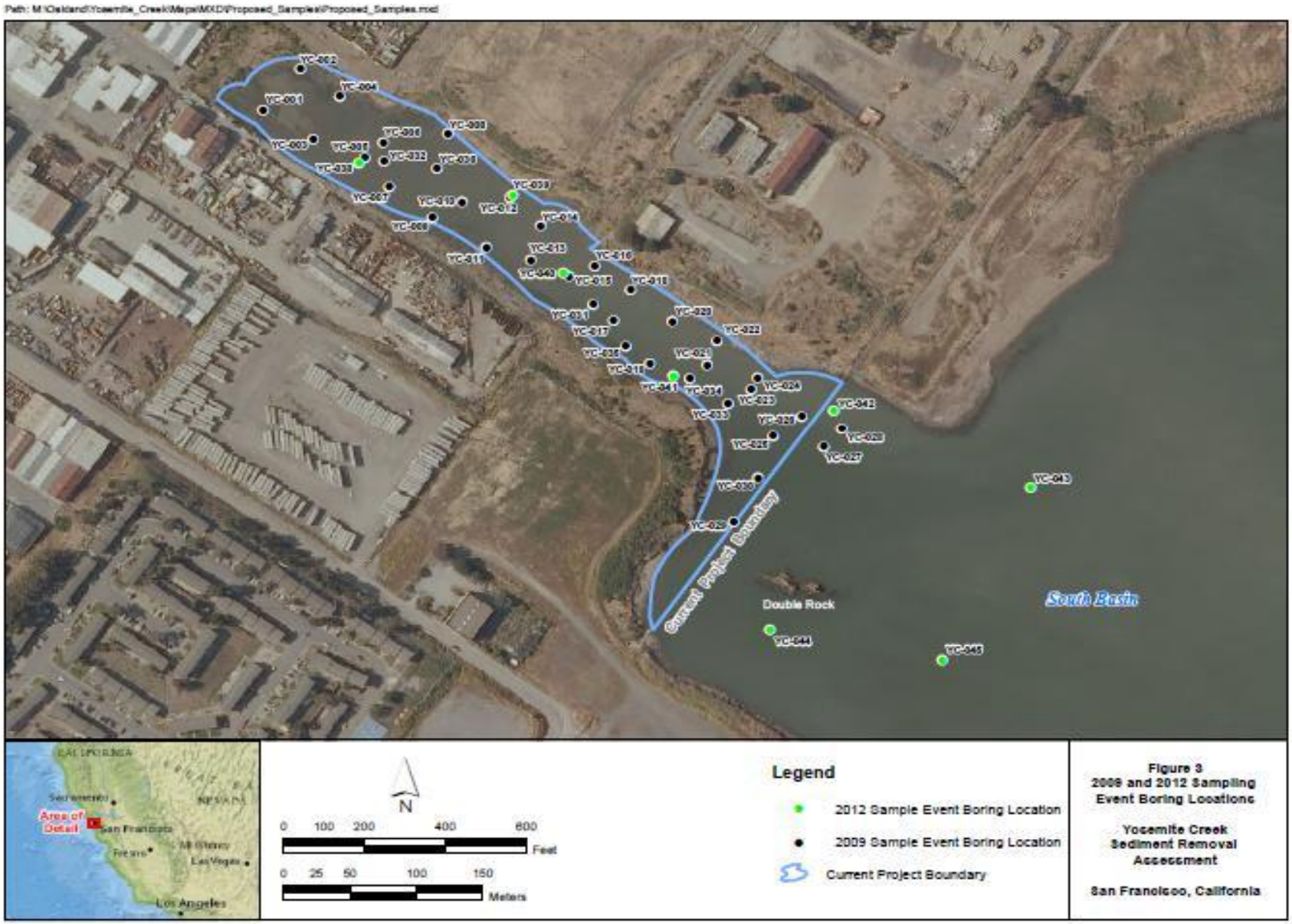
Summary of Waste Characterization Study
Yosemite Slough Site
San Francisco, CA
Technical Stakeholder Committee Meeting
July 24, 2012

ecology and environment, inc.
Global Environmental Specialists

Waste Characterization Study

- Study Scope:
  - Collected 32 sediment samples from eight sampling locations at Yosemite Slough on February 21, 2012.
  - Samples collected in 1-foot intervals to ~4 feet below sediment surface
  - 4 borings (16 samples) were within current project boundary.

Waste Classification Study Sample Location Map



Study Objectives

- Test site sediment for PCBs, asbestos, and metals (chromium, lead, mercury, and zinc)
- Determine where these concentrations exceed state and federal waste disposal criteria.
- Evaluate the potential for extrapolating the results of this study to cost estimates associated with sediment volumes for various EECA alternatives.
- Note: These volume extrapolations will be completed as part of the EE/CA.

Acronyms

- TCLP Toxicity Characteristic Leaching Procedure
- TSCA Toxic Substances Control Act

State of California Hazardous Waste Tests:

- STLC: Soluble Threshold Limit Concentrations
- TTLC: Total Threshold Limit Concentrations

Summary of Waste Characterization Study Results

- PCB Total Aroclors not detected above TSCA Limit of 50 ppm. Therefore, future disposal costs **will not** likely be regulated as TSCA Waste.

- Neither hexavalent chromium or asbestos appear to be an issue for disposal.

Summary of Waste Characterization Study Results

- No TCLP exceedances; therefore no Federal RCRA Hazardous Waste anticipated in removed sediments
- Except for one sample, total Pb concentration not detected above 1,000 mg/kg TTLC for California Hazardous Waste level
- However, 10 of 16 samples exceed STLC limit for Pb. Therefore, CA Hazardous waste likely in removed sediments.

Summary of Waste Characterization Study Results

- Good correlation total Pb concentrations and STLC results suggests total Pb concentrations above ~155 mg/kg will fail STLC.

- Relationship extrapolated to 2009 EPA data report. Approximately 61 of 75 samples from top 2 intervals (0-1, 1-2 feet) are likely to fail STLC. Therefore, approximately 75-80 percent of top 2 feet of Slough sediments would be California Hazardous Waste without any pre-treatment

Summary of Waste Characterization Study Results

- MAJOR CONCLUSIONS TO DATE:

➢ Approximately 75-80% of any removed sediments from top 2 feet of Yosemite Slough will likely test out as “PCB-contaminated CA Hazardous Waste due to soluble Pb”.

➢ EPA/E&E currently evaluating efficacy of Pb stabilization/solidification prior to disposal to minimize disposal as CA Hazardous Waste.

Status of Cleanup Planning

Yosemite Slough Site

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Presentation Outline

- Sediment Site Guidance
- Cleanup Action Objectives
- Sediment Remediation Goals
- Key Project Assumptions
- “Tool Box” Approach
- Technology Screening
- Preliminary Cleanup Alternatives

Iterative Process to Site Cleanup

- Project Scoping via Pre-EECA Meetings
  - Technical Stakeholder Committee Meetings
  - EPA/PRP Tech Sessions
  - Early outreach with local community groups
- Public comment period and meeting on the Draft EE/CA
- Finalization of the EE/CA
- EPA Action Memorandum
- Settlement negotiations with PRPs
- Site Sediment Testing to support Remedial Design
- Prepare Remedial Design including hydrodynamic modeling
- CWA 404 and 401 compliance with ACOE and Water Board
- Meet with Dredged Materials Management Office and BCDC
- Get input from remedial construction contractors
- Remedy effectiveness monitoring and remedy adjustments

Key Guidance to be Used on the EECA for Yosemite Slough

- USEPA Non Time Critical Removal Action Guidance (EPA-540-F-94-009). August 1993
- USEPA Contaminated Sediment Remediation at Hazardous Waste Sites (EPA-540-R-05-012). December 2005
- Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, DC. OSWER Directive 9285.6-08. February 2002.
- USACE Technical Guidelines for Environmental Dredging of Contaminated Sediments (ERDC/EL TR-08-29). 2008

Additional Guidance on Contaminated Sediments

- Palermo, M., Maynord, S., Miller, J., and Reible, D. 1998. "Guidance for In-Situ Subaqueous Capping of Contaminated Sediments," EPA 905-B96-004, Great Lakes National Program Office, Chicago, IL.

- Palermo, M., et. al., 1998. “Guidance for Subaqueous Dredged Material Capping.” USACE Waterways Experiment Station Dredging Operations and Environmental Research Program, Technical Report DOER-1.

- Bridges, Todd et. al. 2009. “Technical Guide: Monitored Natural Recovery at Contaminated Sediment Sites.” Environmental Security Technology Certification Program (ESTCP) Project ER-0622.

- Bridges, Todd et. al. 2008. “The Four Rs of Environmental Dredging: Resuspension, Release, Residual, and Risk.” USACE Engineer Research and Development Center (ERDC) Environmental Laboratory (EL) Technical Report (TR) ERDC/EL-TR-08-4. January.

Key Messages from EPA Guidance on Contaminated Sediment Sites

- Develop and refine a conceptual site model with focus on risk-based objectives.
- Ensure that sediment cleanup levels are clearly tied to risk-management goals.
- Evaluate the three major cleanup approaches (Monitored Natural Recovery, Capping, and Removal)
- Maximize the effectiveness of institutional controls and recognize their limitations.
- Select and design remedies to minimize short-term risks while achieving long-term protection.
- Monitor during and after sediment remediation to assess and document remedy effectiveness.

Removal Action Objectives (RAOs) for Yosemite Slough Cleanup

1. Protect Human Health
2. Protect Wildlife
3. Protect current and future beneficial uses of the Slough
4. Support and protect healthy aquatic and benthic communities, including existing habitat functions
5. Prevent contaminant migration to adjacent off-site areas and prevent recontamination during or following site remediation
6. Protect local properties, residents, workers, and natural resources during sediment remediation
7. Provide a cost effective remedy

Contaminants of Concern (COCs) and Remedial Goals (RGs)

Contaminant of Concern	Remedial Goal (mg/kg)	Reference
Polychlorinated Biphenyls (PCBs)	1,240 or less at any confirmation sample and overall weighted average, (site wide) must be approximately 386 or less.	Navy Parcel F Risk Assessments Note: Risk goal after cleanup in Yosemite Slough will not to exceed 3X10(-6) cancer risk.
Nickel	112	Background for SF Bay (SFEI)
Copper	271	Navy Parcel F Risk Assessments
Lead	218	NOAA ERM
Mercury	1.87	Navy Parcel F Risk Assessments
Zinc	410	NOAA ERM

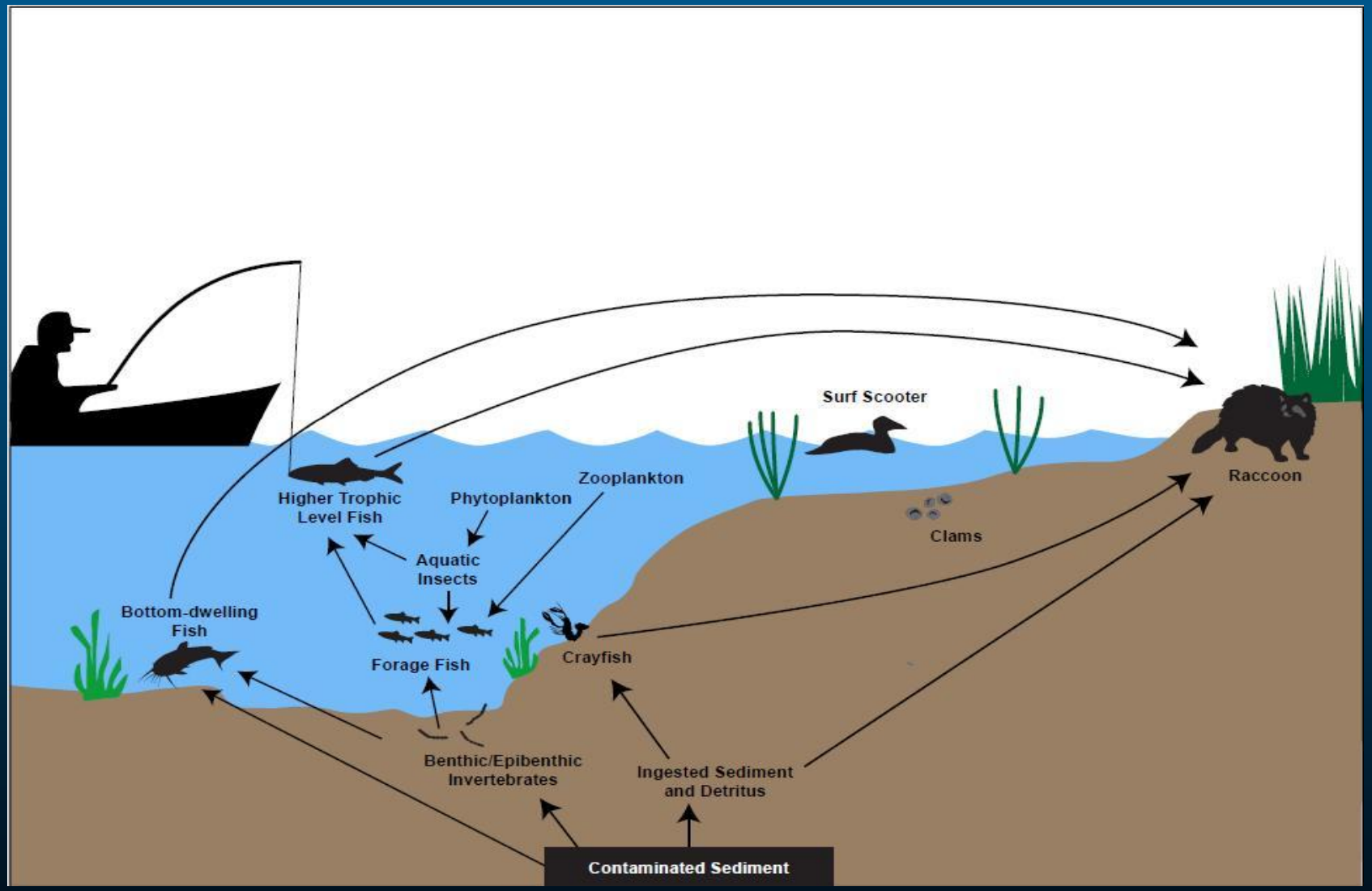
Detected Chemicals that were screened out

Chemical	Reason for Screening
Pesticides	Less than 5% detection and generally below screening values*
Petroleum	Co-located with PCBs or Lead. Generally below screening values*
PAHs	Less than 5% detection and generally below screening values*

* Eliminated as a COC but will be included during remedy effectiveness testing

Yosemite Slough Site Boundary

Generic Site Conceptual Model



Typical Sediment Site Remedial Technologies

- No Action
- Institutional Controls
- Monitored Natural Recovery
- In-situ Treatment
- Capping
- Removal and Off-site Disposal
  - Mechanical Excavation (dry)
  - Mechanical Dredge (wet)
  - Hydraulic Dredge
  - Sediment Dewatering
  - Off-Site Disposal

Are Site Conditions Favorable to Dredging at Yosemite Slough ?

- Answer: Conditions are challenging for dredging
- Favorable Factors:
  - Low gradient bottom and side slopes
  - Lack of piers and permanent structures
- Unfavorable Factors:
  - High debris potential
  - High resuspension, contaminant migration and recontamination potential
  - Resuspended contaminants will impact Bay water quality
  - Turbidity BMPs difficult to install

Are Site Conditions Favorable to MNR at Yosemite Slough ?

- **Answer: Natural recovery appears to be occurring in portions of the Site.**
- **Factors Favorable:**
  - **Anticipated land uses or new structures are not incompatible with natural recovery**
  - **Scour potential relatively low**
  - **For portions of the Slough, contaminant concentrations in the biologically active zone of sediment are moving towards risk-based goals on their own**
- **Factors NOT Favorable:**
  - **Continued human exposure (via fishing) and ecology exposure to contaminants at portions of the site for several more years and ICs cannot control these exposures**
  - **Site contaminants tend to bioaccumulate**

Are Conditions Favorable to Capping Present at Yosemite Slough ?

Answer: Yes.

Factors Favorable:

- **Suitable types and quantities of cap material are readily available**
- **Anticipated infrastructure needs (e.g., piers, pilings, buried cables) are compatible with cap**
- **Water depth is adequate to accommodate cap with anticipated uses (navigation, flood control)**
- **Incidence of cap-disrupting human behavior, such as large boat anchoring, is low or controllable**
- **Hydrodynamic conditions are not likely to compromise cap or can be accommodated in design**

Key Project Assumptions for the Development of Cleanup Options at Yosemite Slough

1. Reliable, long-term protection of the biological active zone (BAZ) is the most efficient way to achieve the risk based RAOs.
2. PCBs and Lead contaminated zones are the primary threats to the BAZ
3. Other site contaminants are collocated with PCBs or Lead.
4. The BAZ is assumed to be the top 12 inches of sediments (i.e. same as consensus made at Hunters Point Shipyard - Parcel F)
5. Protection of the BAZ will be conducted by looking at PCB and Lead contaminated zones in both the 0-1 foot horizon and the 1-2 foot horizon.

Key Project Assumptions for the Development of Cleanup Options at Yosemite Slough(cont'd)

6. Final remedy must maintain bathymetry site-wide
7. Based on results at sediment site cleanups nationwide, attempts at full removal of contaminated mass alone often does not achieve the risk based RAOs in the long-term.
8. Slough banks must be addressed to prevent erosion and recontamination pathways
9. Multi-agency efforts at upland source control is essential for long-term remedy effectiveness
10. Any backfill capping material in the BAZ shall be of a quality supportive of mudflat ecology
11. Stakeholders must have confidence in Selected Alternative's long-term effectiveness and protectiveness.

EPA's Screening Criteria of Cleanup Technologies

- **Effectiveness**
  - Protective of public health and the environment ?
  - Likely compliant with Project RAOs and potential ARARs ?
- **Implementability**
  - Technically Feasible?
  - Administratively Feasible?
  - Technologies Available ?
- **Cost**
  - Cost Prohibitive ?

Technology	Retained as a Site-Wide Alternative?	Retained as a Component of Multiple Technology Alternative?	Retained as a Enhancement Option during Design?
No Action	No	Yes	No
Removal	Yes	Yes	No
Capping	No	Yes	No
MNR	No	Yes in some zones; No in other zones	Yes, option to for Enhanced MNR in MNR zones only
ICs	No	Yes	No
In-Situ Treatment	No	No	Yes, option for absorbent under caps only

Sediment Removal Tool Box Options

- **All typical sediment removal technologies are retained as a tool box options in zones where removal is selected:**
  - Removal “In the dry” by dewatering the area and using excavators
  - Removal “in the wet” using hydraulic (suction pumps) or mechanical (bucket) dredges
- **Exact removal technology to be determined during the design stage**

PCB Natural Recovery Evaluation

- Total PCB data (sum of NOAA 2x18 congeners) in the 0-1 foot interval were collected during the 1998 Yosemite Slough Sediment Investigation performed by AD Little
- Natural Recovery processes were evaluated in Yosemite Slough by comparing these historic data collected in 1998 to PCB data collected in 2009 (the EPA data set)
- Yosemite Slough was divided into five regions based on the sampling transects defined by the AD Little sampling locations
- Data sets were compared using three methods as described below:
  - PCB concentrations for sample locations within each region were averaged and compared to the historic PCB concentration collected in that region.
  - An area weighted average of PCB concentrations for sample locations within each region were compared to the historic PCB concentration collected in that region.
  - PCB concentrations were averaged in sample locations immediately adjacent to the historic sample locations and compared.

Yosemite Slough Regions

SYMBOL KEY:

LEAD (mg/kg) ZINC (mg/kg) TOTAL PCBs (µg/kg)

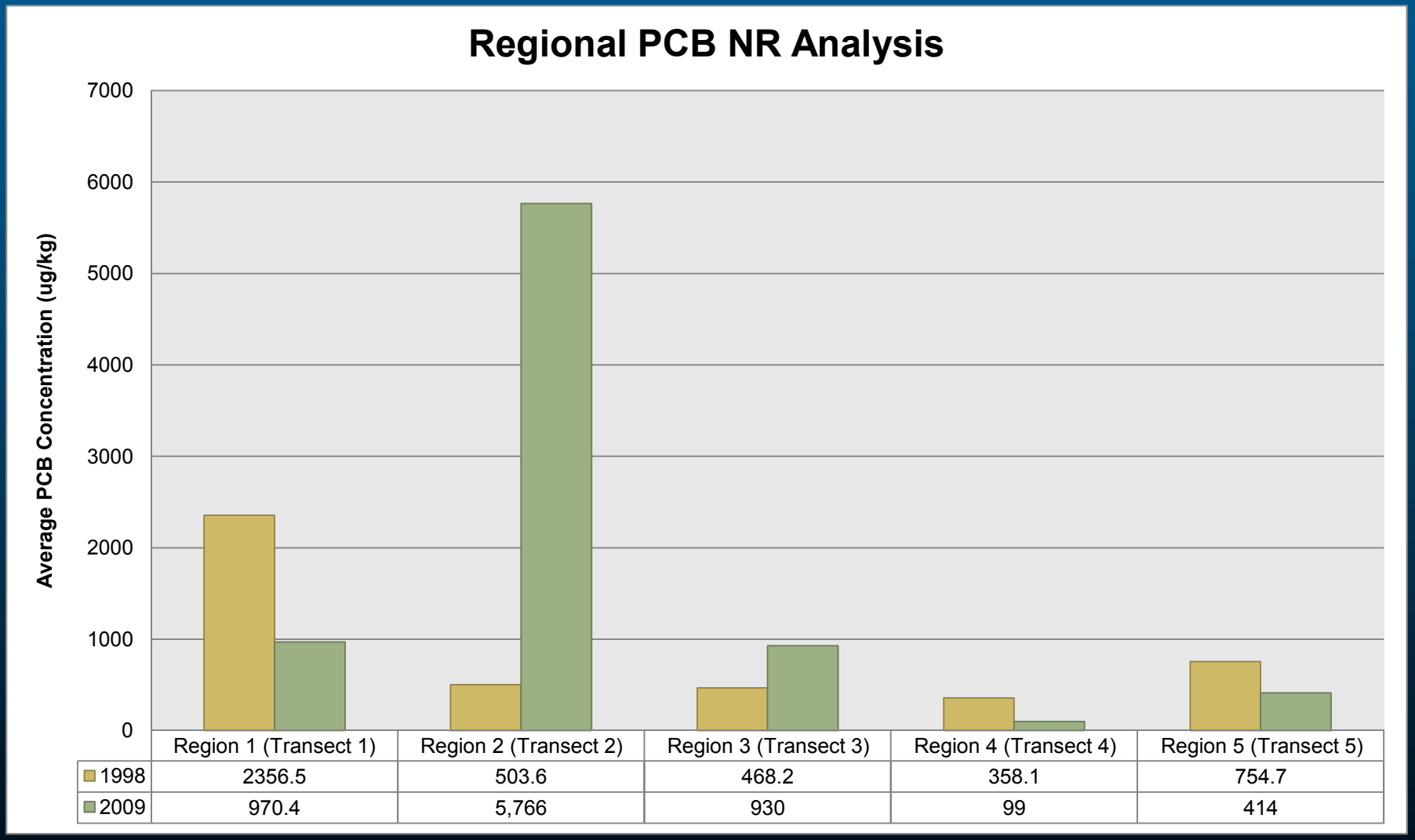
- Does Not Exceed Remedial Action Level
- Appropriate for MNR
- Exceeds Remedial Action Level

- SAMPLE LOCATION WITH RESULTS (2009)
- AD LITTLE SAMPLE LOCATIONS (1998)
- SAMPLES COLLECTED AS PART OF THE HUNTERS POINT SOUTH BASIN FEASIBILITY STUDY (2003)
- SITE BOUNDARY
- SITE REGIONS

APPROXIMATE RESTORATION AREA BOUNDARIES

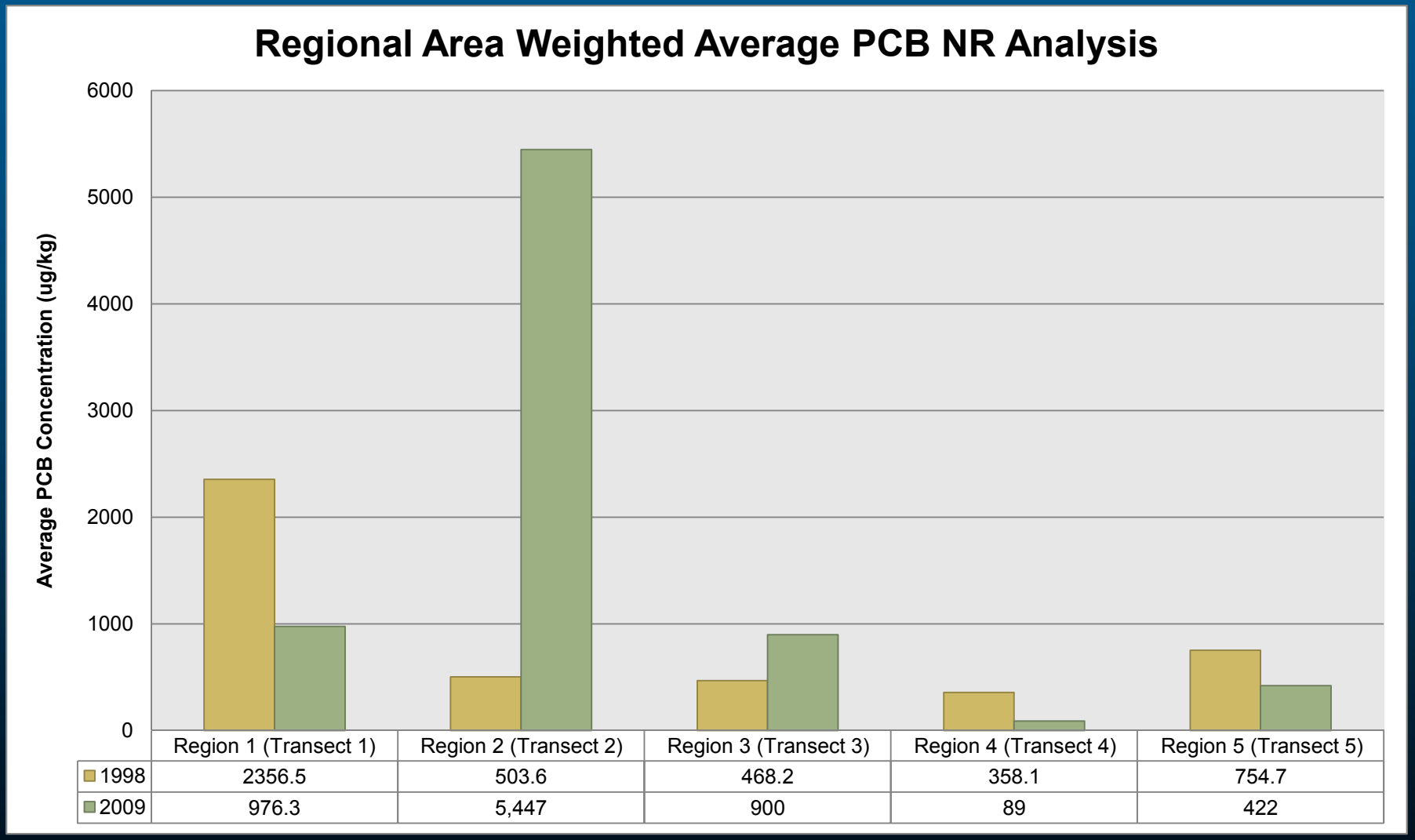
- PHASE I RESTORATION AREA (COMPLETED 2011)
- POTENTIALLY SUBMERGED PORTION OF PHASE I WETLAND RESTORATION AREA
- PHASE II RESTORATION AREA (SCHEDULED FOR 2013)
- WETLAND RESTORATION ISLAND

Graphical Data Comparisons



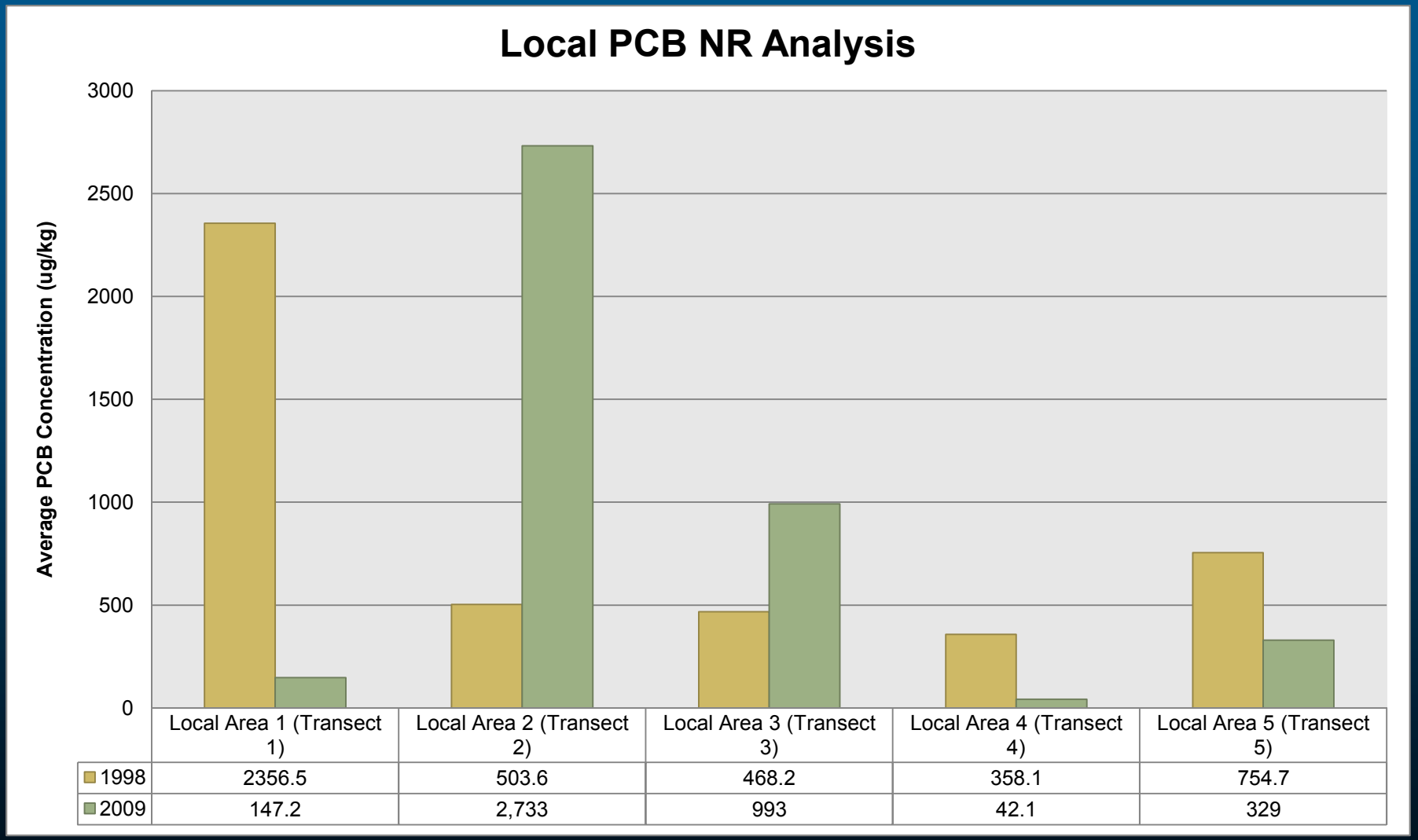
	Region 1 (Transect 1)	Region 2 (Transect 2)	Region 3 (Transect 3)	Region 4 (Transect 4)	Region 5 (Transect 5)
1998	2356.5	503.6	468.2	358.1	754.7
2009	970.4	5,766	930	99	414

Graphical Data Comparisons



	Region 1 (Transect 1)	Region 2 (Transect 2)	Region 3 (Transect 3)	Region 4 (Transect 4)	Region 5 (Transect 5)
1998	2356.5	503.6	468.2	358.1	754.7
2009	976.3	5,447	900	89	422

Graphical Data Comparisons



	Local Area 1 (Transect 1)	Local Area 2 (Transect 2)	Local Area 3 (Transect 3)	Local Area 4 (Transect 4)	Local Area 5 (Transect 5)
1998	2356.5	503.6	468.2	358.1	754.7
2009	147.2	2,733	993	42.1	329

Results of PCB Natural Recovery Evaluation at Yosemite Slough

- Three of the five regions evaluated in Yosemite Slough demonstrate that natural recovery of PCBs is currently taking place
- Physical processes (i.e. conceptual site model) of natural process need to be further developed so that long-term effectiveness of MNR as a cleanup remedy can be evaluated
- Other Site COCs need to be evaluated for natural recovery as well
- Employing MNR as a remediation tool reduces ecological risk and immediate disruption of the benthic community during implementation

Approximate Zones Retained for Further Consideration of MNR

(zones in with purple shading)

Scope and Objectives of the Selected Remedy

- **Selected Remedy in the EECA will identify:**
  - **Cleanup technologies to be applied at Yosemite Slough Site**
  - **Anticipated technology application zones**
  - **Remedy performance expectations**
  - **Schedule to meet those expectations**
  - **Default Components for the Selected Remedy**
  - **Default components for the Selected Remedy that includes sediment removal**
  - **Use a "Tool Box" approach to decide technical details during the design phase**
- **Final and exact locations of technology application zones will be determined during design stage and approved by EPA.**

Default Components for any Selected Site Cleanup Remedy at Yosemite Slough	Tool Box Options
Slough Bank Stability	- EECA to show potential options - Final decision TBD during design
Possible CSO Outfall Apron Modification	- EECA to show potential options - Final decision TBD during design
Reasonable Upland Source Control	- Not actually a component of the Selected Remedy - EECA to describe efforts to date and future planned efforts
Long-term Effectiveness Monitoring	- EPA considering testing of sediments in BAZ every 5 years for 20 years
Compliance with ARARs -Natural Resource Laws -Cultural Resources Laws	N/A

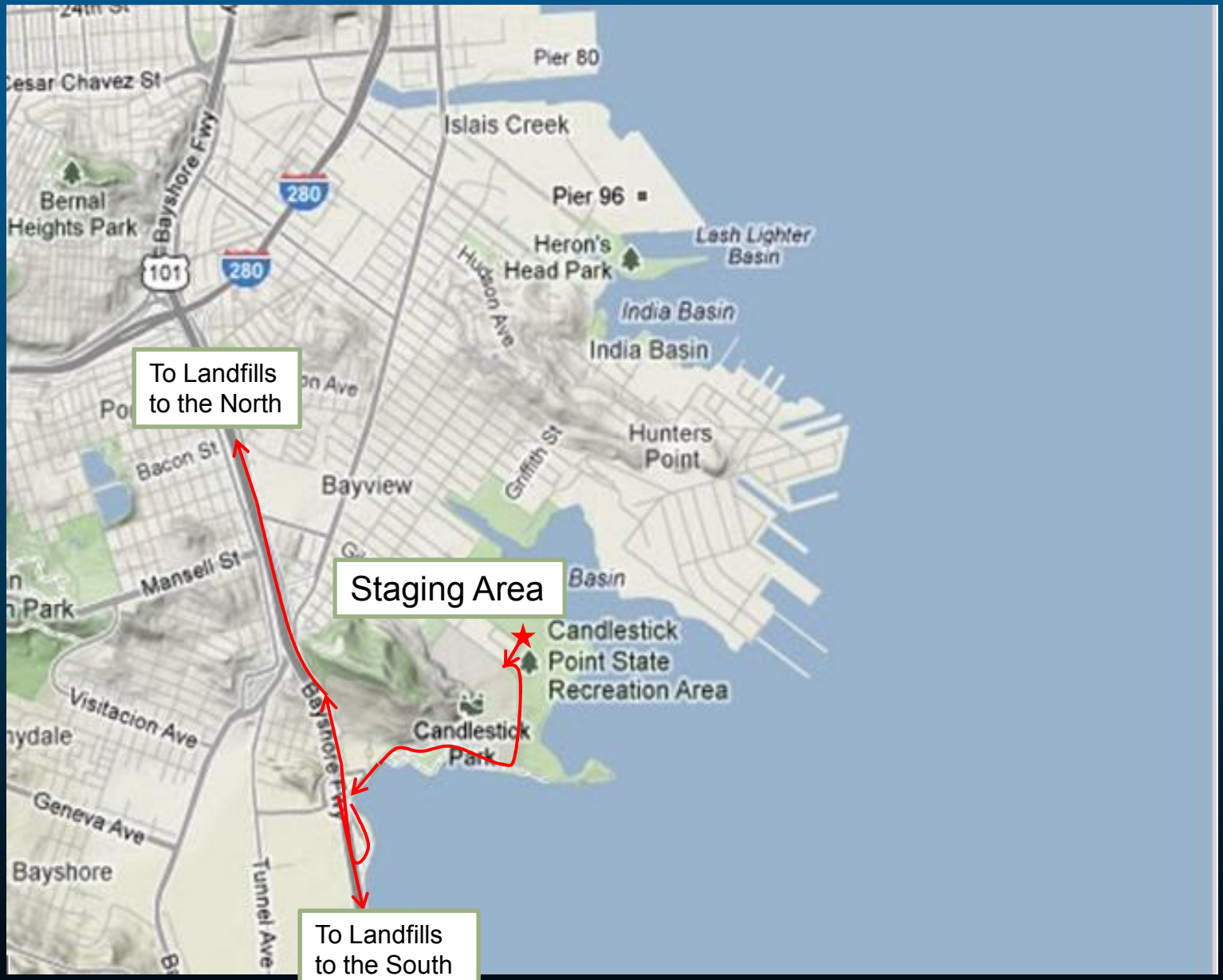
Default Components for any Alternative that Includes Sediment Removal	Tool Box Options
Tidal Control and Resuspension Migration Control	All types of cofferdam structures and silt curtains
Sediment Dewatering/Project Staging Area(s)	To be located State Parks Property on Southside of Slough (see staging area map)
Sediment Transport to Dewatering Area	Pipelines/hoses, trucking
Sediment Dewatering	Passive, Accelerated, Mechanical, Geotubes
Sediment Water Management	Onsite treatment, Discharge to sewer for treatment at POTW

Default Components for any Alternative that Includes Sediment Removal	Tool Box Options
Sediment Transport to Off-Site Landfills	- Truck, rail (see haul routes map)
Evaluation, Testing, and Transport of Clean Cover Material to Site	- Truck, rail, barge
Odor Management	- EECA to identify possible mitigation measures
Noise, Dust and Traffic Management	- EECA to identify possible mitigation measures
Compliance with ARARs - CWA Section 404 and 401	N/A

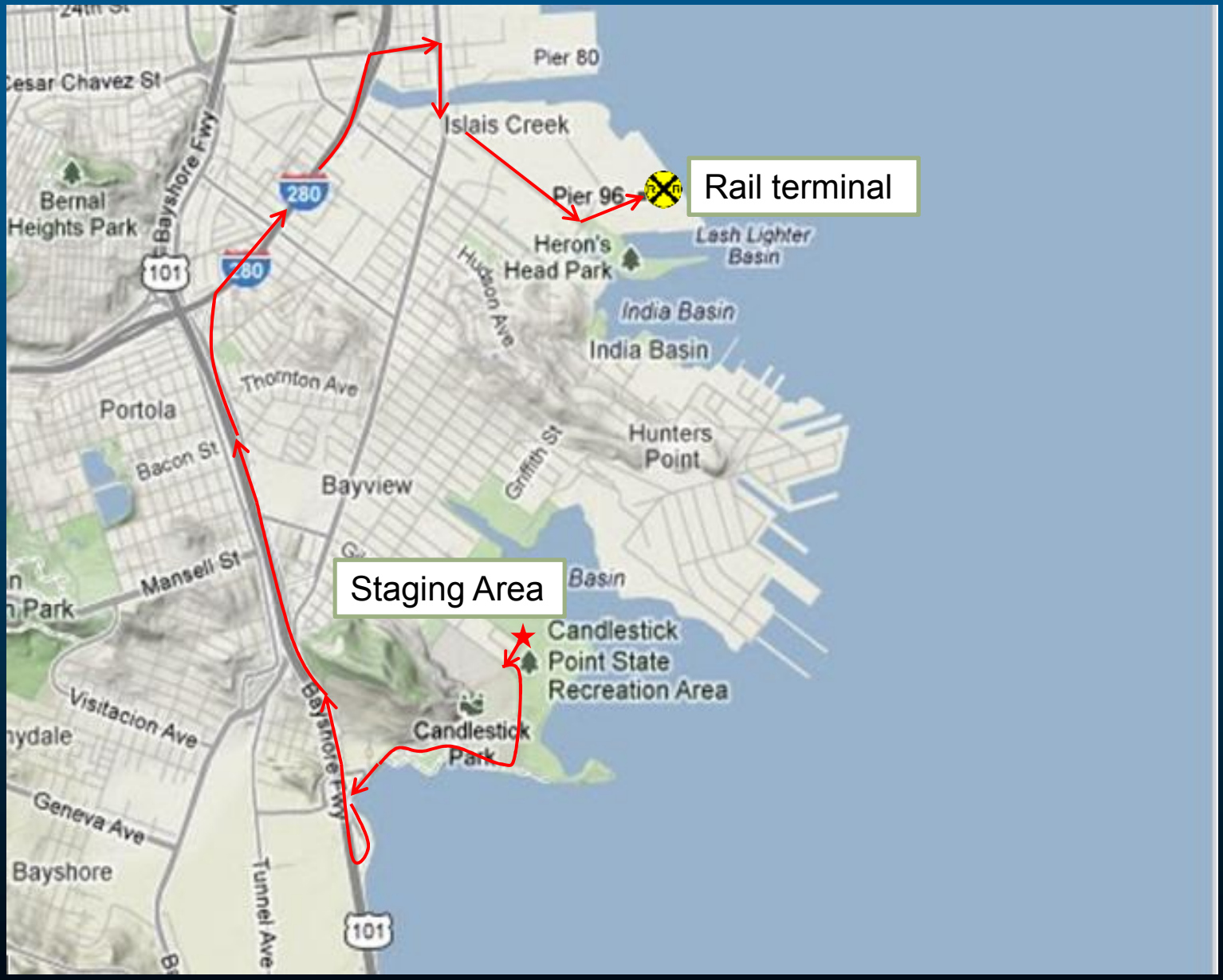
Potential Project Staging and Sediment Dewatering Areas

Exact areas to be determined in coordination with State Parks

Haul Routes: Truck Only



Haul Routes: Truck to Rail



3-D View of Chemical Exceedances

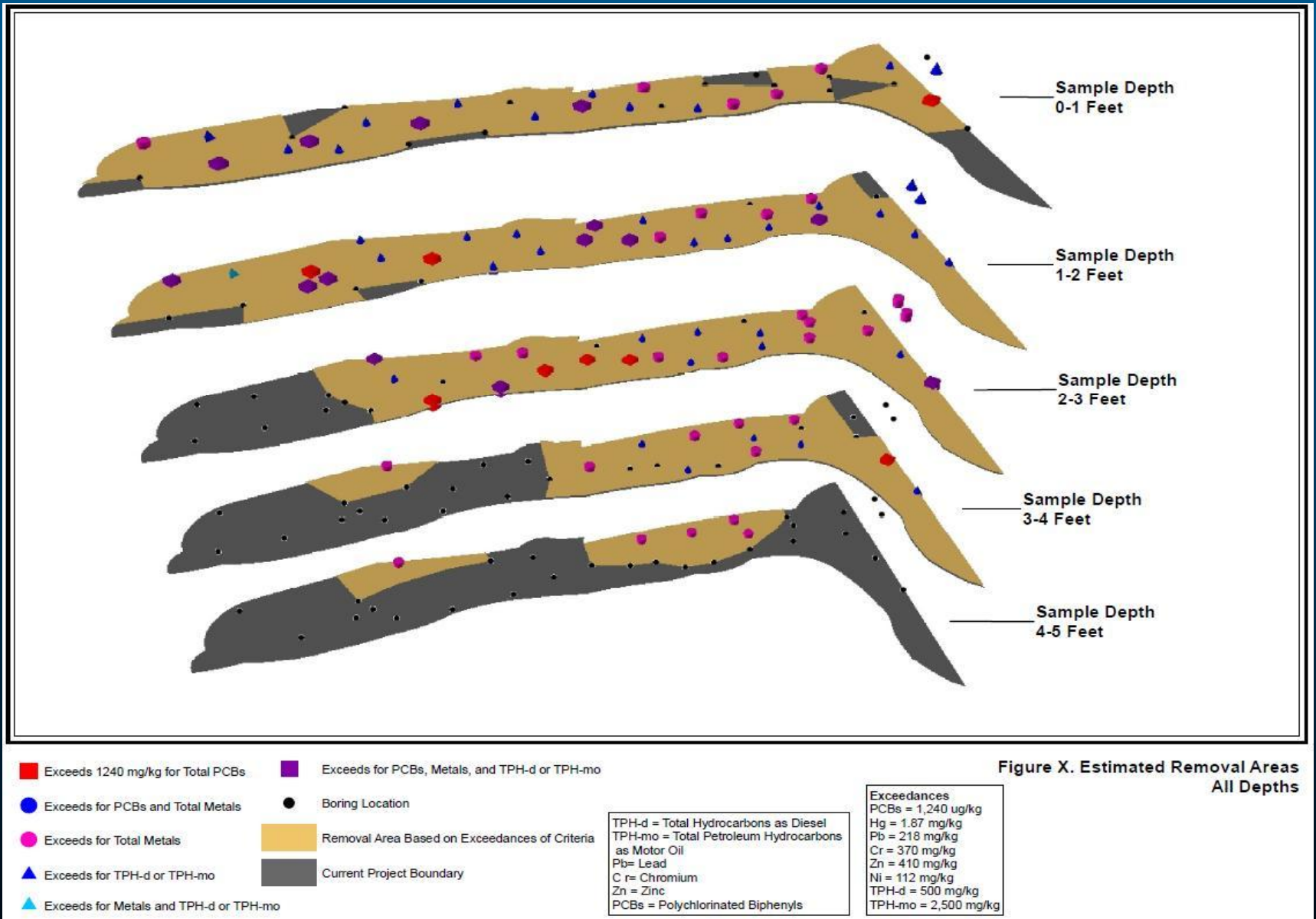


Figure X. Estimated Removal Areas
All Depths

Alternatives to Undergo Detailed Evaluation

1. No Action

2. Sediment Removal to 1 foot with Engineered Cap and ICs
   - Removal top 1 foot where COCs exceed RGs.
   - Assume 8,500 cubic yards removal

3. Sediment Removal to 2 feet with Engineered Cap and ICs
   – Removal to up to 2 feet where COCs exceed RGs.
   – Assume 18 inches to 24 inches (27,400 cubic yards) in the cost estimate tables and present a range.
   – Exact depth will be determined in the RD.

4. Full Removal and Backfill (No Engineered Cap and No ICs)
   - Assume removal depths to 4 or 5 feet
   - Confirmation testing to confirm complete removal
   - Assume 54,200 cubic yards

Alternatives to Undergo Detailed Evaluation (Cont'd)

5. Options for a Multiple Technology Alternative

- This Alternative is a "Work in Progress"
- Present a wide range of options for applying Sediment Removal/Cap, MNR, and No Action/Monitoring based on the chemical concentration and risk posed at each location
- Use Thiessen Polygons around sediment sampling locations for total PCBs, zinc and lead.
- Evaluate point compliance and Area Weighted Average (AWA) concentrations in two sediment horizons; zero to 1 ft below sediment surface (bss) and 1-2 feet bss.
- Compare data against RGs, 2xRGs, and 3xRGs
- In the last option, select locations were reclassified from capping to MNR based on further evaluation of the site data, including the more recent data

Alt. 2: Sediment Removal to 1 foot with Engineered Cap and ICs. Estimated Volume removed = 8,5000 cy; Estimated Cost = $11M

Figure 1. Strict Removal of All Criteria Exceedences, 0-1 feet

Alt 3: Sediment Removal to 2 feet with Engineered Cap and ICs. Estimated Volume removed = 27,400 cy; Estimated Cost = $24M

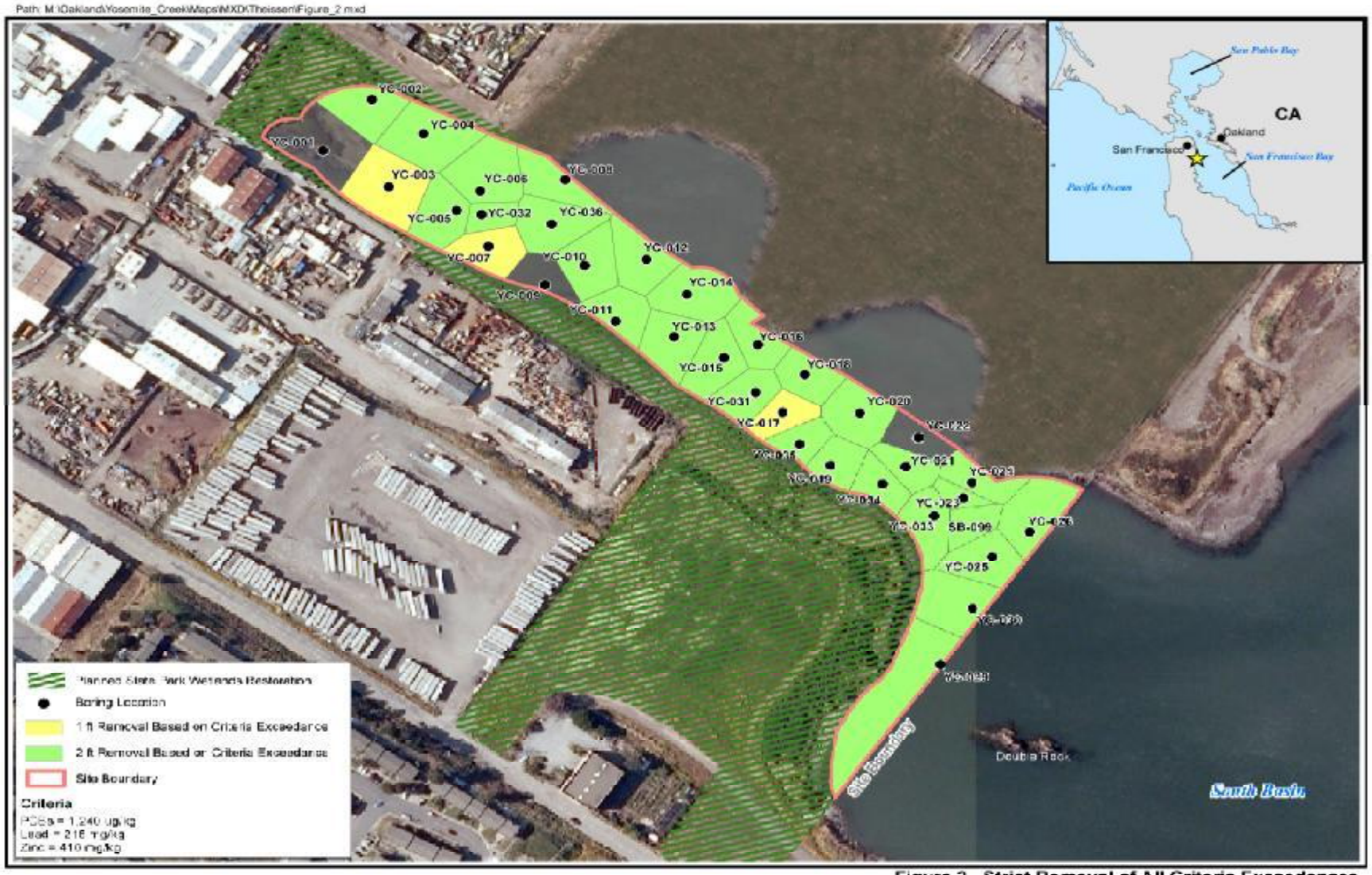
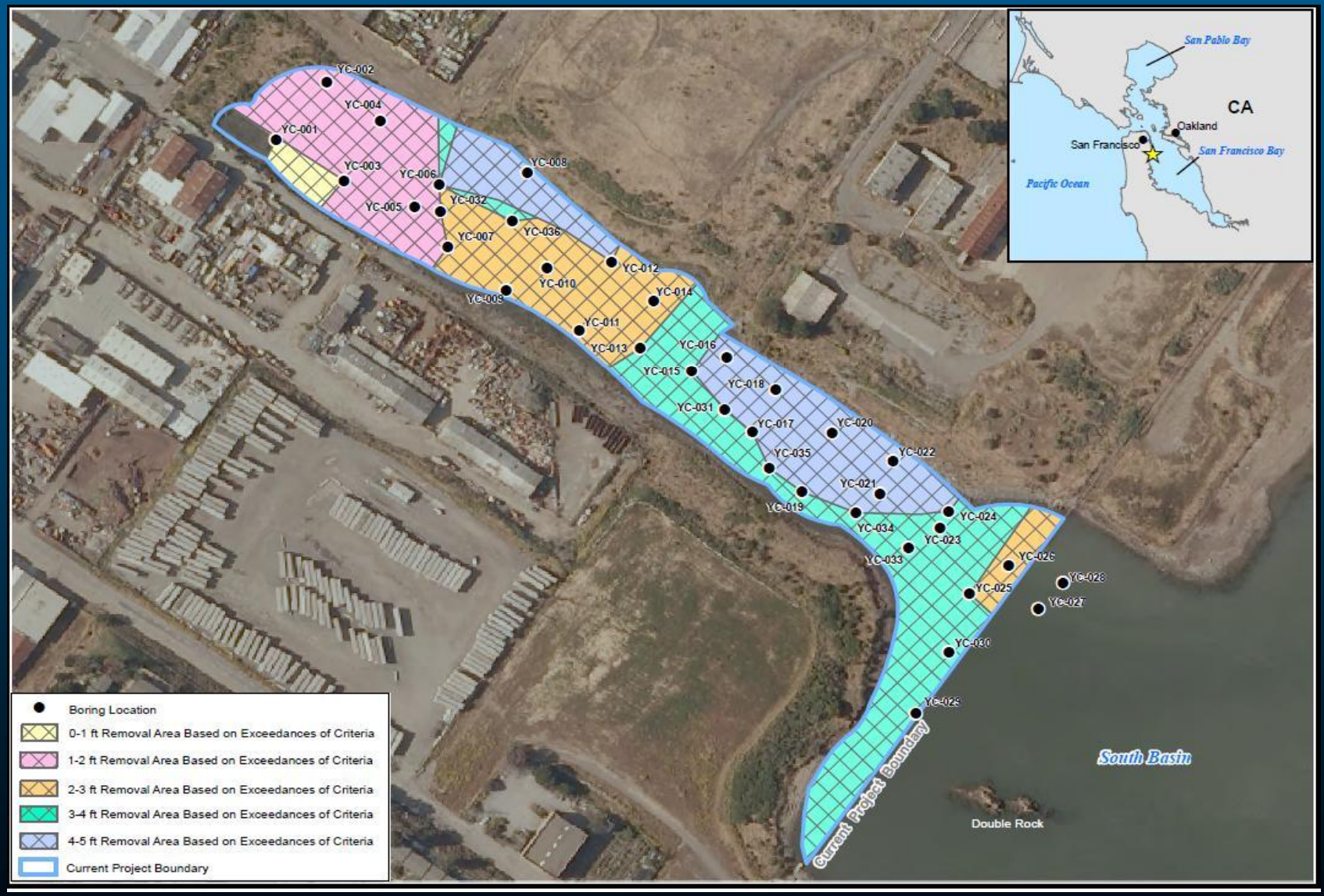


Figure 2. Strict Removal of All Criteria Exceedences, 0-2 feet

Imagery: © 2013 NAIP

Alt. 4: Full Removal and Backfill
Estimated Volume removed = 54,200 cy
Estimated Cost = $50M



Alt 5a: 0-1 foot horizon evaluated. Remove and Cap if greater than 2x RGs; MNR less than 2x RGs.
Est Volume removed = 4,400 cu yds; Estimated Cost = $7M

Figure 3. Removal of Criteria Exceedances Greater Than 2 x RG, MNR at Locations Where Criteria Exceedances are Less Than 2 x RG, 0-1 ft

Imagery © 2015 NAIP

Alt 5b: 0-2 foot horizon evaluated. Remove and Cap if greater than 2x RGs; MNR less than 2x RGs.
Est. Volume Removed = 24,800; Estimated Cost = $23M

Figure 4. Removal of Criteria Exceedances Greater Than 2 x RG, MNR at Locations Where Criteria Exceedances are Less Than 2 x RG, 0-2 ft

Imagery: © 2010 NAIP

Alt 5c: 0-1 foot horizon evaluated. Remove and Cap if >3xRGs with 3 exceptions; MNR if between 1 and 3 times RG; RD Monitoring if < RG.

PROPOSED REMEDIAL ACTION AREA BOUNDARIES
- REMOVE AND CAP
- MNR
- NO ACTION

APPROXIMATE RESTORATION AREA BOUNDARIES
- PHASE I RESTORATION AREA (COMPLETED 2011)
- POTENTIALLY SUBMERGED PORTION OF PHASE I WETLAND RESTORATION AREA
- PHASE II RESTORATION AREA (SCHEDULED FOR 2013)
- WETLAND RESTORATION ISLAND
- SITE BOUNDARY

SAMPLE LOCATION WITH RESULTS

SAMPLES COLLECTED AS PART OF THE HUNTERS POINT SOUTH BASIN FEASIBILITY STUDY

SYMBOL KEY:

- Does Not Exceed Remedial Action Level
- Appropriate for MNR
- Appropriate for capping

	Remedial Action Level	Area Weighted Remedial Action Level	SAWC @ T = 5 Years
Total PCBs	1,240 µg/kg[1]	386 µg/kg	314 µg/kg
Lead	218 mg/kg	--	105 mg/kg
Zinc	410 mg/kg	--	112 mg/kg

Calculation of AWAs for Alternative 5c

- Surface chemistry data in areas identified for capping were replaced with concentrations representing clean backfill (SF Bay RWQCB Beneficial Reuse of Dredged Material Guidelines [lead and zinc]; Dredged Material Testing Thresholds for Sediment for 2012 [PCBs]).
- Surface area weighted concentrations (SAWC) of total PCBs, lead and zinc from zero to 1 ft bss were calculated for each remedial unit and for the entire site representing time zero after remedial implementation.

MNR Evaluation			SAWCs		
AREA ID	Strategy	Unit Area (sqft)	PCB's (ug/kg)	Lead (mg/kg)	Zinc (mg/kg)
UNIT 1	MNR	8,329.7	135.7	268.3	405.7
UNIT 2	NO ACTION	16,302.0	44.0	31.6	56.5
UNIT 3	NO ACTION	36,532.4	663.1	176.3	247.3
UNIT 4	MNR	18,725.2	3,884.3	887.8	393.6
UNIT 5	REMOVE AND CAP	62,471.0	26.4	43.2	158.0
UNIT 6	MNR	15,289.1	1,500.0	1,130.0	806.0
UNIT 7	NO ACTION	39,942.6	222.8	183.6	269.4
UNIT 8	MNR	13,733.0	940.0	267.0	312.0
UNIT 9	REMOVE AND CAP	12,404.6	26.4	43.2	158.0
UNIT 10	MNR	36,020.9	1,686.4	267.4	372.5
UNIT 11	MNR	25,391.6	401.9	233.8	330.3
UNIT 12	NO ACTION	78,351.9	446.5	147.8	216.1
UNIT 13	MNR	36,326.0	1,526.7	756.9	468.3
UNIT 14	MNR	16,311.5	1,690.0	164.0	250.0
UNIT 15	NO ACTION	37,190.4	800.0	141.0	234.0
Total SAWC	--	453,321.9	803.5	264.5	283.3

SEDCAM Predictive Modeling for Alternative 5c

- Sediment concentrations of Total PCBs, zinc and lead were predictively modeled over a 5-year period using the SEDCAM model (Jacobs et al. 1988 and Washington Department of Ecology 1991) in areas identified for MNR
- The SEDCAM model is a one-dimensional mixing model that evaluates source loading, sediment deposition, chemical-specific degradation rate, and mixing
- Stormwater loading was determined from samples collected in 2009 and 2010 from 3 locations that discharge into Yosemite Slough.
  - Half of the detection limit was used for non-detect results
- Other sources of mass loading could be considered in future analysis

Alternative 5c Evaluation Results

EE/CA multi-technology alternative that includes MNR	Surface Area (sq ft)	COC	SEDCAM Predicted Concentration	Area Weighted Remedial Action Level[1]	SEDCAM Percentage of Remedial Action Level
EE/CA MNR Alternative	453,322	Total PCBs (mg/kg)	0.314	0.386	81.3%
		Lead (mg/kg)	104.8	218	48.1%
		Zinc (mg/kg)	112.3	410	27.4%

Notes:

1. The draft proposed action level, as an area-weighted average (AWA) concentration of PCBs, is 386 ug/kg, which corresponds to the calculated AWA for the post-remedial conditions at Hunter's Point Parcel F (ARCADIS 2012).

cm = centimeter
g/cm2-yr = grams per square centimeter per year
mg/kg = milligrams per kilogram
sq ft = square feet

EPA Cost Estimation Guidance

- A Guide to Developing and Documenting Cost Estimates During the Feasibility Study. EPA 540-R-00-002; OSWER 9355.0-75. USEPA, July 2000.
- Capital costs
- Operation, Maintenance & Monitoring costs

Example of Preliminary Estimate of Primary Costs for Removal/Cap Alternative #3

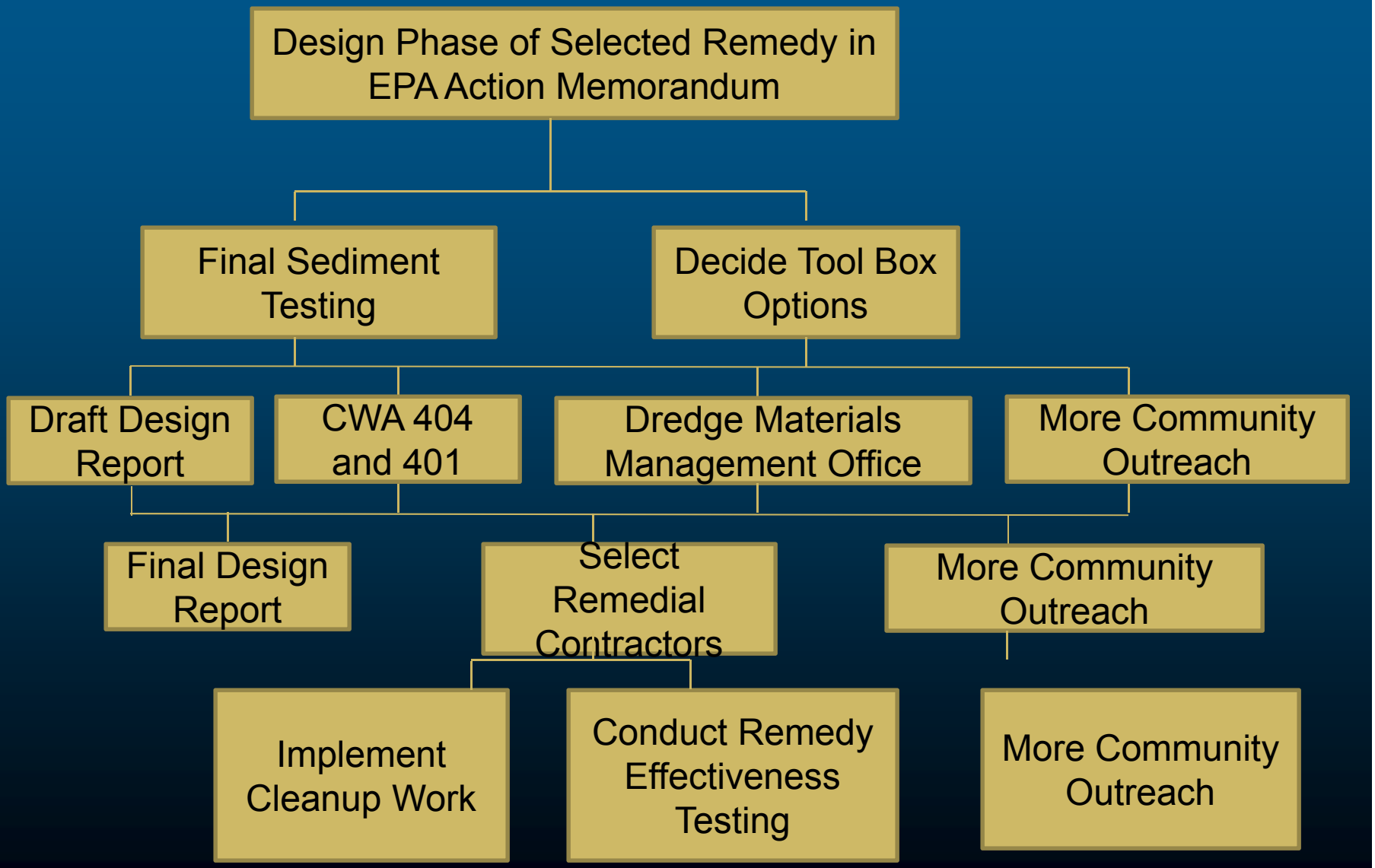
- Removal of COCs to 2 feet (27,400 cubic yards)

Tasks	Dredging "In the Dry"	Hydraulic Dredging
Site Preparation	$205,800	$400,000
Health and Safety	$96,700	$168,500
Construction Mobilization/Demobilization	$67,300	$130,700
Site Dewatering	$1,744,800	
Contaminated Sediment Removal	$605,400	$2,312,600
Sediment Dewatering	$1,041,900	$2,188,000
Transportation and Disposal of Dewatered Sediment	$5,273,800	$5,273,800
Treatment of Dewatering Process Water	$248,800	$333,700
Discharge of Dewatering Process Water to SFPUC	$22,300	$14,500
Capping	$3,106,600	$3,106,600
Construction Subtotal	***$12,110,900***	***$13,359,900***
Post Construction Costs	$59,500	$59,500
Capital Cost Subtotal	***$12,472,900***	***$13,987,900***
Adjusted Capital Cost Subtotal for San Francisco, CA Location Factor (123.4):	$15,391,600	$17,261,100
10% Legal and Administrative Fees:	$1,539,200	$1,726,200
20% Contingencies:	$3,078,400	$3,452,300
Construction Management (2.5% of Capital costs):	$384,800	$431,600
Engineering Design (10 % of Capital costs):	$1,539,200	$1,726,200
Total Capital Costs in 2012 Dollars:	**$21,934,000**	**$24,598,000**

EE/CA Cleanup Alternative Evaluation Criteria

- **Effectiveness**
  - Protective of public health, workers, and the environment
  - Complies with RAOs and ARARs
- **Implementability**
  - Technical Feasibility
  - Administrative Feasibility
  - Availability of Services and Materials
  - Potential Stakeholder Concerns/Support
- **Cost**
  - Capital Costs
  - Operation, Maintenance and Monitoring Costs

Design and Cleanup Flowchart



Next Steps

- Release “Working Draft” EECA to Technical Stakeholder Committee (TSC) in September
- Final Meeting TSC on “Working Draft” EECA
- Release Official Draft EECA for Public Comment Period in November
- Finalize EECA based on input from Public
  - Goal: Complete by December 31, 2012
- EPA Action Memorandum based on Final EECA selects the Final Remedy in 2013
- Best Case Schedule: Start Cleanup in late Summer 2014