Confined Disposal Facilities for Contaminated Sediments

Presentation to Community Advisory Group

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Summary

- CDFs used to management sediments from navigation and environmental dredging projects nationwide
- CDFs are one option being considered at Portland Harbor to manage contaminated sediments
- CDFs may be a cost effective and protective approach for management of some contaminated sediments at Portland Harbor
- CDF design will consider the need for environmental controls
- Site data will be used to determine suitability of material for placement within any Portland Harbor CDF
- Performance standards for long-term environmental protection must be established
- Monitoring will be performed to ensure protectiveness

History of CDFs

- Sediment management driven by navigation dredging
- Prior to 1960's, sediments from navigation projects were typically disposed in open water
- Beginning in 1960's CDFs come into use to address environmental concerns
- Dozens built in Great Lakes for navigation sediments
  - 90,000,000 CY of sediments
- CDFs may be used for both navigation and environmental dredging projects (e.g., Pointe Mouillee)
- Have been used for contaminated sediments nationally
  - West Coast
  - Great Lakes
  - Chesapeake Bay

Management of Dredged Sediments

- Ex-Situ Treatment
  - Generally not feasible due to cost
- Upland Disposal
  - Sediments may be disposed of in a landfill or used for fill at nearshore areas
  - Disposal location determined based on contaminants and contaminant concentration
  - Requires transport using barges, rail and/or trucks
  - May require construction of sediment handling facility
- Confined Aquatic Disposal
  - Filling of deep holes within water body
- Confined Disposal Facility
  - Nearshore or Island
  - Fill behind berm to create land and/or shallow water habitat

CDFs – Some Pros and Cons

- Negative Effects
  - Loss of bottom habitat
  - Potential for releases during filling if not properly conducted
  - Potential for long term release of contaminants
- Positive Effects
  - Cost effective long-term sediment management
  - Facilitation of dredging projects
  - Potential for the creation of new land for redevelopment and recreation
  - Potential for the creation of shallow water, wetland and riparian habitat

Puget Sound CDF Summary

Site Name	Operator	Year Built	Capacity (cy)	Land Use Notes
Milwaukee Waterway Fill, Tacoma, WA	Port of Tacoma	1993 - 1995	2,600,000	Formed part of an existing marine container cargo facility.
Eagle Harbor, Bainbridge Island, WA	Washington State Ferries	1997	20,000	Developed for use as a ferry maintenance facility.
St. Paul Waterway, Tacoma, WA	Simpson Tacoma Kraft Company	2003 – 2005	650,000	Accepted sediment from the Thea Foss Waterway Superfund Site
Slip 1 CDF, Tacoma, WA	Port of Tacoma	2002 – 2004	1,000,000	Accepted sediment from multiple users including various Tacoma Superfund sites
Terminal 91, Seattle, WA	Port of Seattle	1985	600,000	Marine Terminal

Primary CDF Design Elements

- Physical Containment
  - Berms and Dikes retain sediments laterally
  - Various designs utilized
- Water management
  - High water content of sediments requires water management during filling
  - Water may migrate through berm or over a weir
- Environmental protection through control methods
  - Contaminant migration pathways include effluent, seepage/leachate, bioaccumulation and volatilization
  - A range of approaches have been utilized to control contaminant releases
  - Barriers, caps, operational controls, effluent treatment

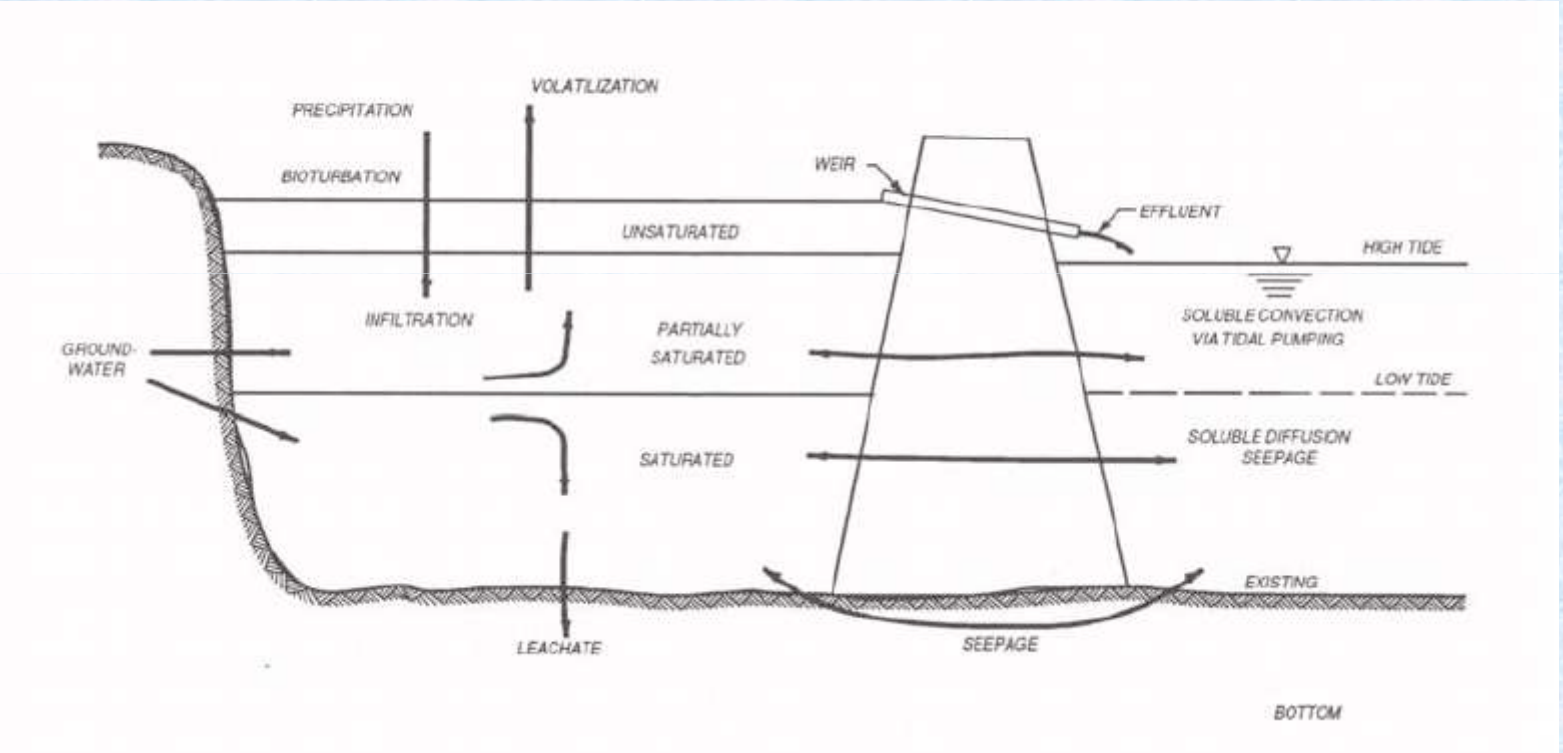
CDF Operation and Maintenance

- Dredged material placement
  - Dependent on type of dredging (hydraulic vs. mechanical)
- Dewatering and consolidation
  - Water generated during placement is typically managed prior to discharge
- Long term management
  - Dependent on land use
- Monitoring
  - Environmental monitoring
  - Structural monitoring

How is safety ensured?

- Ensure protectiveness through:
  - Design criteria address major flood events and earthquakes
  - Minimize contaminant transport through the berm
  - Waste acceptance criteria
  - Appropriate performance standards
  - Long term monitoring requirements

CDF Release Mechanisms



Environmental Protection Controls

- Effluent and seepage are the primary contaminant migration pathways
- Effluent Management (Operational Controls)
  - Reduce the amount of water generated during dredging and filling
  - Solids management prior to discharge
- Seepage Management (Long-Term Controls)
  - Placement sequencing
    - Encapsulate more contaminated material with less contaminated material
  - Other Options
    - Strategic placement of materials
    - Controlling effluent discharges
    - Capping with a low permeable cover
    - Reactive treatment barriers
    - Hydraulic controls – cut-off walls and wick drains

Monitoring Requirements

- Operational monitoring:
  - Monitor effluent or receiving water body during filling operations
  - Dewatering and consolidation are typically not monitored
- Long-Term monitoring
  - Groundwater monitoring within berm
  - Structural inspection
  - Inspection following major events (e.g., flood, earthquake)

CDF Monitoring Results

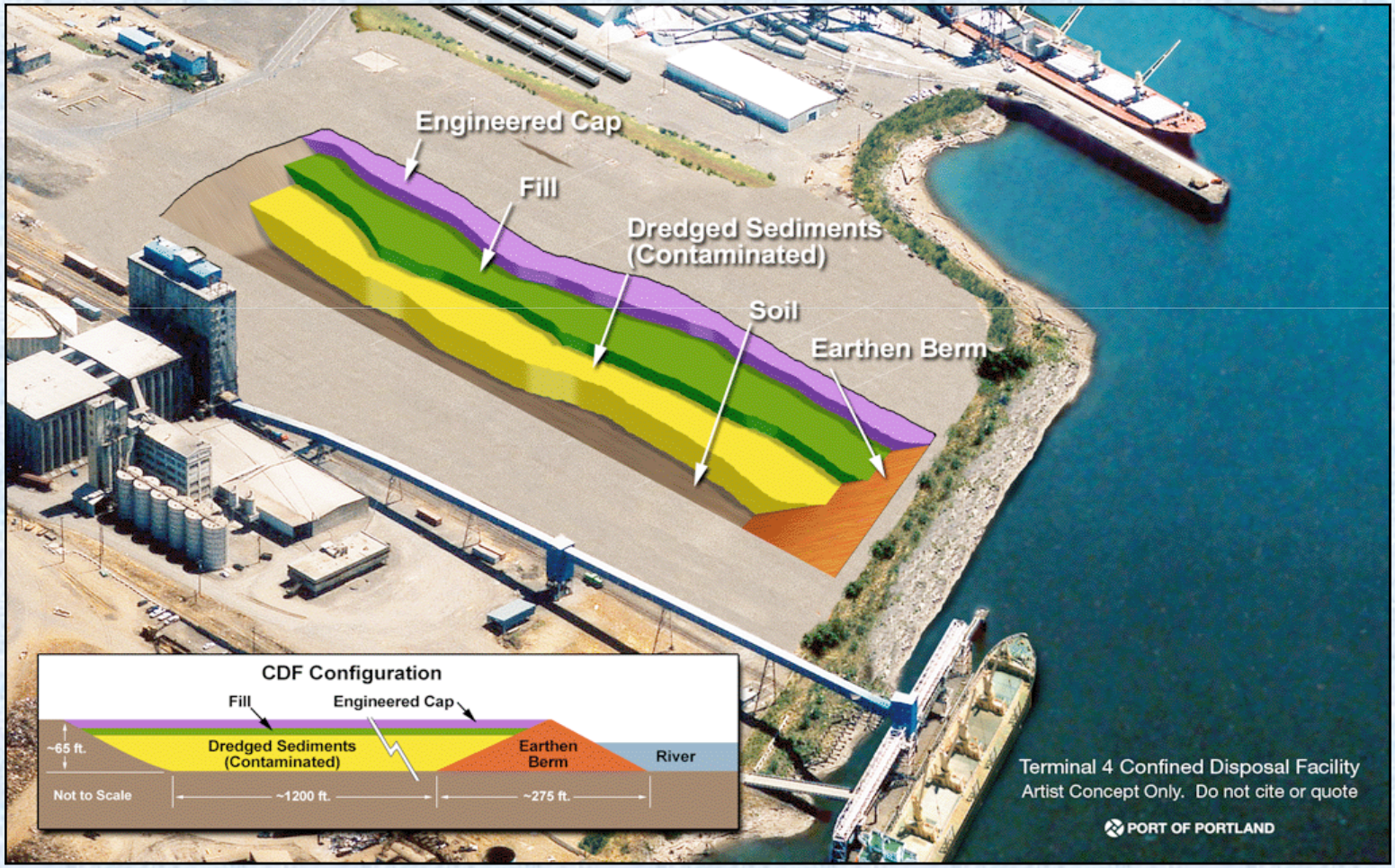
- CDF Monitoring historically focused on:
  - Structural integrity
  - Dredged material placement
  - Effluent monitoring
- CDF monitoring data for seepage through the berm is available
  - Sawyer Street CDF – New Bedford Harbor Site
    - Monitoring wells established within berm
    - Monitoring for VOCs, PCBs and metals have met standards
  - Wyckoff Eagle Harbor –
    - Early detection of metals, however, recent monitoring suggests that CDF is protective

Potential Portland Harbor CDFs

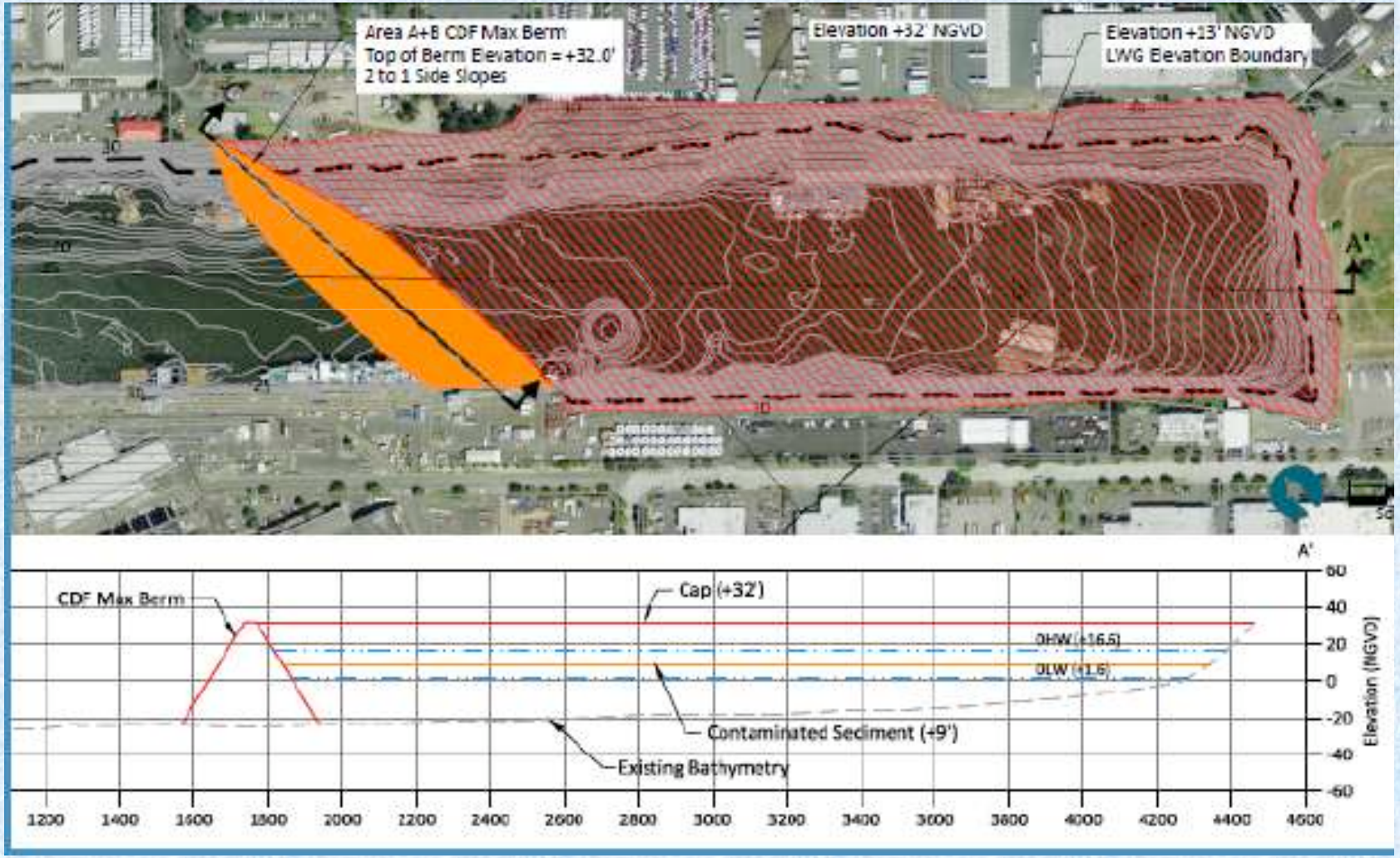
- Terminal 4
  - To be constructed as part of early action (after Record of Decision)
  - CDF design is underway
- Swan Island Lagoon
- Arkema

Disposal Site	Approximate Capacity (cy)	Berm Face Area (sf)	Top of Cap Elevation (ft NVGD)
Terminal 4	870,000	38,000	33.2
Swan Island	1,359,000	63,000	32
Arkema (one berth)	55,000	45,000	32.5
Arkema (two berth)	164,000	65,000	32.5

T4 CDF Conceptual Design

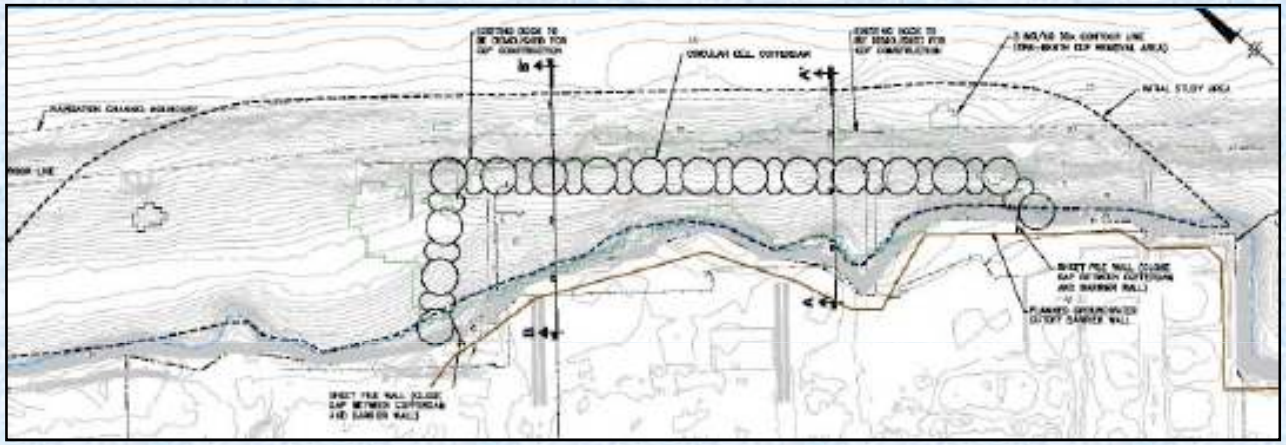


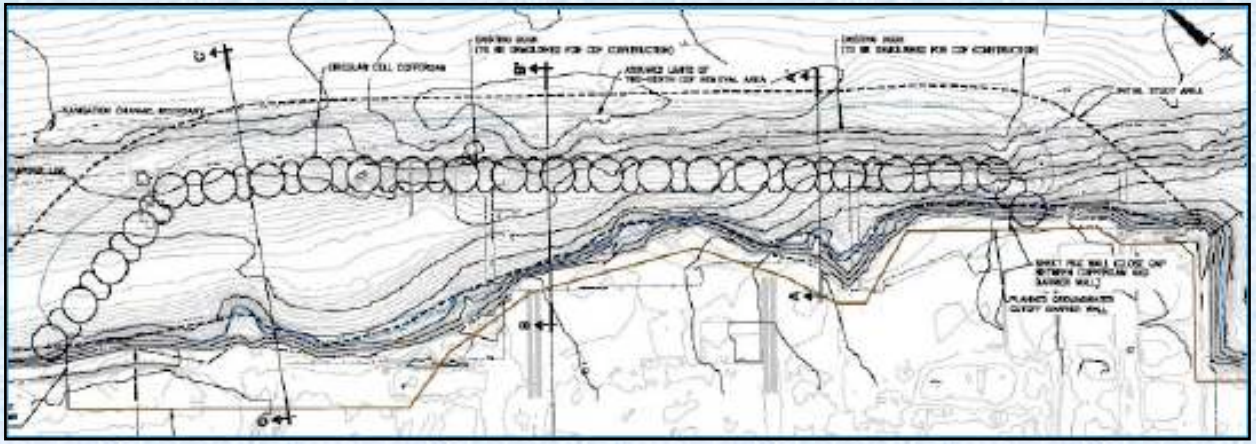
Swan Island Lagoon
CDF Conceptual Design



Arkema CDF Conceptual Designs

One Berth





Two Berths

Performance Standards and Monitoring

- Portland Harbor performance standards
  - Achieve WQS within berm and within receiving water body
    - Fish consumption AWQC for shellfish consumption
    - Chronic AWQC for aquatic life protection
  - Minimize impacts to fish and wildlife by removing fish from slip before and after berm construction
  - Sediment acceptance criteria to minimize contaminant discharge through berm
    - Highly mobile constituents will not be placed within the CDF
- Operational Monitoring
  - Monitoring to ensure that water discharges during filling operations do not exceed AWQC

Benefits of CDFs

- Management of sediments at limited number of closely monitored locations
- Close proximity to dredging operations increased work accomplished during limited fish window
- Lower transportation and handling costs than upland disposal in landfills
- Potential for creating developable land and/or shallow water habitat

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