

Denny Way Sediment Cleanup Unit Background

Preliminary Draft for Discussion Purposes Only – January 3, 2018

The Denny Way Combined Sewer Overflow (CSO) sediment cleanup unit consists of sediments within approximately 800 feet of former City of Seattle raw sewage and King County CSO outfalls at Myrtle Edwards Park that may have been affected by historical wastewater releases (Figure 1-1). It is anticipated that cleanup of this site unit will be performed under an Order or Decree overseen by the Washington Department of Ecology (Ecology) in the formal site process provided for under the Model Toxics Control Act (MTCA) Cleanup Regulation, Chapter 173-340 of the Washington Administrative Code (WAC), and consistent with the Sediment Management Standards (SMS), Chapter 173-204 WAC. The remedy proposed will be subject to regulatory and stakeholder review in this process.

King County previously conducted cleanup actions in the Denny Way CSO area as well as construction of a new offshore outfall structure. In 1990, the U.S. Army Corps of Engineers (Corps) and King County previously placed a 3-foot layer of graded sand dredged from the Upper Turning Basin of the Duwamish Waterway over a 3-acre area of what is now defined as the Denny Way sediment cleanup unit offshore of the former CSO outfall (depicted as sediment management area [SMA] 2 in Figure 1-2). In 2007, the Washington Department of Ecology (Ecology) and King County entered into an Agreed Order under Ecology's formal site process to implement an Interim Cleanup Action Plan (CAP) in nearshore areas of the Denny Way sediment cleanup unit, including dredging, backfilling, and placement of sand around the perimeter of the dredge area, which was completed in 2008 (depicted as SMA 1 in Figure 1-2). The 2007 Agreed Order and associated Interim Action Work Plan confirmed the expectation that the site will continue to final cleanup under the formal site process, and that *"[f]ollowing implementation of this Interim CAP, Ecology and King County will continue to evaluate environmental conditions at the site and discuss technical issues related to determining the nature and scope of final sediment cleanup actions."*

Denny Way CSO Source Controls

Seattle was incorporated by the territorial legislature in 1865 when its population was approximately 300. To manage waste generated by the growing population of Seattle, a board of public works undertook construction of the first sewers. These sewers were wooden troughs or boxes that carried wastes to the most convenient water bodies—Elliott Bay and Lake Union. Organized planning and construction of sewers began in 1875, and the first permanent sewer to Elliott Bay was constructed in 1882. In 1895, problems with sewage in Lake Union and sewage overflowing in streets during rainstorms prompted construction of diversion lines from an approximate 2,000-acre catchment area in the Lake Union and Denny Way areas, routing raw sewage and stormwater flows from these relatively large areas to an intertidal discharge outfall at Denny Way (Figure 1-1). This outfall continued to discharge relatively large volumes of raw sewage and stormwater for the next 60 to 70 years (discharge volumes were not measured, but likely exceeded several billion gallons per year).

Mounting concerns over high fecal bacteria levels in Elliott Bay and even greater bacteria and nutrient problems in Lake Washington led to major construction projects that eventually eliminated all continuous untreated wastewater flows to Elliott Bay. In the 1960s, the Municipality of Metropolitan Seattle (Metro; now merged with King County) built much of the present system of interceptors and

treatment plants that collect, transport, and treat wastewater in the greater Seattle area. These projects progressively reduced wastewater and stormwater discharges to the Denny Way CSO area. Seattle's raw sewage outfall at Denny Way was acquired by Metro in 1962 and intercepted for treatment at West Point in 1967. A combined sewer overflow, the relief point where the combined sewer basin was connected to the interceptor, was constructed at the location of the previous raw sewage outfall. In 1969, Metro also implemented the first industrial waste program in the nation to make sure wastewater generated by industries is treated properly, requiring many to pretreat before discharging to sewers.

Beginning in the 1970s, Metro further reduced CSO discharge volumes through a variety of means, including use of a computer-augmented treatment and disposal system that maximized inline storage and regulated where overflows occur. However, the largest and most frequent overflow site to Elliott Bay has been at the Denny Way CSO outfall (Figure 1-1).

In the early 1980s, there were roughly 30 to 60 overflow events annually from the Denny Way CSO that produced a volume of approximately 500 million gallons per year. In 1986, Metro adopted a new Facilities Plan to expand secondary treatment and further reduce CSO discharge volumes. Also in 1986, Metro began a trial program to identify and further reduce toxicant inputs to the sewer system discharging through the Denny Way CSO. The resultant expanded industrial pre-treatment program further reduced hazardous substance concentrations in the wastewater system and continues to be highly effective.

A joint effort between King County and Seattle Public Utilities to further control CSO discharges resulted in construction of two new outfalls in the Denny Way CSO area. Treated discharges from King County's Elliott West Wet Weather Treatment Facility are now routed through a 7.5-foot diameter, 490-foot length outfall to a depth of approximately -60 to -70 feet mean lower low water (MLLW)(Figure 1-1). The outfall was constructed in 2002 and the treatment facility came on-line in 2005. Treated discharge from this outfall occurs intermittently (roughly eight times per year), with volumes averaging approximately 200 million gallons per year. In addition, a 100-foot extension of the previous outfall to a depth of approximately -20 feet MLLW was constructed in 2002 as an emergency overflow for the treatment facility and overflow for a separate relatively-small combined basin. The overflow discharges untreated CSO effluent to Elliott Bay an average of once-per-year when flows exceed system capacity. Untreated CSO discharge volumes average approximately 14 million gallons per year.

Previous Sediment Cleanup Actions and Monitoring

In 1990, the Corps and King County sponsored the Denny Way CSO capping project to test the feasibility of capping contaminated sediments in Elliott Bay with suitable navigation dredged material. A 3-foot layer of graded sand, dredged from the Upper Turning Basin of the Duwamish Waterway during routine navigation channel maintenance, was beneficially reused by placing these materials over a 3-acre area in water depths ranging from approximately -30 to -60 feet MLLW; Figure 1-2. Construction of the cap was performed by the Corps by controlling the release of the sand using specially equipped bottom dump barges and accompanying tugs.

During the next 10 years, King County monitored the effectiveness of the placed cap. Monitoring data demonstrated that the cap remained stable and successfully isolated underlying contaminated sediments. However, chemical concentrations on the cap surface layer (offshore of the Denny Way CSO)

increased after cap construction, likely due to redistribution of contaminated sediments present in adjacent shallow subtidal slope areas along the inshore edge of the cap.

To further accelerate cleanup of the Denny Way area and minimize the risk of future recontamination, Ecology and King County entered into an Agreed Order in 2007 to perform interim sediment cleanup actions in nearshore areas upslope of the cap (Figure 1-2). Sediments targeted for dredging included relatively high concentration deposits (e.g., greater than 5,000 micrograms per kilogram [$\mu\text{g}/\text{kg}$] total polychlorinated biphenyls [PCBs]) that could pose a risk of recontamination of the adjacent cap due to wind-wave, vessel propeller wash, and/or seismic disturbances. Once flows were directed to the new outfalls in 2005 and the old Denny Way shoreline outfall was decommissioned and subsequently removed, the interim action was started. The project was completed in 2007 which resulted in mechanical dredging and off-site landfill disposal of approximately 14,000 cubic yards (cy) of contaminated sediments from side slopes ranging in depth from approximately +10 feet to -35 feet MLLW within a 1.2-acre area. The dredged area was backfilled and armored with an average thickness of more than 8 feet of material, including well-graded sand, sandy-gravel habitat mix, cobbles, and boulders, all from upland quarry sources. In addition, an approximate 6-inch-thick layer of well-graded, clean sand was placed around the perimeter of the dredge prism to address dredging residuals.

The 2007 Agreed Order and permit conditions for the 2005 outfall construction project required King County to perform detailed surface sediment monitoring of the Denny Way CSO area from 2006 through 2025. The monitoring data collected to date have tracked surface sediment quality of un-remediated offshore areas beyond the limits of the current cap, in addition to the inshore backfill/sand cover areas.

As a result of the previous source control and interim sediment cleanup actions, a series of detailed sediment quality investigations were completed in and around the Denny Way CSO area, which collectively constitute a remedial investigation meeting the substantive requirements of the MTCA Cleanup Regulation and the SMS. Those investigations include:

- 1987 Denny Way CSO Toxicant Reduction Study
- 1995 Elliott Bay Duwamish Restoration Program Recontamination Study
- 1996 Denny Way Sediment Cap Monitoring
- 1998 Denny Way Sediment Characterization
- 2000 Denny Way Sediment Cap Monitoring
- 2001 Denny Way Pre-Construction Sediment Characterization Study
- 2005 Post-Construction Sediment Monitoring: Long-term Sediment Monitoring Program
- 2007 Denny Way Pre-Remedial Design Sediment Sampling and Analysis
- 2008 Denny Way Long-Term Sediment Monitoring Program
- 2016 Denny Way Long-Term Sediment Monitoring Program

Sediment investigation data have also been conducted by Ecology and others in the area beyond the Denny Way sediment cleanup unit. Recent (2008 to 2015) sediment data collected by King County in the Denny Way CSO area representing the current discharge pattern and primarily post- interim action conditions are compiled in Figures 1-3 and 2-1 through 2-5; most of these data are also available in Ecology's Environmental Information Management database.

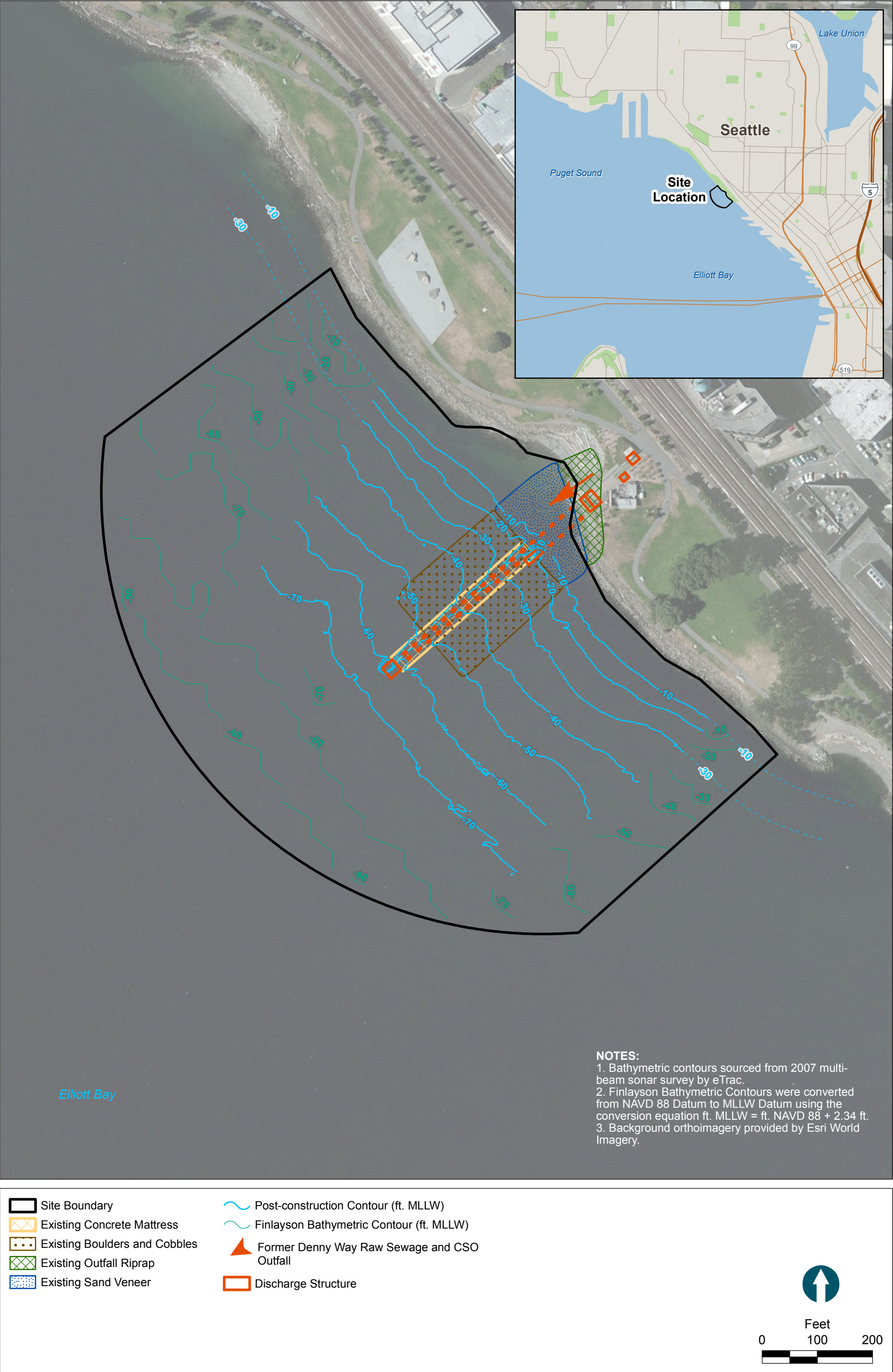
Regulatory Framework

The Denny Way CSO area sediment cleanup unit encompasses property owned by the State of Washington and managed by the Washington Department of Natural Resources (DNR). DNR has provided King County an easement along a portion of state-owned aquatic lands for the placement and operation of the Denny Way CSO outfall.

Operation of the Denny Way CSO outfall is regulated by Ecology under King County's National Pollutant Discharge Elimination System (NPDES) permit for the County's West Point Treatment Plant (WA0029181). The most recent NPDES permit for West Point Treatment Plant became effective in February 2015. In addition, a 2013 Consent Decree (Civil Action No. 2:13-cv-677) between the U.S. Department of Justice, U.S. Environmental Protection Agency (EPA), Ecology, and King County requires additional CSO control efforts.

The current MTCA Cleanup Regulation and the SMS recognize that, in urban areas such as Elliott Bay, sediment contamination from a variety of different sites and sources can become commingled, potentially creating a very large site. In such areas, a sediment cleanup unit associated with an individual facility may be established (see WAC 173-204-500). Sediment cleanup units within a larger site can be proposed by potentially liable parties interested in cleaning up a focused area within a larger site. The Denny Way CSO area sediment cleanup unit is defined as those sediments within approximately 800 feet of former City of Seattle and King County CSO outfalls at Myrtle Edwards Park that may have been affected by historical wastewater releases (Figure 1-3).

\\nrcas\gis\lob\KingCounty_0067\DennyWay_CSOMaps\2016_10\CSO Control Project Report Figures\Figure 1-1 Denny Way Sediment Cleanup Unit.mxd ckblinger 6/1/2017 5:00:13 PM



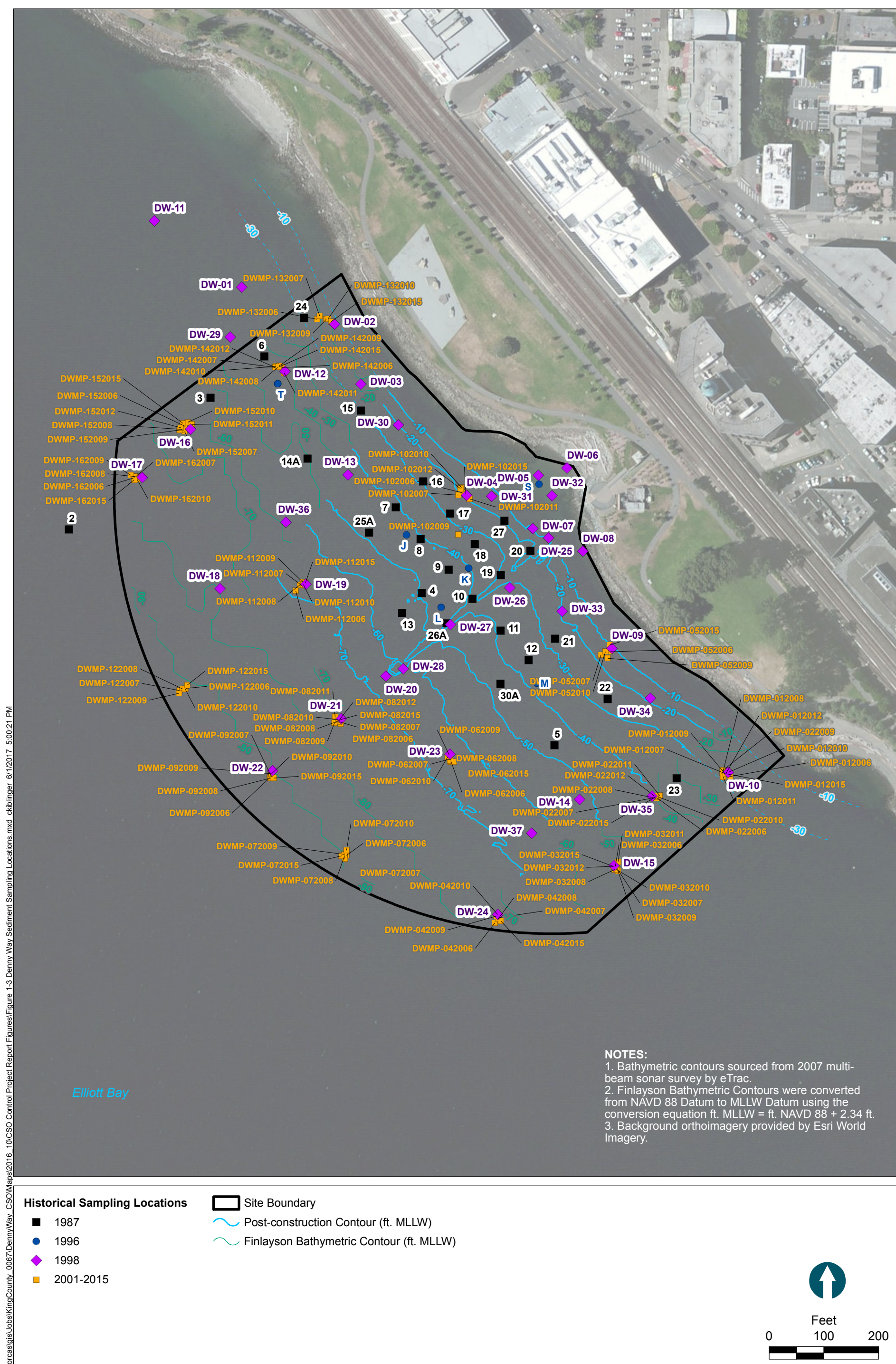
DRAFT

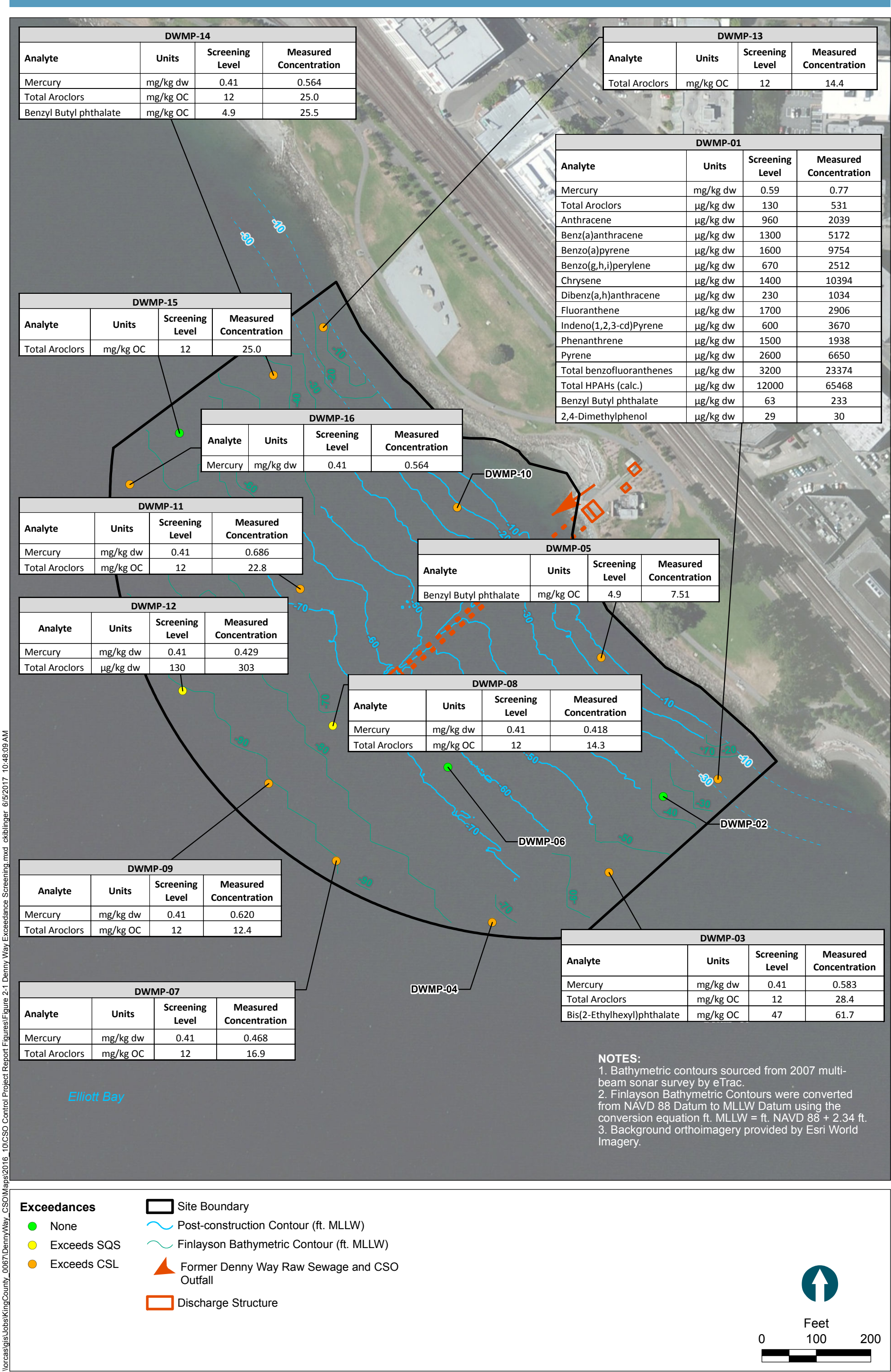


Figure 1-1
Denny Way Sediment Cleanup Unit

\\norcas\gis\lobis\KingCounty_0067\DennyWay_CSOMaps\2016_10\CSO Control Project Report Figures\Figure 1-2 Denny Way Sediment Management Areas.mxd ckiblinger 6/1/2017 4:59:26 PM





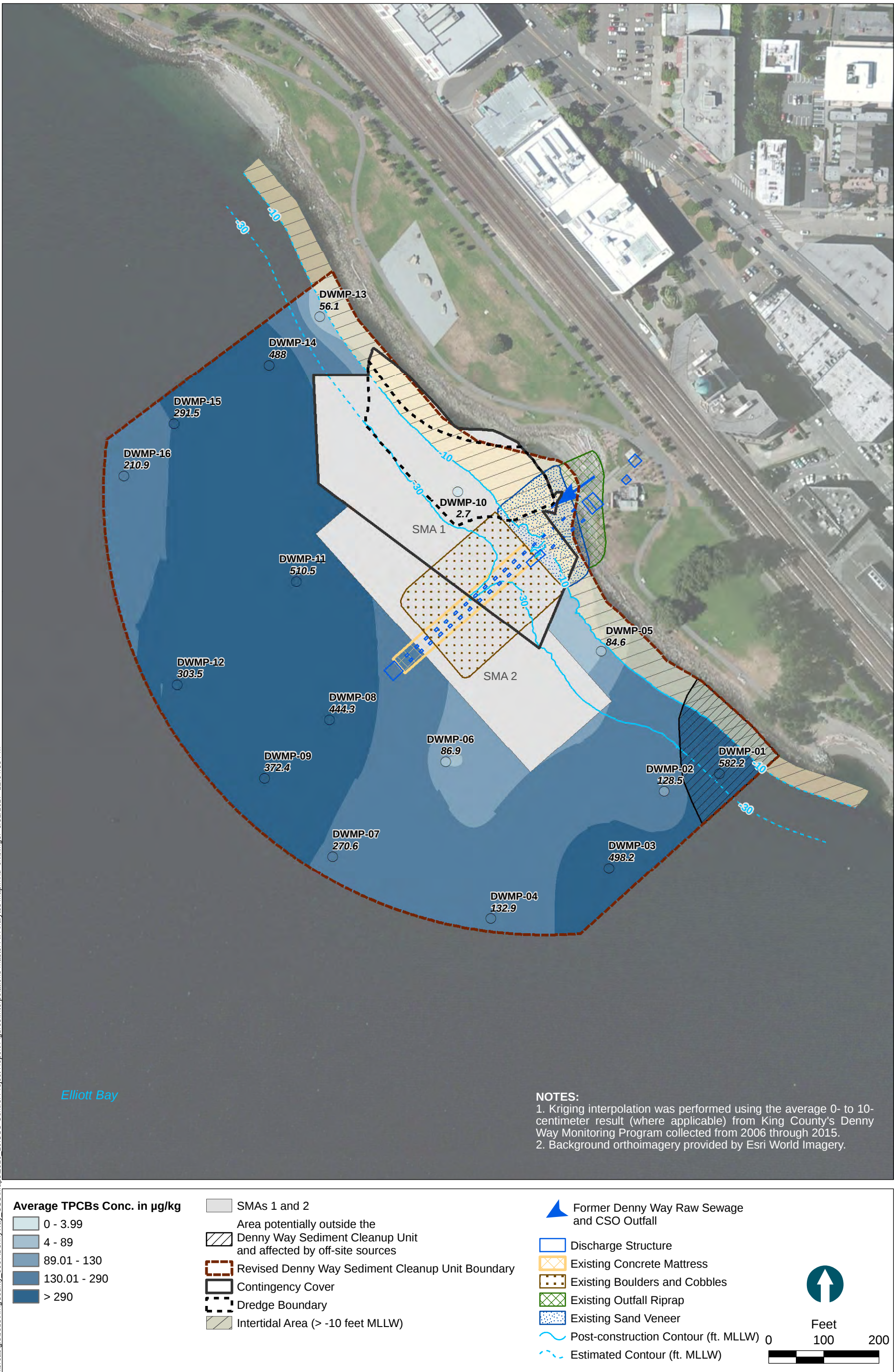


DRAFT



Figure 2-1
Current Surface Sediment Exceedances of SCO Benthic Criteria

\\orcassgis\jobs\KingCounty_0067\DennyWay_CSOMaps\2016_10\CSO Control Project Report Figures\Interpolations Master All Analyses Map.mxd ckiblinger 5/31/2017 12:04:35 PM

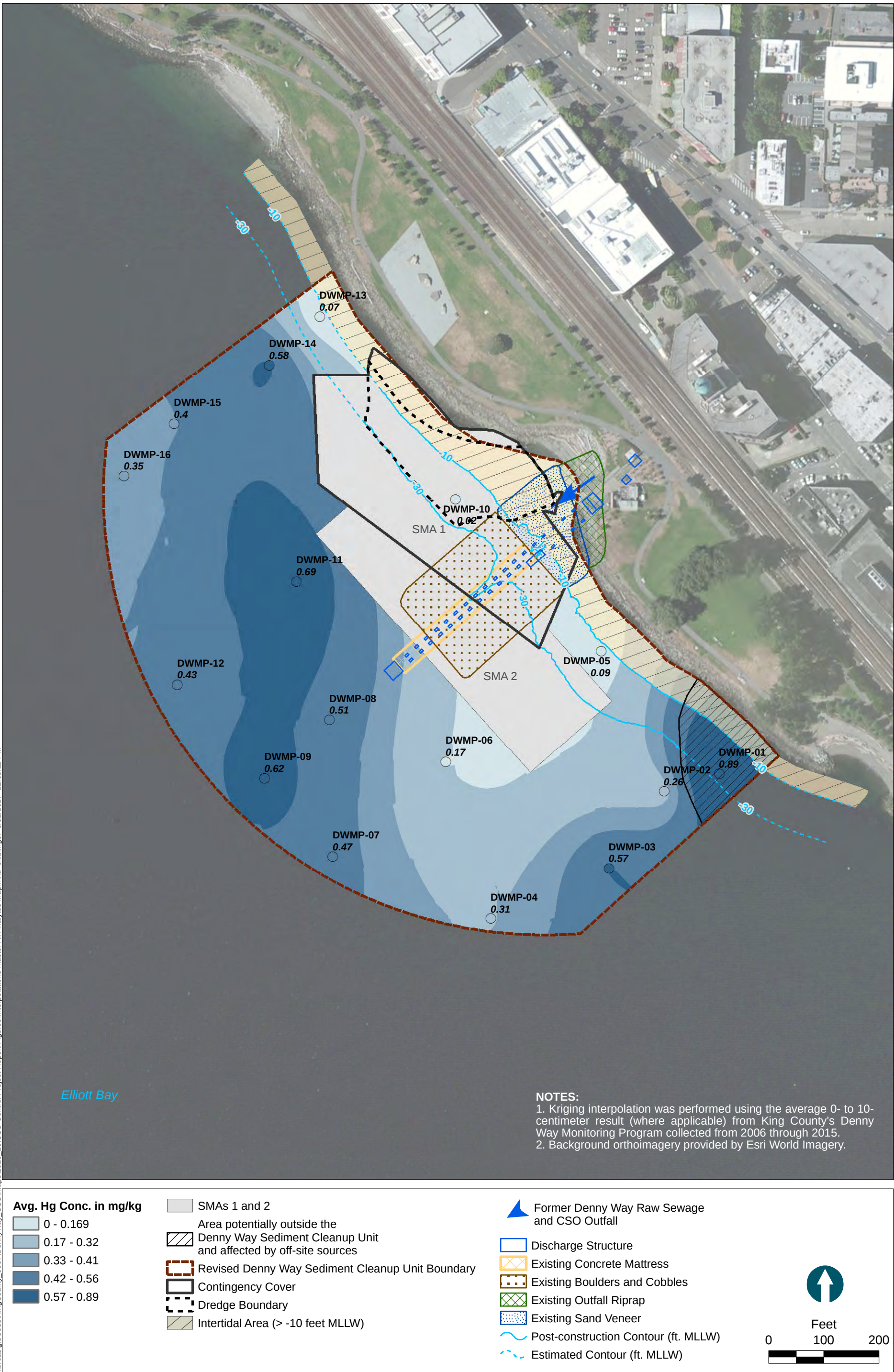


DRAFT



Figure 2-2
Surface Sediment Total PCB Concentrations

\\orcassgis\Jobs\KingCounty_0067\DennyWay_CSOMaps\2016_10\CSO Control Project Report Figures\Interpolations Master All Analyses Map.mxd ckiblinger 5/31/2017 12:05:11 PM



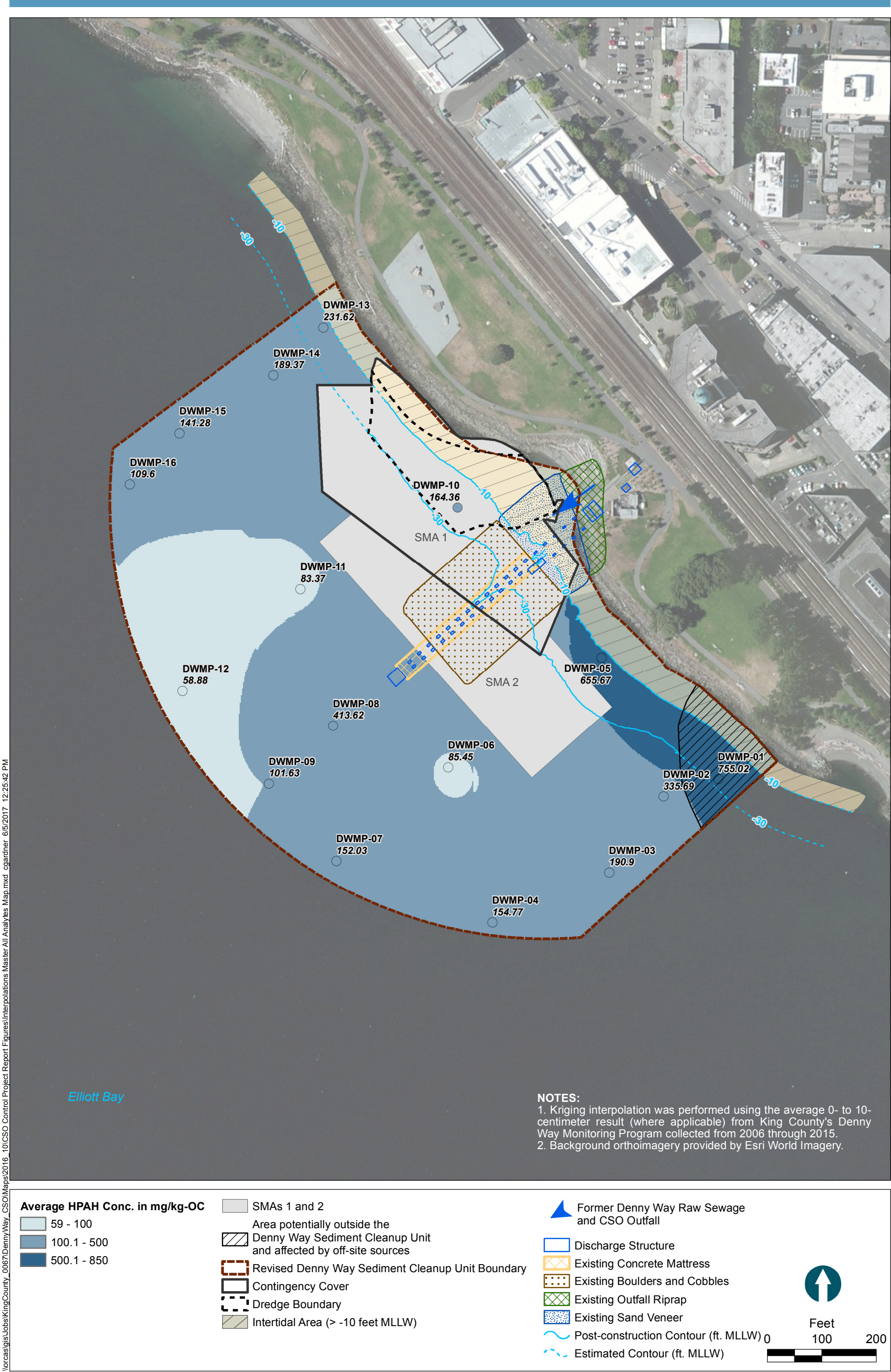


Figure 2-4
Surface Sediment Total HPAH Concentrations



\\orcass\gis\Jobs\KingCounty_0067\DennyWay_CSOMaps\2016_10\CSO Control Project Report Figures\Interpolations Master All Analyses Map.mxd ckiblinger 5/31/2017 12:07:01 PM

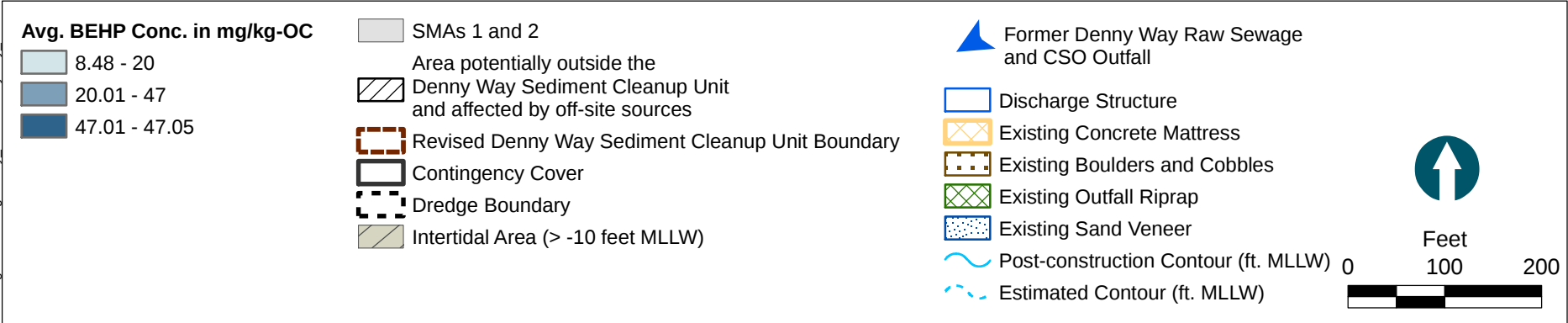
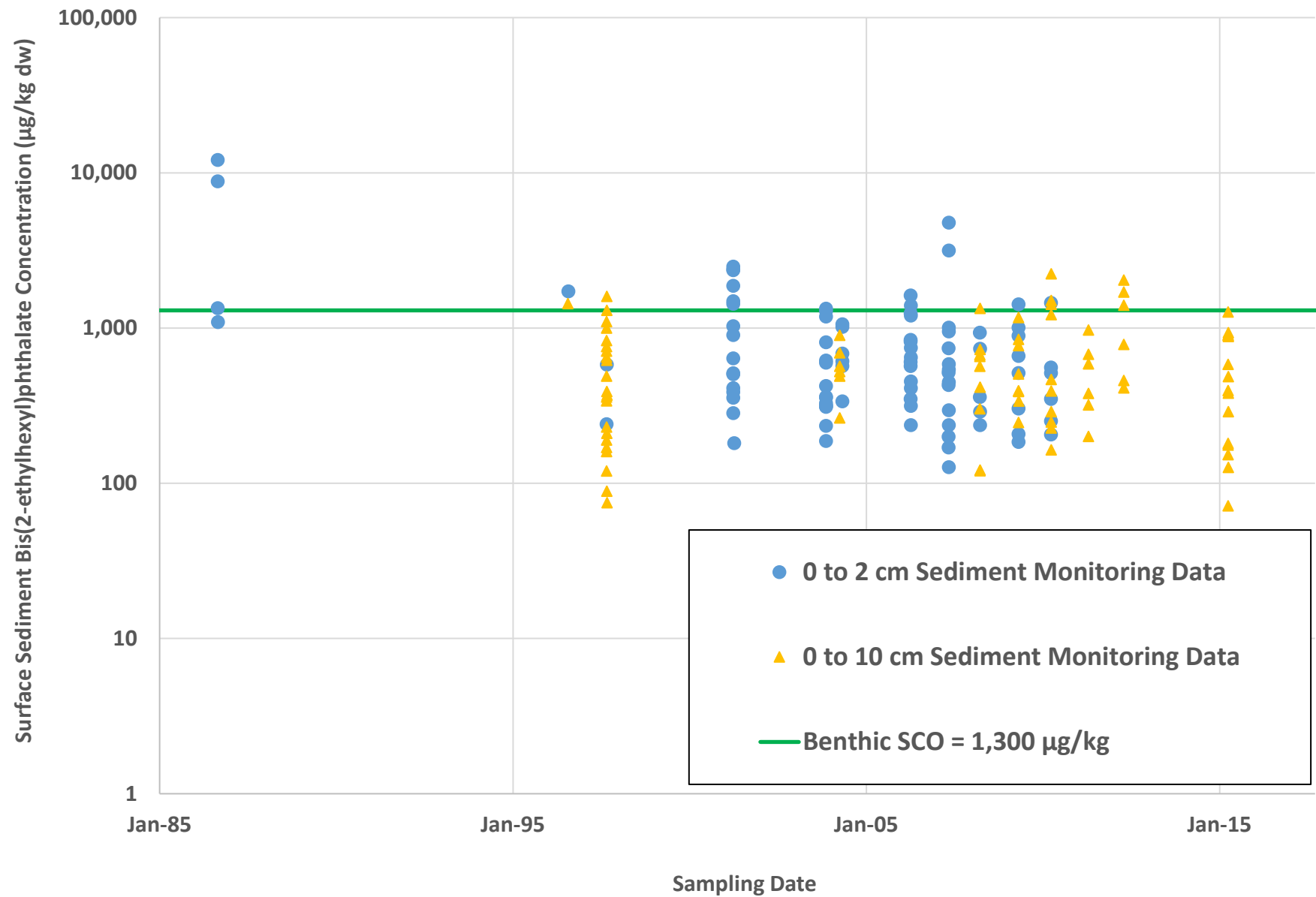
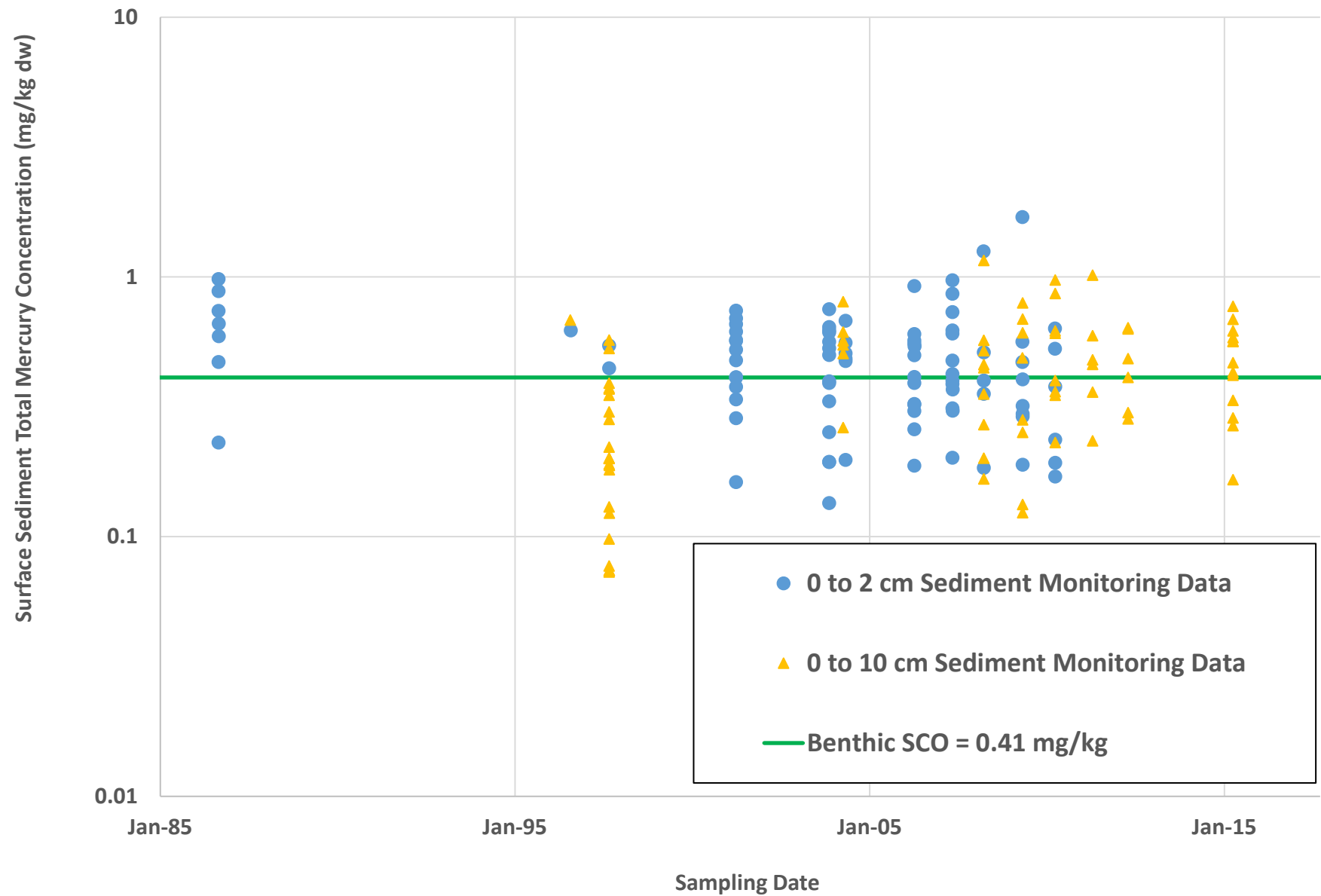


Figure 2-5
Surface Sediment Bis(2-ethylhexyl)phthalate Concentrations

Denny Way Sediment Recovery Monitoring Data: Bis(2-ethylhexyl)phthalate



Denny Way Sediment Recovery Monitoring Data: Total Mercury



Denny Way Sediment Recovery Monitoring Data: Total PCBs

