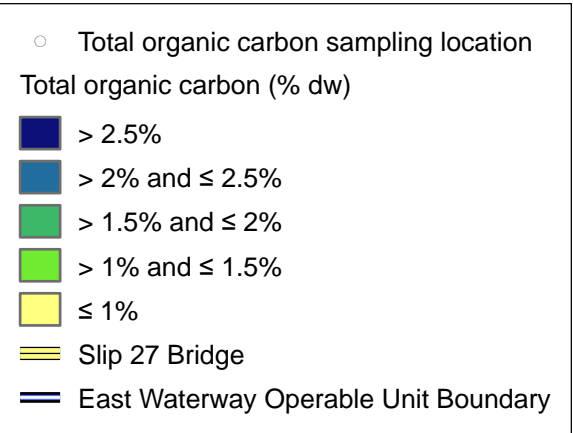
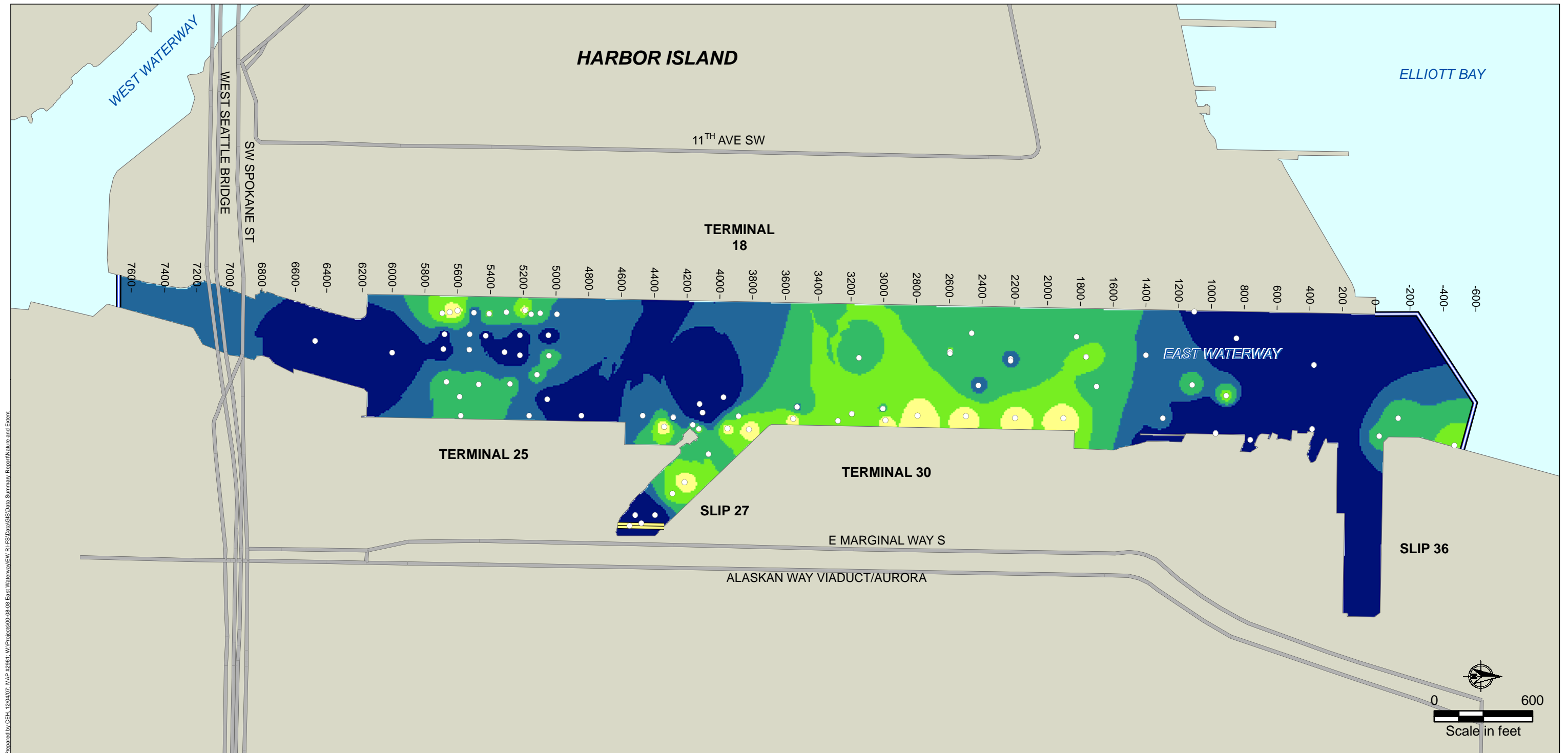


Figure 2-9
 Total Organic Carbon in Surface Sediment
 (0-10 cm) in the East Waterway
 Existing Information Summary Report
 East Waterway Operable Unit



Prepared by CEH 12/04/07 MAP #2961 W/Project/00-08-08 East Waterway/EV R/FS/Qual/IS/08a Summary Report/Nature and Extent

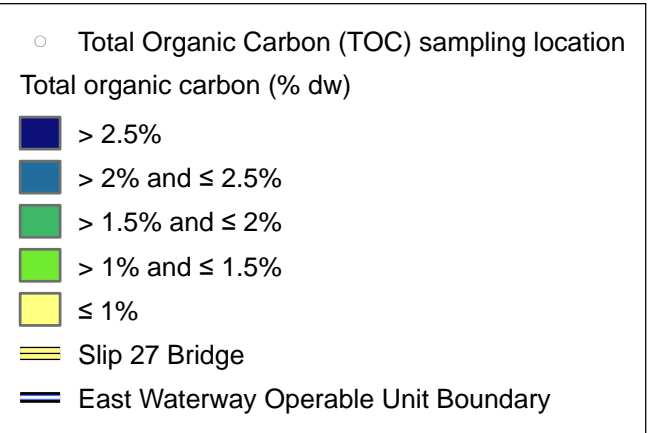
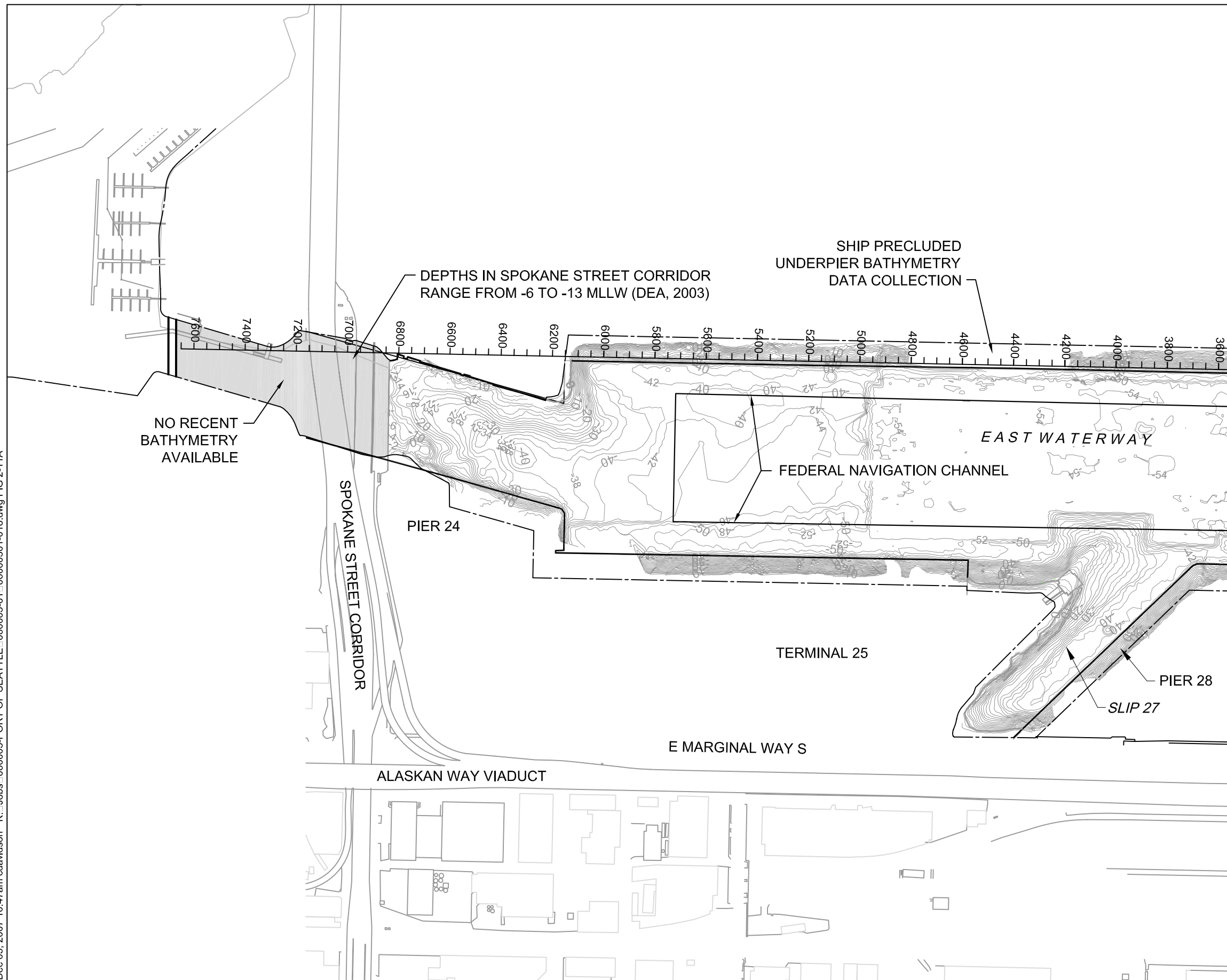



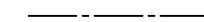
Figure 2-10
 Total Organic Carbon in Subsurface Sediment (0-4 ft) in the East Waterway
 Existing Information Summary Report
 East Waterway Operable Unit

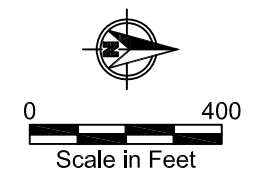
Dec 05, 2007 10:47am ctdavidson K:\Jobs\060003-PORT OF SEATTLE\060003-01\06000301-018.dwg FIG 2-11A



MATCHLINE TO FIGURE 2-9B

LEGEND

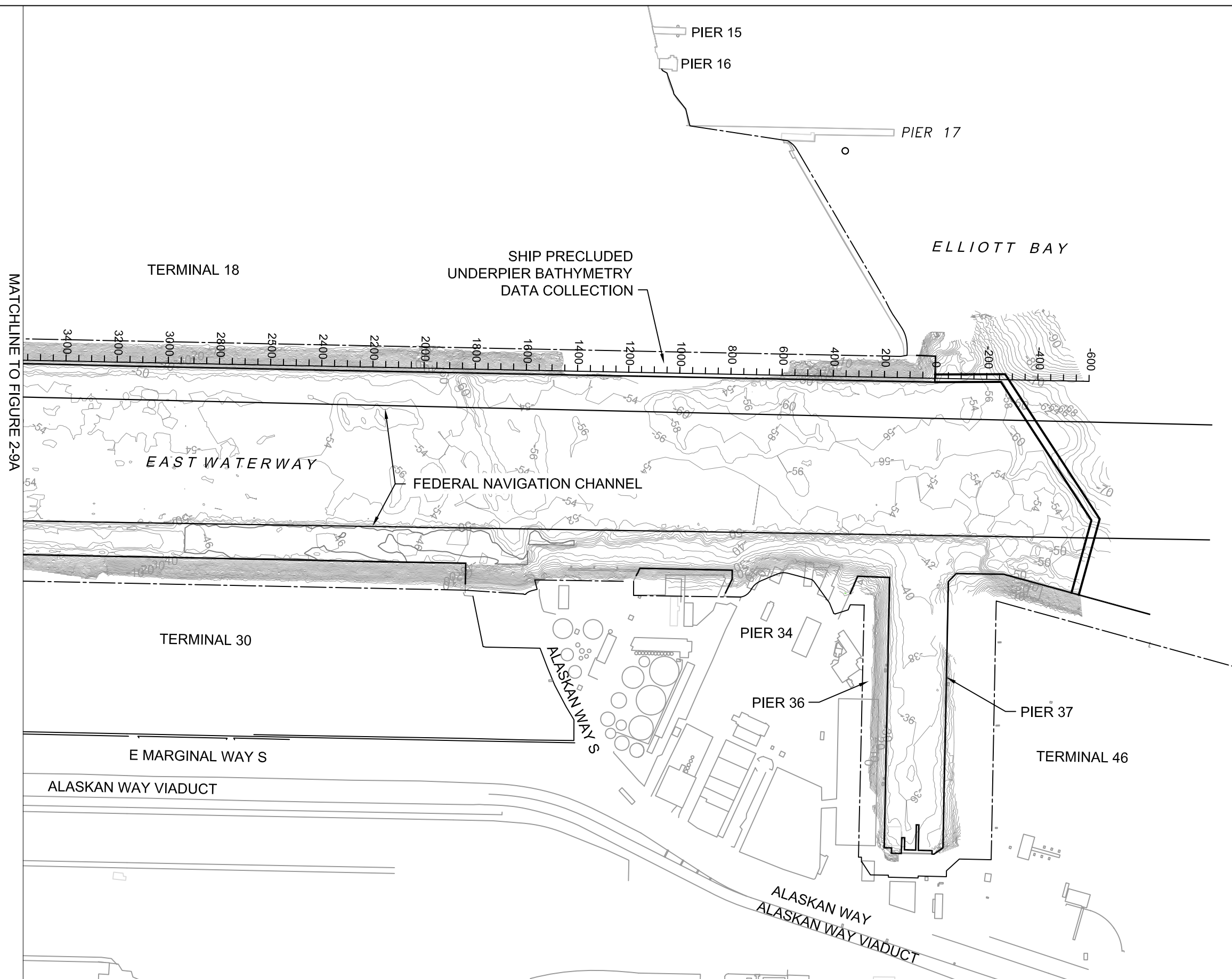
-  PROPOSED EAST WATERWAY OPERABLE UNIT BOUNDARY
-  MHHW LINE



- Notes:
1. Existing bathymetry from David Evans Associates dated 2003 and Blue Water Engineering dated 2004.
 2. Bathymetry contours shown at 2-foot intervals (MLLW).

Figure 2-11A
 Existing Bathymetry
 Existing Information Summary Report
 East Waterway Operable Unit

Dec 05, 2007 10:48am ctdavidson K:\Jobs\060003-PORT OF SEATTLE\060003-01_06000301-018.dwg FIG 2-11B



MATCHLINE TO FIGURE 2-9A

LEGEND

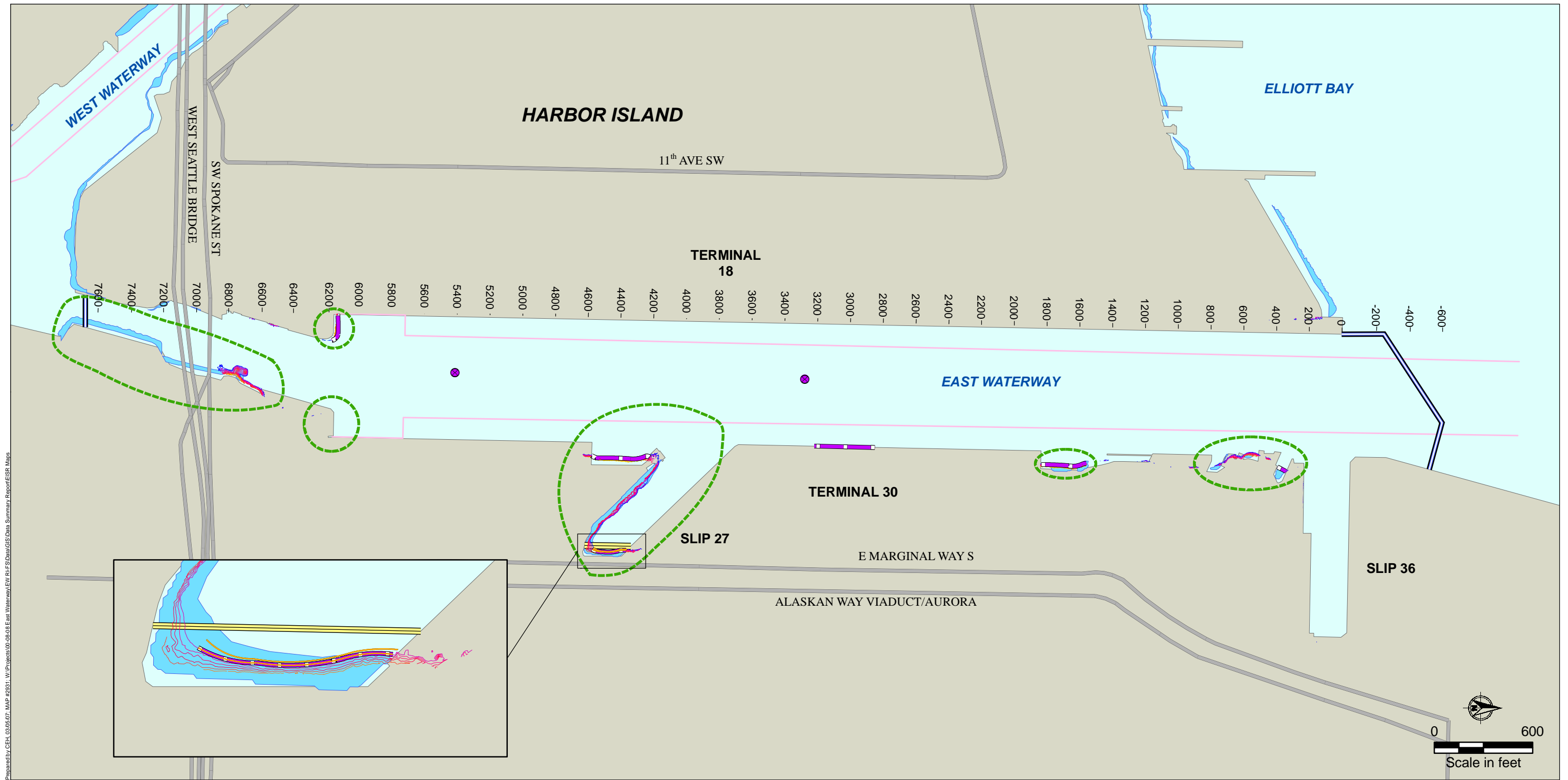
- PROPOSED EAST WATERWAY OPERABLE UNIT BOUNDARY
- MHHW LINE

Scale in Feet

Notes:

- Existing bathymetry from David Evans Associates dated 2003 and Blue Water Engineering dated 2004.
- Bathymetry contours shown at 2-foot intervals (MLLW).

Figure 2-11B
Existing Bathymetry
Existing Information Summary Report
East Waterway Operable Unit



Prepared by CEH, 03.05.07, MAP #29511, W:\Projects\00_08_08_East Waterway\EW_HLF\Shank\GIS\Data_Summary_Report\ESR_Maps

- Potential intertidal habitat
- Intertidal zone, US Fish and Wildlife Service
- Taylor purse seine
- Taylor EpiBenthic transect
- Taylor beach seine
- Slip 27 Bridge
- Navigation channel
- East Waterway Operable Unit Boundary

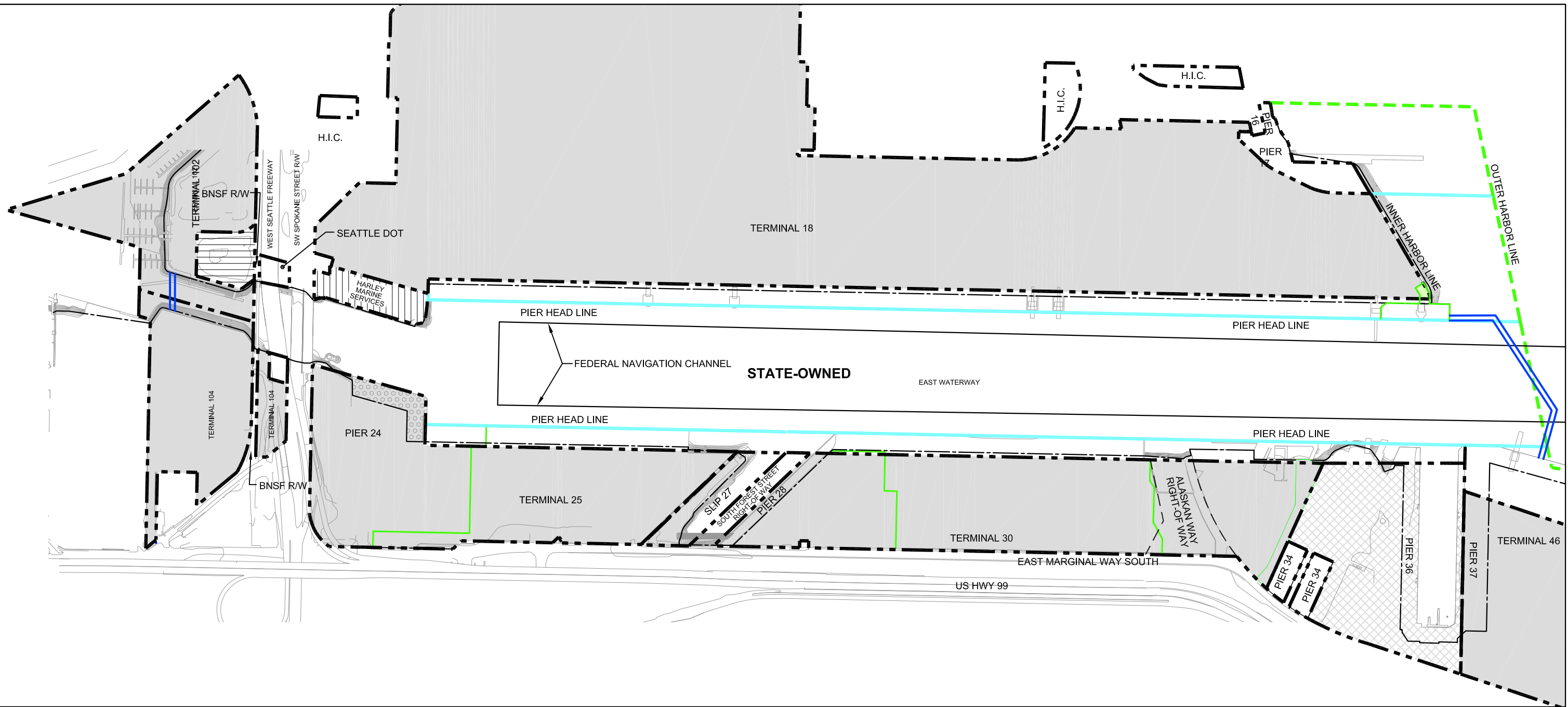
Purse and Beach seine:
Taylor Associates. 2005. Memorandum dated May 13, 2005 to M. McLaughlin, Port of Seattle, from J. Shannon regarding East Waterway dredge and cleanup fish monitoring project summary report 2005. Taylor Associates, Seattle, WA.

EpiBenthic transect:
Taylor W.J., Shreffler D.K., and Cordell J.R. 1999. Duwamish East Waterway channel deepening project: alternative dredge disposal sites juvenile salmonid and epibenthic prey assessment. Technical report. Preliminary draft. Prepared for Port of Seattle. Taylor Associates, Seattle, WA.


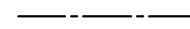




Intertidal zone:
USFWS. 2000. GIS coverage of Duwamish intertidal habitats. Contact: Carol Langston, GIS Analyst; Curtis Tanner, Fish and Wildlife Biologist. U.S. Fish and Wildlife Service, Lacey, WA.





Figure 2-12
Potential Intertidal Habitat in the East Waterway
Existing Information Summary Report
East Waterway Operable Unit

Mar 04, 2008 8:25am cdavidson K:\Jobs\060003-PORT OF SEATTLE\060003-0106000301-023.dwg FIG 2-13



LEGEND

-  PROPOSED EAST WATERWAY OPERABLE UNIT BOUNDARY
-  MHHW LINE
-  PIER HEAD LINE
-  OUTER HARBOR LINE
-  INNER HARBOR LINE/PROPERTY LINE APPROXIMATE
-  LEASE LINE

-  PORT OF SEATTLE
-  HARBOR REAL ESTATE
-  DUWAMISH PROPERTIES
-  US COAST GUARD

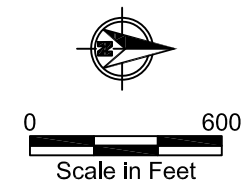
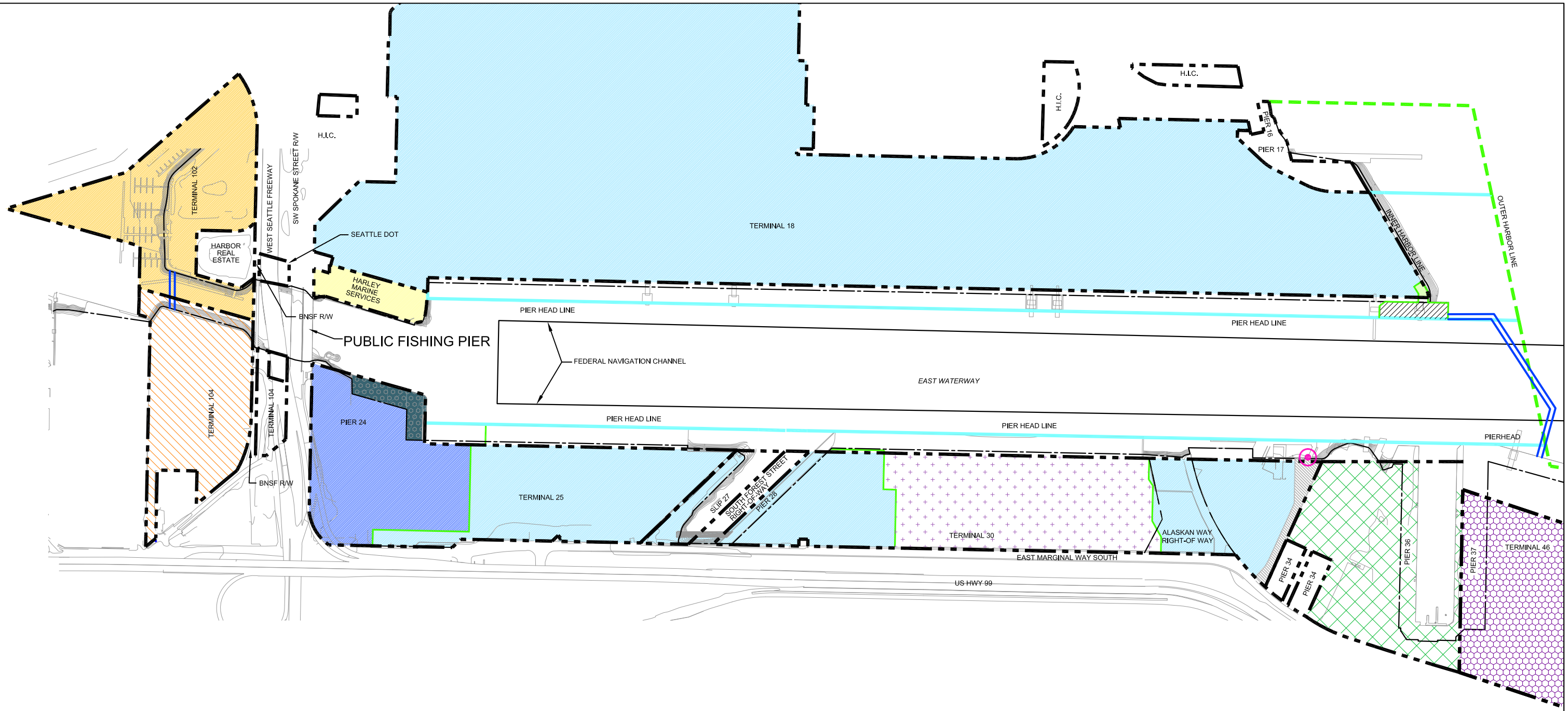


Figure 2-13
Parcel Boundary and Owner Map
Existing Information Summary Report
East Waterway Operable Unit

Mar 11, 2008 1:13pm cdavidson K:\Jobs\060003-PORT OF SEATTLE\060003-0106000301-019.dwg FIG 2-14



LEGEND

- DEMOLISHED TIMBER DECK, PILES REMAIN
- PROPOSED EAST WATERWAY OPERABLE UNIT BOUNDARY
- MHHW LINE
- PIER HEAD LINE
- OUTER HARBOR LINE
- INNER HARBOR LINE/PROPERTY LINE
- APPROXIMATE LEASE LINE
- PUBLIC ACCESS TO THE WATERWAY

- JACK PERRY MEMORIAL SHORELINE ACCESS
- KINDER MORGAN
- SSA (STEVEDORING SERVICES OF AMERICA)
- OLYMPIC TUG & BARGE
- HARBOR ISLAND MARINA
- SCS (SEATTLE COLD STORAGE)

- CTA (CRUISE TERMINALS OF AMERICA)
- U.S. COAST GUARD
- TTI (TOTAL TERMINALS INTERNATIONAL)
- WESTERN CARTAGE

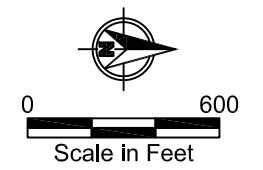
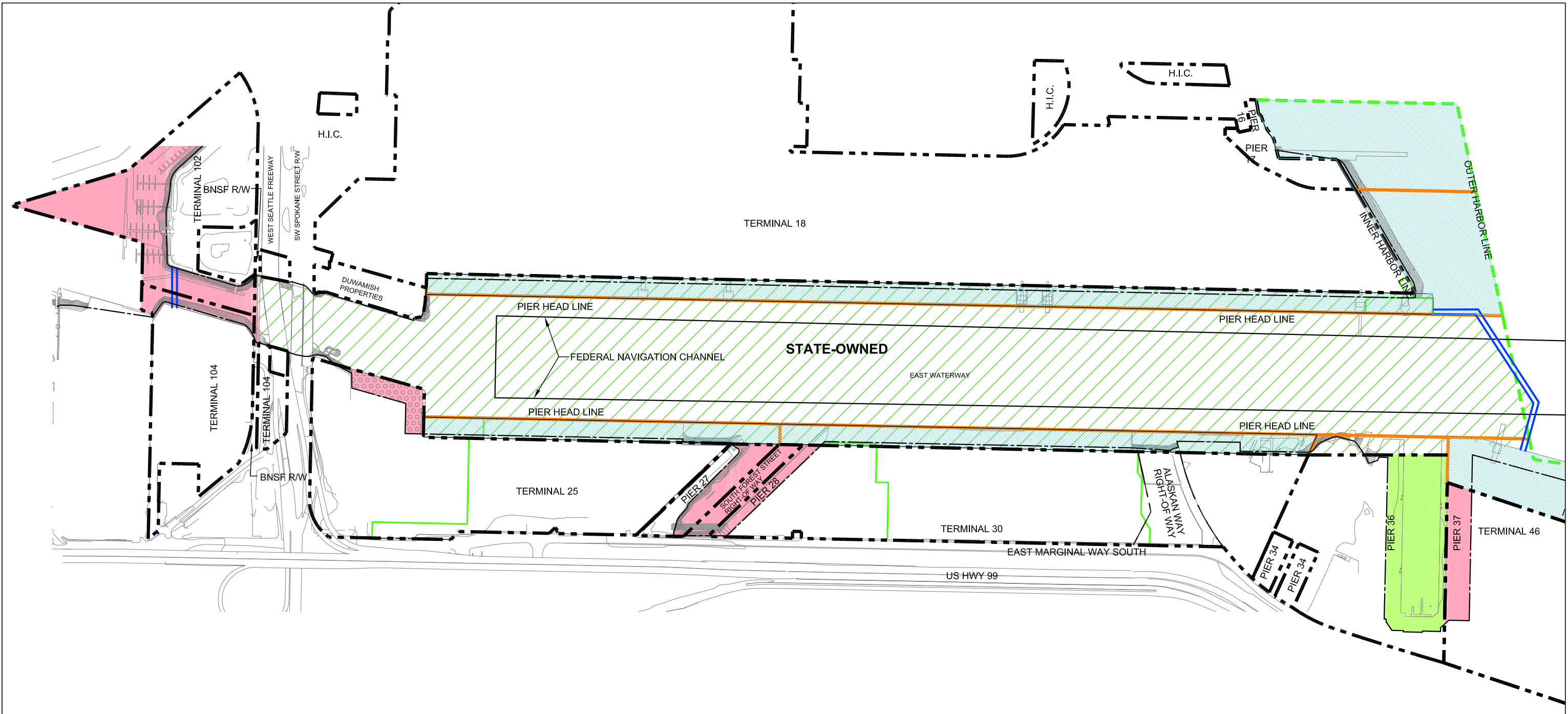

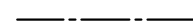









Figure 2-14
Operator and Tenant Map
Existing Information Summary Report
East Waterway Operable Unit

Mar 10, 2008 2:31pm heriksen K:\jobs\060003-PORT OF SEATTLE\060003-0106000301-015.dwg FIG 2-15



LEGEND

-  PROPOSED EAST WATERWAY OPERABLE UNIT BOUNDARY
-  MHHW LINE
-  PIER HEAD LINE
-  OUTER HARBOR LINE

-  INNER HARBOR LINE/PROPERTY LINE
-  STATE-OWNED LAND MANAGED BY THE PORT OF SEATTLE UNDER CURRENT PORT MANAGEMENT AGREEMENT (PMA) WITH DNR
-  STATE-OWNED LAND WITHIN EAST WATERWAY
-  US COAST GUARD-OWNED
-  PORT-OWNED

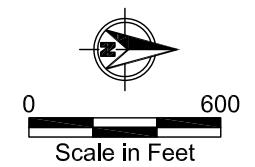
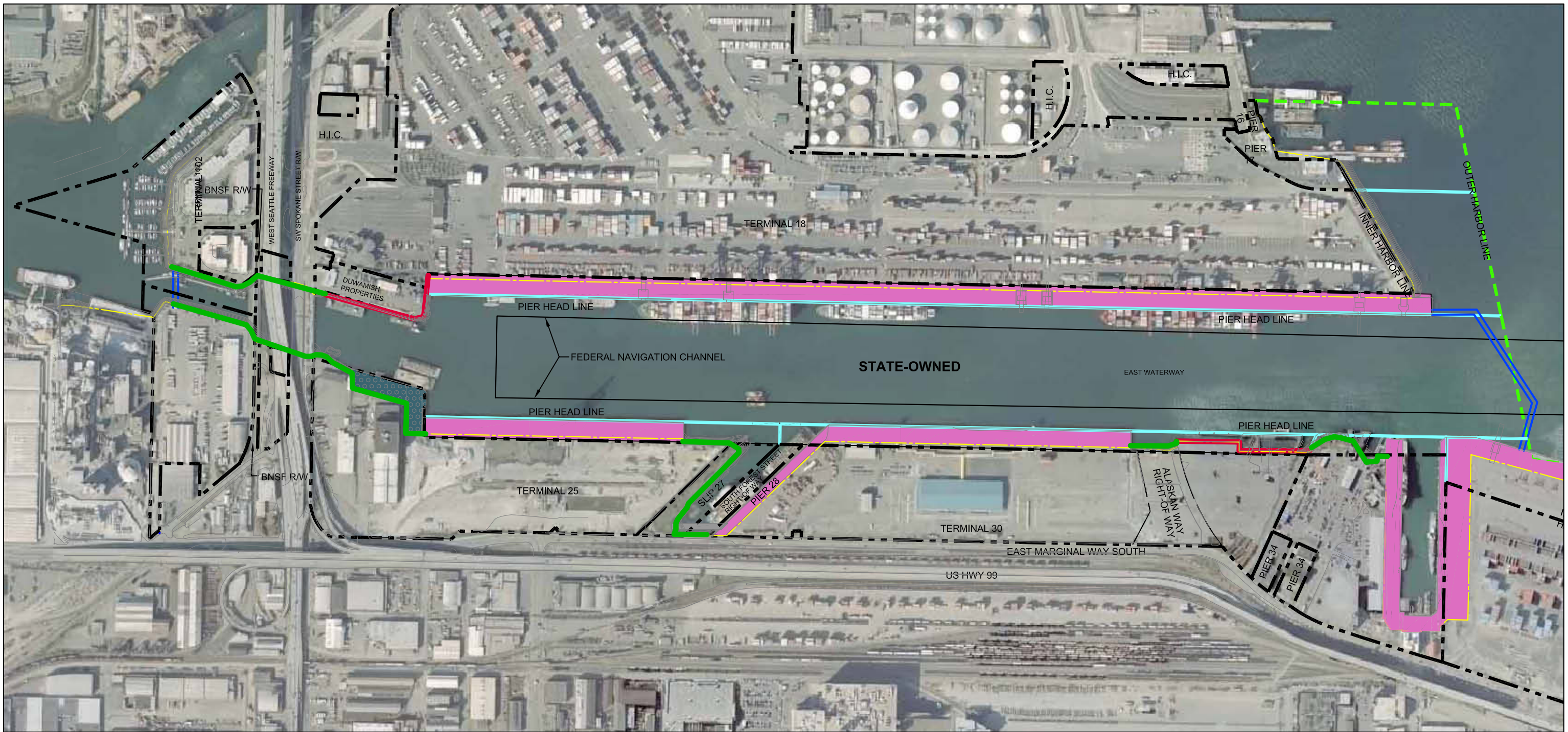











Figure 2-15
 Aquatic Land Ownership
 Existing Information Summary Report
 East Waterway Operable Unit

Mar 04, 2008 8:36am cdaavidson K:\jobs\060003-PORT OF SEATTLE\060003-01\06000301-025.dwg FIG 2-16



LEGEND

-  DEMOLISHED TIMBER DECK, PILES REMAIN
-  PROPOSED EAST WATERWAY OPERABLE UNIT BOUNDARY
-  MHHW LINE
-  PIER HEAD LINE
-  OUTER HARBOR LINE

-  INNER HARBOR LINE/PROPERTY LINE
-  SHEETPILE WALL
-  EXPOSED RIPRAP
-  OVERWATER PIER ABOVE RIPRAP

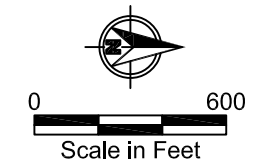
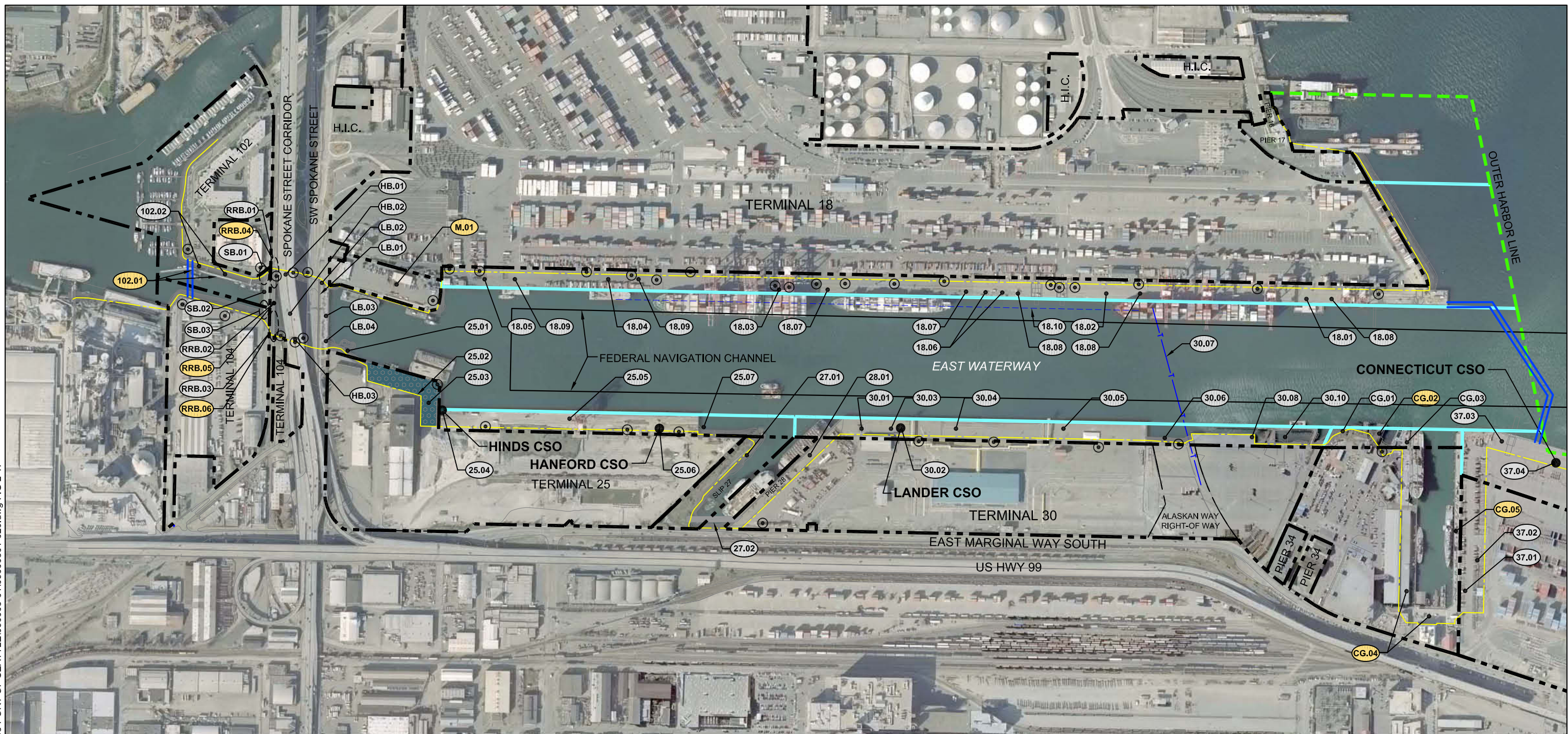














Figure 2-16
Shoreline Structures
Existing Information Summary Report
East Waterway Operable Unit

Jan 28, 2008 3:09pm cdavidson K:\Jobs\060003-PORT OF SEATTLE\060003-0106000301-020.dwg FIG 2-17



LEGEND

-  DEMOLISHED TIMBER DECK, PILES REMAIN
-  PROPOSED EAST WATERWAY OPERABLE UNIT BOUNDARY
-  UNDERWATER BULKHEAD STRUCTURE
-  MHHW LINE
-  PIER HEAD LINE
-  OUTER HARBOR LINE
-  INNER HARBOR LINE/PROPERTY LINE

-  TELEPHONE UTILITY (QWEST CROSSING)
-  INFORMATION AVAILABLE, SEE TABLE 2-15
-  INFORMATION UNAVAILABLE, SEE TABLE 2-15
-  CSO LOCATION
-  APPROXIMATE STORM DRAIN LOCATION

NOTE: TABLE 2-15 CONTAINS DETAILED INFORMATION ON THE ELEMENTS IDENTIFIED ON THIS FIGURE.

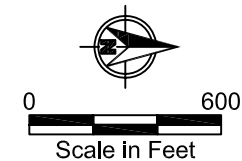
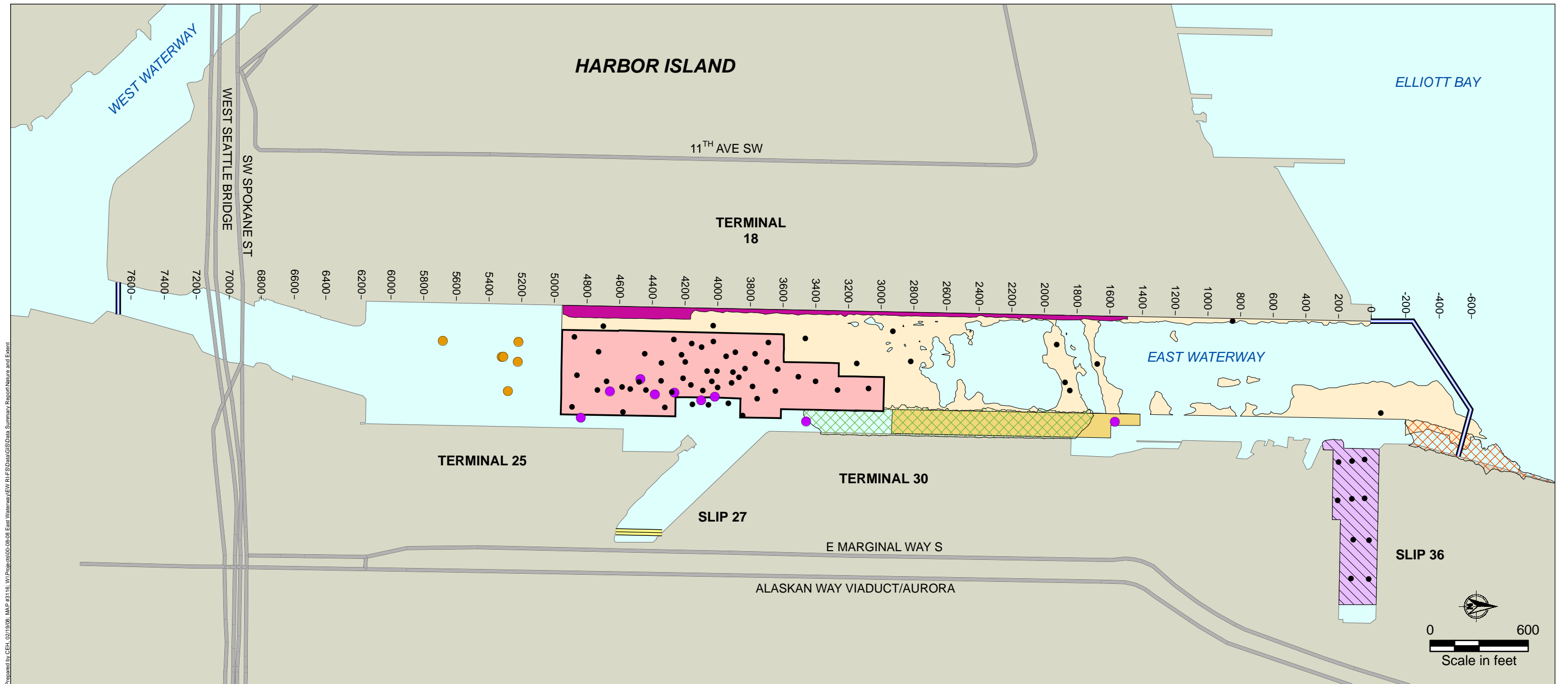


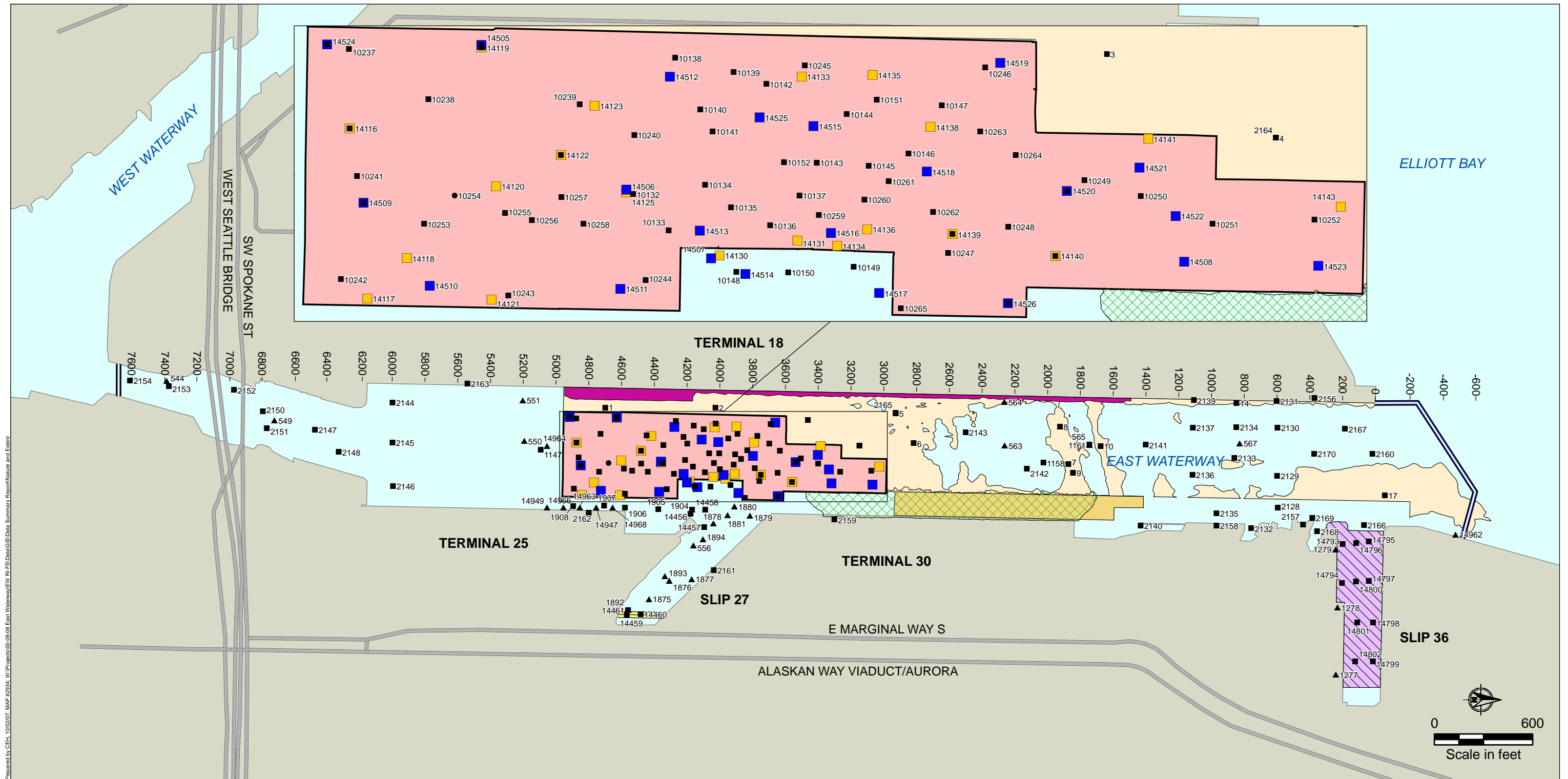
Figure 2-17
Structural and Utility Information
Existing Information Summary Report
East Waterway Operable Unit



Prepared by CEH, 02/13/08, MAP #3118, W/Project#00-08-08 East Waterway VEV R/FSD/Qual/SD/Summ. Summary Report/Nature and Extent

- Post-dredge monitoring location
- Sediment sampling location with Z sample (dredging complete)
- Sediment sampling location with Z sample (dredging not complete)
- ▨ T-30 interim dredge (proposed 2008, -51 MLLW)
- ▨ Terminal 46
- Stage 1a (completed 2006, -51 MLLW)
- ▨ Coast Guard dredge, completed 2005
- Phase 1 removal action boundary (completed 2005, -51 MLLW)
- Stage 1 (completed 2000, -51 MLLW)
- T-30 boundary (completed 2002, -51 MLLW)
- ▬ Slip 27 Bridge
- ▬ East Waterway Operable Unit Boundary

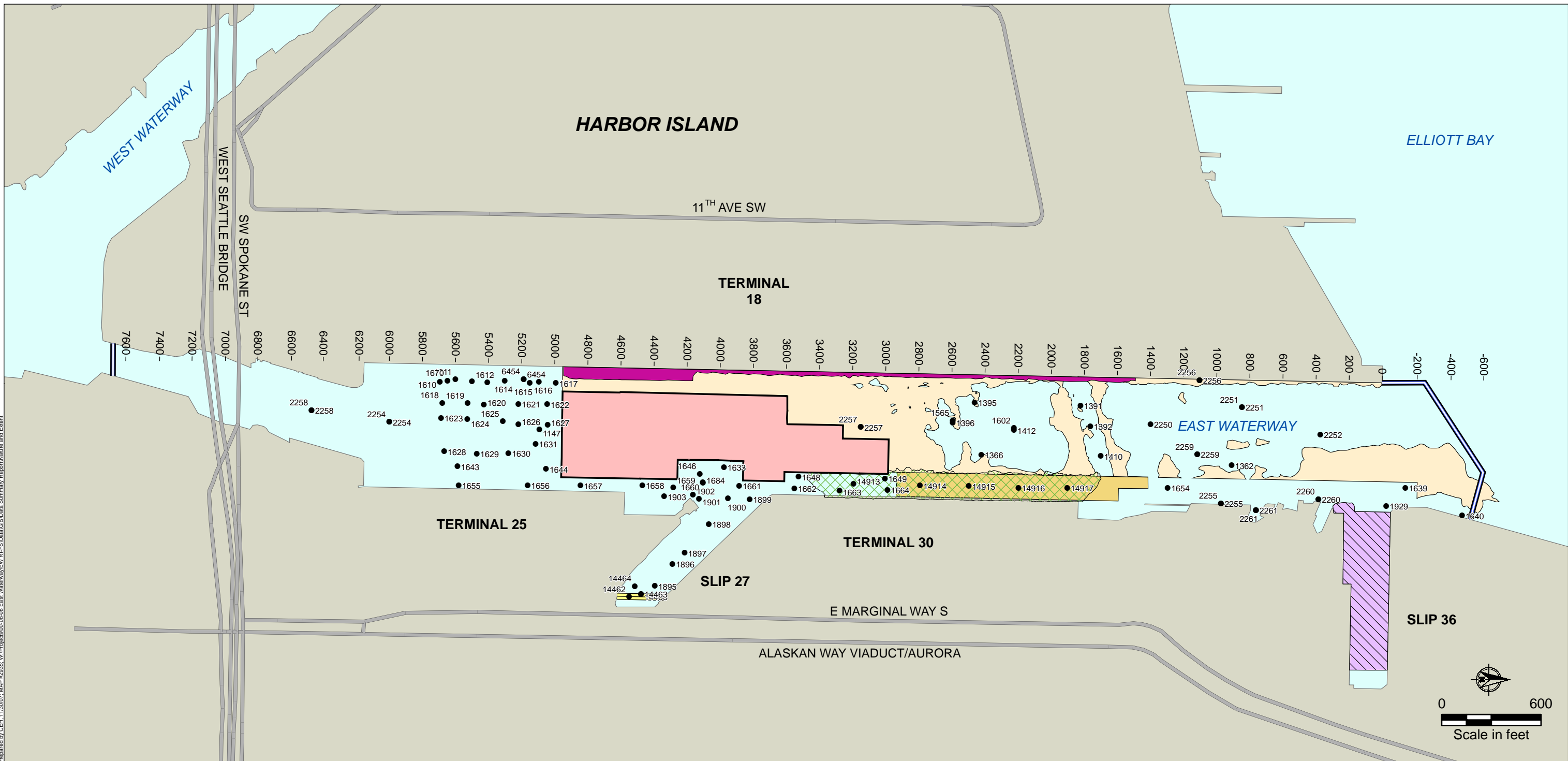
Figure 3-1
 Sediment Sampling Locations with Z Samples
 and Post-Dredge Monitoring Locations
 Existing Information Summary Report
 East Waterway Operable Unit



Prepared by CEH, 10/02/07, MAP #2954, W:\Projects\00_08_08_East Waterway\EW_OU-FS\Drawings\Data_Summary_Report\Nature and Extent



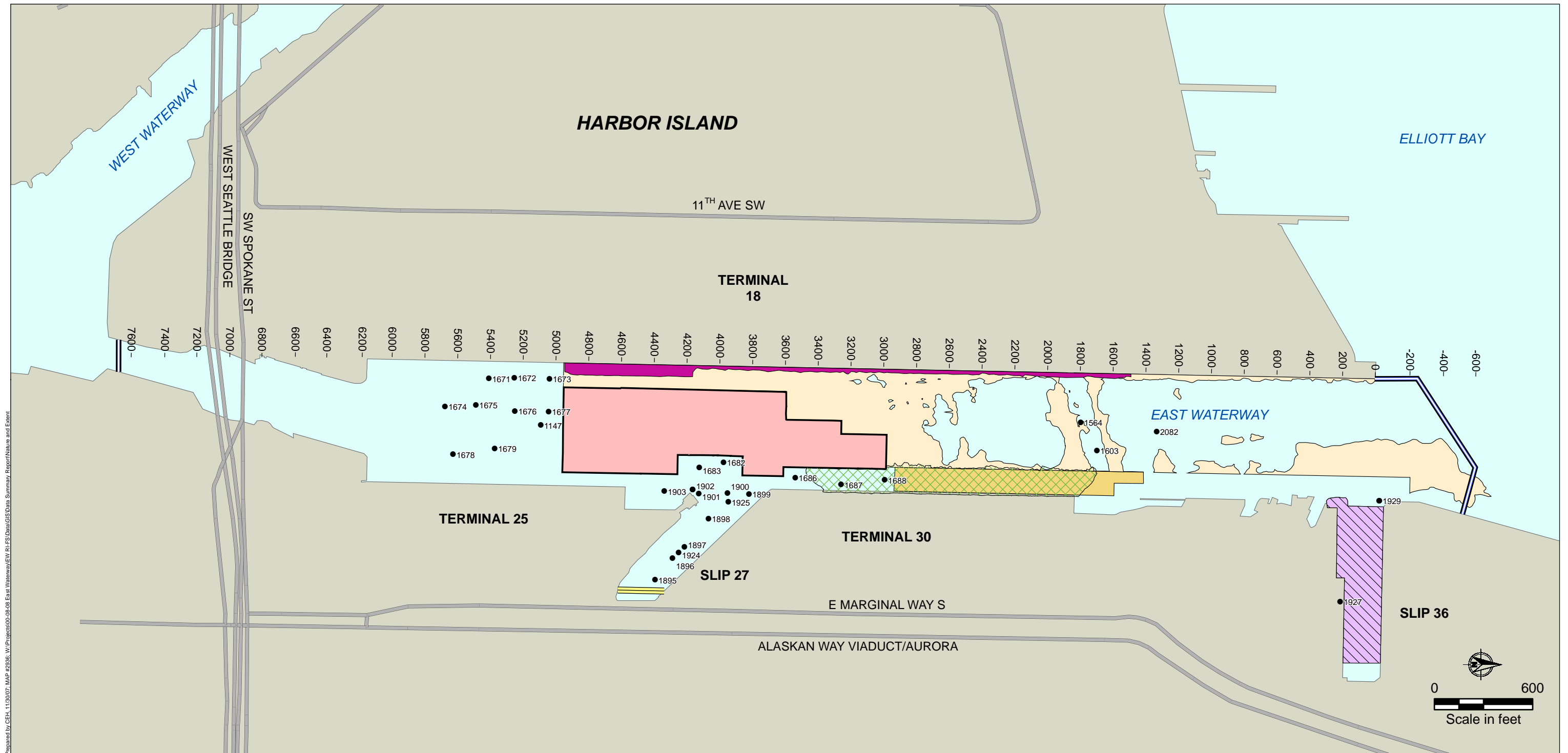
Figure 3-2
 Surface (0-10 cm) Sediment Sampling Locations
 Existing Information Summary Report
 East Waterway Operable Unit



Prepared by CEH, 11/20/07, MAP #2935, W:\Projects\00-08-08 East Waterway\EWV\RFIS\Drawings\Data Summary Report\Map and Extent

- Surface sediment sampling location
- T-30 boundary (completed 2002, -51 MLLW)
- Stage 1 (completed 2000, -51 MLLW)
- Phase 1 removal action boundary (completed 2005, -51 MLLW)
- Coast Guard dredge, completed 2005
- Stage 1a (completed 2006, -51 MLLW)
- T-30 interim dredge (proposed 2008, -51 MLLW)
- Slip 27 Bridge
- East Waterway Operable Unit Boundary

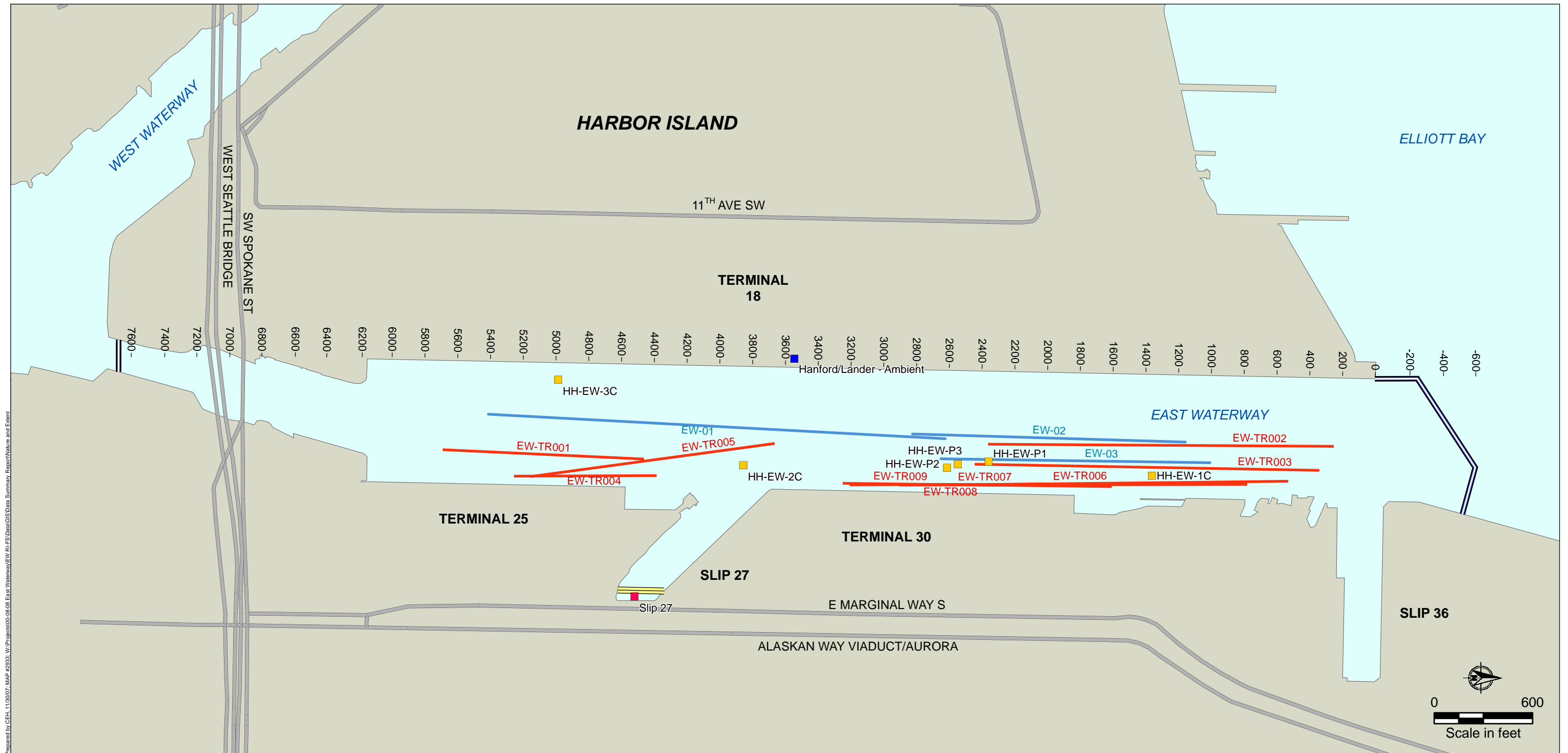
Figure 3-3
Subsurface (0-4 ft) Sediment Sampling Locations
Existing Information Summary Report
East Waterway Operable Unit



Prepared by CEH 11/20/07 MAP #2956 W:\Projects\00-08-08 East Waterway\EW R\FS\Drawings\Summary Report\Map and Extent

- Subsurface sediment sampling location
- T-30 boundary (completed 2002, -51 MLLW)
- Stage 1 (completed 2000, -51 MLLW)
- Phase 1 removal action boundary (completed 2005, -51 MLLW)
- Coast Guard dredge, completed 2005
- Stage 1a (completed 2006, -51 MLLW)
- T-30 interim dredge (proposed 2008, -51 MLLW)
- Slip 27 Bridge
- East Waterway Operable Unit Boundary

Figure 3-4
 Subsurface (>4 ft) Sediment Sampling Locations
 Existing Information Summary Report
 East Waterway Operable Unit



Prepared by CEH, 11/20/07, MAP #2953, W:\Projects\08-08 East Waterway\EW_RLFS\QualIS Data Summary Report\Volume and Extent

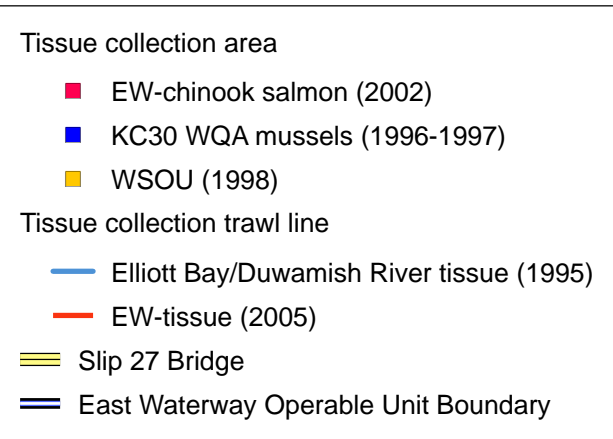
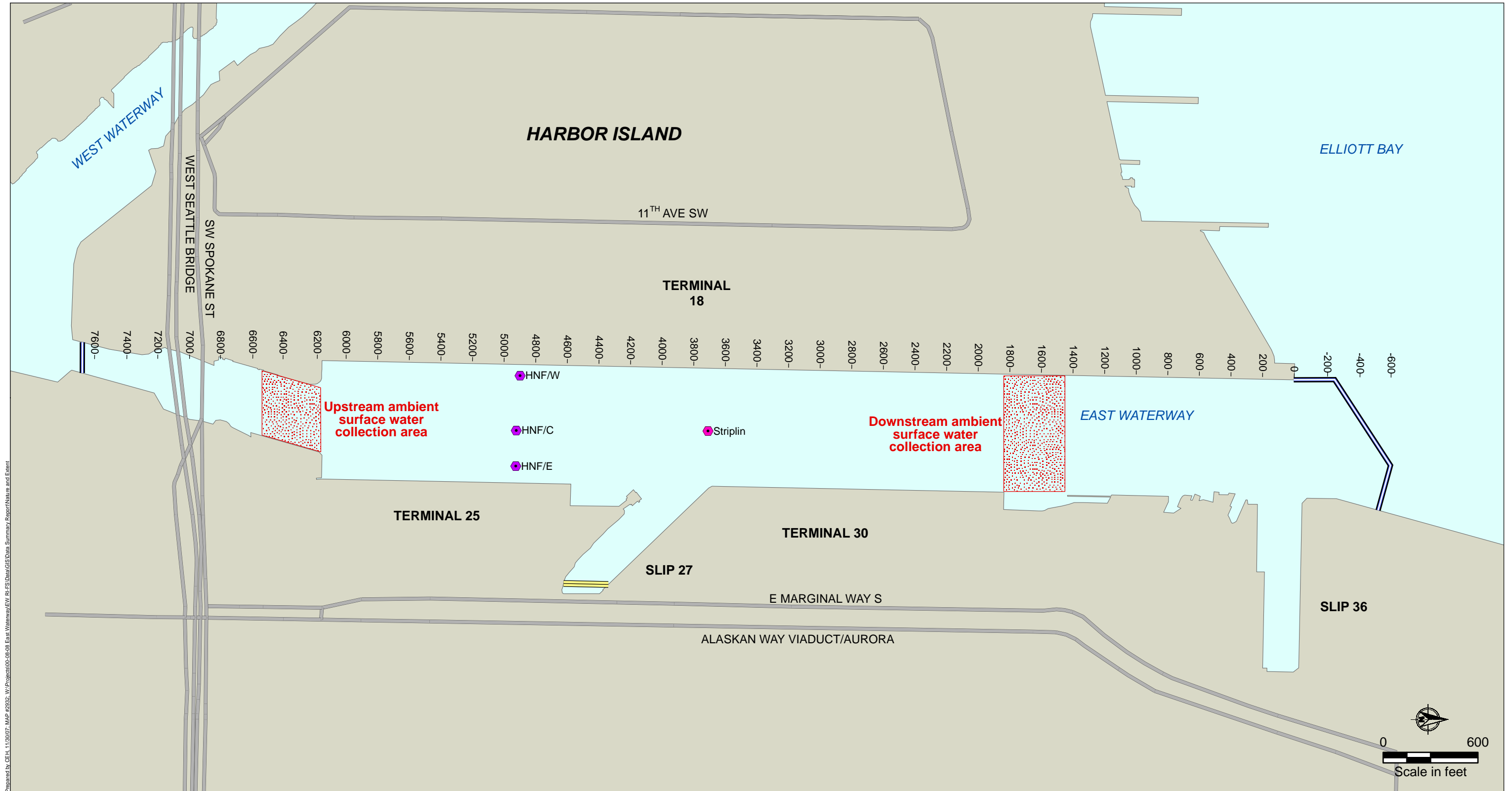
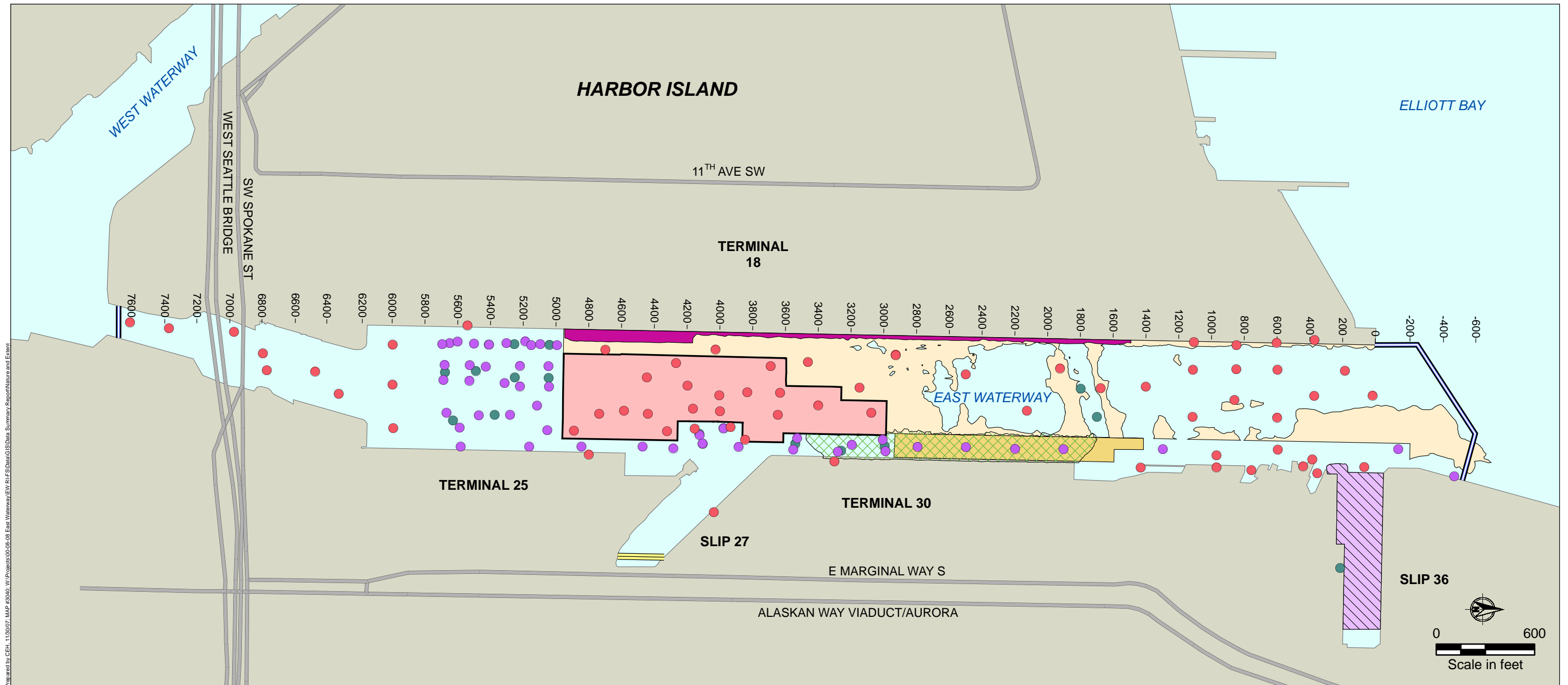


Figure 3-5
Fish and Benthic Macroinvertebrate Collection Locations
Existing Information Summary Report
East Waterway Operable Unit



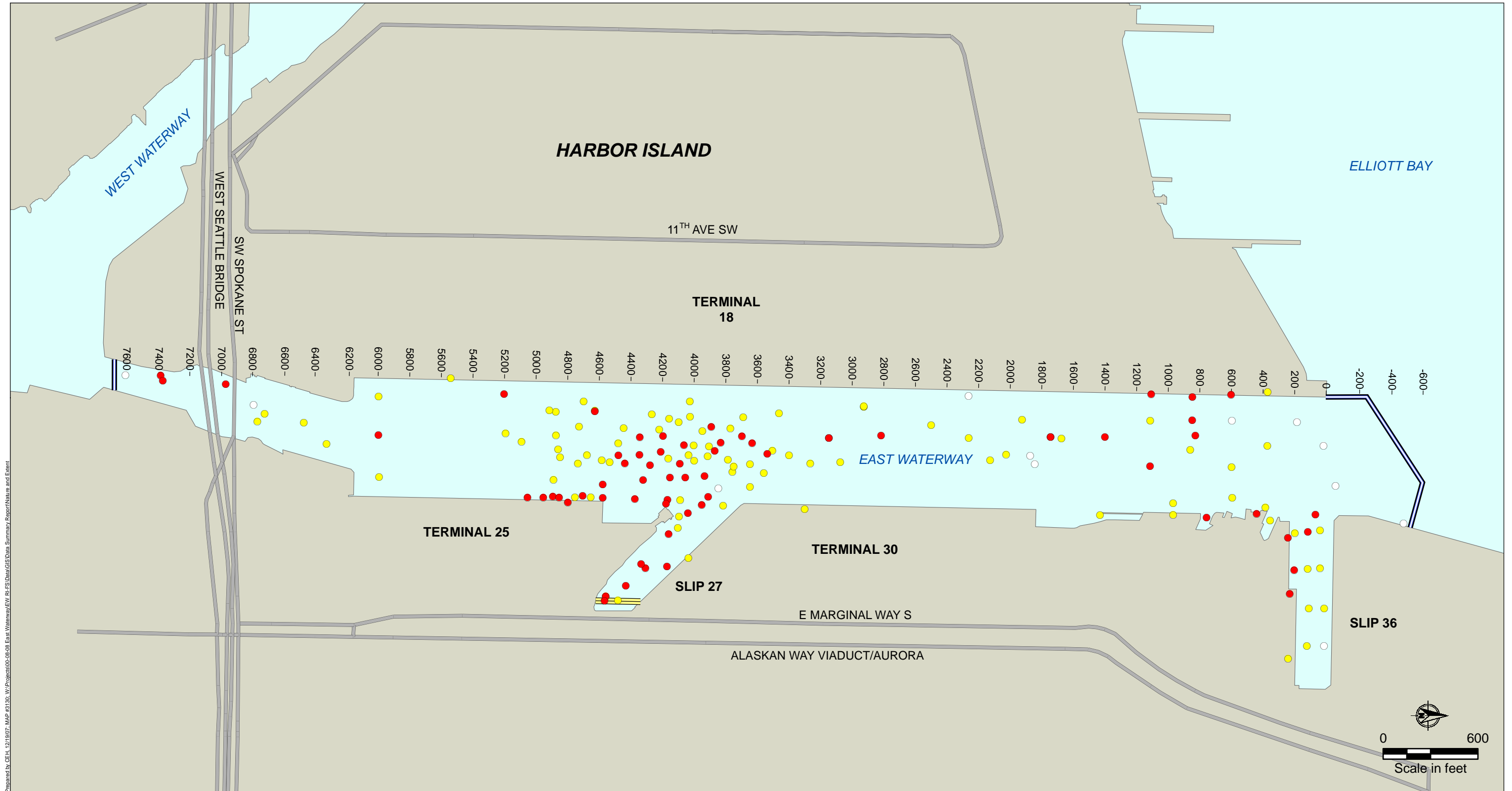
- Surface water sampling location
- KC WQA (1996/1997)
- Striplin WQM (2000)
- ▨ Windward WQM ambient surface water collection area (2004/2005)
- ▬ Slip 27 Bridge
- ▬ East Waterway Operable Unit Boundary

Figure 3-6
 Surface Water Collection Locations
 Existing Information Summary Report
 East Waterway Operable Unit



- Porewater sampling location by depth horizon**
- 0-10 cm
 - 0-4 ft
 - > 4 ft
 - T-30 boundary (completed 2002, -51 MLLW)
 - Stage 1 (completed 2000, -51 MLLW)
 - Phase 1 removal action boundary (completed 2005, -51 MLLW)
 - Coast Guard dredge, completed 2005
 - Stage 1a (completed 2006, -51 MLLW)
 - T-30 interim dredge (proposed 2008, -51 MLLW)
 - == Slip 27 Bridge
 - == East Waterway Operable Unit Boundary

Figure 3-7
 Porewater Sampling Locations (All Depth Horizons)
 Existing Information Summary Report
 East Waterway Operable Unit

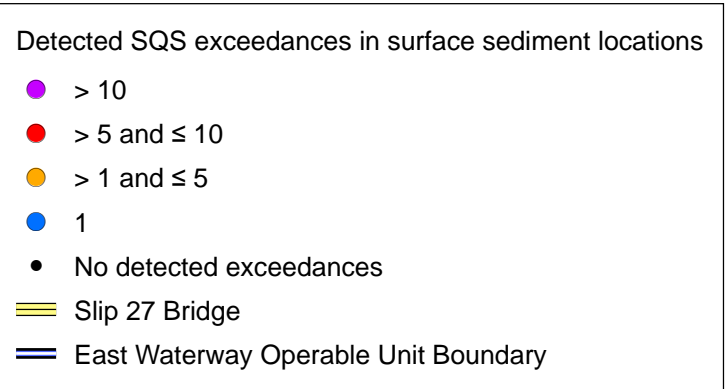
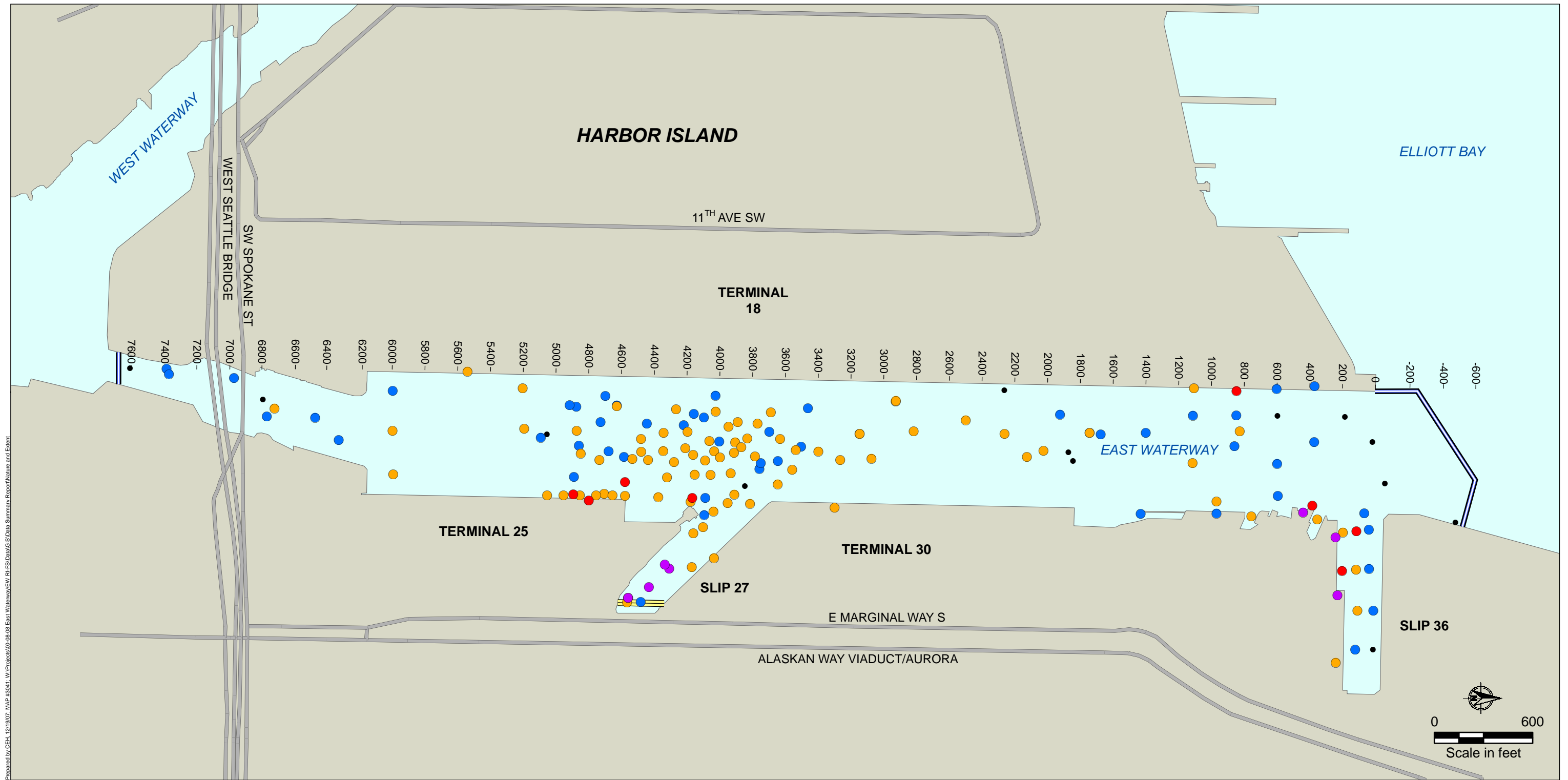


Prepared by CEH 12/19/07, MAP #2130, W:\Projects\00-08-08 East Waterway\EW_EI-FS\Anal\GIS\Data Summary Report\Nature and Extent

- SQS/CSL categories for all chemicals with SMS criteria¹**
- > CSL, detect
 - > SQS and ≤ CSL, detect
 - No detected exceedances
 - Slip 27 Bridge
 - East Waterway Operable Unit Boundary

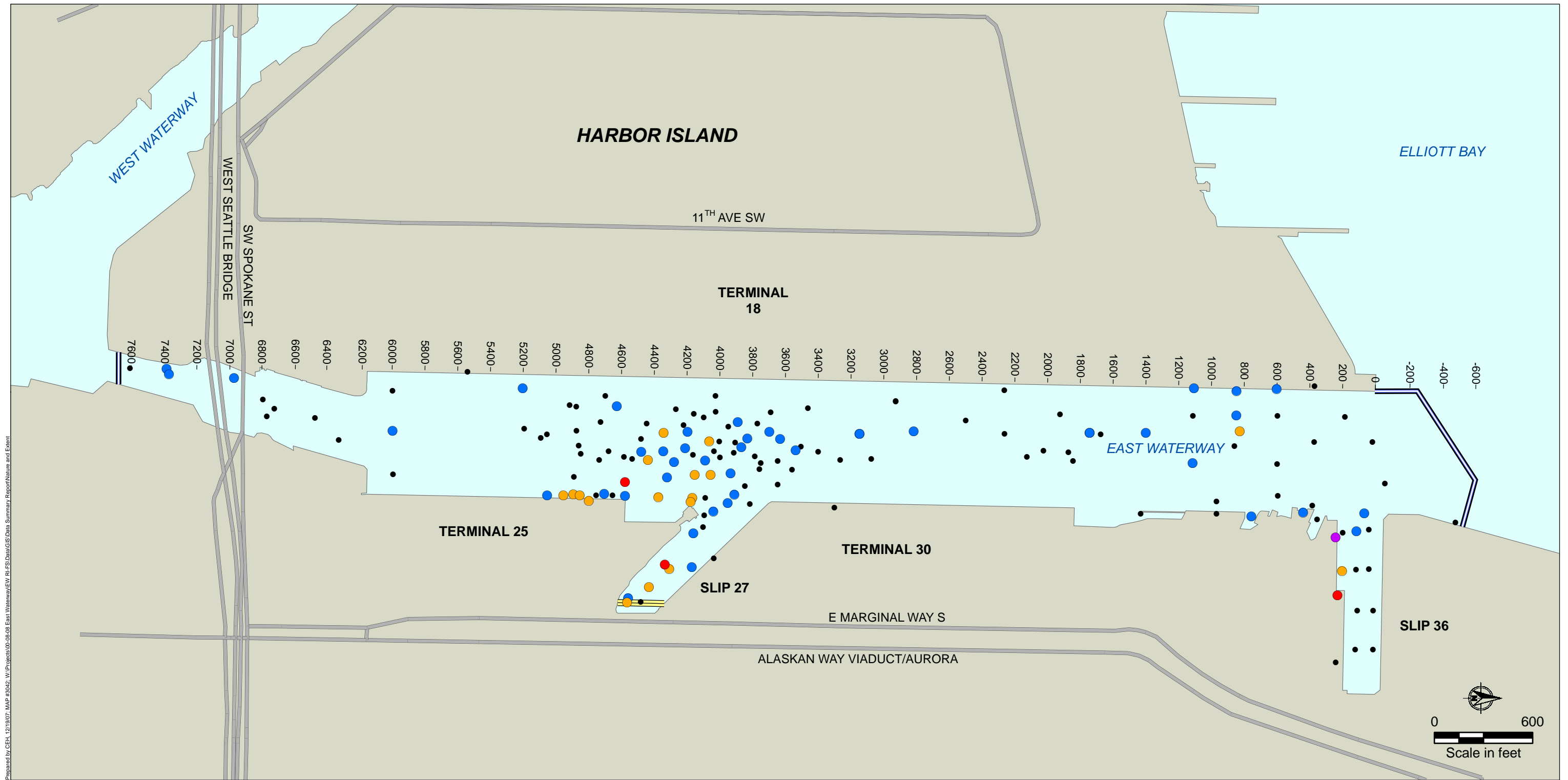
¹ Each location was assigned one of the SQS/CSL categories based on the hierarchy as listed.

Figure 3-8
 Exceedances of SMS Criteria (SQS or CSL) for all Chemicals
 with SMS Criteria in Surface (0-10 cm) Sediment
 Existing Information Summary Report
 East Waterway Operable Unit



1. Exceedance counts include individual PAHs in addition to Total LPAH and Total HPAH
2. Exceedance counts only include SMS chemicals
3. Exceedance counts > SQS include chemical concentrations > CSL (i.e., it is not the number of samples with concentrations between the SQS and CSL)

Figure 3-9
 Surface (0-10 cm) Sediment Sampling Locations All SQS Exceedance Counts
 Existing Information Summary Report
 East Waterway Operable Unit



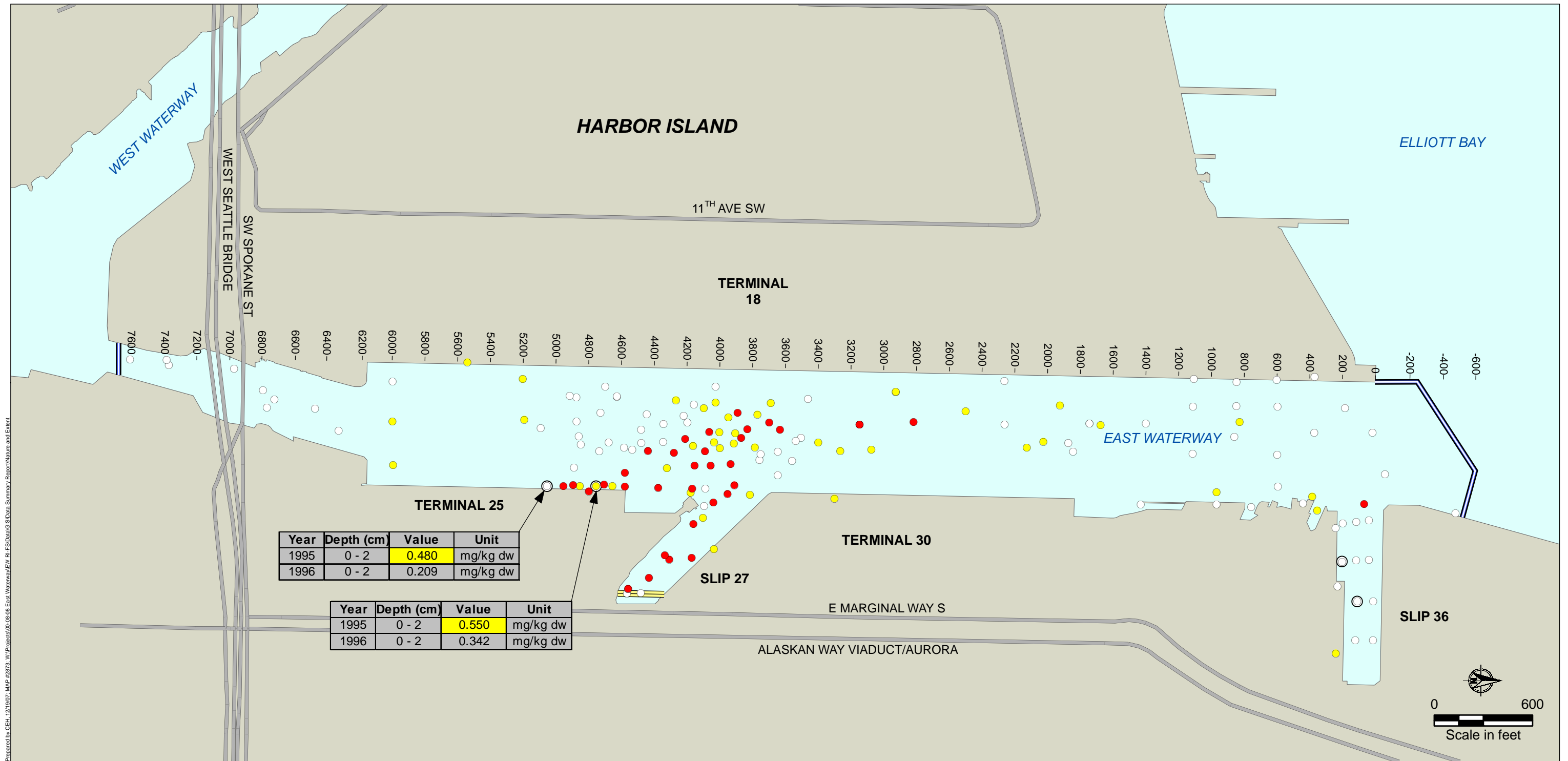
Prepared by CEH 12/18/07. MAP #2042. W:\Projects\00-08-08 East Waterway\EW E-FS\Datagis\Data Summary Report\Nature and Exent

Detected CSL exceedances in surface sediment locations

- > 10
- > 5 and ≤ 10
- > 1 and ≤ 5
- 1
- No detected exceedances
- Slip 27 Bridge
- East Waterway Operable Unit Boundary

1. Exceedance counts include individual PAHs in addition to Total LPAH and Total HPAH
 2. Exceedance counts only include SMS chemicals

Figure 3-10
 Surface (0-10 cm) Sediment Sampling Locations All CSL Exceedance Counts
 Existing Information Summary Report
 East Waterway Operable Unit

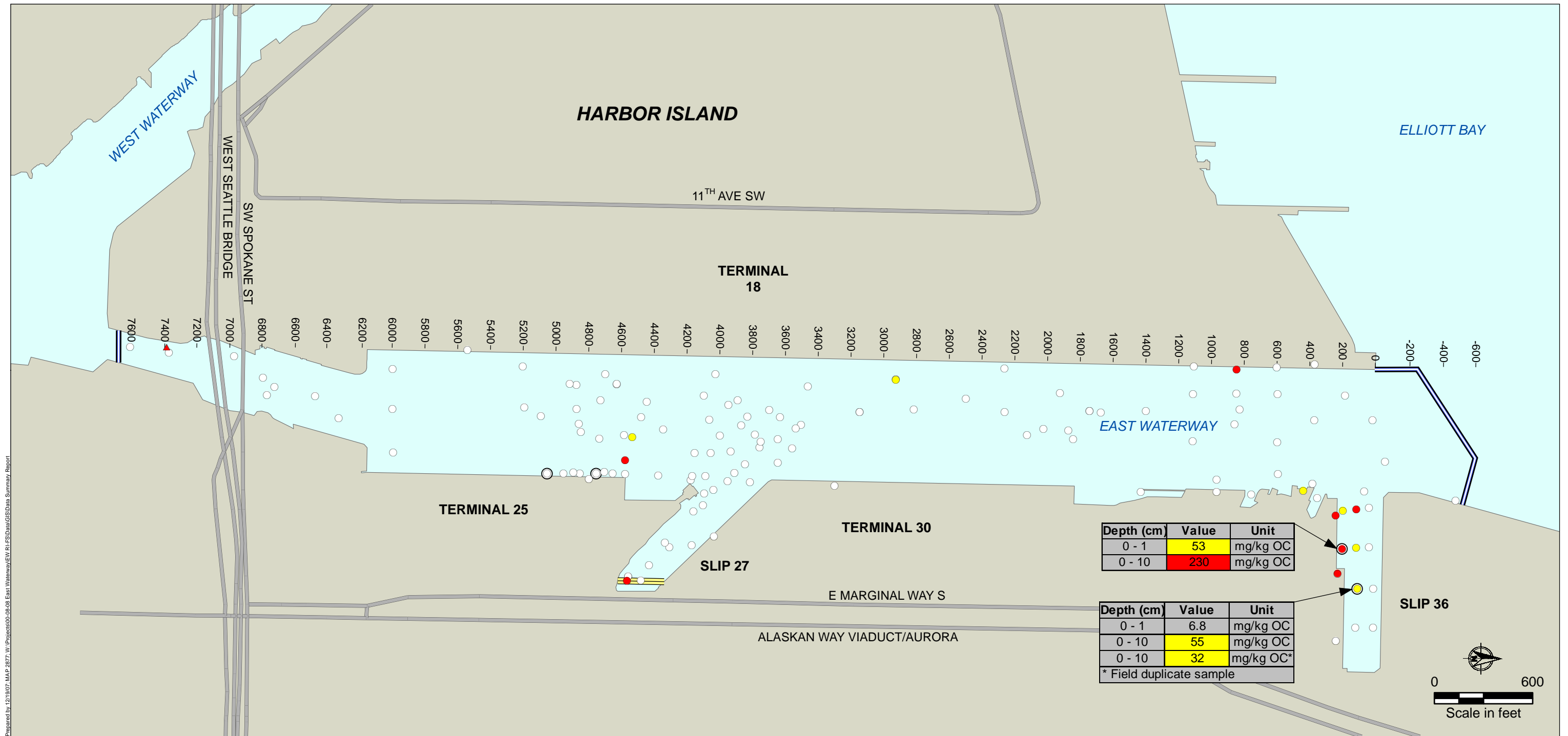


Mercury
 SQS = 0.41 mg/kg dw
 CSL = 0.59 mg/kg dw

- > CSL, detect
- > SQS and ≤ CSL, detect
- ≤ SQS
- Averaged location¹
- ▬ Slip 27 Bridge
- ▬ East Waterway Operable Unit Boundary

Note: Chemistry data for all samples is provided for every averaged location with an exceedance.
¹ Averaged locations are symbolized using an outline around the location's SMS exceedance symbol.

Figure 3-11
 Mercury Exceedances of SMS Values in Surface (0-10 cm) Sediment
 Existing Information Summary Report
 East Waterway Operable Unit



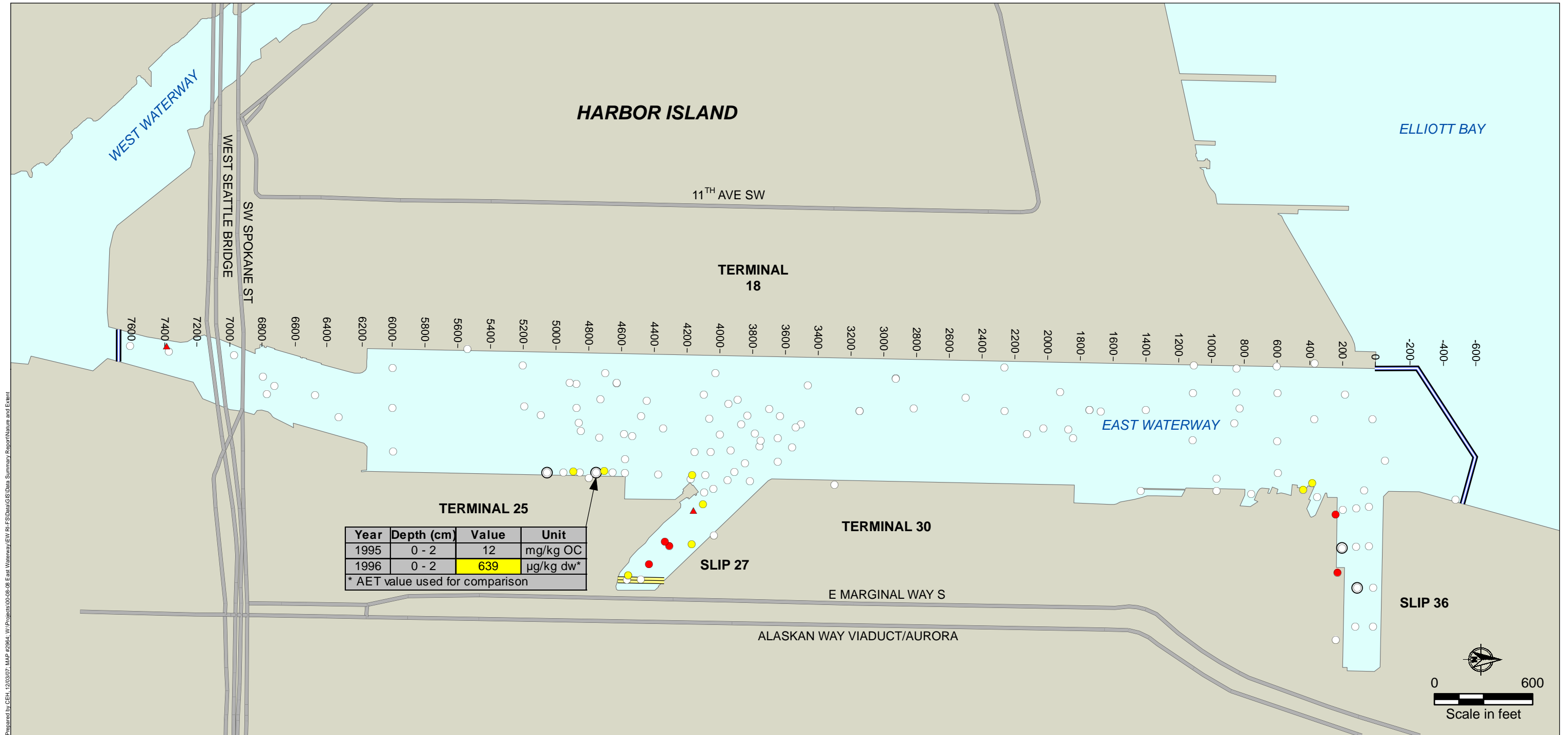
Acenaphthene

SQS = 16 mg/kg OC
 CSL = 57 mg/kg OC

- > CSL, detect
- > SQS and ≤ CSL, detect
- ▲ > CSL, non-detect
- ≤ SQS
- Averaged location¹
- ▬ Slip 27 Bridge
- ▬ East Waterway Operable Unit Boundary

Note: Chemistry data for all samples is provided for every averaged location with an exceedance.
¹ Averaged locations are symbolized using an outline around the location's SMS exceedance symbol.

Figure 3-12
 Acenaphthene Exceedances of SMS Values in Surface (0-10 cm) Sediment
 Existing Information Summary Report
 East Waterway Operable Unit



Indeno(1,2,3-cd)pyrene

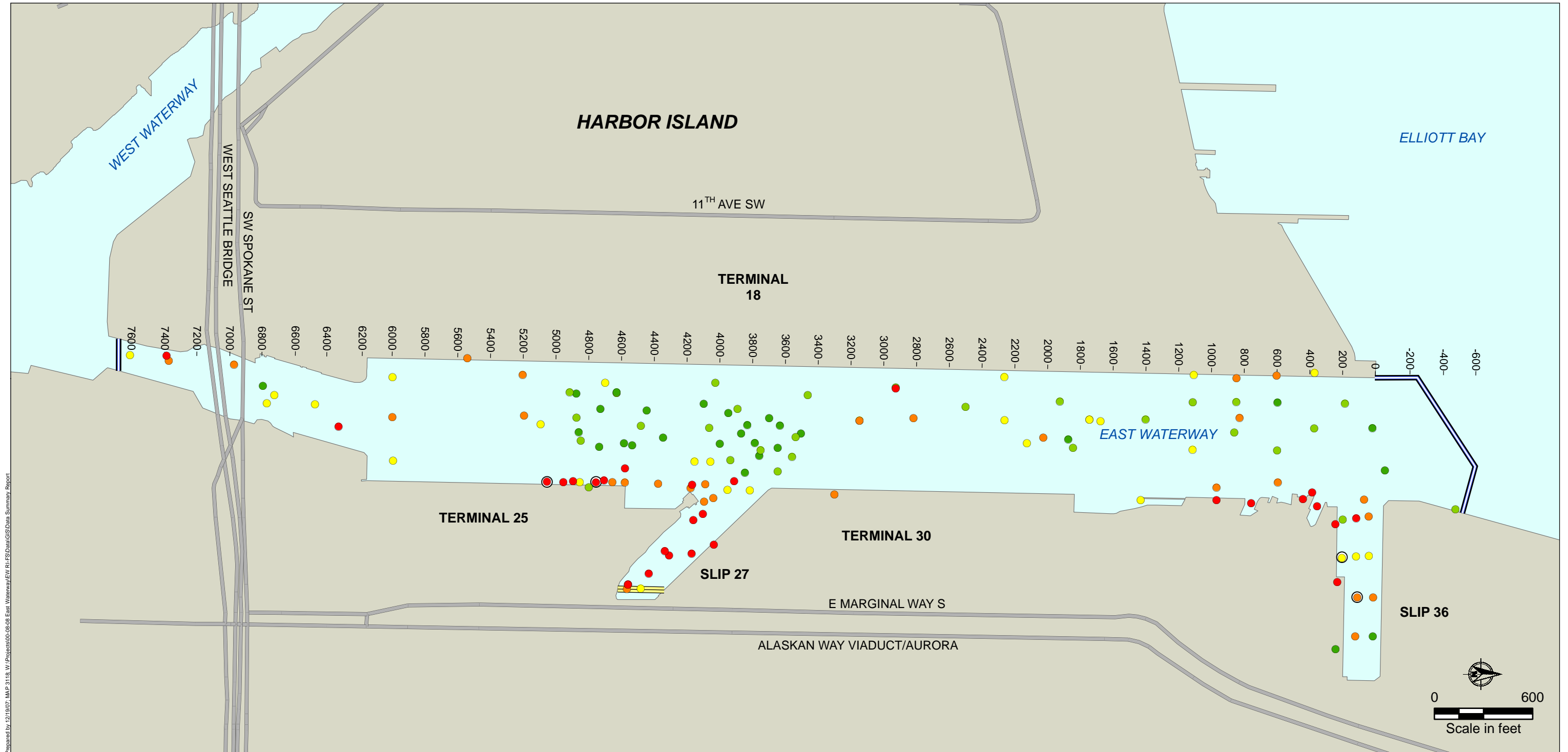
SQS = 34 mg/kg OC

CSL = 88 mg/kg OC

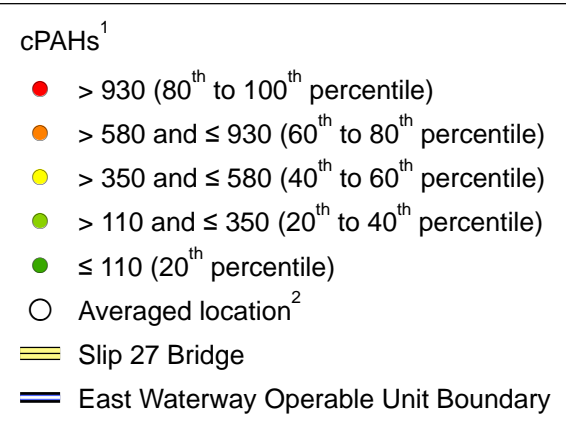
- > CSL, detect
- > SQS and ≤ CSL, detect
- ▲ > CSL, non-detect
- ≤ SQS
- Averaged location¹
- ▬ Slip 27 Bridge
- ▬ East Waterway Operable Unit Boundary

Note: Chemistry data for all samples is provided for every averaged location with an exceedance.
¹ Averaged locations are symbolized using an outline around the location's SMS exceedance symbol.

Figure 3-13
 Indeno(1,2,3-cd)pyrene Exceedances of SMS Values in Surface (0-10 cm) Sediment
 Existing Information Summary Report
 East Waterway Operable Unit

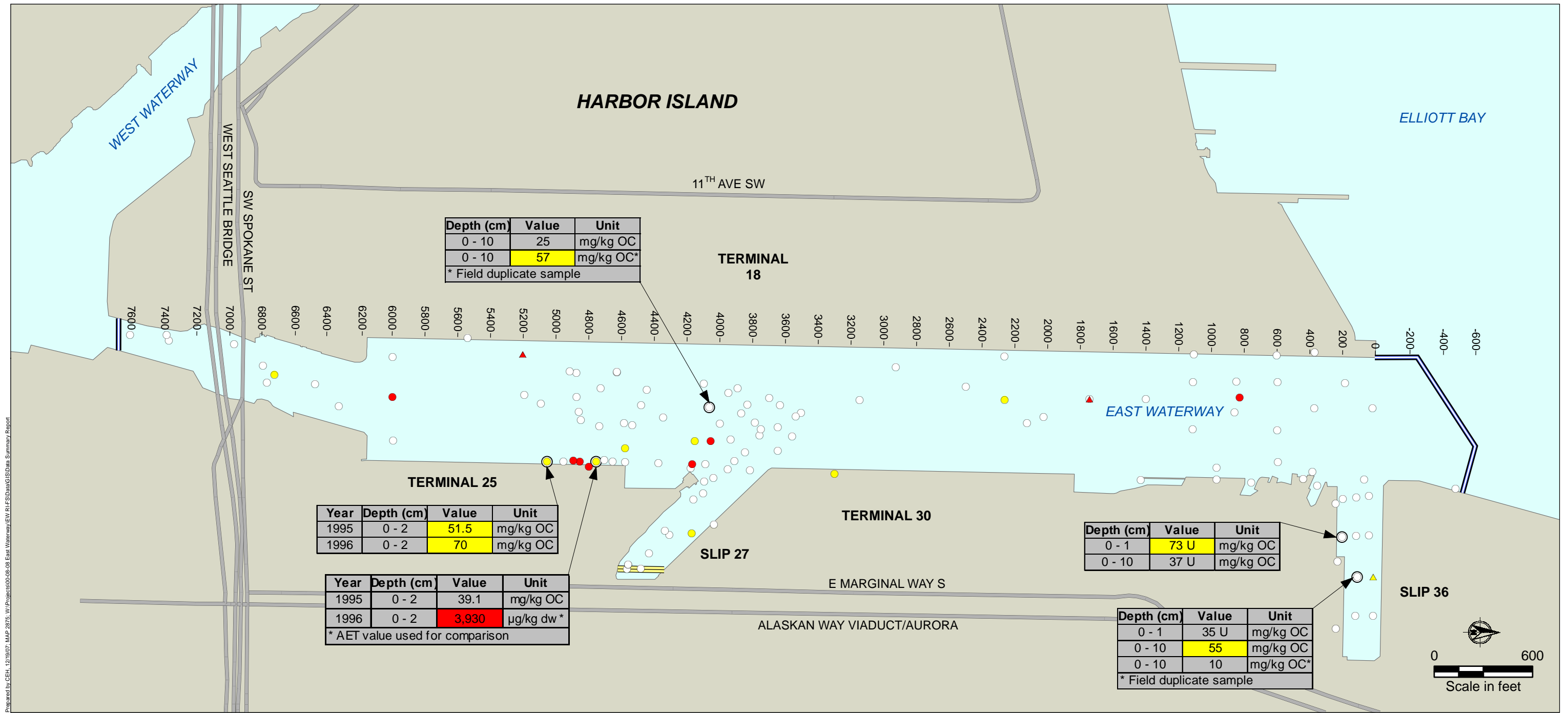


Prepared by: 12/18/07, MAP 3118, W. Project: 00-08-08 East Waterway/EW RU-FSD/Map/SD/Map Summary Report



Note: Chemistry data for all samples is provided for every averaged location with an exceedance.
¹ cPAH concentrations were calculated as benzo(a)pyrene equivalents using PEF values from CalEPA 1994.
² Averaged locations are symbolized using an outline around the location symbol.

Figure 3-14
 Carcinogenic PAH Concentrations in Surface (0-10 cm) Sediment
 Existing Information Summary Report
 East Waterway Operable Unit

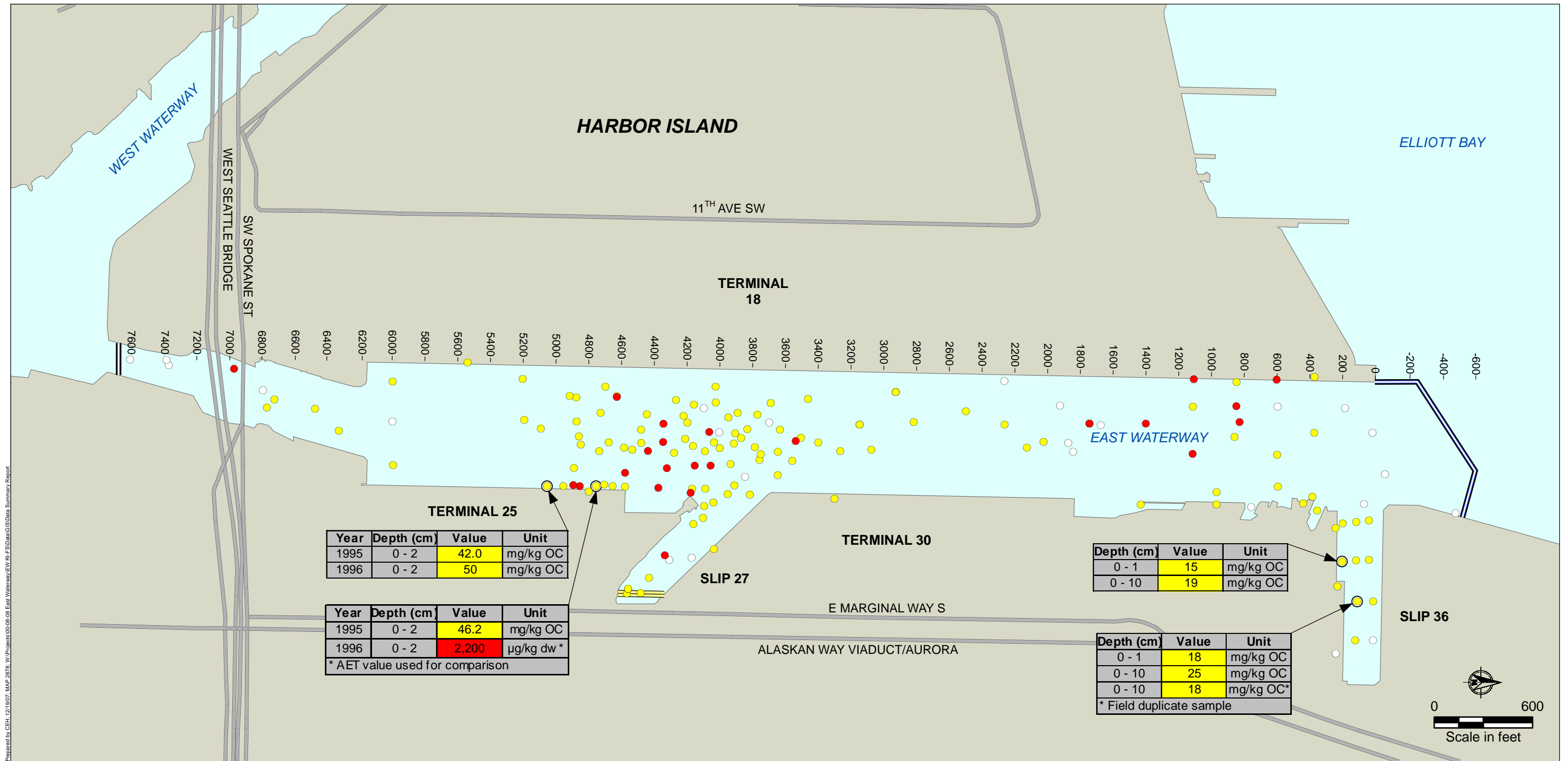


Bis(2-ethylhexyl)phthalate
 SQS = 47 mg/kg OC
 CSL = 78 mg/kg OC

- > CSL, detect
- > SQS and ≤ CSL, detect
- ▲ > CSL, non-detect
- ▲ > SQS and ≤ CSL, non-detect
- ≤ SQS
- Averaged location¹
- ▬ Slip 27 Bridge
- ▬ East Waterway Operable Unit Boundary

Note: Chemistry data for all samples is provided for every averaged location with an exceedance.
¹ Averaged locations are symbolized using an outline around the location's SMS exceedance symbol.

Figure 3-15
 Bis(2-ethylhexyl)phthalate Exceedances of SMS Values in Surface (0-10 cm) Sediment
 Existing Information Summary Report
 East Waterway Operable Unit

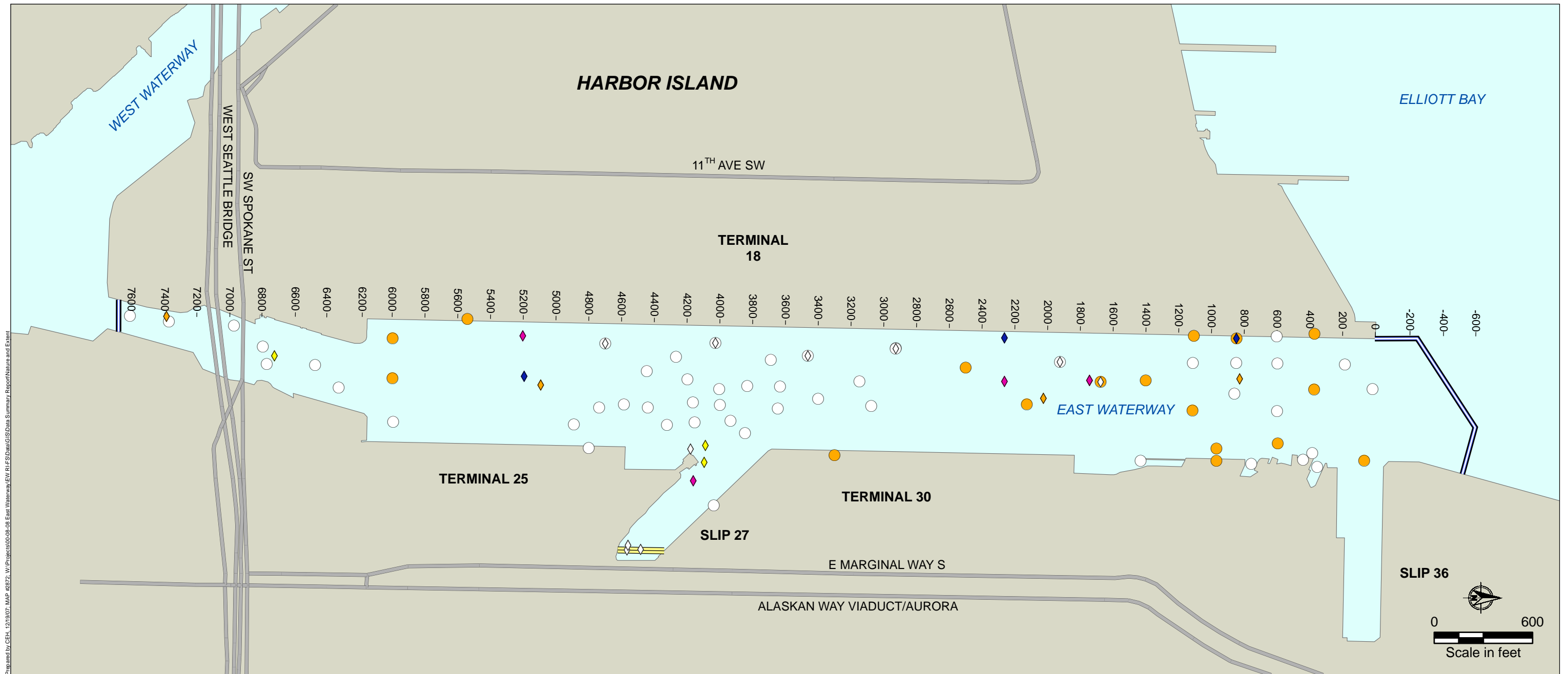


Total PCBs
 SQS = 12 mg/kg OC
 CSL = 65 mg/kg OC

- > CSL, detect
- > SQS and ≤ CSL, detect
- ≤ SQS
- Averaged location¹
- ▬ Slip 27 Bridge
- ▬ East Waterway Operable Unit Boundary

Note: Chemistry data for all samples is provided for every averaged location with an exceedance.
¹ Averaged locations are symbolized using an outline around the location's SMS exceedance symbol.

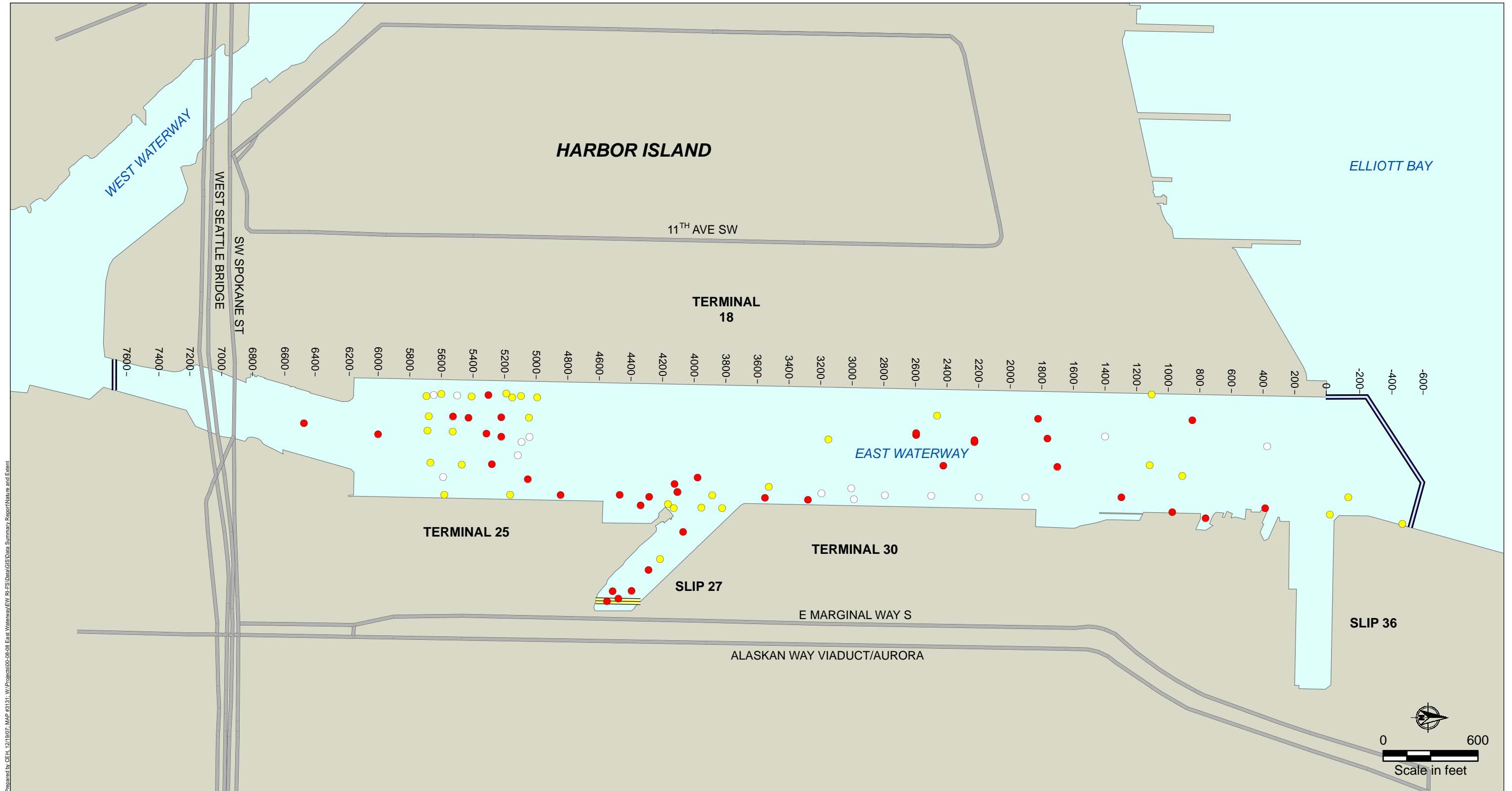
Figure 3-16
 Total PCB Exceedances of SMS Values in Surface (0-10 cm) Sediment
 Existing Information Summary Report
 East Waterway Operable Unit



Prepared by CEH, 12/18/07, MAP 26272, W:\Projects\GIS\MapData\Summary_Reports\Nature and Extent



Figure 3-17
 Tributyltin Porewater Exceedances of DMMP Values and Tributyltin Bulk Sediment Concentrations in Surface (0-10 cm) Sediment
 Existing Information Summary Report
 East Waterway Operable Unit

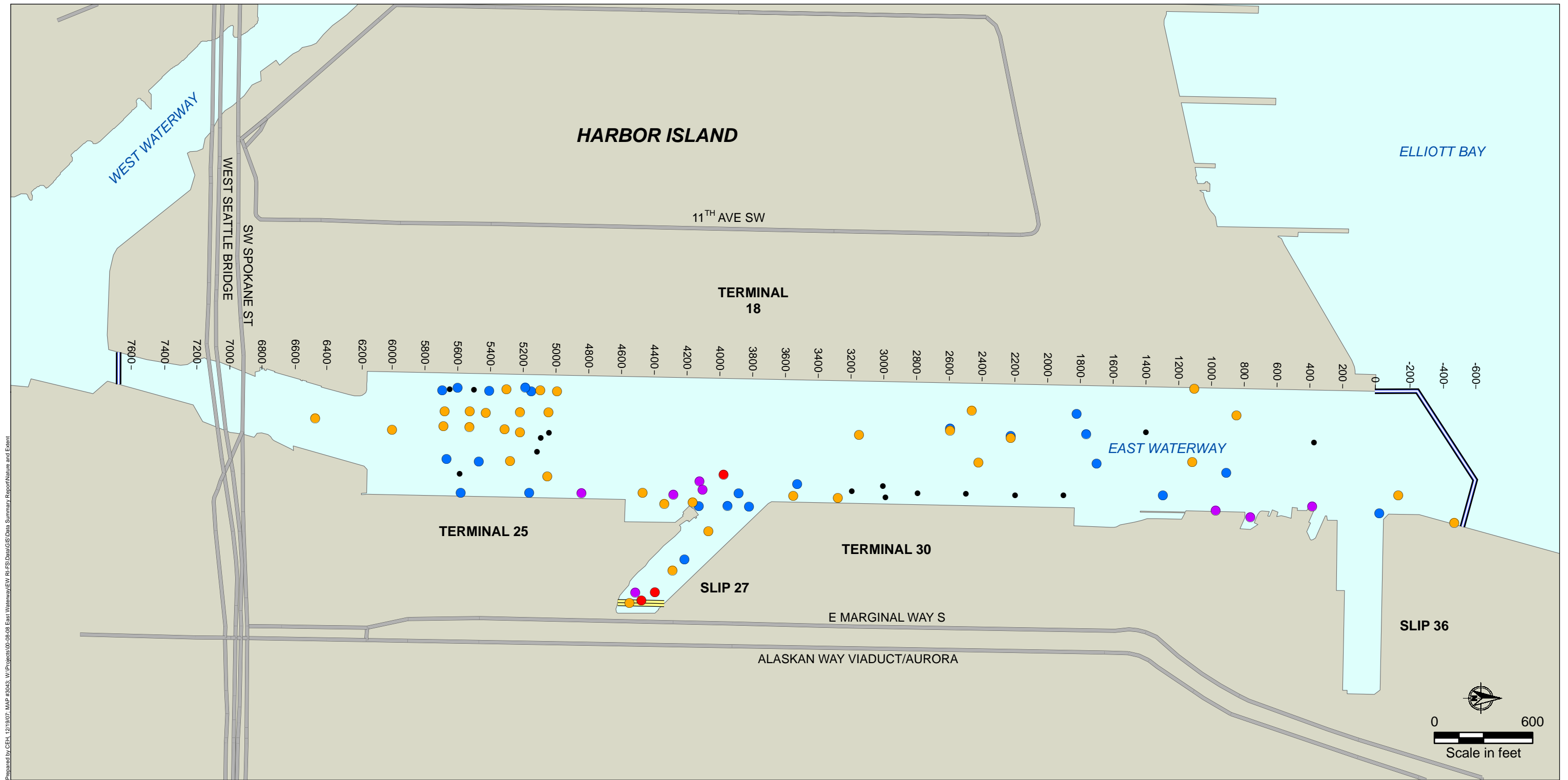


Prepared by CEH 12/19/07, MAP #21311, W:\Projects\00-08-08 East Waterway\EW_EI-FS\Anal\GIS\Data Summary Report\Nature and Extent

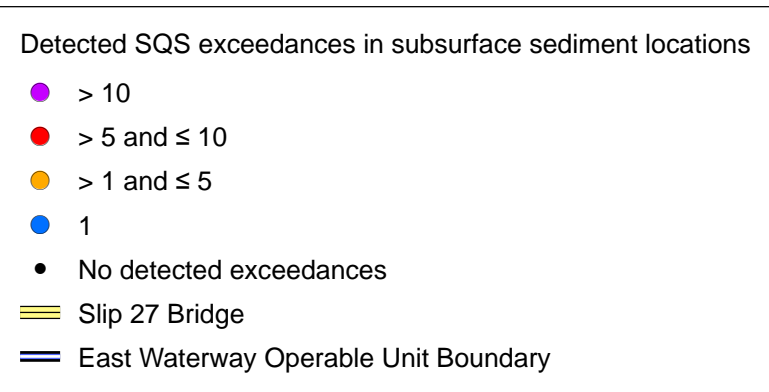
- SQS/CSL categories for all chemicals with SMS criteria¹
- > CSL, detect
 - > SQS and ≤ CSL, detect
 - No detected exceedances
 - ▬ Slip 27 Bridge
 - ▬ East Waterway Operable Unit Boundary

¹ Each location was assigned one of the SQS/CSL categories based on the hierarchy as listed.

Figure 3-18
 Exceedances of SMS Criteria (SQS or CSL) for all Chemicals
 with SMS Criteria in Subsurface (0-4 ft) Sediment
 Existing Information Summary Report
 East Waterway Operable Unit

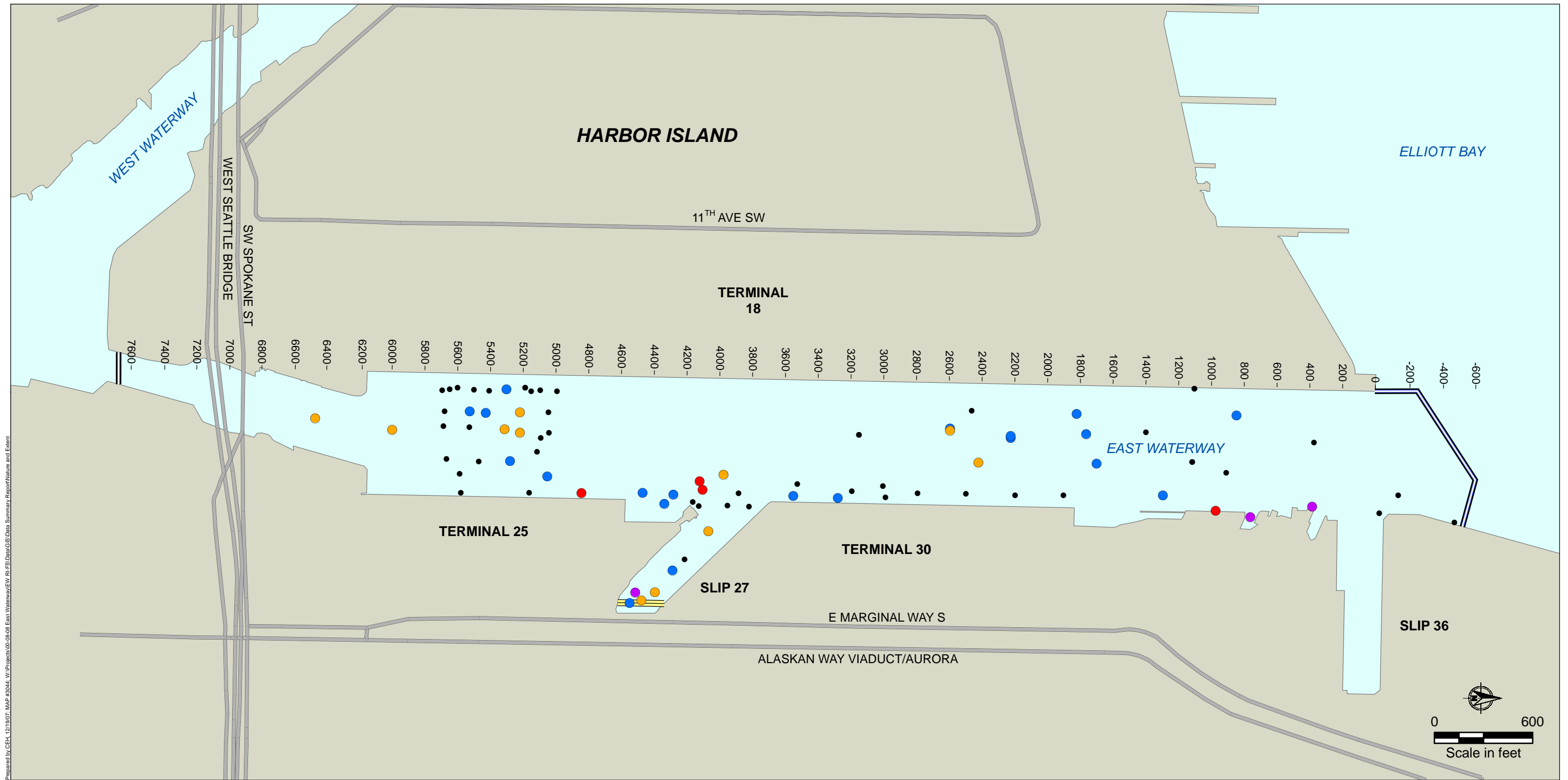


Prepared by CEH 12/18/07. MAP #2049. W:\Projects\00-08-08 East Waterway\EW E-FS\Drawings\08-08 Summary Report\Nature and Exent



1. Exceedance counts include individual PAHs in addition to Total LPAH and Total HPAH
2. Exceedance counts only include SMS chemicals
3. Exceedance counts > SQS include chemical concentrations > CSL (i.e., it is not the number of samples with concentrations between the SQS and CSL)

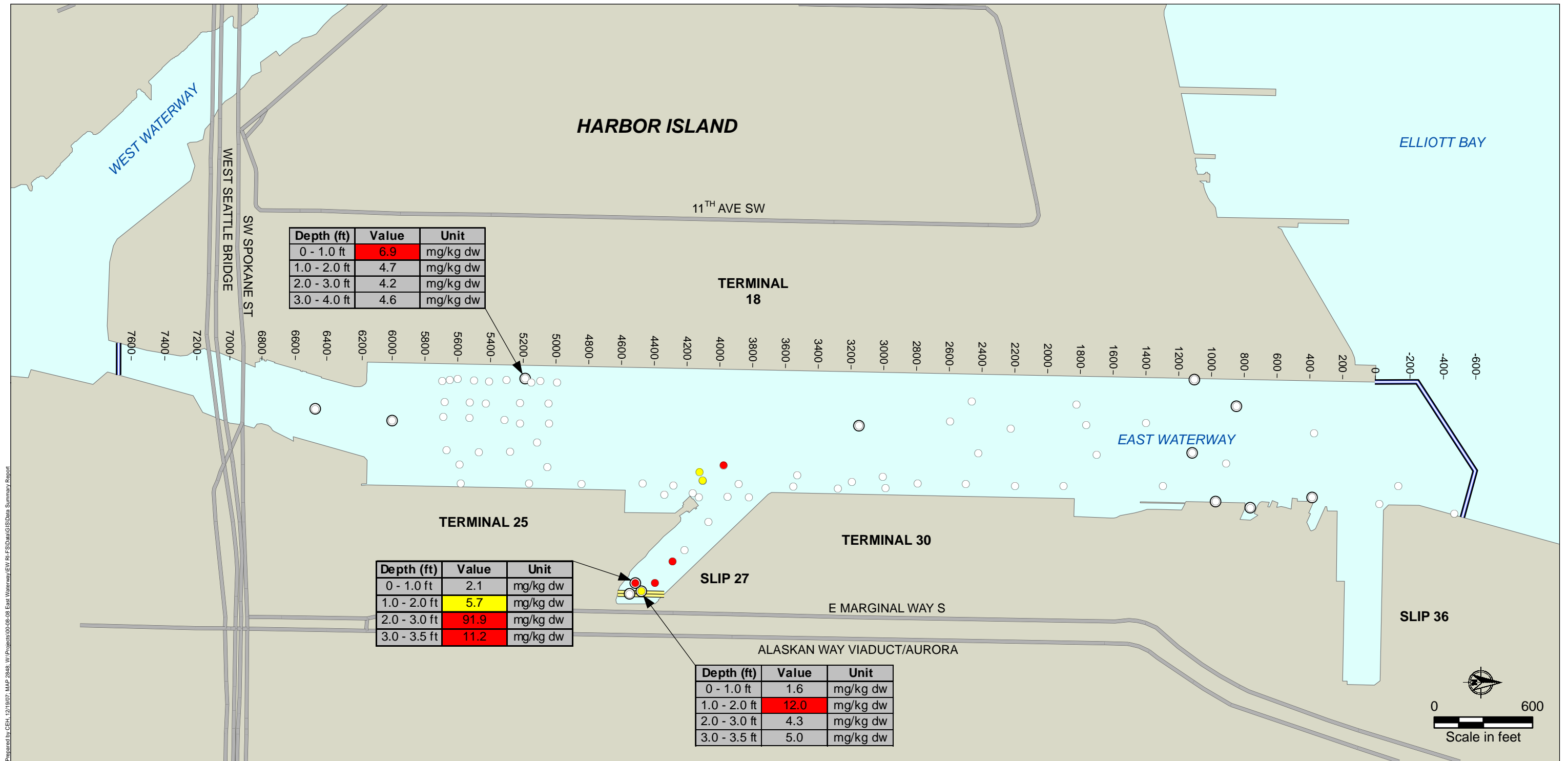
Figure 3-19
Subsurface (0-4 ft) Sediment Sampling Locations All SQS Exceedance Counts
Existing Information Summary Report
East Waterway Operable Unit



Prepared by CEH 12/18/07. MAP #2044. W:\Projects\00-08-08 East Waterway\EW E-FS\Drawings\08-08 Summary Report\Nature and Exent

1. Exceedance counts include individual PAHs in addition to Total LPAH and Total HPAH
2. Exceedance counts only include SMS chemicals

Figure 3-20
Subsurface (0-4 ft) Sediment Sampling Locations All CSL Exceedance Counts
Existing Information Summary Report
East Waterway Operable Unit

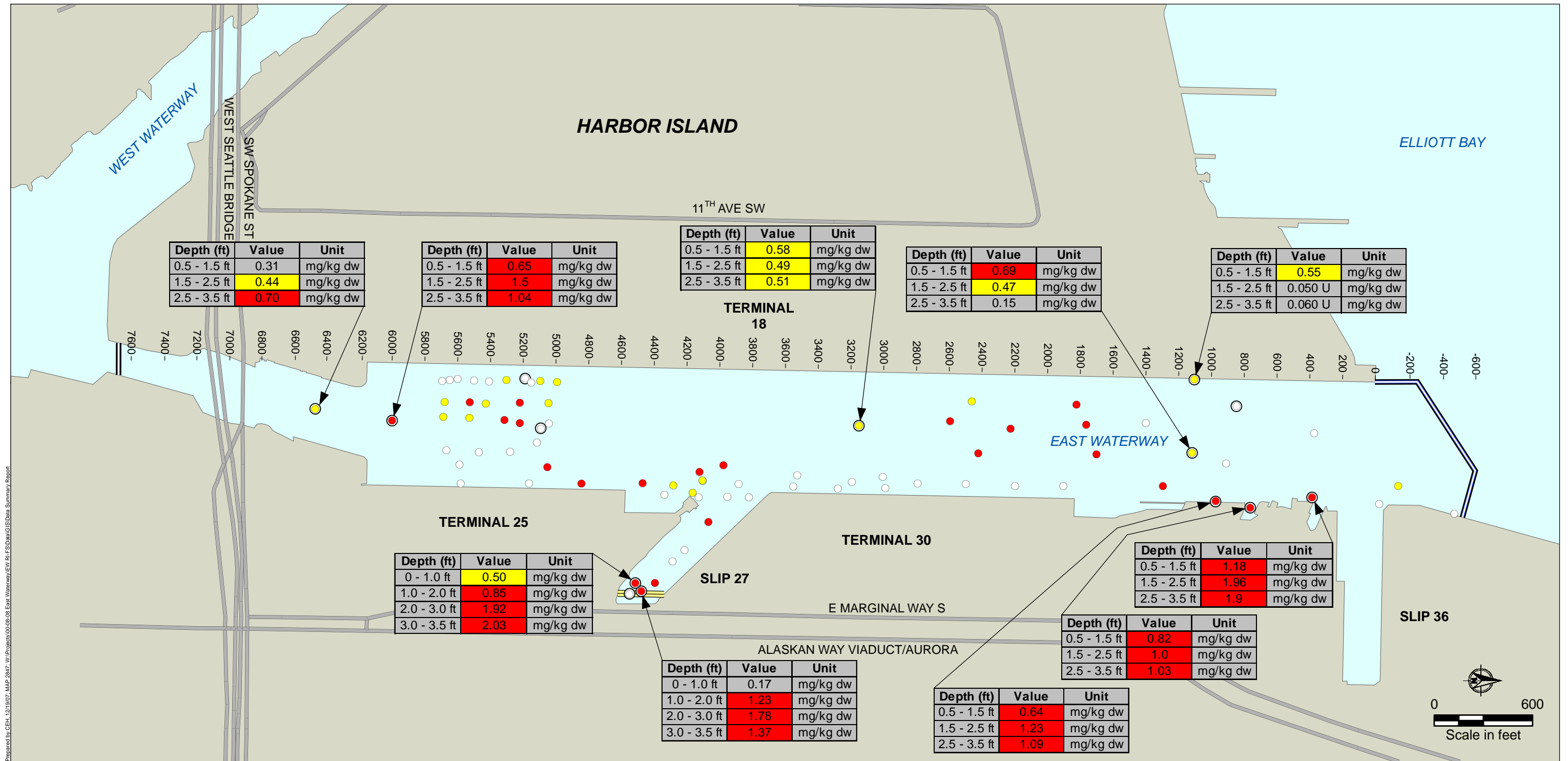


Cadmium
 SQS = 5.1 mg/kg dw
 CSL = 6.7 mg/kg dw

- > CSL, detect
- > SQS and ≤ CSL, detect
- ≤ SQS
- Averaged location¹
- ▬ Slip 27 Bridge
- ▬ East Waterway Operable Unit Boundary

Note: Chemistry data for all samples is provided for every averaged location with an exceedance.
¹ Averaged locations are symbolized using an outline around the location's SMS exceedance symbol.

Figure 3-21
 Cadmium Exceedances of SMS Values in Subsurface (0-4 ft) Sediment
 Existing Information Summary Report
 East Waterway Operable Unit

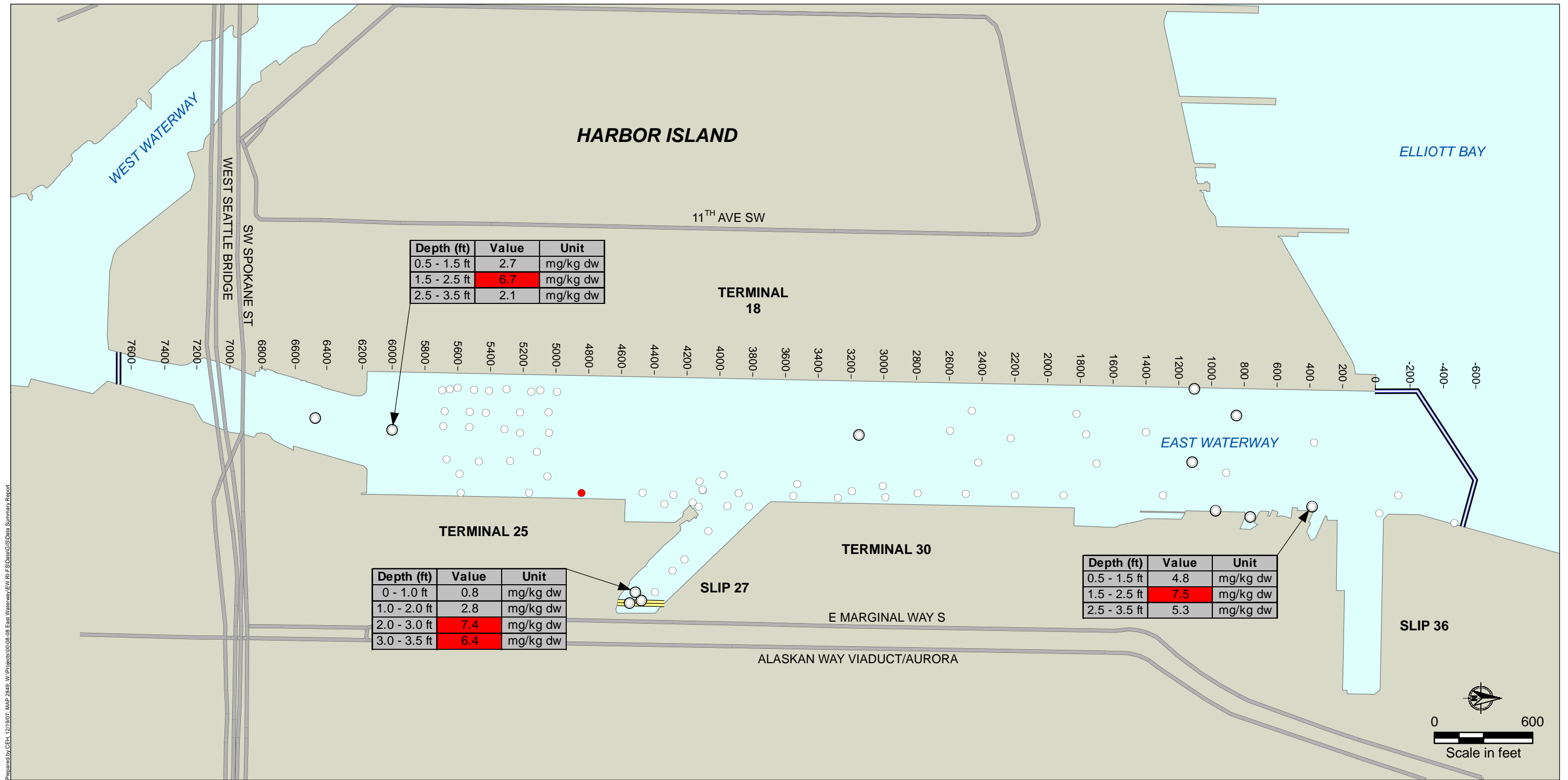


Mercury
 SQS = 0.41 mg/kg dw
 CSL = 0.59 mg/kg dw

- > CSL, detect
- > SQS and ≤ CSL, detect
- ≤ SQS
- Averaged location¹
- ≡≡≡ Slip 27 Bridge
- ≡≡≡ East Waterway Operable Unit Boundary

Note: Chemistry data for all samples is provided for every averaged location with an exceedance.
¹ Averaged locations are symbolized using an outline around the location's SMS exceedance symbol.

Figure 3-22
 Mercury Exceedances of SMS Values in Subsurface (0-4 ft) Sediment
 Existing Information Summary Report
 East Waterway Operable Unit



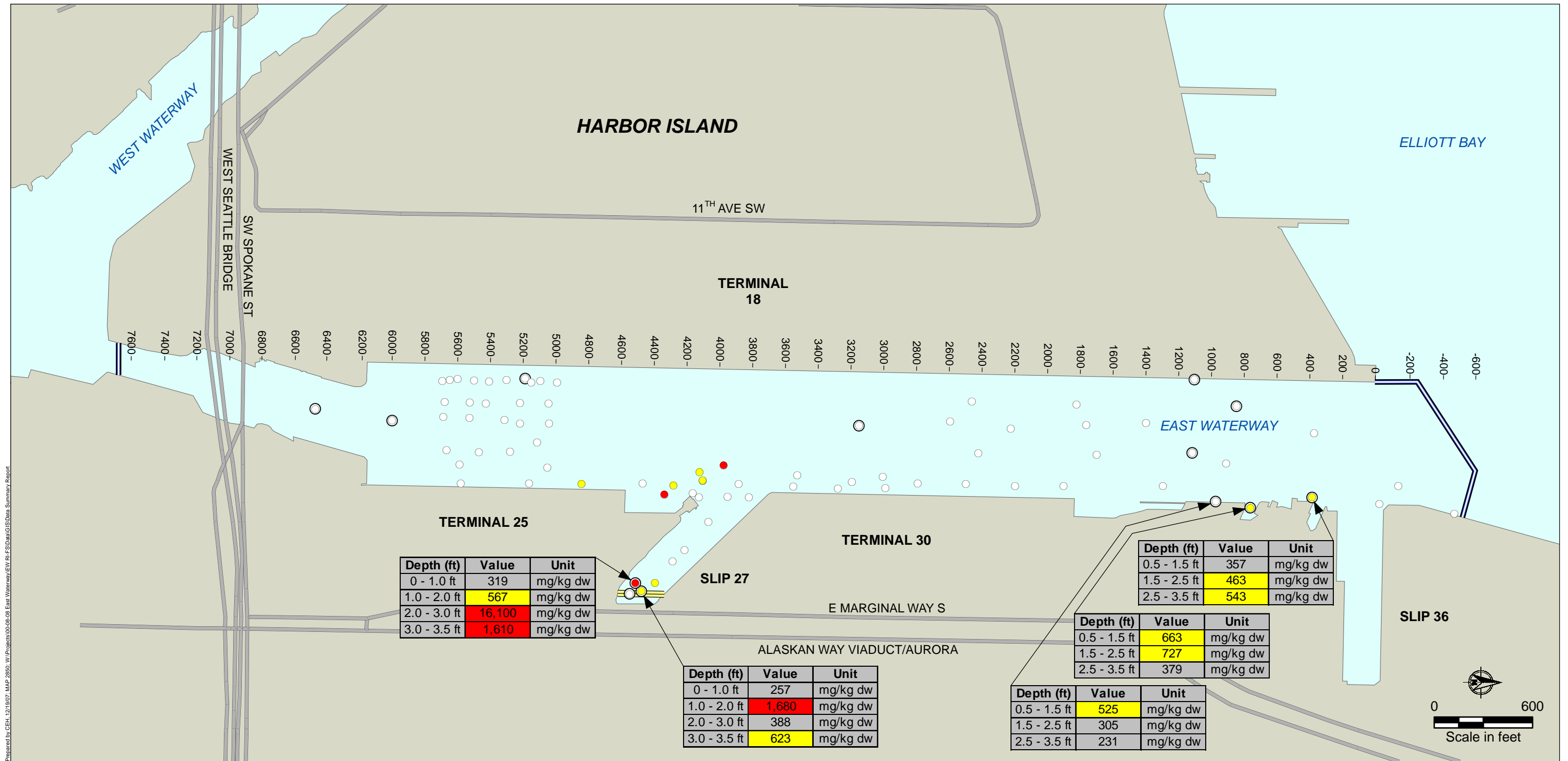
Prepared by CEH, 12/18/07, MAP 2845, W:\Projects\06-08-East Waterway\REV\Final\GIS\Map\Summary_Report

Silver
 SQS = 6.1 mg/kg dw
 CSL = 6.1 mg/kg dw

- > CSL, detect
- ≤ SQS
- Averaged location¹
- ▬ Slip 27 Bridge
- ▬ East Waterway Operable Unit Boundary

Note: Chemistry data for all samples is provided for every averaged location with an exceedance.
¹ Averaged locations are symbolized using an outline around the location's SMS exceedance symbol.

Figure 3-23
 Silver Exceedances of SMS Values in Subsurface (0-4 ft) Sediment
 Existing Information Summary Report
 East Waterway Operable Unit



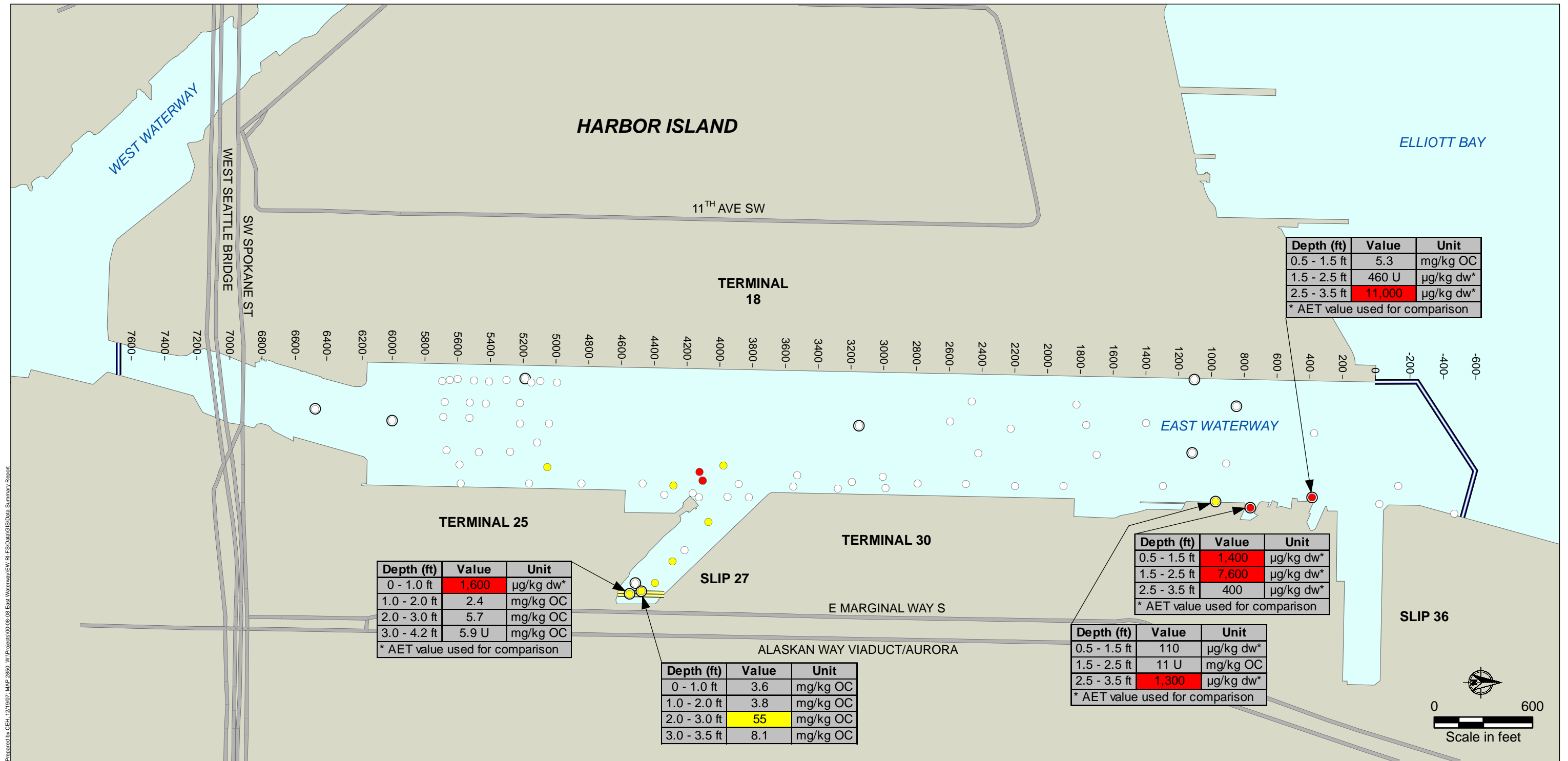
Prepared by CEH, 12/19/07, MAP 2850, W/Projects/00-08-08 East Waterway/EV/ELFSD/07/08/08/Summary Report

Zinc
 SQS = 410 mg/kg dw
 CSL = 960 mg/kg dw

- > CSL, detect
- > SQS and ≤ CSL, detect
- ≤ SQS
- Averaged location¹
- ▬ Slip 27 Bridge
- ▬ East Waterway Operable Unit Boundary

Note: Chemistry data for all samples is provided for every averaged location with an exceedance.
¹ Averaged locations are symbolized using an outline around the location's SMS exceedance symbol.

Figure 3-24
 Zinc Exceedances of SMS Values in Subsurface (0-4 ft) Sediment
 Existing Information Summary Report
 East Waterway Operable Unit

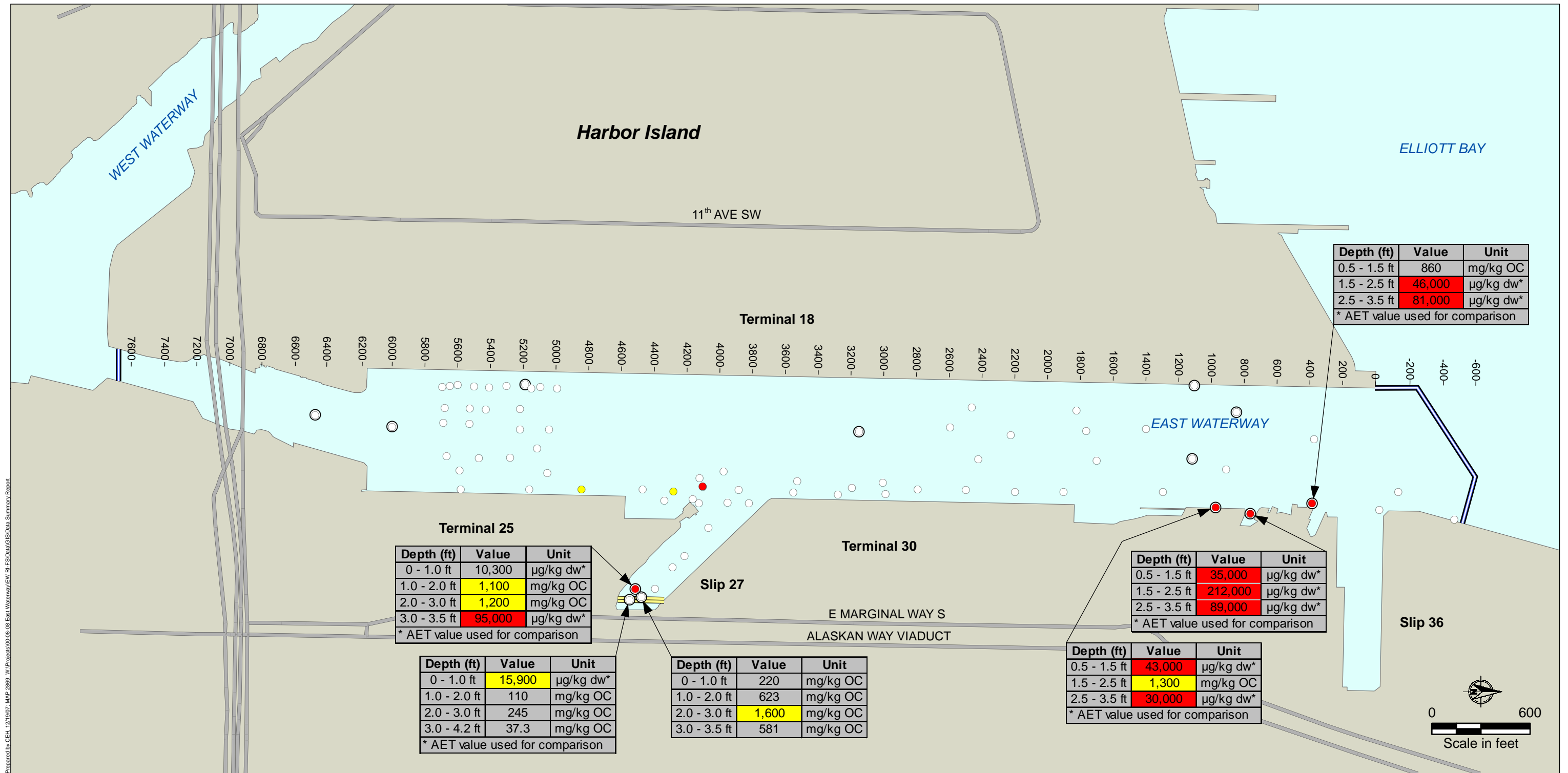


Acenaphthene
 SQS = 16 mg/kg OC
 CSL = 57 mg/kg OC

- > CSL, detect
- > SQS and ≤ CSL, detect
- ≤ SQS
- Averaged location¹
- ▬ Slip 27 Bridge
- ▬ East Waterway Operable Unit Boundary

Note: Chemistry data for all samples is provided for every averaged location with an exceedance.
¹ Averaged locations are symbolized using an outline around the location's SMS exceedance symbol.

Figure 3-25
 Acenaphthene Exceedances of SMS Values in Subsurface (0-4 ft) Sediment
 Existing Information Summary Report
 East Waterway Operable Unit

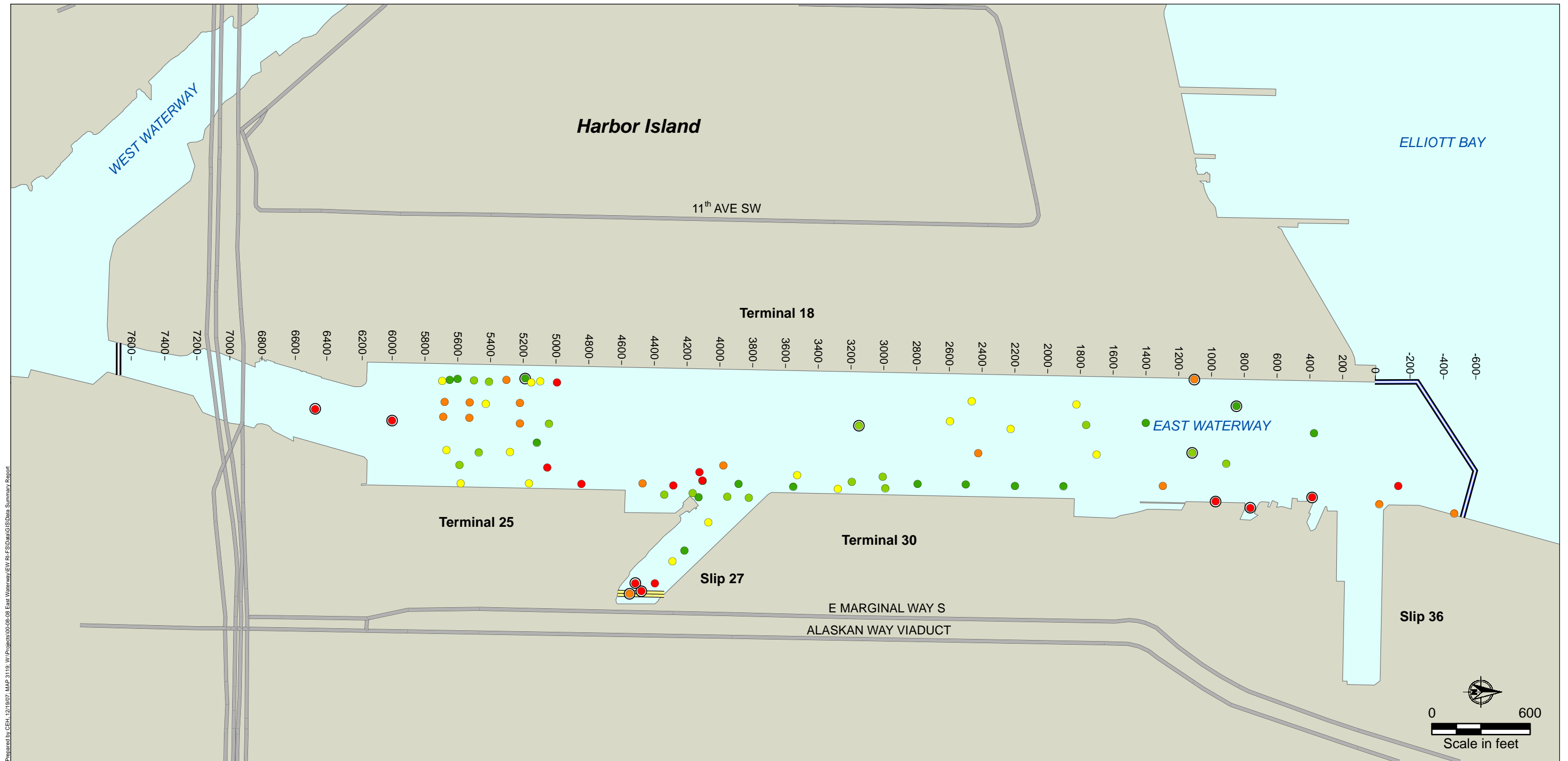


Total HPAH
 SQS = 960 mg/kg OC
 CSL = 5300 mg/kg OC

- > CSL, detect
- > SQS and ≤ CSL, detect
- ≤ SQS
- Averaged location¹
- ▬ Slip 27 Bridge
- ▬ East Waterway Operable Unit Boundary

Note: Chemistry data for all samples is provided for every averaged location with an exceedance.
¹ Averaged locations are symbolized using an outline around the location's SMS exceedance symbol.

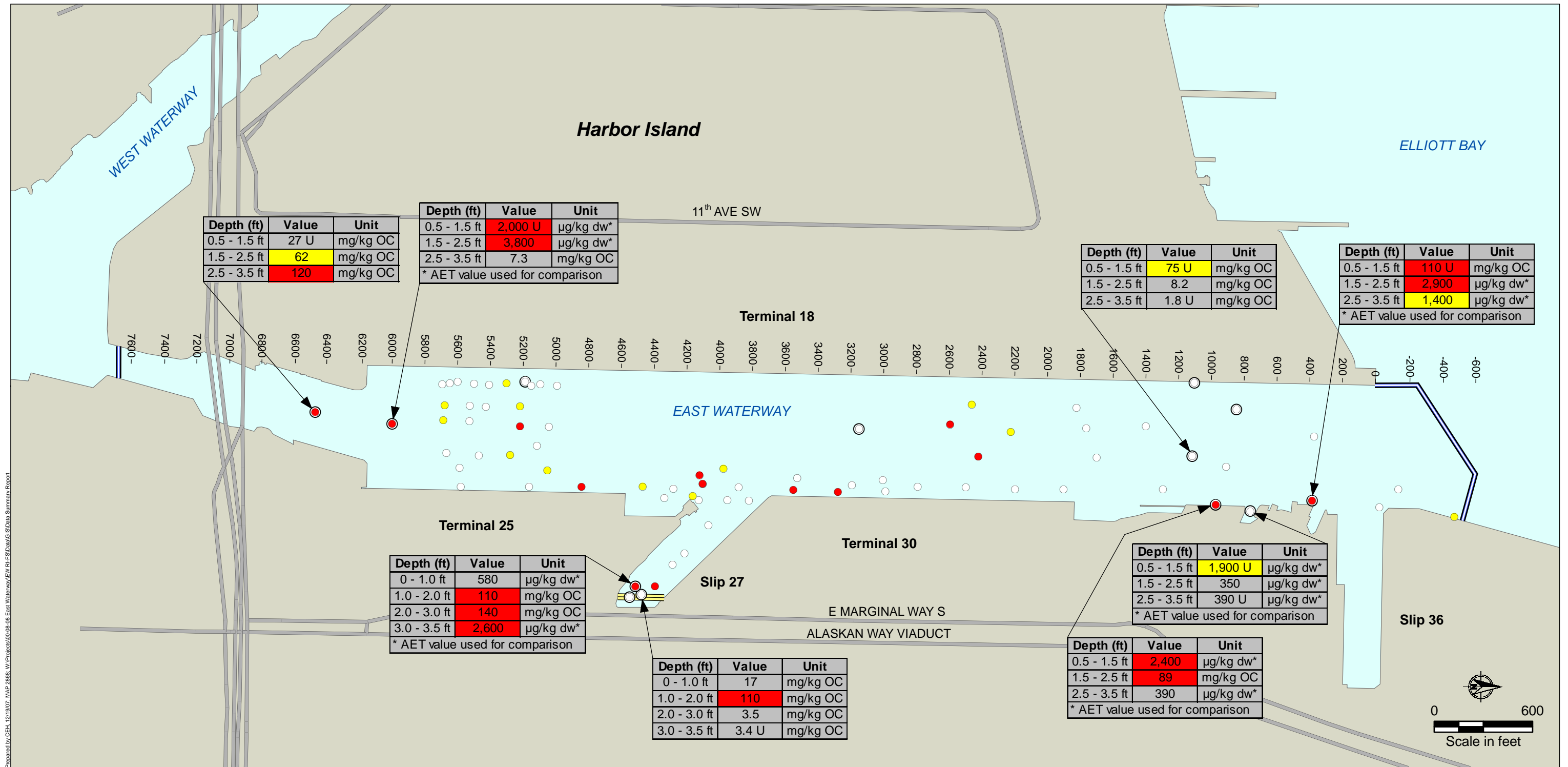
Figure 3-26
 Total HPAH Exceedances of SMS Values in Subsurface (0-4 ft) Sediment
 Existing Information Summary Report
 East Waterway Operable Unit



- cPAHs¹**
- > 830 (80th to 100th percentile)
 - > 550 and ≤ 830 (60th to 80th percentile)
 - > 290 and ≤ 550 (40th to 60th percentile)
 - > 150 and ≤ 290 (20th to 40th percentile)
 - ≤ 150 (20th percentile)
 - Averaged location²
 - ▬ Slip 27 Bridge
 - ▬ East Waterway Operable Unit Boundary

Note: Chemistry data for all samples is provided for every averaged location with an exceedance.
¹ cPAH concentrations were calculated as benzo(a)pyrene equivalents using PEF values from CalEPA 1994.
² Averaged locations are symbolized using an outline around the location symbol.

Figure 3-27
 Carcinogenic PAH Concentrations in Subsurface (0-4 ft) Sediment
 Existing Information Summary Report
 East Waterway Operable Unit



Bis(2-ethylhexyl)phthalate

SQS = 47 mg/kg OC

CSL = 78 mg/kg OC

- > CSL, detect
- > SQS and ≤ CSL, detect
- ≤ SQS
- Averaged location¹
- == Slip 27 Bridge
- == East Waterway Operable Unit Boundary

Note: Chemistry data for all samples is provided for every averaged location with an exceedance.

¹ Averaged locations are symbolized using an outline around the location's SMS exceedance symbol.

Figure 3-28
 Bis(2-ethylhexyl)phthalate Exceedances of SMS Values in Subsurface (0-4 ft) Sediment
 Existing Information Summary Report
 East Waterway Operable Unit

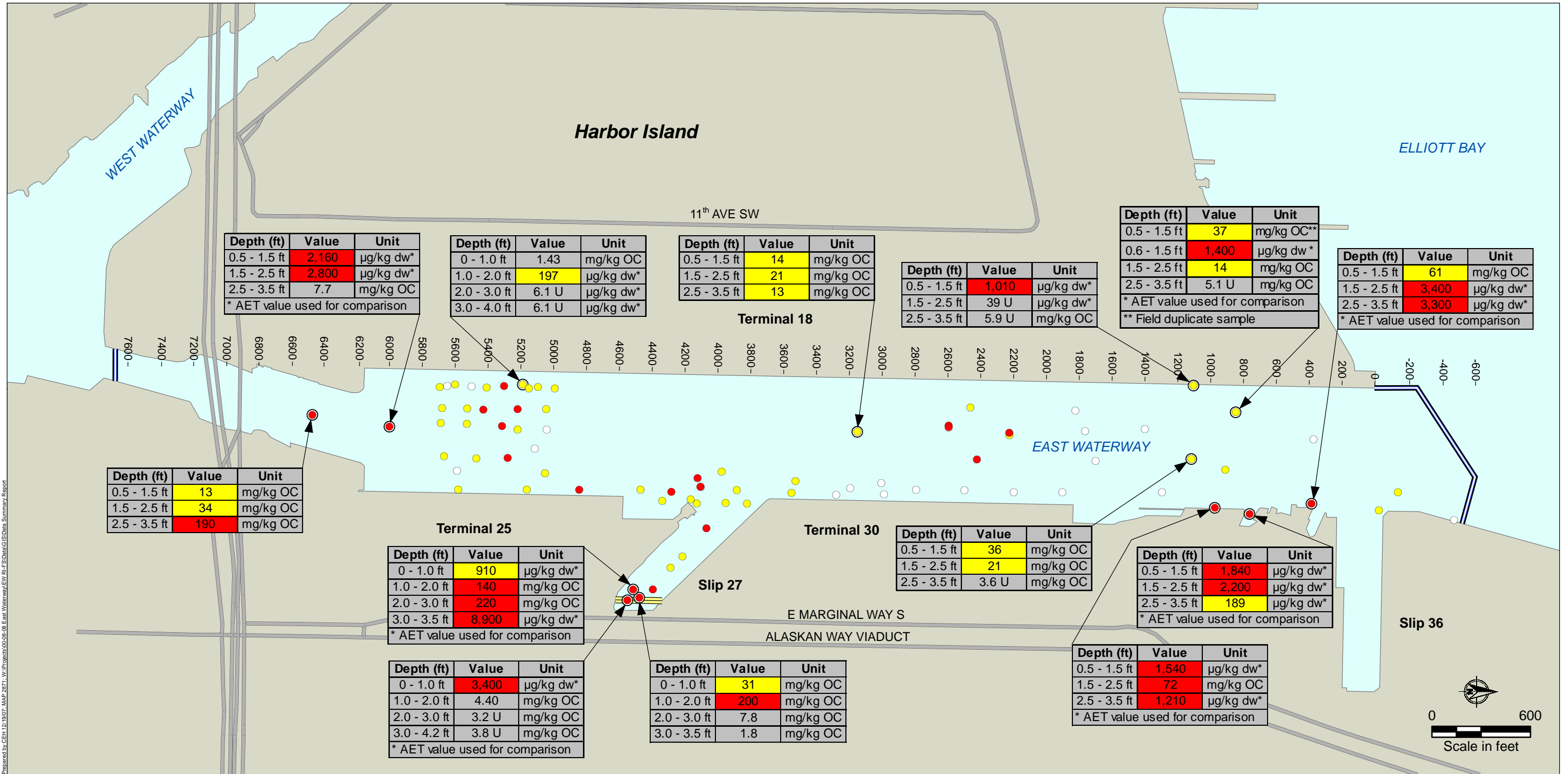
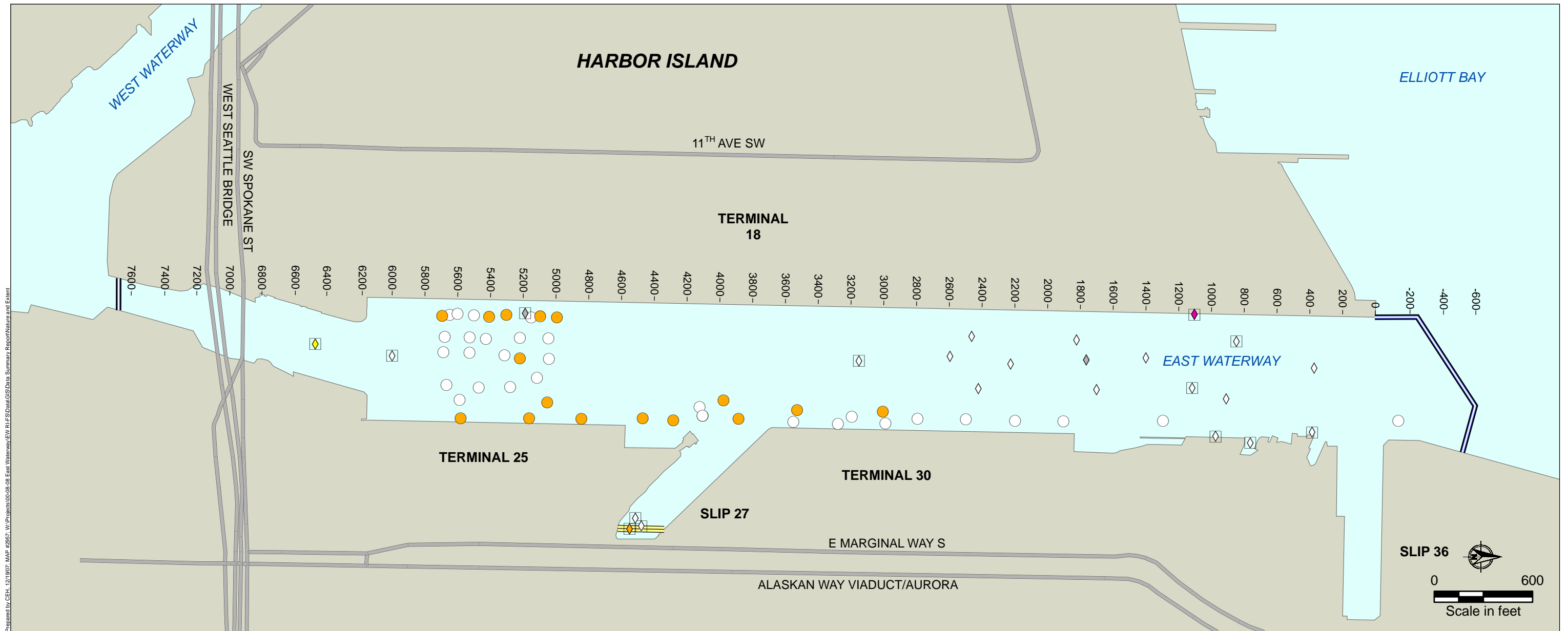
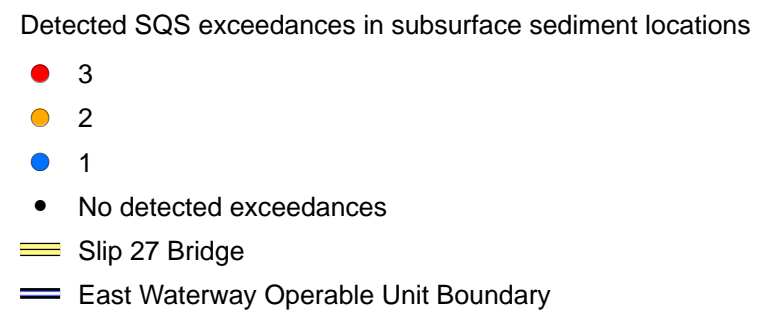
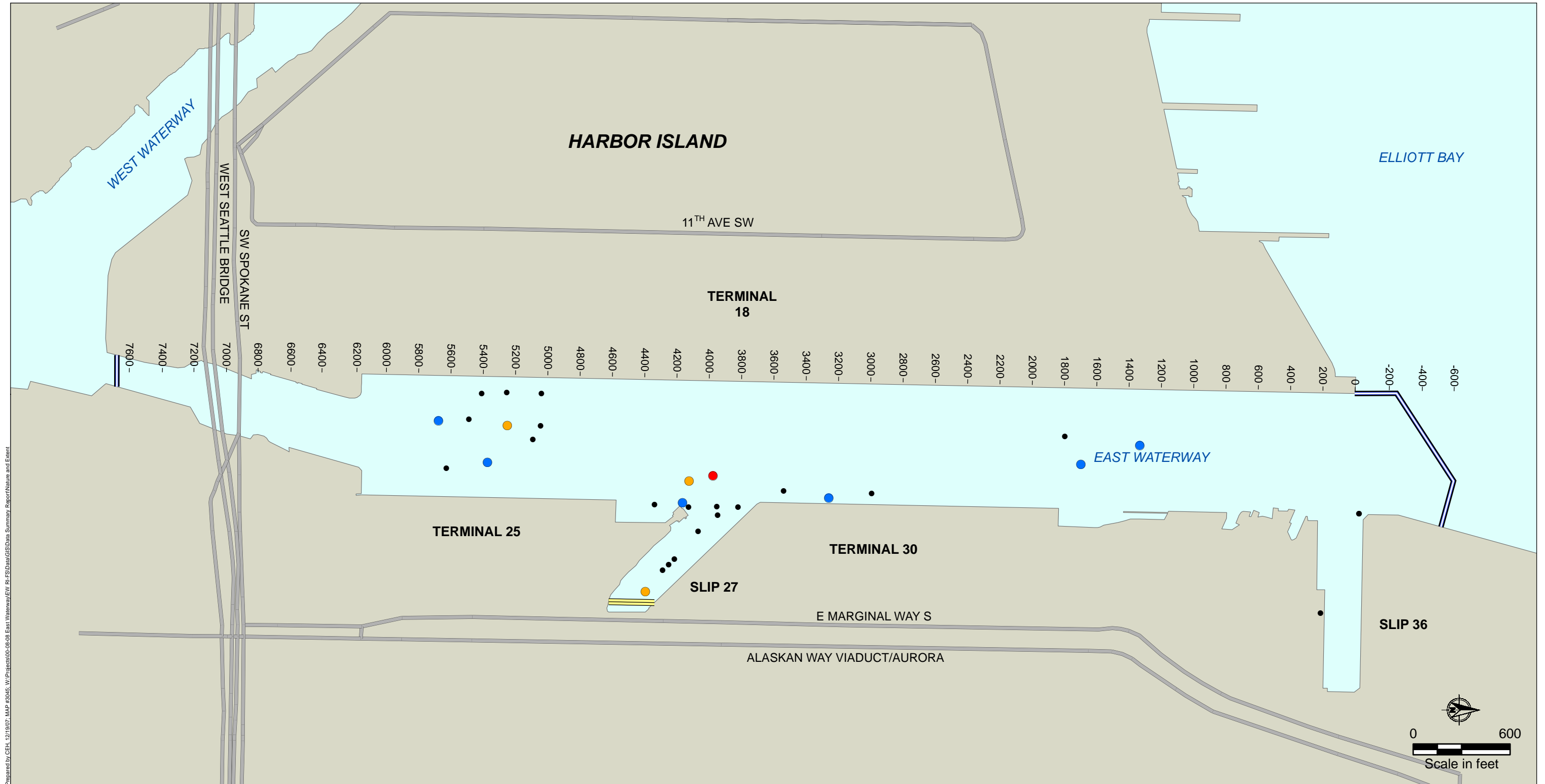


Figure 3-29
 Total PCB Exceedances of SMS Values in Subsurface (0-4 ft) Sediment
 Existing Information Summary Report
 East Waterway Operable Unit



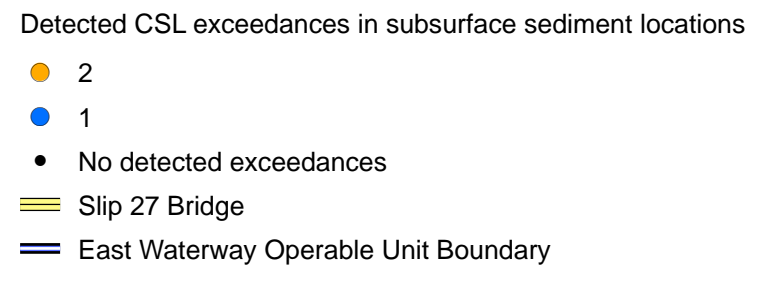
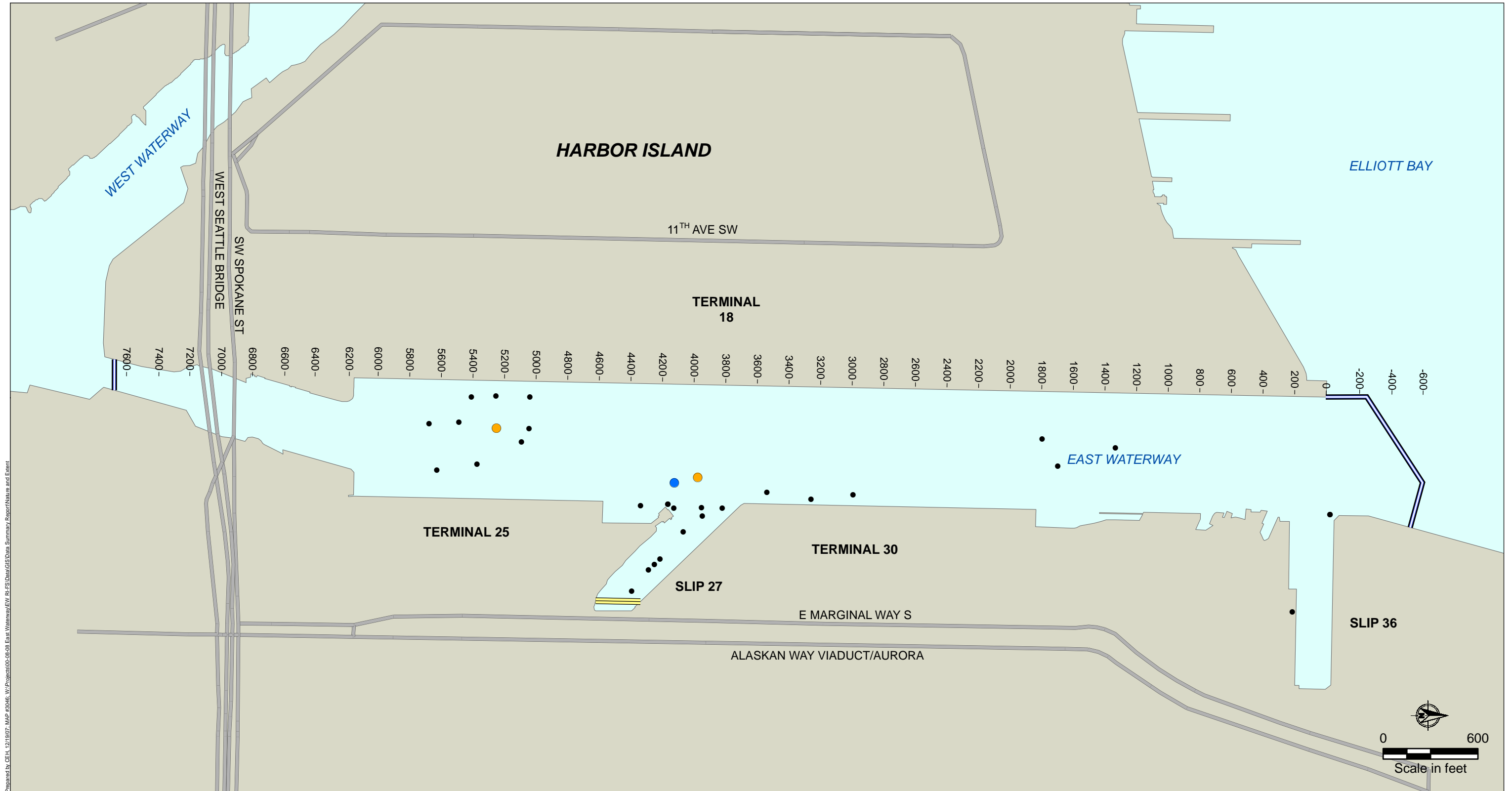
- Tributyltin as ion**
- Porewater**
SL = 0.15 µg/L
- > SL and no ML, detect
 - ≤ SL and no ML
- Bulk sediment values**
(µg/kg dw)
- ◆ > 500
 - ◇ > 200 and ≤ 500
 - ◇ > 100 and ≤ 200
 - ◇ ≤ 100
 - ◇ Non-detect
 - ◆ Averaged location
 - ▬ Slip 27 Bridge
 - ▬ East Waterway Operable Unit Boundary

Figure 3-30
Tributyltin Porewater Exceedances of DMMP Values and Tributyltin Bulk Sediment Concentrations in Subsurface (0-4 ft) Sediment Existing Information Summary Report East Waterway Operable Unit



1. Exceedance counts include individual PAHs in addition to Total LPAH and Total HPAH
 2. Exceedance counts only include SMS chemicals
 3. Exceedance counts > SQS include chemical concentrations > CSL (i.e., it is not the number of samples with concentrations between the SQS and CSL)

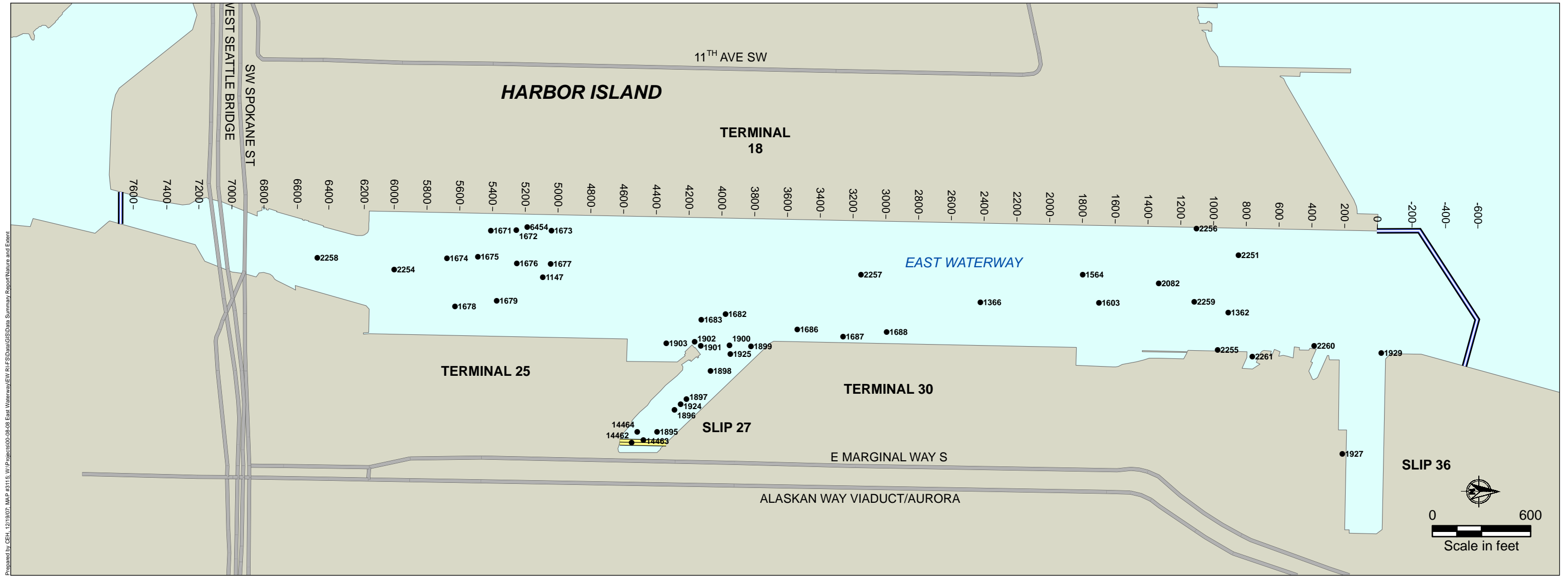
Figure 3-31
 Subsurface (> 4 ft) Sediment Sampling Locations All SQS Exceedance Counts
 Existing Information Summary Report
 East Waterway Operable Unit



1. Exceedance counts include individual PAHs in addition to Total LPAH and Total HPAH
 2. Exceedance counts only include SMS chemicals

Figure 3-32
 Subsurface (> 4 ft) Sediment Sampling Locations All CSL Exceedance Counts
 Existing Information Summary Report
 East Waterway Operable Unit

Prepared by CEH 12/19/07, MAP #3046, W:\Projects\00-08-08 East Waterway\EW_EI-FS\GIS\GISData Summary Report\Nature and Extent



Prepared by CEH, 12/19/07, MAP #115, W:\Projects\00-08-08 East Waterway\NEW R\F\SD\GIS\Data Summary Report\Nature and Extent

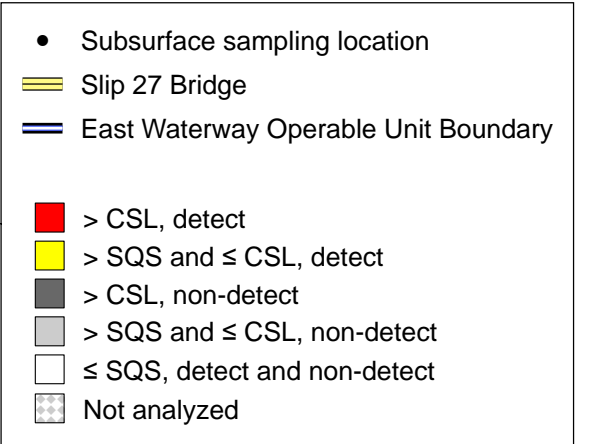
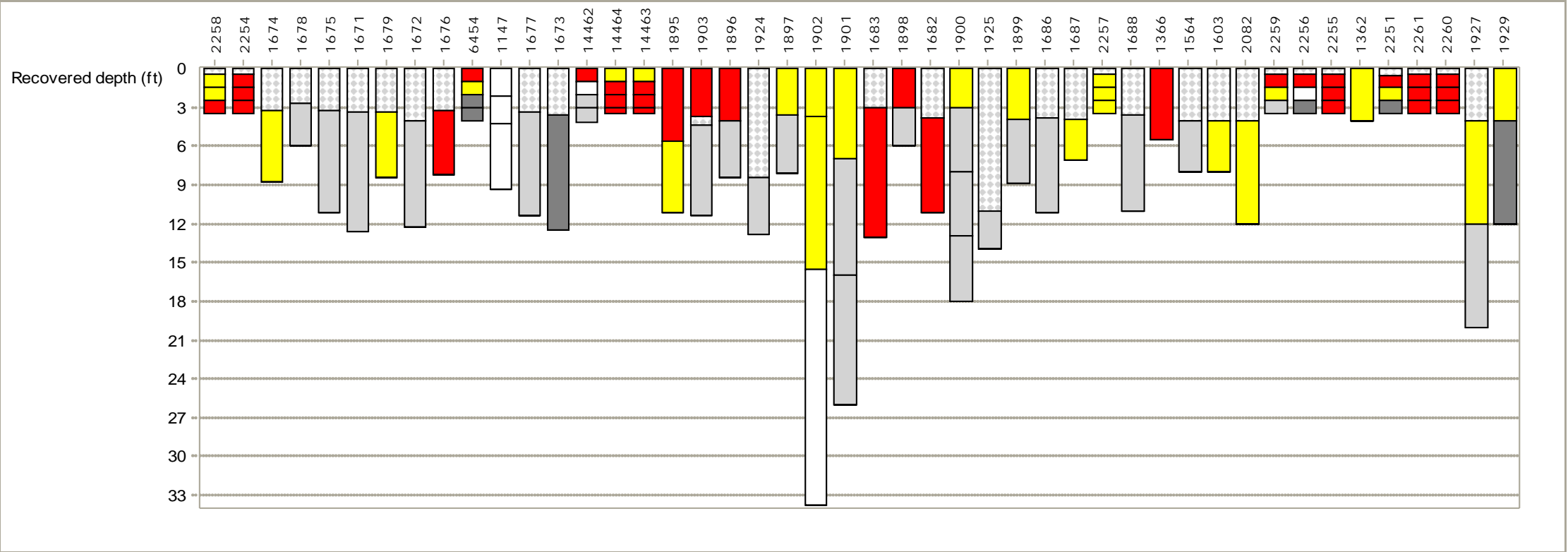
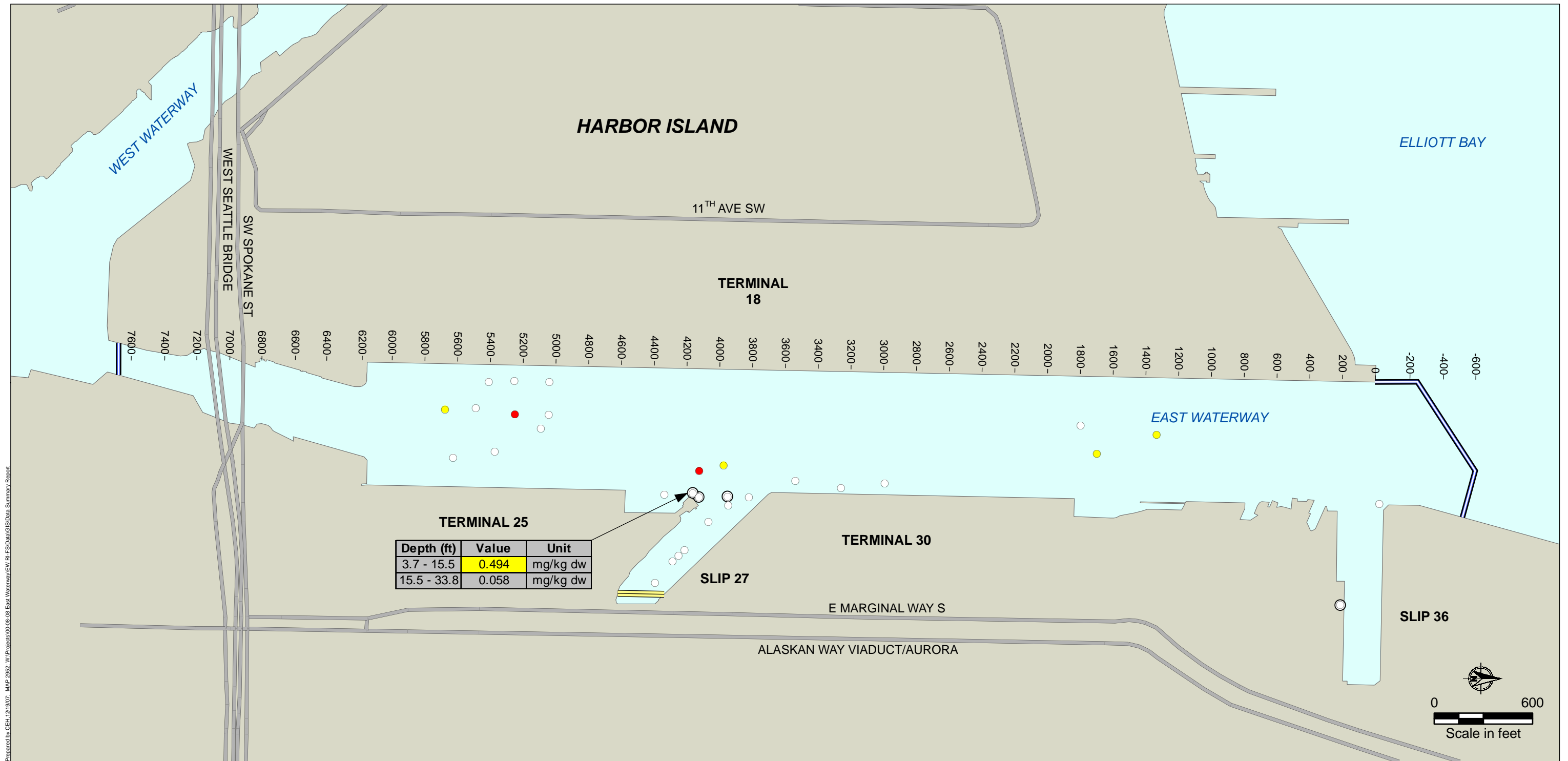


Figure 3-33
 Exceedances of SMS Criteria (SQS or CSL) for
 All Chemicals with SMS Criteria in Subsurface Sediment
 Cores with Multiple Samples and All > 4 ft Samples
 Existing Information Summary Report
 East Waterway Operable Unit



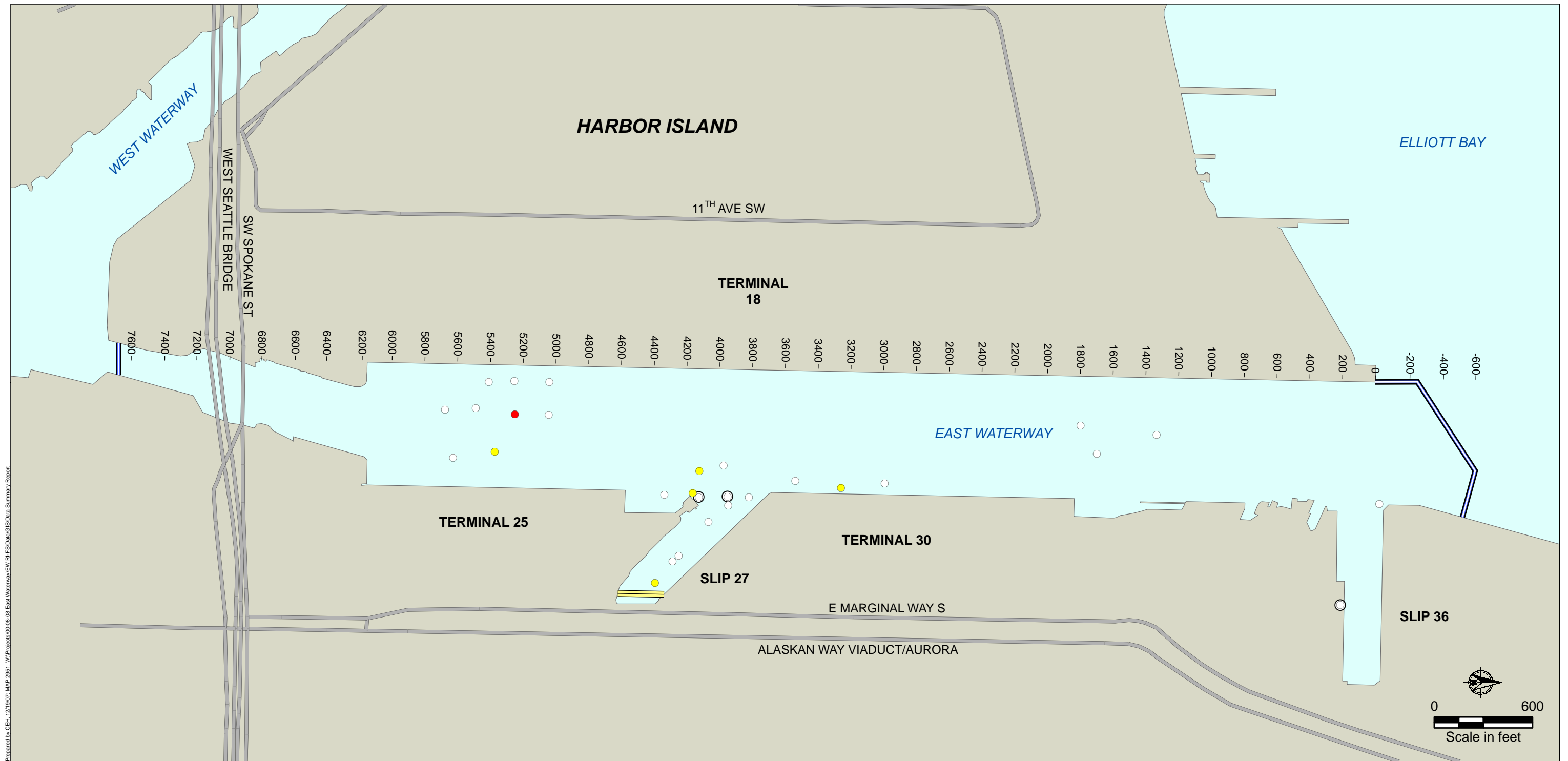
Prepared by GEHL 12/19/07. MAP_2952_W\Projects\00-08-08_East Waterway\EV_RF\FSD\GISData_Summary_Report

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

- > CSL, detect
- > SQS and ≤ CSL, detect
- ≤ SQS
- Averaged location¹
- ▬ Slip 27 Bridge
- ▬ East Waterway Operable Unit Boundary

Note: Chemistry data for all samples is provided for every averaged location with an exceedance.
¹ Averaged locations are symbolized using an outline around the location's SMS exceedance symbol.

Figure 3-34
 Mercury Exceedances of SMS Values in Subsurface (> 4 ft) Sediment
 Existing Information Summary Report
 East Waterway Operable Unit

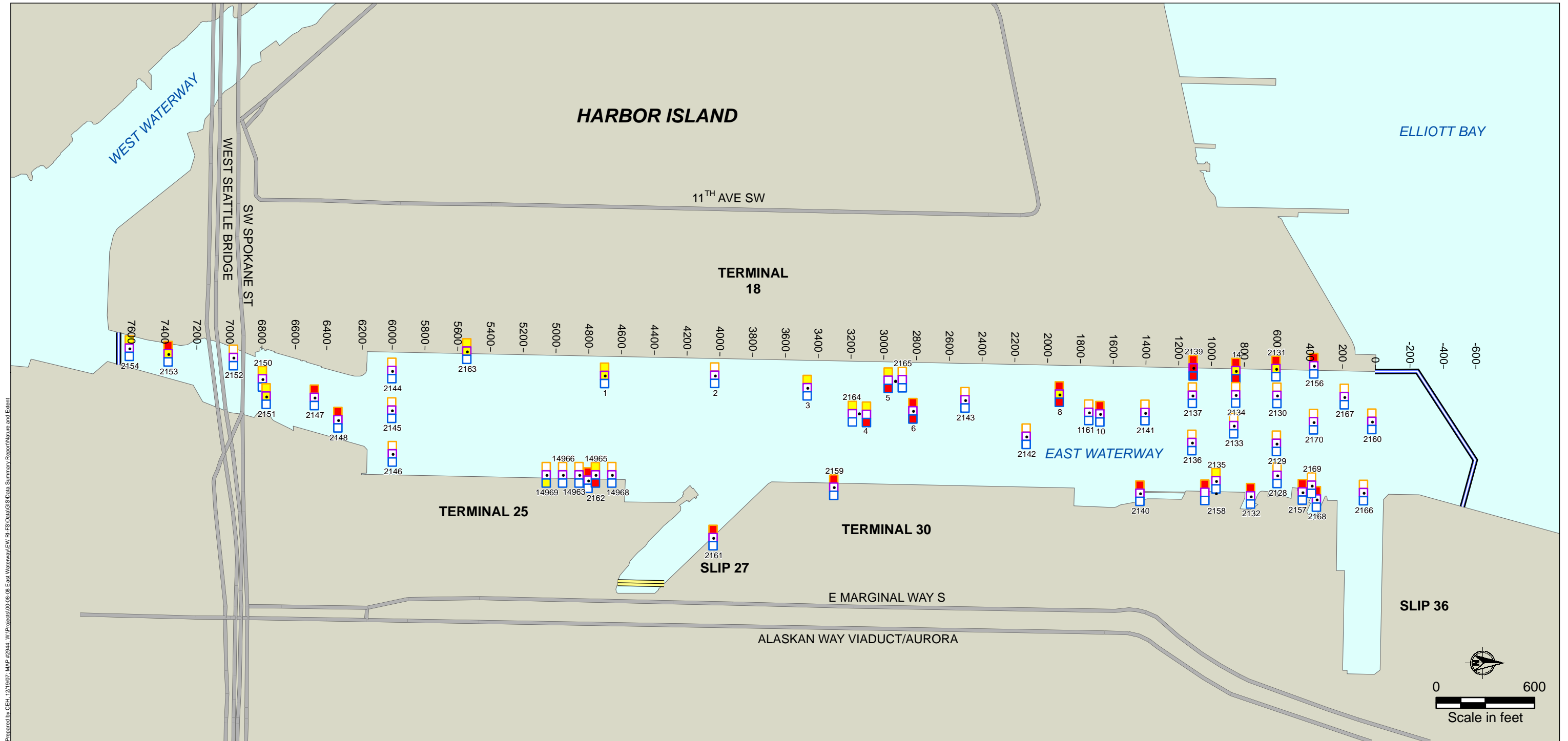


Total PCBs
 SQS = 12 mg/kg OC
 CSL = 65 mg/kg OC

- > CSL, detect
- > SQS and ≤ CSL, detect
- ≤ SQS
- Averaged location¹
- ▬ Slip 27 Bridge
- ▬ East Waterway Operable Unit Boundary

¹ Averaged locations are symbolized using an outline around the location's SMS exceedance symbol.

Figure 3-35
 Total PCB Exceedances of SMS Values in Subsurface (> 4 ft) Sediment
 Existing Information Summary Report
 East Waterway Operable Unit



Prepared by CEH, 12/18/07, MAP #2544, W:\Projects\05-05-08-E East Waterway\EV-RI-FS Data\GIS Data Summary Report\Nature and Etern

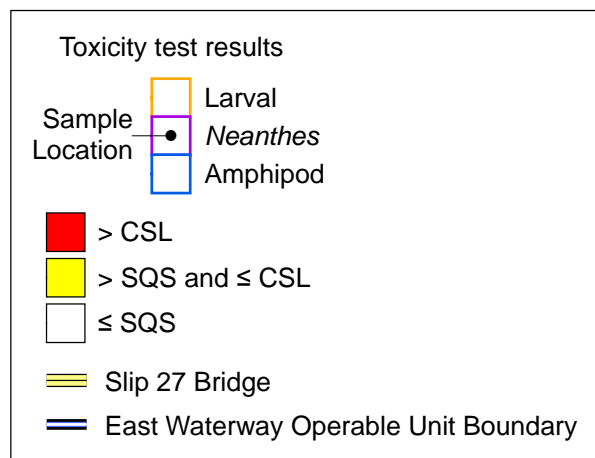
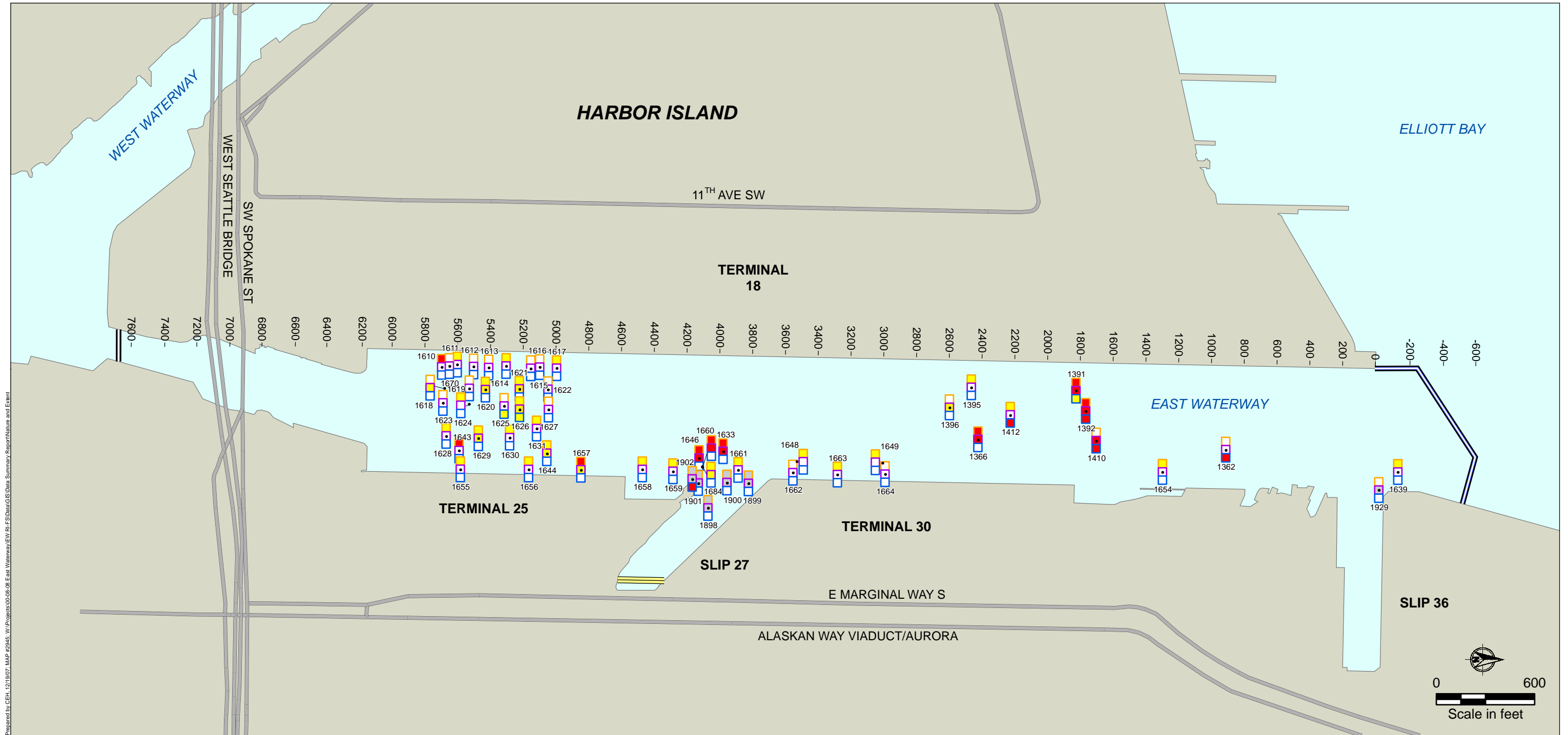


Figure 3-36
 Amphipod, *Neanthes*, and Larval Bioassay Exceedances
 of SQS/CSL in Surface (0-10 cm) Sediment Samples
 Existing Information Summary Report
 East Waterway Operable Unit



Prepared by CEH 12/18/07; MAP #2945; W:\Projects\030808\08_East Waterway\EW_OU_Data_Summary_Report\Nature and Extent

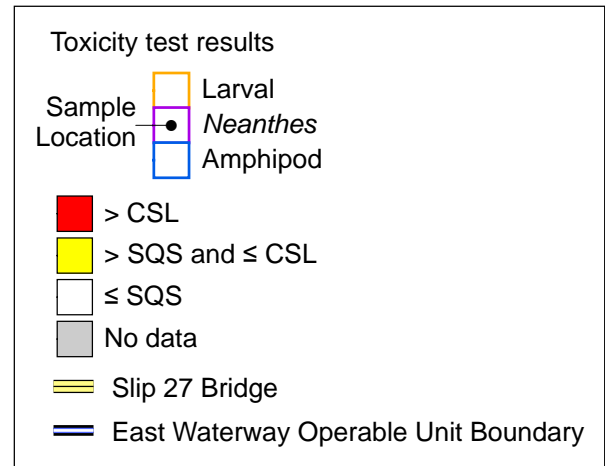
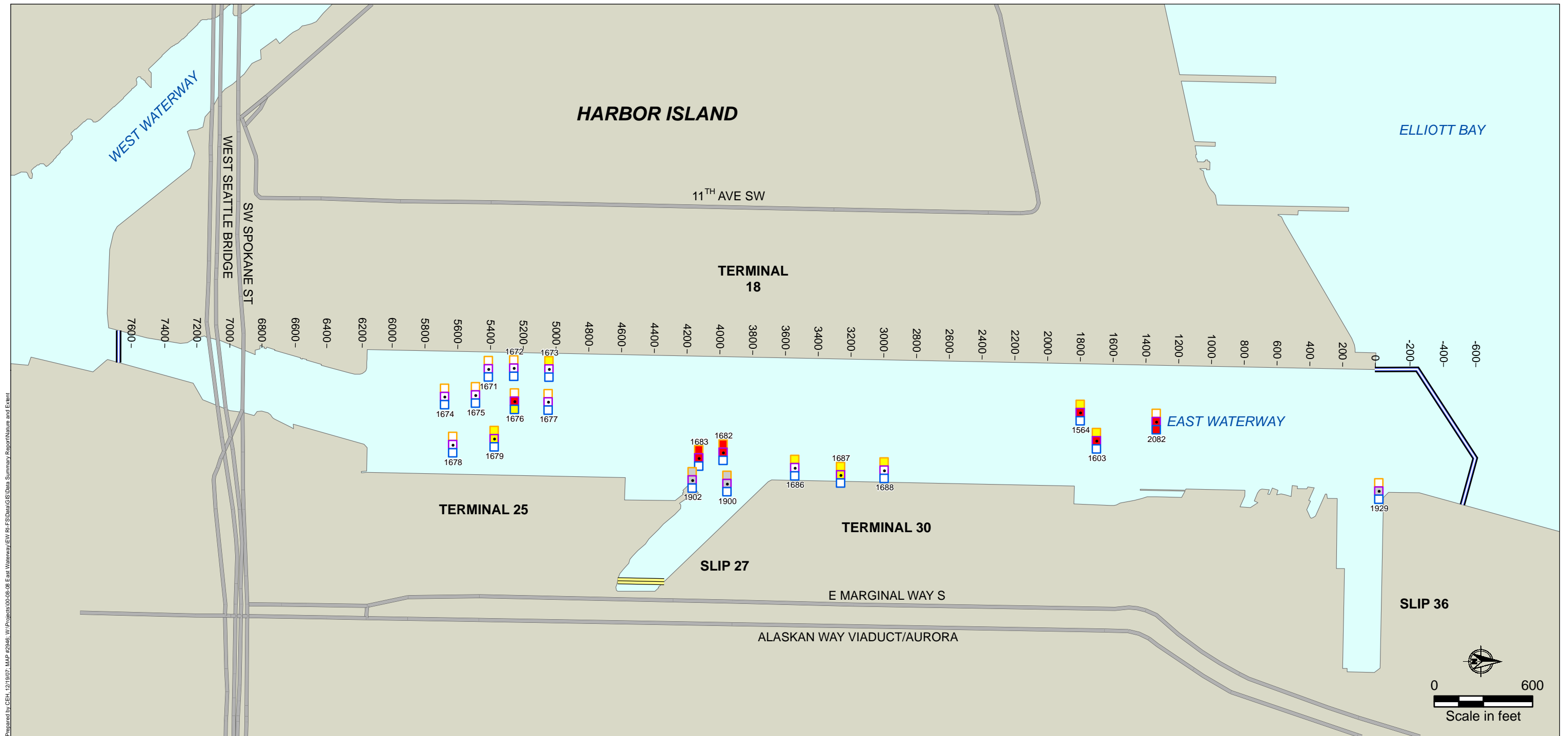


Figure 3-37
 Amphipod, *Neanthes*, and Larval Bioassay Exceedances
 of SQS/CSL in Subsurface (0-4 ft) Sediment Samples
 Existing Information Summary Report
 East Waterway Operable Unit



Prepared by CEH: 12/18/07; MAP: F2946; W:\Projects\002808\08_East Waterway\EW_OU\Figures\GSData_Summary_Report\Nature and Extent

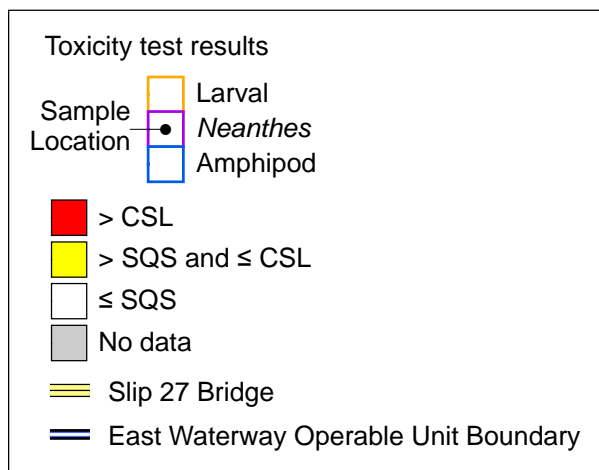
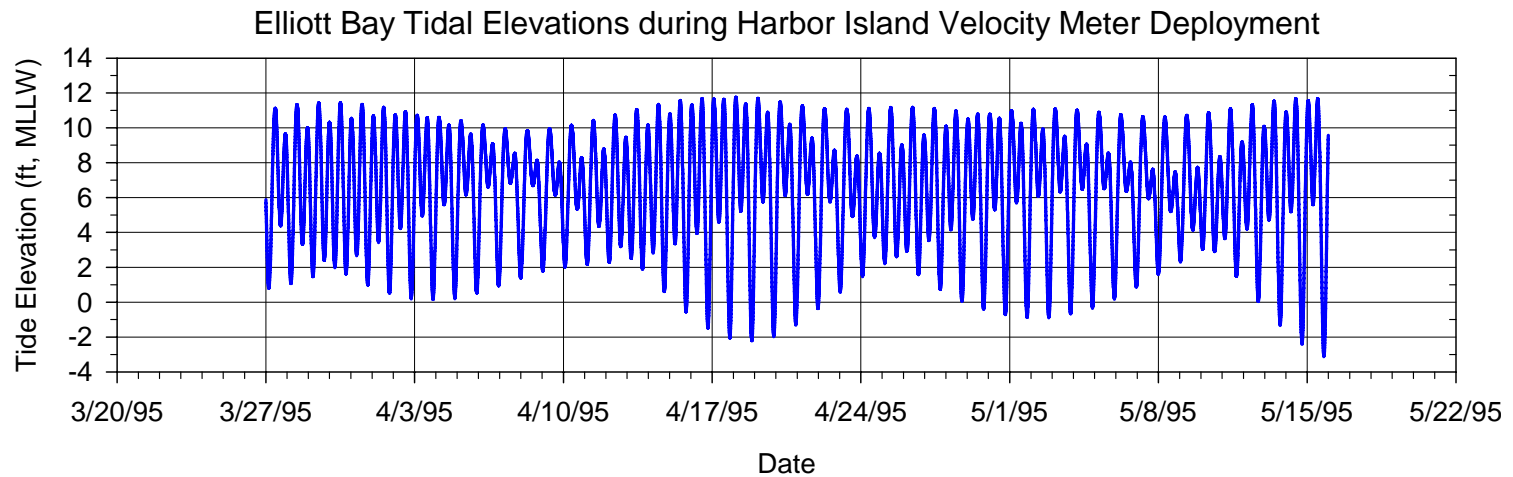
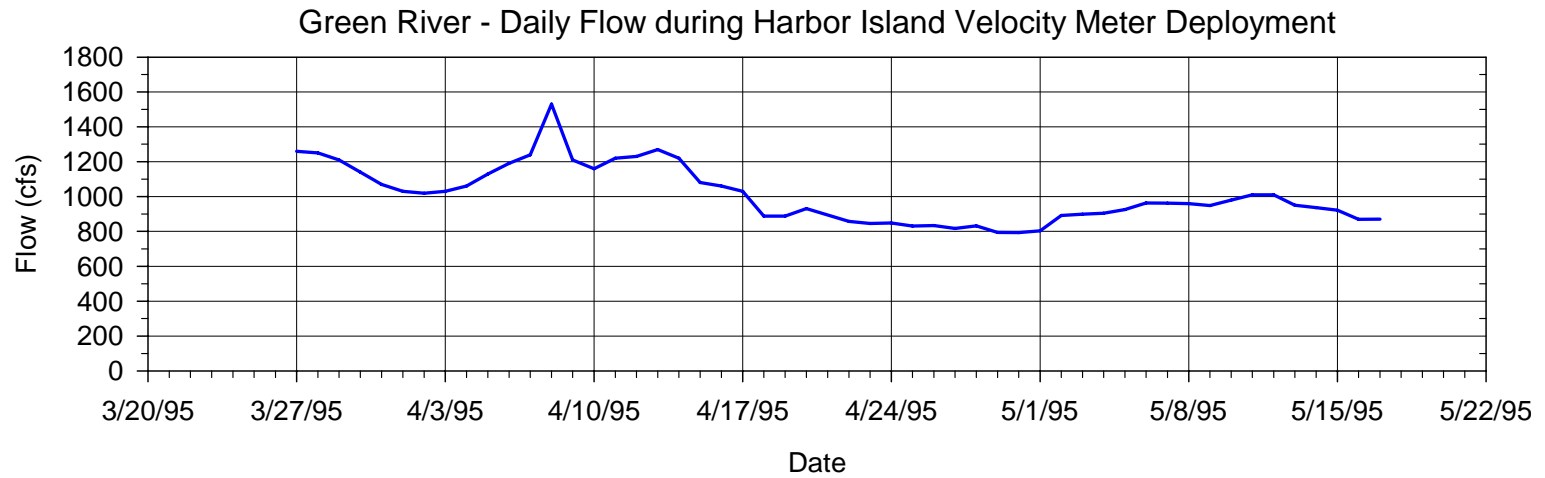


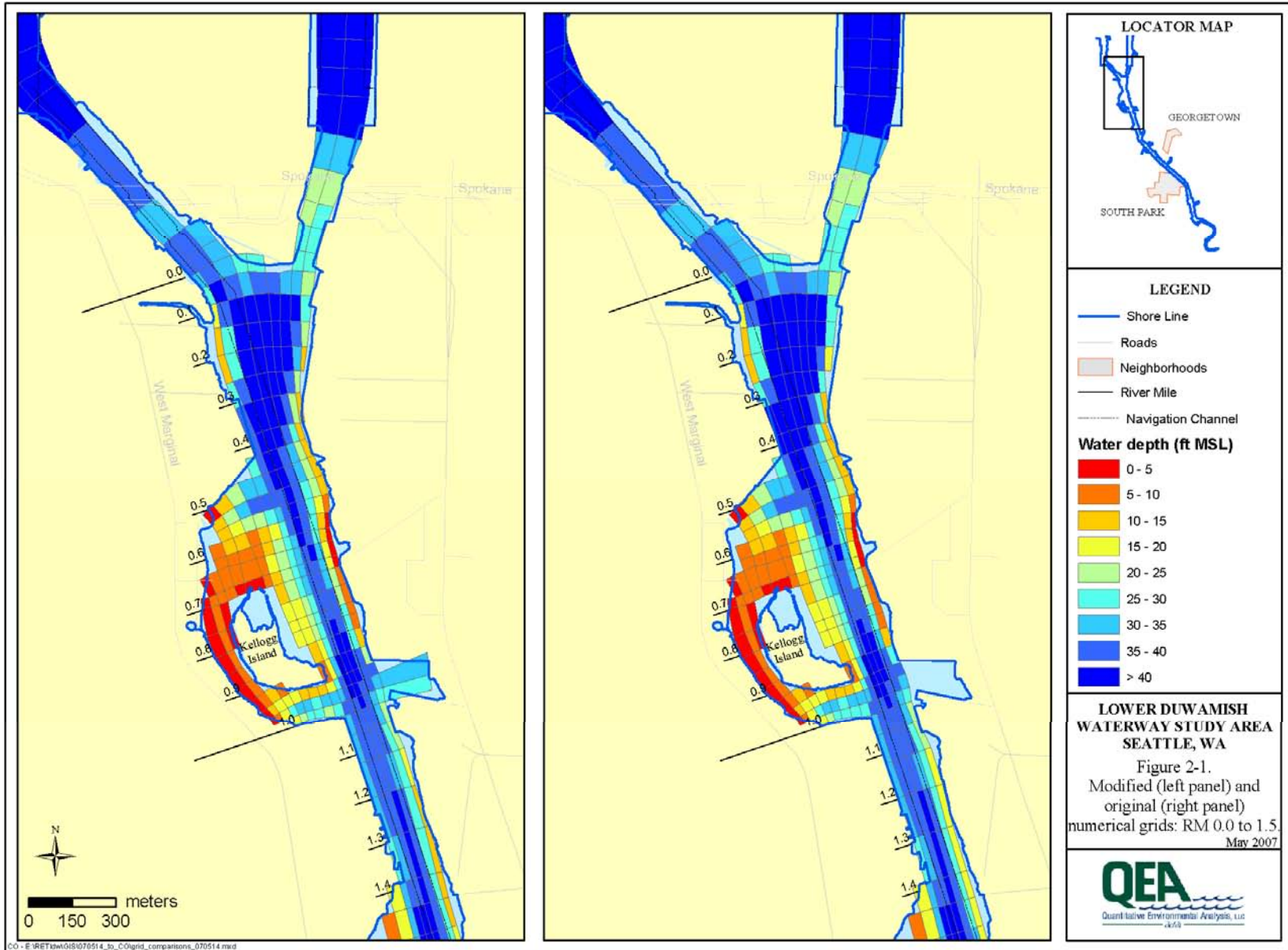
Figure 3-38
 Amphipod, *Neanthes*, and Larval Bioassay Exceedances
 of SQS/CSL in Subsurface (> 4 ft) Sediment Samples
 Existing Information Summary Report
 East Waterway Operable Unit



Notes:

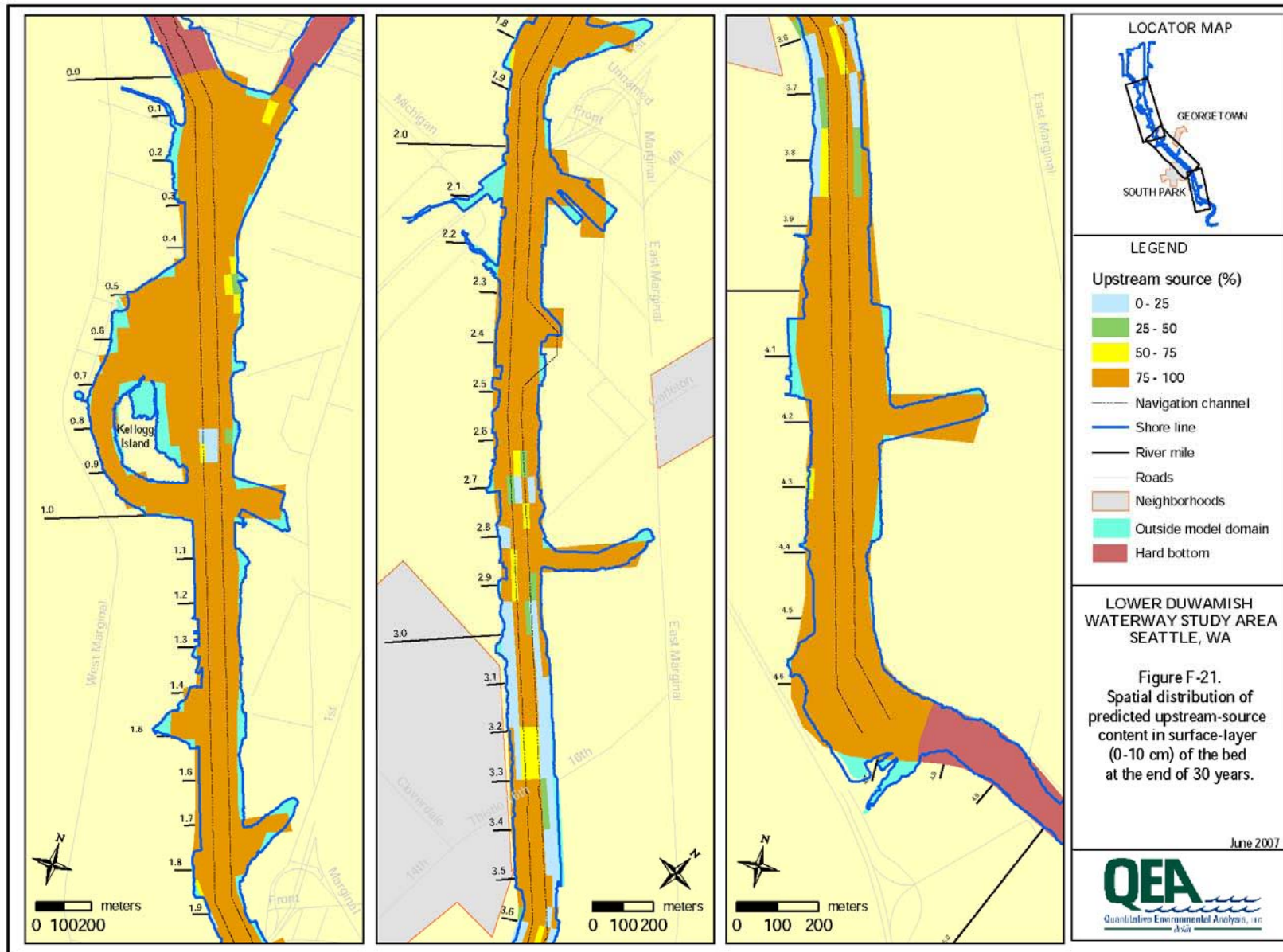
- River flow was measured by USGS at Auburn, WA (USGS 12113000)
- Elevations were measured by NOAA (Station 9447130)
- Elevations are with reference to Mean Lower Low Water Level (MLLW)

Figure 4-1
 Flow in the Green River and Tide Elevation in Elliott Bay During the Harbor Island Velocity Meter Deployment
 Existing Information Summary Report
 East Waterway Operable Unit



Source: QEA 2007

Figure 4-2
Model Grid Used for the Lower Duwamish Waterway Sediment Transport Model
Existing Information Summary Report
East Waterway Operable Unit



FC:\1Gis\stationID_DRIVE\Private\RET\dwgs_plot\layout_bed_en_chg_070205.mxd

Source: QEA 2007

Figure 4-3
Predicted Upstream-Source Sediment After 30-Year Simulation Period
Existing Information Summary Report
East Waterway Operable Unit

Dec 05, 2007 4:27pm cdavidson K:\Jobs\060003-PORT OF SEATTLE\060003-01_06000301-012.dwg FIG 4-4

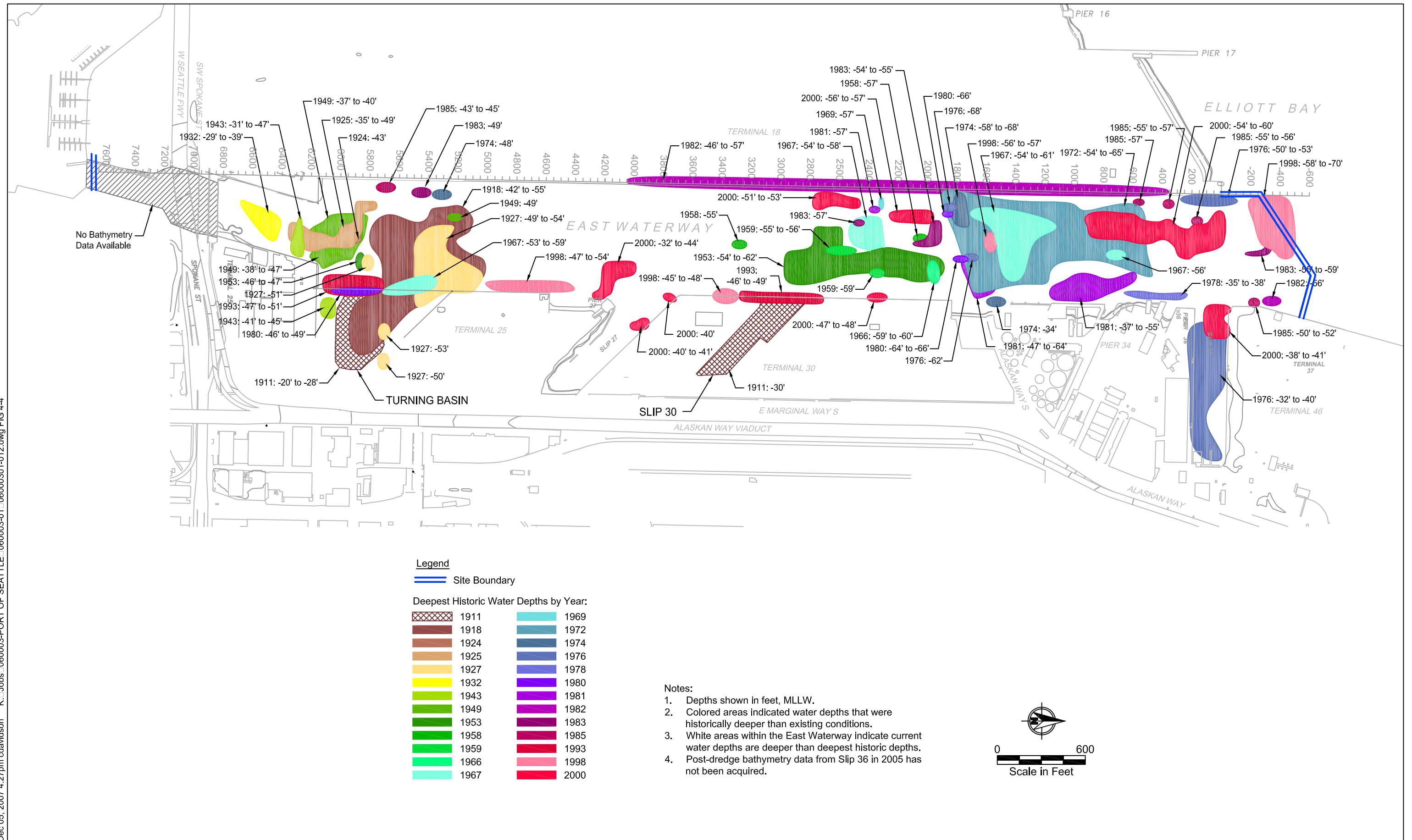


Figure 4-4
Deepest Historical Bed Elevations
Existing Information Summary Report
East Waterway Operable Unit

Dec 05, 2007 4:26pm cdavidson K:\Jobs\060003-PORT OF SEATTLE\060003-01_06000301-010.dwg FIG 4-5

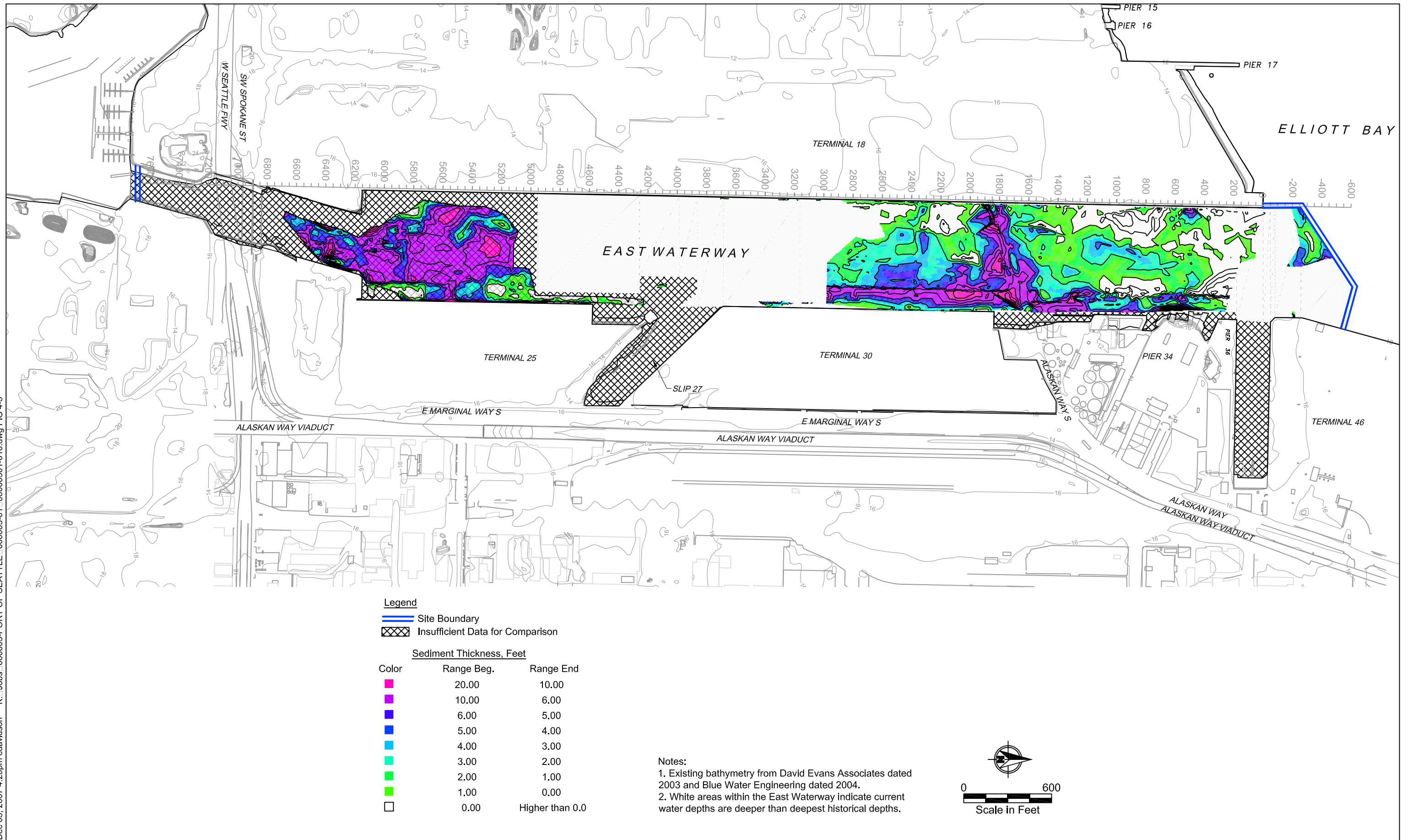


Figure 4-5
Sediment Thickness Above Deepest Historical Dredge Elevations
Existing Information Summary Report
East Waterway Operable Unit

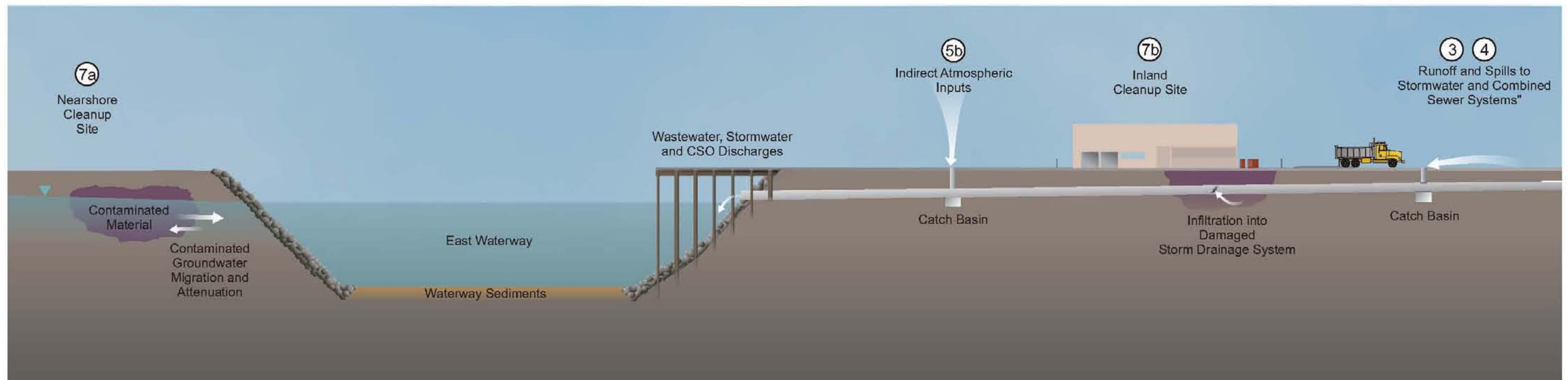
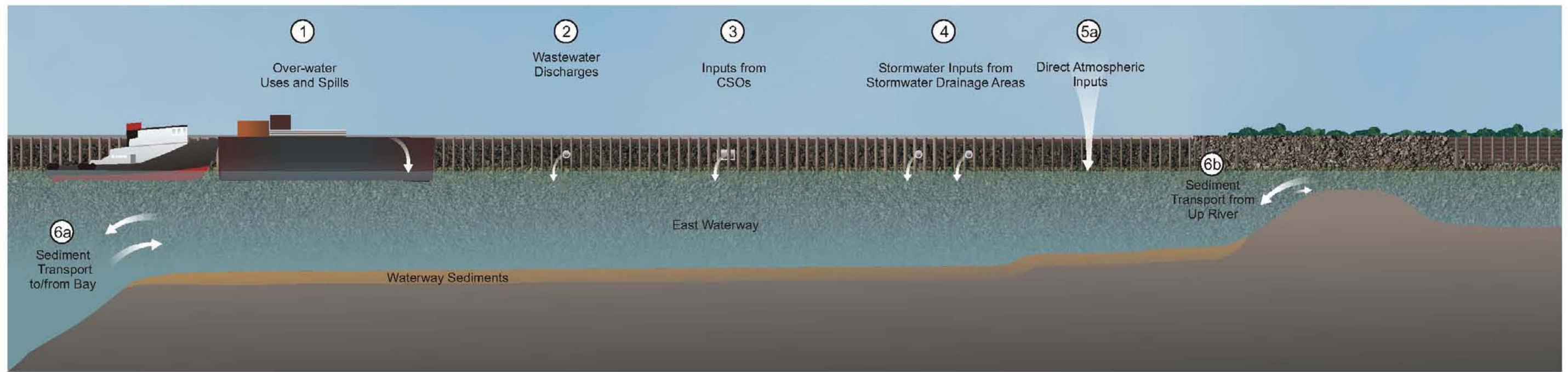
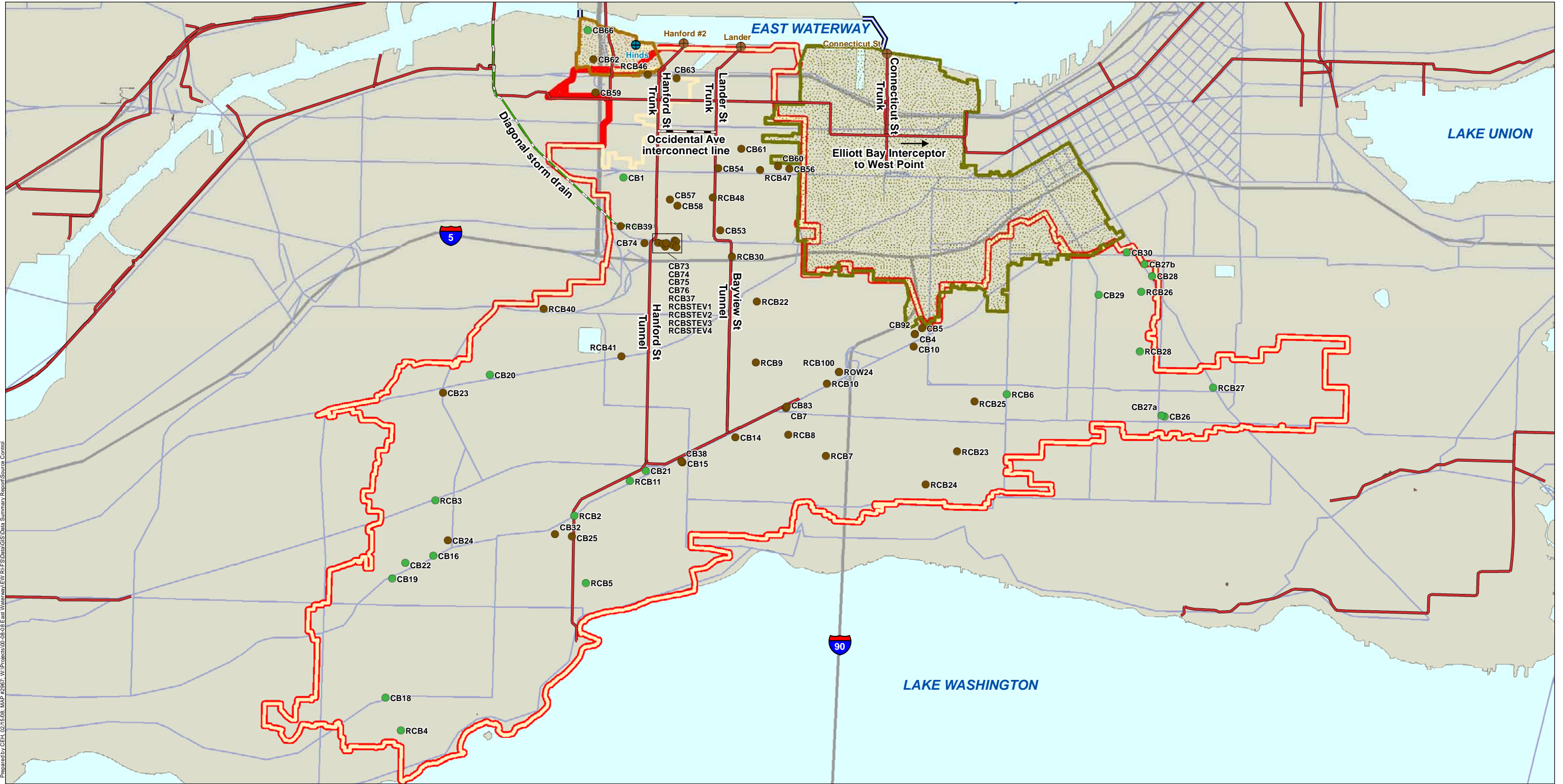


Figure 5-1
Types of Potential Sources Evaluated
Existing Information Summary Report
East Waterway Operable Unit



Prepared by CEH, 02/15/08, MAP #2987, W:\Projects\00_08_08_East Waterway\EW_EIS\GIS\08_08_Summary_Report\Source Control

Catch basin sample location by sewer type ¹ (CB = catch basin; RCB = right-of-way catch basin)	
● Storm drain	— CSO line
● Combined sewer	— Diagonal storm drain
● City of Seattle CSO	— Occidental Avenue interconnect line
● King County CSO	□ Lander CSO basin ²
— East Waterway Operable Unit Boundary	□ Hanford #2 CSO basin ²
	□ Hinds CSO basin ¹
	□ Connecticut St CSO basin ²

¹ Source: City of Seattle.
² Source: King County. Lander and Hanford CSO basins are largely coincident.
 Note: Basin boundaries have not been completely validated.

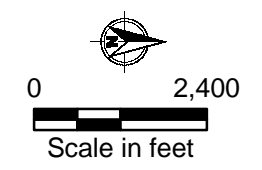
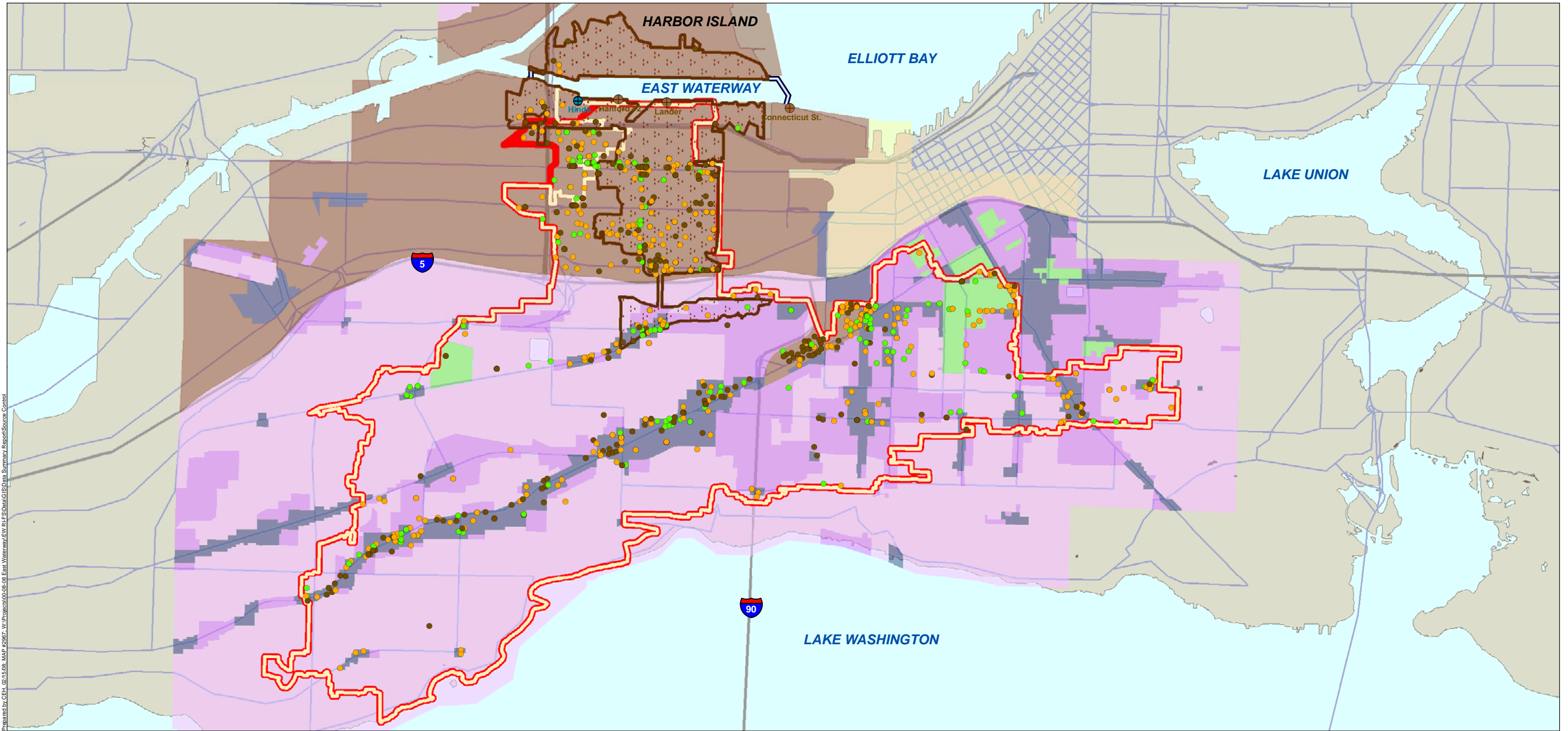
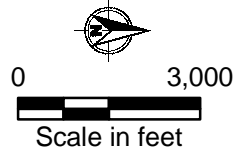
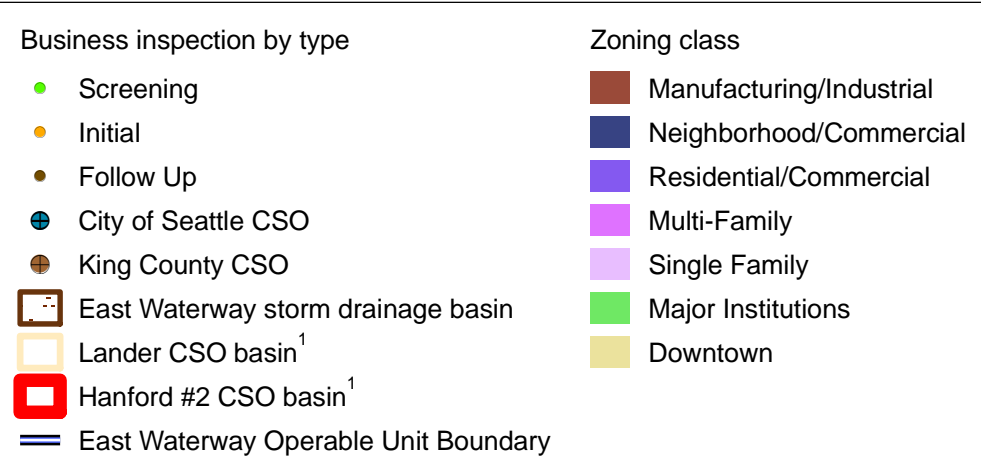


Figure 5-2
 King County Combined Sewer Interceptors and Trunks and Catch Basin Source Sample Locations in the Vicinity of the Duwamish River/East Waterway Existing Information Summary Report East Waterway Operable Unit

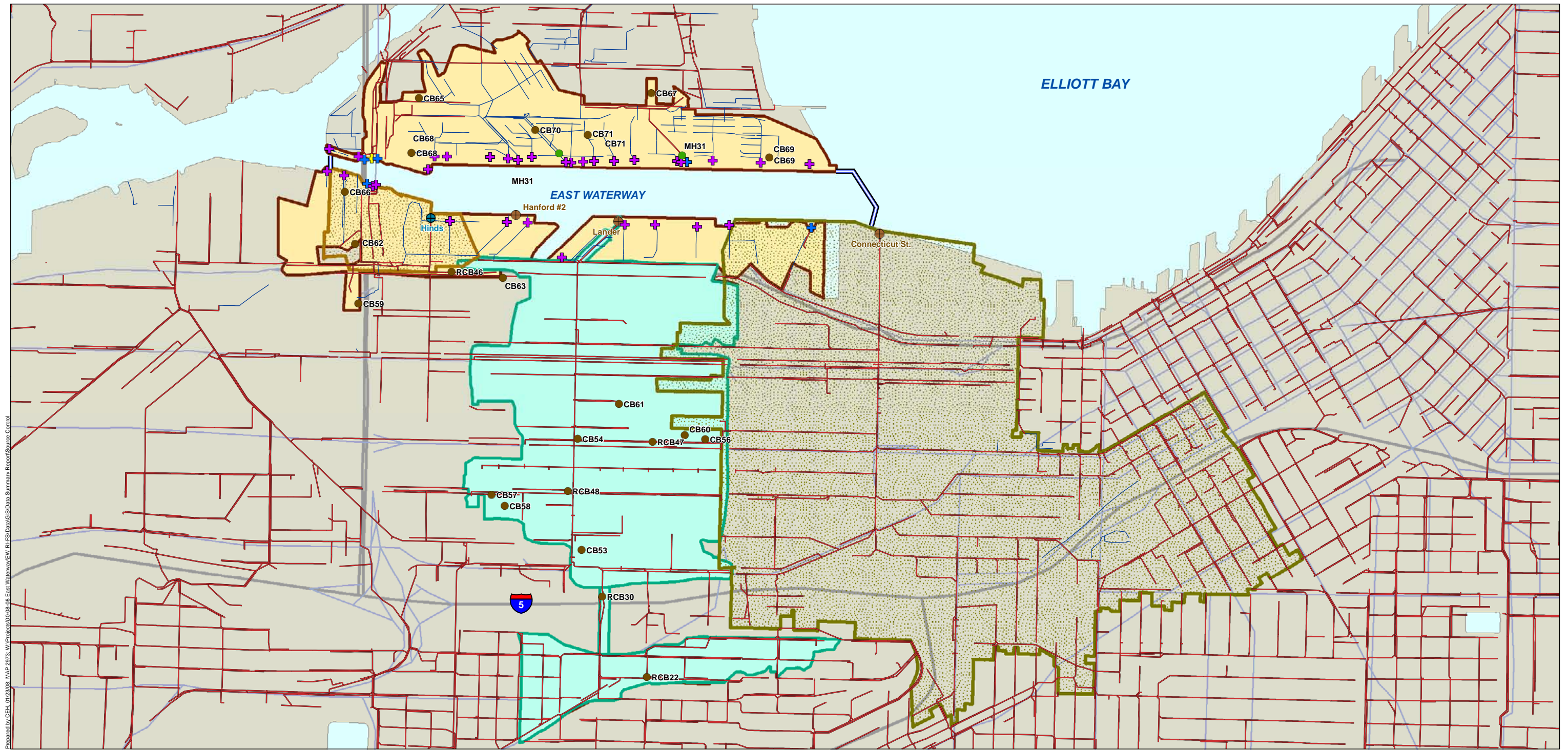


Prepared by CEH, 02/15/08, MAP #2867, W:\Projects\02-08-East Waterway\VIEW\Final\CSO\Map_Summary_Report\Source Control



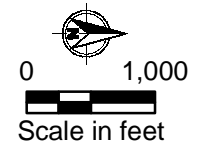
¹ Source: King County. Lander and Hanford CSO basins are largely coincident. Note: Basin boundaries have not been completely validated.

Figure 5-3
East Waterway CSO Basins, Zoning Designations and Business Inspections Existing Information Summary Report East Waterway Operable Unit



Prepared by GEH, 07/23/08, MAP 2973, W:\Projects\03\08\08\East Waterway\EW_BI\GIS\Data\GISData_Summary_Report\Source_Control

<p>Outfall location within the EW storm drainage basin by owner¹</p> <ul style="list-style-type: none"> + Port of Seattle + City of Seattle + Unknown <p> <ul style="list-style-type: none"> ● Catch basin sample location¹ (CB = catch basin; RCB = right-of-way catch basin) ● Inline sediment sample location¹ (MH = manhole) — Storm drain mainline — Private mainline </p>	<ul style="list-style-type: none"> Nearshore storm drainage basin² Lander storm drainage basin² Hinds CSO basin² Connecticut St CSO basin³ ● King County CSO ● City of Seattle CSO — East Waterway Operable Unit Boundary
--	---



¹ Sources: City of Seattle files and maps, Port SW Inspection Report, SWPPPs.
² Source: City of Seattle
³ Source: King County
 Note: Basin boundaries have not been completely validated.

Figure 5-4
 Storm drain basins, outfall locations, and catch basin source sample locations in the East Waterway Existing Information Summary Report East Waterway Operable Unit



Prepared by GCH_0125018_MAP_2016_W\Projects\0125018_East Waterway\EW_EU\GIS\Data_Summary_Report\Source_Control

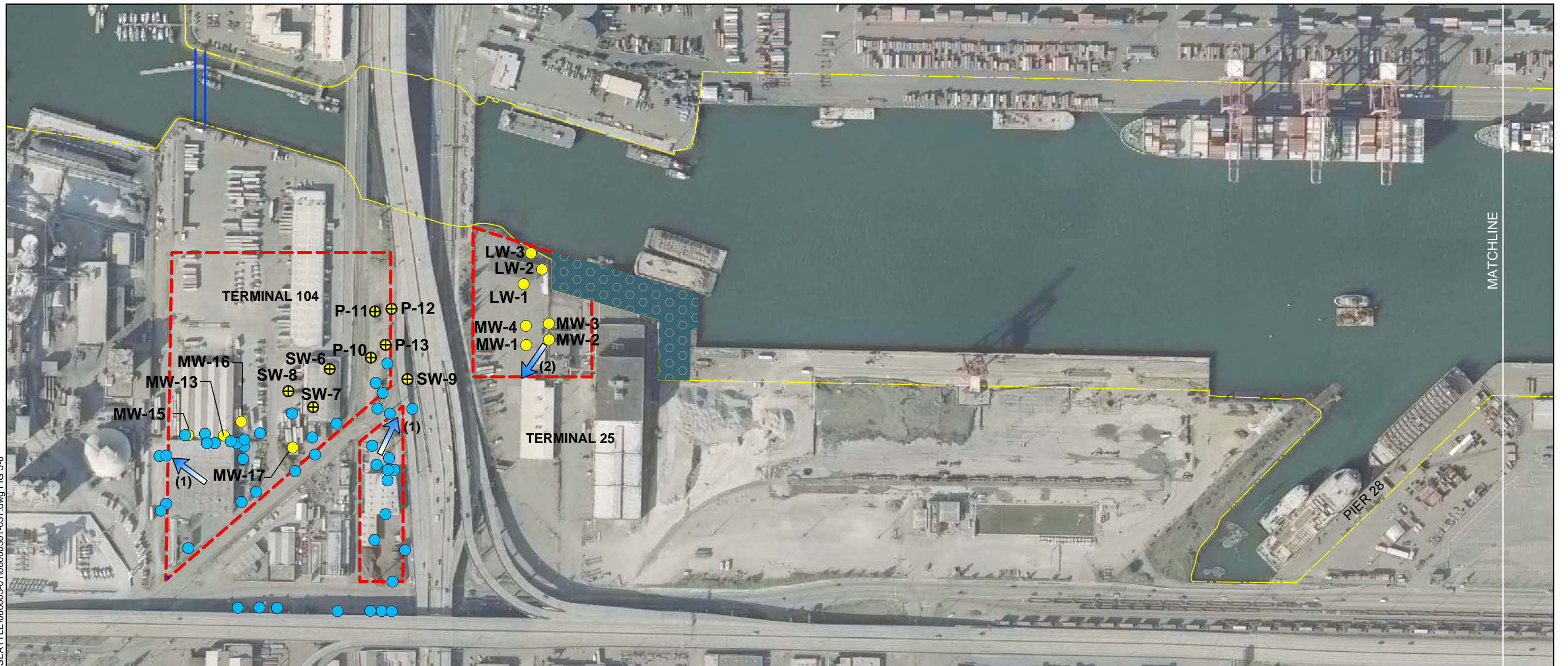
- Harbor Island groundwater operable unit (OU) compliance monitoring well¹
- Harbor Island groundwater operable unit (OU) inland monitoring well²
- Geoprobe boring (approximate location)
- Approximate location of USTs removed from T-18³
- Former Terminal 18 hot spot³
- Approximate location of T-102 removed USTs³
- Cleaned up LUST at property (exact LUST location not known)
- Approximate location of Terminal 18 dock pipeline spill³
- Portion of Terminal 18 where capping or other environmental work was completed during terminal expansion
- Harbor Island soil and groundwater OU boundary
- East Waterway OU Boundary

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 Table 5-6 of Section 5 and results are presented in Appendix "Cleanup Sites".

Scale in feet

Figure 5-5
Nearshore Cleanup Sites – Harbor Island
Existing Information Summary Report
East Waterway Operable Unit

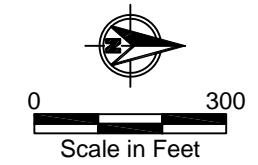
Feb 19, 2008 11:05am ctdavidson K:\Jobs\060003-PORT OF SEATTLE\060003-01\06000301-037.dwg FIG 5-6



LEGEND

- MONITORING WELL GROUNDWATER SAMPLE LOCATION
- UPLAND GROUNDWATER SAMPLE LOCATION
- ⊕ TEMPORARY BORING GROUNDWATER SAMPLE LOCATION
- APPROXIMATE UPLAND SITE AREAS
- DEMOLISHED TIMBER DECK - REMAINING PILINGS TO BE REMOVED
- EAST WATERWAY OPERABLE UNIT BOUNDARY
- MHHW LINE

- ➔ REPORTED GROUNDWATER FLOW DIRECTION
- (1)** ENVIRONMENTAL PARTNERS (2007)
- (2)** SWEET-EDWARDS/EMCON (1990)



NOTES: ALL LOCATIONS ARE APPROXIMATE AND ARE BASED ON LOCATIONS OBTAINED FROM SITE DOCUMENTS.

Figure 5-6
Nearshore Cleanup Sites Located Along the Southeast Portion of the East Waterway
Existing Information Summary Report
East Waterway Operable Unit

Feb 19, 2008 11:05am ctdavidson K:\Jobs\060003-PORT OF SEATTLE\060003-01\06000301-037.dwg FIG 5-7

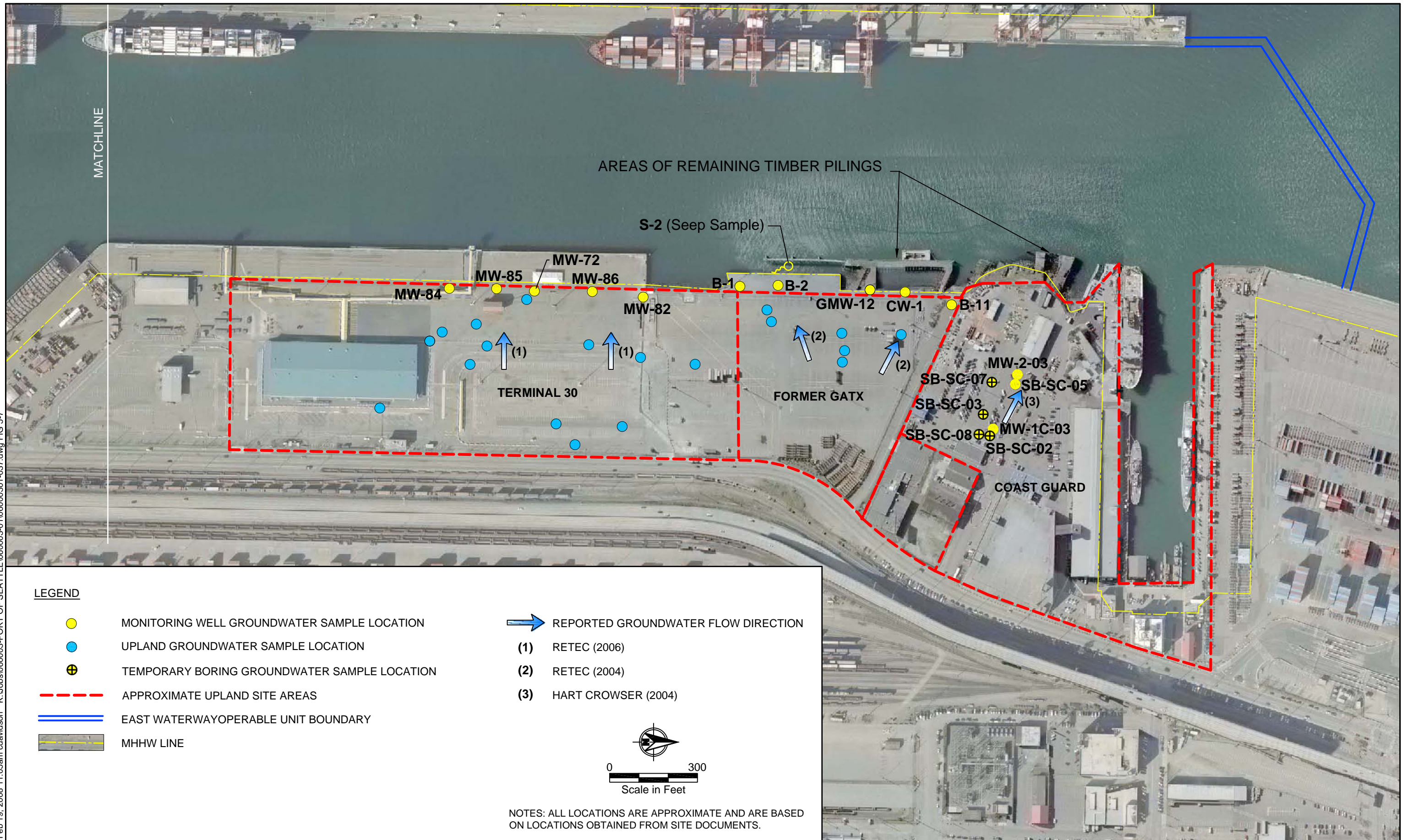
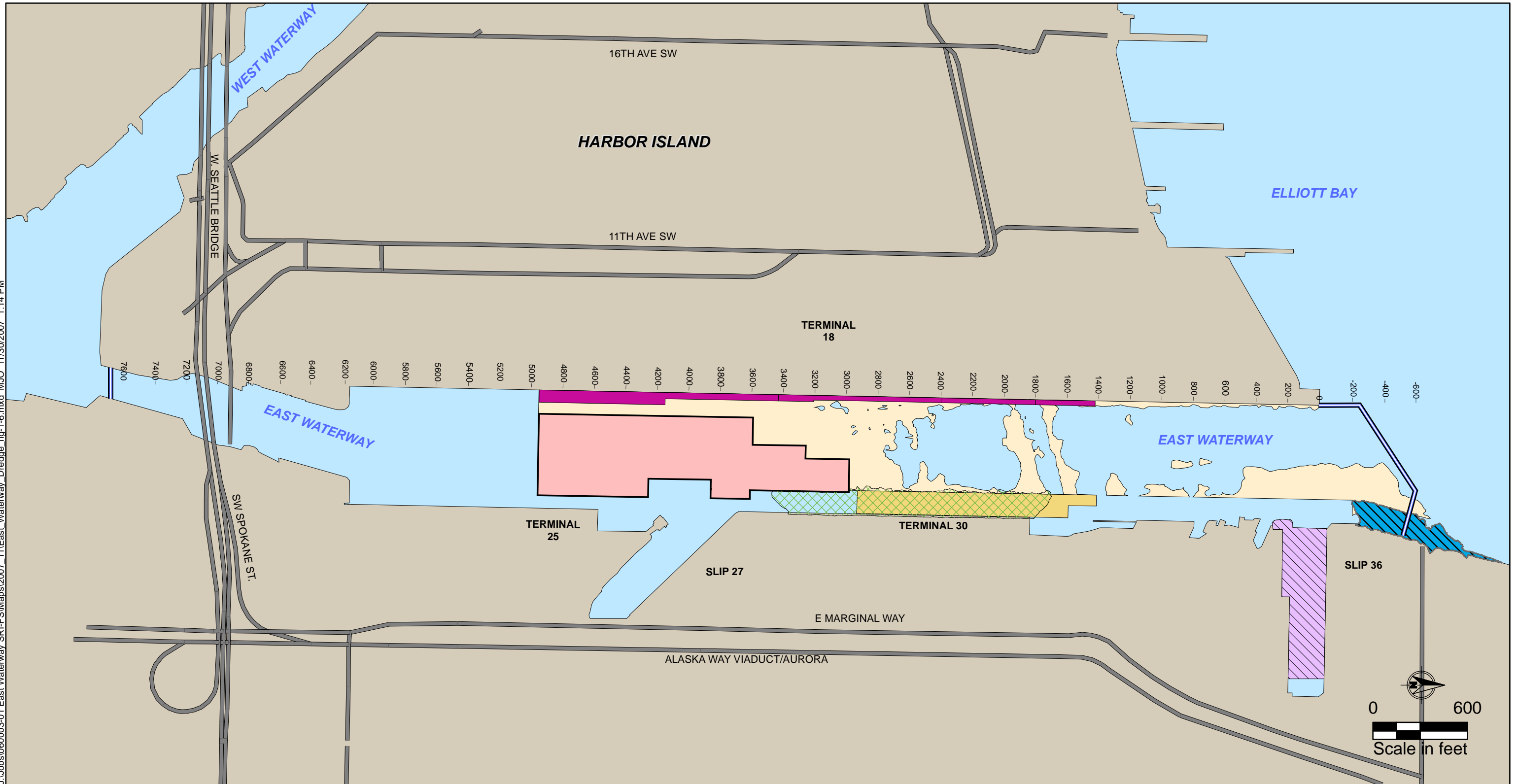


Figure 5-7
Nearshore Cleanup Sites Located Along the Northeast Portion of the East Waterway
Existing Information Summary Report
East Waterway Operable Unit

J:\Jobs\060003-01 East Waterway SRI-FSM\Maps\2007_11\East Waterway_Dredge_fig-1-6.mxd MJO 11/30/2007 1:14 PM



- PROPOSED EAST WATERWAY OPERABLE UNIT STUDY BOUNDARY
- T-46 DREDGING (COMPLETED 2005, -51 ft MLLW)
- T-30 DREDGING (PROPOSED 2008, -51 ft MLLW)
- PHASE 1 REMOVAL ACTION BOUNDARY (COMPLETED 2005, -51 ft MLLW)
- COAST GUARD DREDGE (COMPLETED 2005, -40 ft MLLW)
- STAGE 1A (COMPLETED 2006, -51 ft MLLW)
- STAGE 1 (COMPLETED 2000, -51 ft MLLW)
- T-30 INTERIM DREDGING (COMPLETED 2002, -44 ft MLLW)

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

Figure 1-6
Recent East Waterway Dredge History
Existing Information Summary Report
East Waterway Operable Unit