collected during wet weather. Of these, three of the four enterococcus samples exceeded the TMDL compliance targets while two of the four exceeded the fecal coliform and total coliform targets set out in the TMDL. Given these data, the discharges from Oxford Retention Basin and the Boone Olive Pump Station have an influence on TMDL compliance in Basin E.

During dry weather, one sample within Basin E, out of a total of seven sample locations, exceeded the Bacteria TMDL compliance targets for enterococci and total coliforms. Due to the limited temporal and spatial sampling undertaken in this study these results are inconclusive. However, analysis of the historical data collected in Marina del Rey, undertaken in the *Marina del Rey Harbor Mother's Beach and Back Basins' Indicator Bacteria TMDL Compliance Study* (WESTON, 2008b) indicated the following:

- TMDL compliance targets were mostly met with the exception of compliance monitoring stations during summer dry weather sampling events.

Station Type	within TMDL Compliance Targets		
	Summer Dry Weather	Winter Dry Weather	Wet Weather
Compliance Monitoring	22	89	78
Ambient Monitoring	80	100	100

- Analysis of historical data showed that all stations exceeded the TMDL single sample compliance targets, although only four stations would have met the criteria for SWRCB §303(d) listing. Due to this difference in assessment methodology, the TMDL compliance targets are expected to be more difficult to achieve than meeting the SWRCB §303(d) listing policy.

4.4.2 Toxics Total Maximum Daily Load

Numeric targets for the Toxics TMDL were used to calculate WLAs for the impairing metals and organic compounds, and/or to indicate attainment of numeric limits (Table 17).

Table 17. Numeric Targets for Sediment Quality in the Marina del Rey Back Basins

Organics	Numeric Target for Sediment
Chlordane	0.5 µg/kg
Total PCBs	22.7 µg/kg
Copper	34 mg/kg
Lead	46.7 mg/kg
Zinc	150 mg/kg

The CTR criterion for the protection of human health from the consumption of aquatic organisms was selected as the final numeric target for total PCBs in the water column (Table 18). The interim numeric target is applied until advances in technology allow for the ultra-low detection of PCBs.

Table 18. Numeric Targets for Total Polychlorinated Biphenyls in the Water Column

	Numeric Target (□g□L)
Interim	0.03
Final	0.00017

Sediment
Data collected from Oxford Retention Basin showed that sediment Toxics TMDL compliance targets were not met for copper (101.9 mg/kg and 157.7 mg/kg), lead (306.3 mg/kg and 359.6 mg/kg), or zinc (459.2 mg/kg and 481.2 mg/kg) in the unconsolidated sediments. Total PCB concentrations were also higher than Toxics TMDL compliance targets in the unconsolidated sediments. The two sediment samples collected in the unconsolidated sediments had total PCB concentrations of 118.7 µg/kg and 269.8 µg/kg.

The implications for compliance with the Toxics TMDL are that Oxford Retention Basin may present a source of metals if those sediments were to be transferred into Basin E.

Water
Data collected from the Oxford Retention Basin during wet weather showed that concentrations of total PCBs ranged from 1.9 ng/L through 12.8 ng/L. The interim compliance target is 30 ng/L. Therefore, PCB concentrations in the water column during wet weather comply with Toxics TMDL compliance targets. During dry weather, total PCBs ranged from 0.3 ng/L to 11.1 ng/L again in compliance with Toxics TMDL targets.

4.4.3 Summary

Water and sediment quality, as it related to the Toxics TMDL, does not indicate that Oxford Retention Basin is a key contributor to exceedances in Basin E. However, during wet weather, the impact of Oxford Retention Basin, when all historical data are viewed as a whole, does have an impact on Basin E in terms of compliance with the Bacteria TMDL. In addition, while the bacteria results of dry weather monitoring in this study were low, data collected historically indicate that dry weather flows from Oxford Retention Basin will impact Basin E and will cause compliance issues in terms of the Bacteria TMDL. However, with the recent completion of the Washington/Thatcher low flow diversion system and Marina del Rey low flow diversion system in Oxford Retention Basin, further monitoring to be considered to determine if dry weather flows into Oxford Retention Basin may still impact Basin E or if the system will benefit (i.e., reduce indicator bacteria concentrations) the water quality within the Basin.

4.5 Objective 5

Satisfy the necessary requirements to evaluate the disposal options for sediment removal from Oxford Retention Basin.

4.5.1 Classification of Sediments

Sediment chemistry results were compared to the TTLC and ten times the STLC values. Briefly, TTLC and STLC values are published in Title 22 of the State of California Code of Regulations and are the benchmark for determining whether a solid, or its leachate, respectively, exhibits the characteristics of toxicity, thereby causing it to be classified as hazardous. If bulk chemistry values exceed ten times the STLC, it does not definitively classify the material as hazardous; rather, it suggests those analytes have the potential to exceed the STLC after conducting the WET. None of the analytes exceeded TTLC criteria; however, two analytes did exceed the ten times STLC criteria. These were chromium and lead. These data suggested the potential for leachate from these samples to exhibit the characteristics of toxicity, specifically from chromium and lead. Chromium exceeded in four samples (both composite samples representing the unconsolidated layer, and two individual station samples (S2 and S4) representing the consolidated layer). Lead only exceeded in two samples (both composite samples representing the non-unconsolidated layer).

Further analyses of these samples using the WET showed that chromium and lead results (4.4 mg/L and 2.4 mg/L, respectively) for sample S-1-5-EL, collected from the excavation layer, did not exceed STLC criteria (5 mg/L for both metals) and is therefore classified as non-hazardous material. On the other hand, the WET confirmed that chromium and lead results (5.5 mg/L and 5.3 mg/L, respectively) for sample S-6-10-EL, collected from the excavation layer, exceeded STLC criteria for both metals and is therefore classified as hazardous material as defined by the State of California. Material classified as (California) hazardous must be disposed of at approved facilities such as Clean Harbors Facility in Buttonwillow, California; Chemical Waste Management Facility in Kettleman City, California; or United States Ecology Facility in Beatty, Nevada. Material classified as non-hazardous may be disposed of at approved facilities such as Otay Landfill in Chula Vista, California.

Sediment was also subjected to TCLP tests. Briefly, the TCLP values are published in the Code of Federal Regulations (40 CFR §261.24) and are the federal benchmark for determining whether the leachate from a solid would be classified as toxic and, therefore, hazardous. None of the analytes exceeded published TCLP criteria. Therefore, the material would not be classified as hazardous under federal guidelines.

4.5.2 Volume of Material to be Excavated

Using the descriptions from our core logs, the unconsolidated layer depth for each station location was input into the geographic information system (GIS) project file and excavation volumes were calculated. Since multiple cores were collected at each station, a minimum volume (based on the thinnest layer of unconsolidated material observed in cores taken from each station), a maximum volume (based on the thickest layer of unconsolidated material observed in cores taken from each station), and an average volume (based on the average thickness of unconsolidated material observed in cores taken from each station) was calculated using the method described below.

Data from the ten core sample locations within the Oxford Retention Basin were used in an interpolation procedure to create a surface for the Oxford Retention Basin area that represented the unconsolidated layer depth. Three different surfaces were created that represented the minimum, maximum and mean depth of the unconsolidated layer based on the sediment data collection. The interpolation method used was Inverse Distance Weighted (IDW). The IDW interpolation implements the assumption that points that are close to one another are more alike than those that are farther apart. Therefore, to predict a value for any unmeasured location, IDW used the measured values surrounding the prediction location. Those measured values closest to the prediction location had more influence on the predicted value than those farther away. Cell values in the grid were determined using a linearly weighted combination of a set of sample points in which weight is a function of inverse distance. IDW is an exact interpolator meaning that the predictions will be exactly equal to the data value at locations where data has been input, and predicted values will not fall outside the range of the data input values.

For each of these depth estimates, a volume was calculated using the 3D Analyst Surface Analysis function, which calculates area and volume for a surface above or below a reference plane at a specified height. The height of the reference plane was set to zero, and statistics were calculated for the area above the plane.

There were no assumptions required of the data for IDW. Therefore, the measured values rather than a transformation of the data were used for this set of interpolations. The resulting grid values were then classified by multipliers of the effects range–low (ER-L) threshold. It should be noted that with IDW, there was no assessment of prediction errors, and IDW can produce bull's eyes around data locations as noted in some of the maps.

Based on this GIS exercise, the following estimated volume of material is to be removed:

- The minimum volume of material to be removed is 5,281 cy (142,600 ft^3).
- The maximum volume of material to be removed is 10,896 cy (294,200 ft^3).
- The average volume of material to be removed is 7,982 cy (215,500 ft^3).

4.5.3 Estimated Disposal Costs

Cost estimates associated with the transportation and disposal of hazardous unconsolidated sediments from Oxford Retention Basin to the Clean Harbors Facility in Buttonwillow, California are based on the following assumptions:

- Approximately 4,000 cy (108,000 ft^3) of hazardous material. Since composite sample S-6-10-EL exceeded STLC criteria for both chromium and lead, approximately half of the proposed volume of unconsolidated sediments to be removed from Oxford Retention Basin (4,000 cy) can be assumed to be comprised of hazardous material.
- A transportation and disposal cost of $85/ton (2,000 pounds) of material.
- A conservative weight estimate of 100 pounds/ft^3 for the excavated material.

The estimated total cost to dispose of 4,000 cy of hazardous sediment at the Clean Harbors Facility is $459,000. Costs to excavate the material are not included in this estimate.

Cost estimates associated with the transportation and disposal of non-hazardous dredged material from Oxford Retention Basin to the Otay Landfill in Chula Vista, California are based on the following assumptions:

- Approximately 4,000 cy (108,000 ft^3) of non-hazardous material. Since composite sample S-1-5-EL did not exceed STLC criteria for either chromium or lead, approximately half of the proposed volume of unconsolidated sediments to be removed from Oxford Retention Basin (4,000 cy) can be assumed to be comprised of non-hazardous material.
- A transportation and disposal cost of $45/ton (2,000 pounds) of material
- A conservative weight estimate of 100 pounds/ft^3 for the excavated material.

The estimated total cost to dispose of 4,000 cy of non-hazardous sediment at the Otay Landfill is $243,000. Costs to excavate the material are not included in this estimate.

The total estimated cost to dispose of approximately 8,000 cy of sediment from Oxford Retention Basin (4,000 cy of hazardous material + 4,000 cy of non-hazardous material) is $702,000.

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