

A New Floating Dry Dock for San Diego Bay: Design and Implementation of A Multi-Phased Study to Maximize the Beneficial Reuse of Sediment

October 27, 2017



wood.



Kimbrie Gobbi and Barry Snyder
Amec Foster Wheeler
(now part of the Wood Group)
Sandor Halvax
BAE Systems San Diego Ship Repair

Kimbrie.Gobbi@woodplc.com

(858) 300-4326



Project location

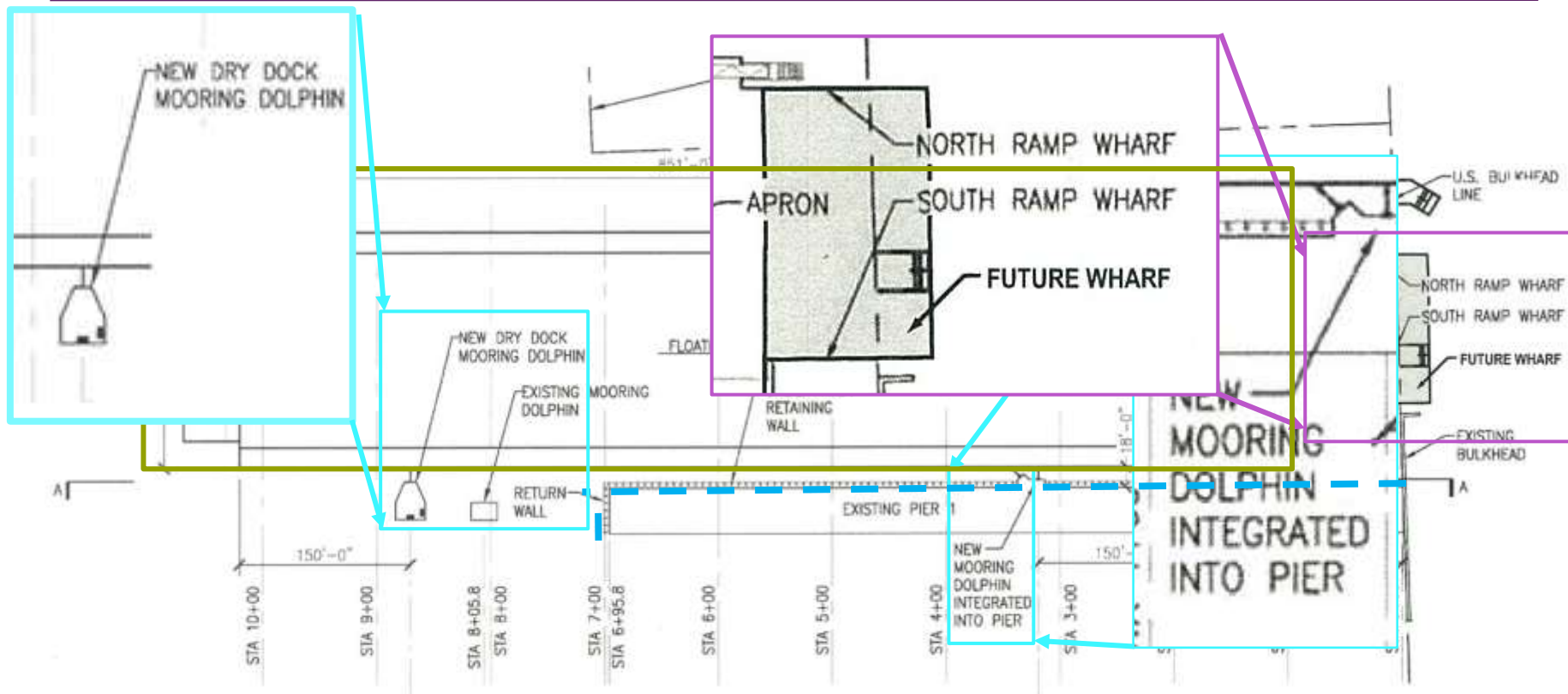


Project: Pier 1 North Dry Dock Installation: Project Need and Importance

- The US Navy plans to rebalance assets to support a strategic pivot towards Asia Pacific
 - 19 additional ships will be homeported to San Diego by 2020
 - Not enough dry dock capacity to support this shift!
 - The Port of San Diego is the **only** California port with US Navy industrial repair capacity, if future capacity needs cannot be met, the Navy would have to go elsewhere (likely outside California) for repairs ☹️
 - Additional capacity would allow the Navy ship's force to stay in San Diego (and near their families) during the dry dock repair period
 - Often ≥ 6 months long



Pier 1 North Dry Dock Project: Project Elements



► Dredging

- -65 feet MLLW
- 395,000 yds³ of dredging

► Disposal

- Beneficial Reuse
- Ocean
- Upland

Pier 1 North Dry Dock: Purpose and Use



Pier 1 North Dry Dock: Purpose and Use



Pier 1 North Dry Dock: Project Timeline

- **Request for Proposal – Early 2015**

- Environmental Impact Report

- Technical Reports

- Dredged Material Characterization Study
- Geotechnical Study



- Environmental Analysis

- Project Engineering Design

- Construction and Dredging
- Eelgrass Mitigation Site



- Permitting

- Dredging and Construction



- ▶ Dry Dock under construction and scheduled to arrive “in the 4th Quarter of 2016”

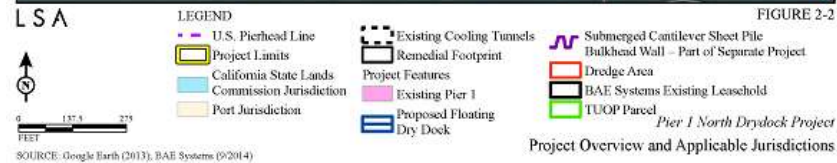


- ▶ New Orleans scheduled to arrive February or March 2017!

Pier 1 North Dry Dock Project: Regulatory Setting

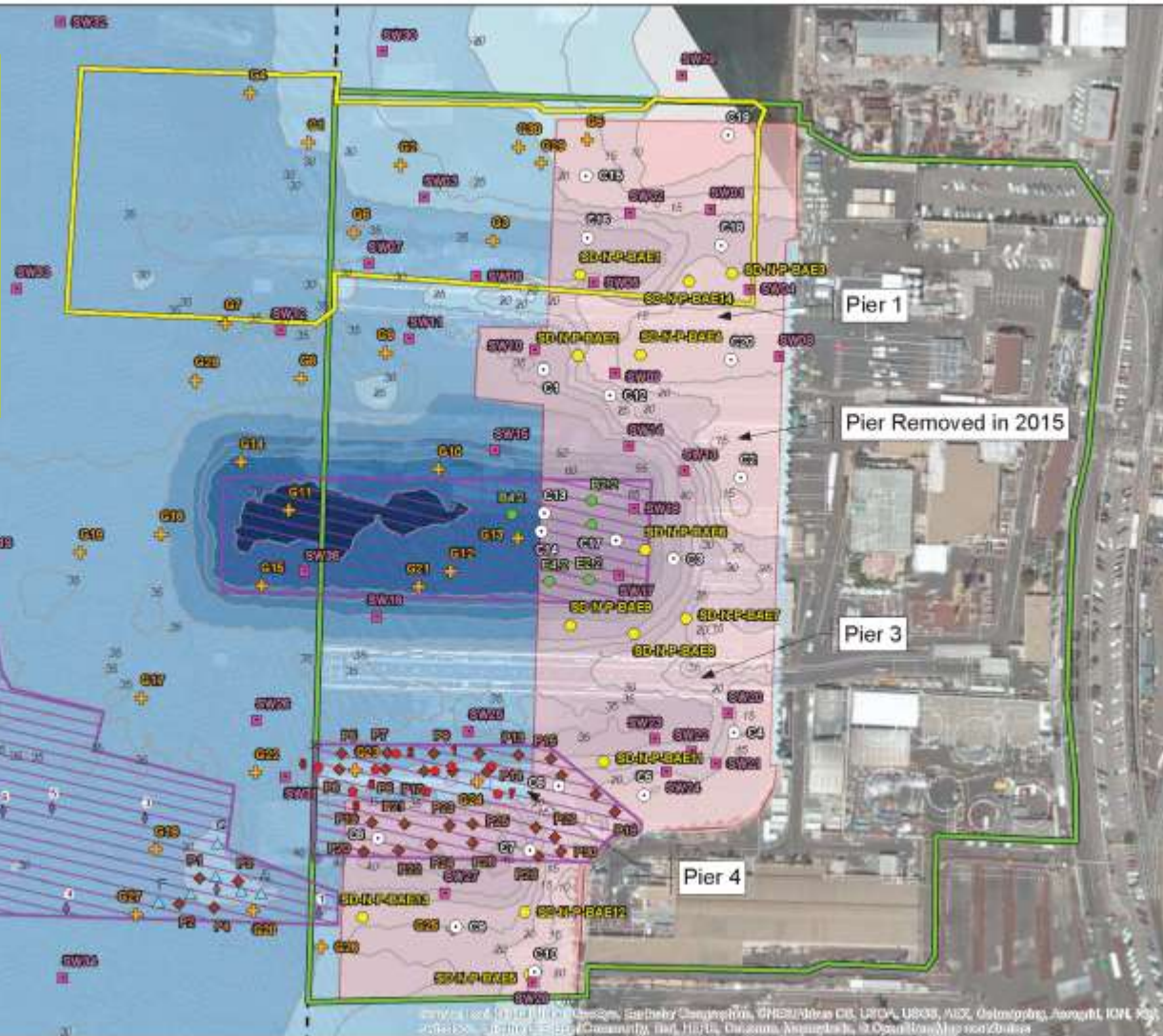
- ▶ Project footprint overlaps with multiple jurisdictional areas
 - ▶ Port of San Diego
 - ▶ State Lands
- ▶ Shipyards Project Cleanup and Abatement Area
 - ▶ Dredging simultaneously with dry dock site characterization
 - ▶ Mitigation for impacts required for both projects

Cleanup and Abatement Order (CAO) Area



BAE Systems San Diego Ship Repair Environmental data

*Environmental
Sampling Data
for Sediments
Available from
multiple
projects
between 2001
and 2013*



Amec Foster Wheeler Project approach/activities

Pile Driving!

Dredging!

Multi-Phased Study

- ▶ Determine aquatic disposal suitability
- ▶ Maximize beneficial reuse
- ▶ Minimize material placed in upland landfill
- ▶ Obtain project permits in an accelerated timeframe

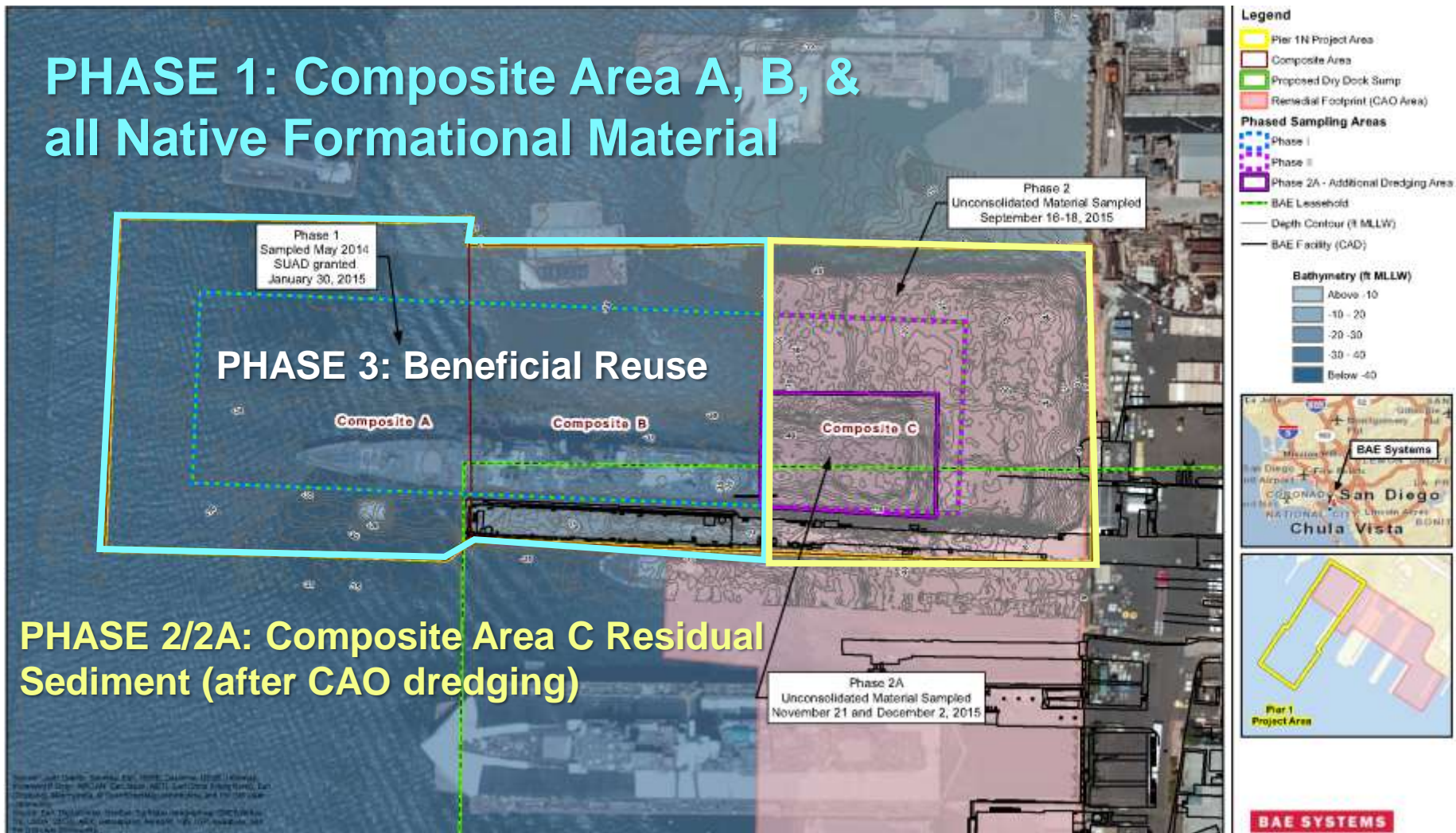
Sediment characterization

Project phases

PHASE 1: Composite Area A, B, & all Native Formational Material

PHASE 3: Beneficial Reuse

PHASE 2/2A: Composite Area C Residual Sediment (after CAO dredging)





Sediment sampling

► Equipment

- Vibracore
- Drill - Diedrich D50 drill rig with a hollow stem auger

► Analysis approach – Phase 1&2

- GOAL: To Optimize Beneficial Reuse or Ocean Disposal
- Abbreviated Tier II
- Green Book Tier III
 - Chemical
 - Physical
 - Toxicological
 - Bioaccumulation
- Landfill approval – Phase 2/2A
 - Waste Acceptance Guidelines
- Beneficial Reuse Applicability

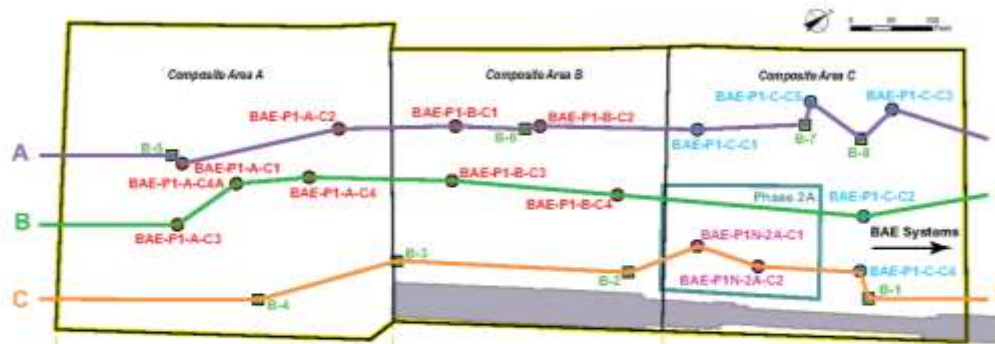


Let me blow that up for you...



Project outcome: analysis results

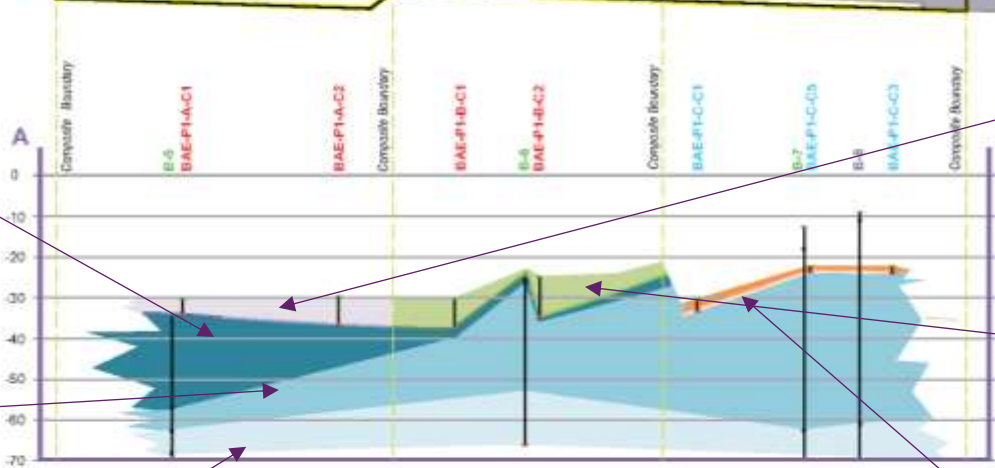
Composite A		
Arsenic	mg/kg	4.19
Cadmium	mg/kg	ND <0.134
Chromium	mg/kg	9.02
Copper	mg/kg	13.4
Lead	mg/kg	5.99
Mercury	mg/kg	0.100
Nickel	mg/kg	5.22
Selenium	mg/kg	ND <0.134
Silver	mg/kg	ND <0.134
Zinc	mg/kg	35.3
TPH	mg/kg	ND <6.60
TRPH	mg/kg	50.0
Total PAHs	µg/kg	244
Total PCBs	µg/kg	25.4
Total DDTs	µg/kg	ND
nbutyltin	µg/kg	6.70



Recent Bay and Holocene Deposits

Younger Quaternary Deposits

Older Quaternary Deposits



Composite Area A (Phase 1)

Composite Area B (Phase 1)

Composite Area C (Phase 2/2A)

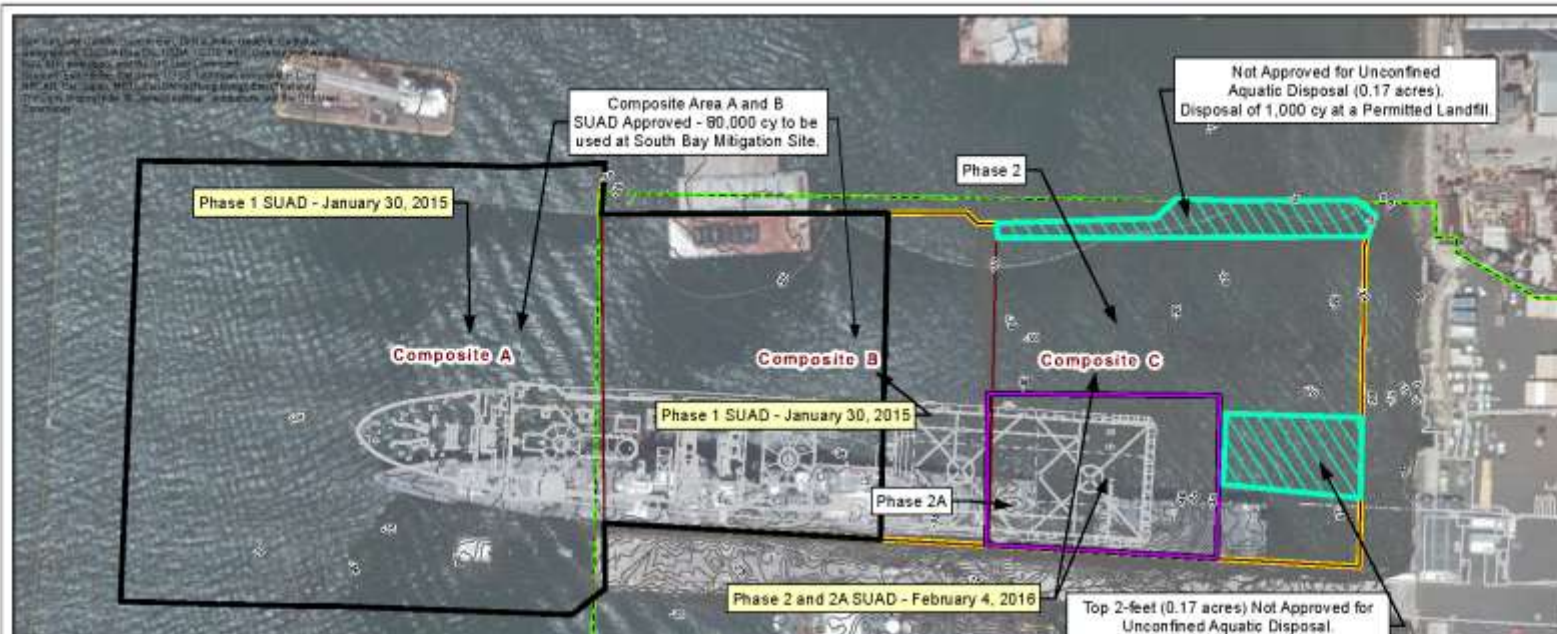
LEGEND			
Composite A	Composite B	BAE-GT-Comp A	Composite C
Subcomposite A1	Subcomposite B1	BAE-GT-Comp B	Subcomposite C1
Subcomposite A2	Subcomposite B2	BAE-GT-Comp C	Subcomposite C2
Sample Penetration	Boring	Vibracore	Estimated Project Boundary

Note: No geotechnical samples were tested between 0-10 feet below ground surface for the sediment characterization study.



amec
foster
wheeler

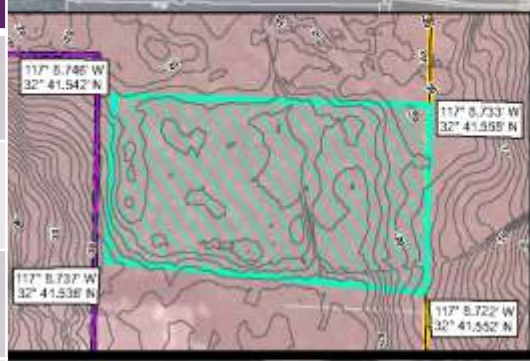
Disposal suitability determination



- Legend**
- Pier 1N Project Area
 - Composite Area
 - Phase 2A - Dredging Area (0.61 acre)
 - No Unconfined Aquatic Disposal (0.34 acres)
 - Eelgrass Mitigation Disposal Site
 - BAE Leasehold
 - BAE Facility (CAD)
 - Depth Contour (ft MLLW)

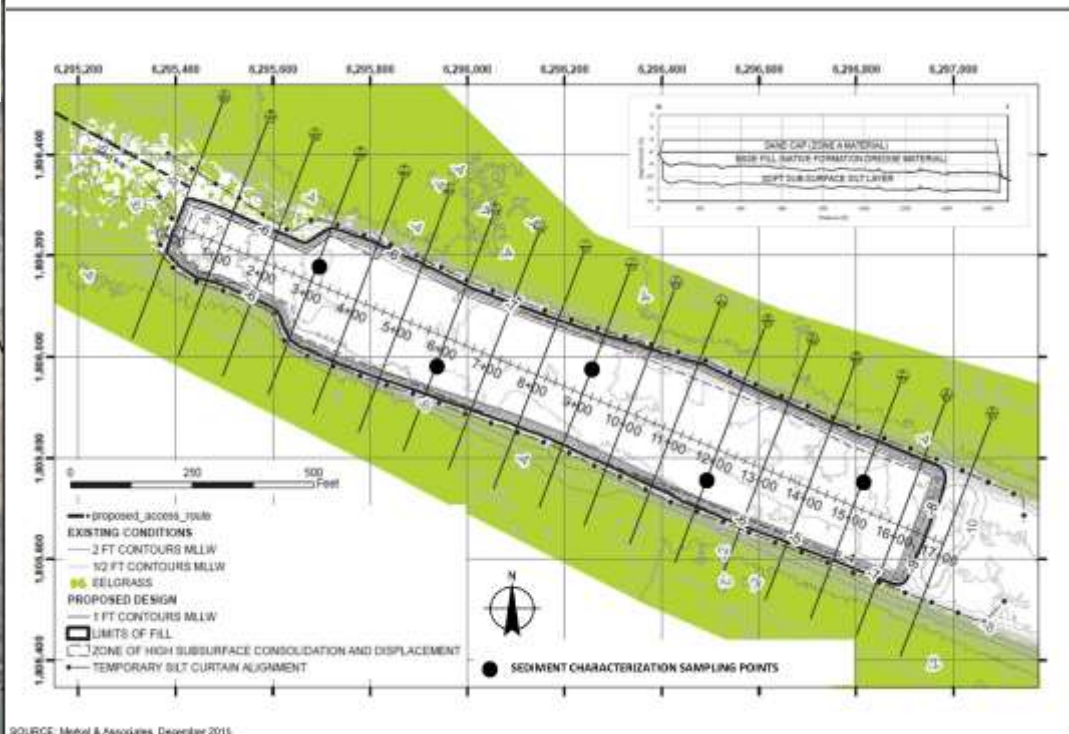


Dredge area	SUAD volume	NUAD volume	Dredge area total
Composite Area A	153,805	0	153,805
Composite Area B	132,582	0	132,582
Composite Area C	107,453	2,160	108,613
Total	393,840	2,160	395,000



Sediment characterization

Project phases - Phase 3



SOURCE: Merkel & Associates, December 2015

Designed by: Merkel & Associates

Beneficial reuse site

Planning and design

Spill barge placement of project dredge material at mitigation site

- 6.5 acres of eelgrass habitat created
 - Raised existing San Diego Bay bottom from ~-11 feet mean lower low water to -4 feet mean lower low water
- Perimeter turbidity curtain used during construction
 - Silt control
 - Prevent impacts to wildlife
- Local harvesting and replanting following settlement of dredge material

Regulatory requirements

- 5 years of monitoring
- Conservation of site in perpetuity



Environmental considerations

- ▶ Turtles
- ▶ Birds
- ▶ Eelgrass
- ▶ Essential fish habitat
- ▶ Water quality
- ▶ Shading
- ▶ Noise
- ▶ Traffic
- ▶ Air quality
- ▶ Hazards and hazardous materials
- ▶ Aesthetics





amec
foster
wheeler

Welcome to the San Diego Bay!

Pride of California

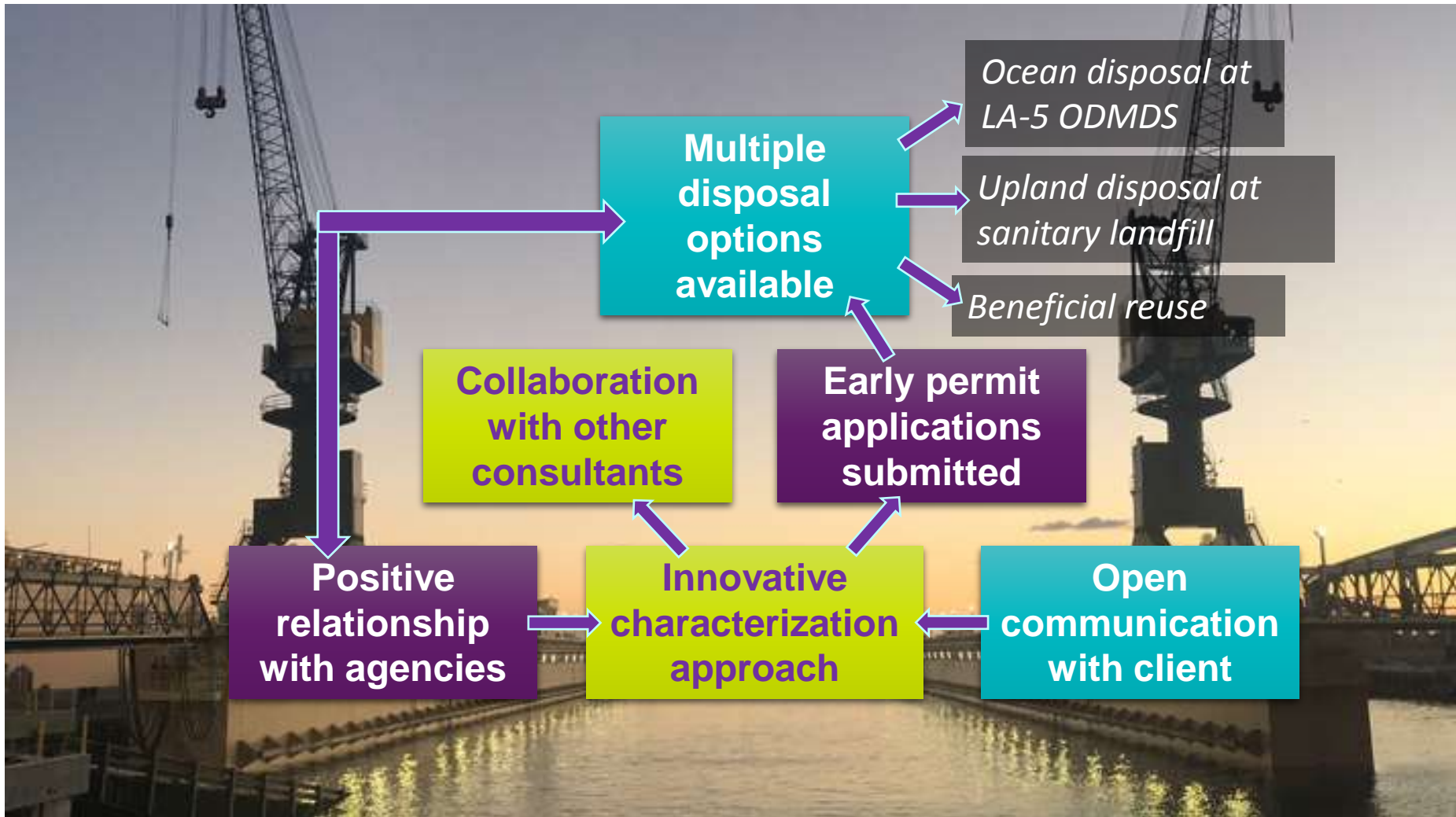
Kimbrie Gobbi
Amec Foster Wheeler
Environment & Infrastructure
(now part of the Wood Group)
Kimbrie.Gobbi@woodplc.com
(858) 300-4326

• Environmental Features

- LED Lighting throughout Structure
- Storm water Recovery Systems
- Non-toxic underwater hull and ballast tank coating (paint)

- Closed-loop salt water fire protection and cooling systems
- Air-cooled emergency back-up generators

Pier 1 North Dry Dock Project: Building blocks of project success



Questions and Acknowledgements

- Huge Thank You to:
- BAE Systems San Diego Ship Repair
- The following agencies:
 - USACE, USEPA, San Diego Regional Water Board, California Coastal Commission, the California State Lands Commission, as well as the San Diego Unified Port District;
- Our friends and fellow consultants at:
 - LSA, Anchor QEA, TerraCosta (and Pacific Drilling), Merkel & Associates, Tierra Data (Pi Environmental and Six Service Scientific);
- The contractor, engineers, and dredgers at RE Stait;
- Republic Landfill
- Our subcontractors:
 - Seaventures, TEG Oceanographic Services, Eurofins Calscience International, and Nautilus Environmental
 - ... and many more!

Questions

Project approach/activities

Challenges

- ▶ Schedules
 - ▶ Active Shipyard
 - ▶ Tight timeline
 - ▶ Permitting
- ▶ Complicated sample collection
- ▶ Footprint overlapped with multiple jurisdictional areas
 - ▶ Cleanup and Abatement Order
 - ▶ Need for mitigation
 - ▶ Multiple permits required
- ▶ Local residential community interest (light, noise, traffic, diesel, particulate matter)

Solutions

- ▶ Communication
 - ▶ Advance coordination with shipyard and agencies
 - ▶ Phased approach avoided potential sampling complications
 - ▶ Project designed to maximize area evaluated while streamlining disposal approval process
- ▶ A variety of specialized marine sampling equipment were used to characterize all sediment types
- ▶ Integrated project plan
 - ▶ Mitigation designed to fulfill needs of Drydock and CAO
 - ▶ Permit applications submitted as soon as possible (possible due to phased approach)
- ▶ Public Notice and meetings



San Diego Bay beneficial reuse projects

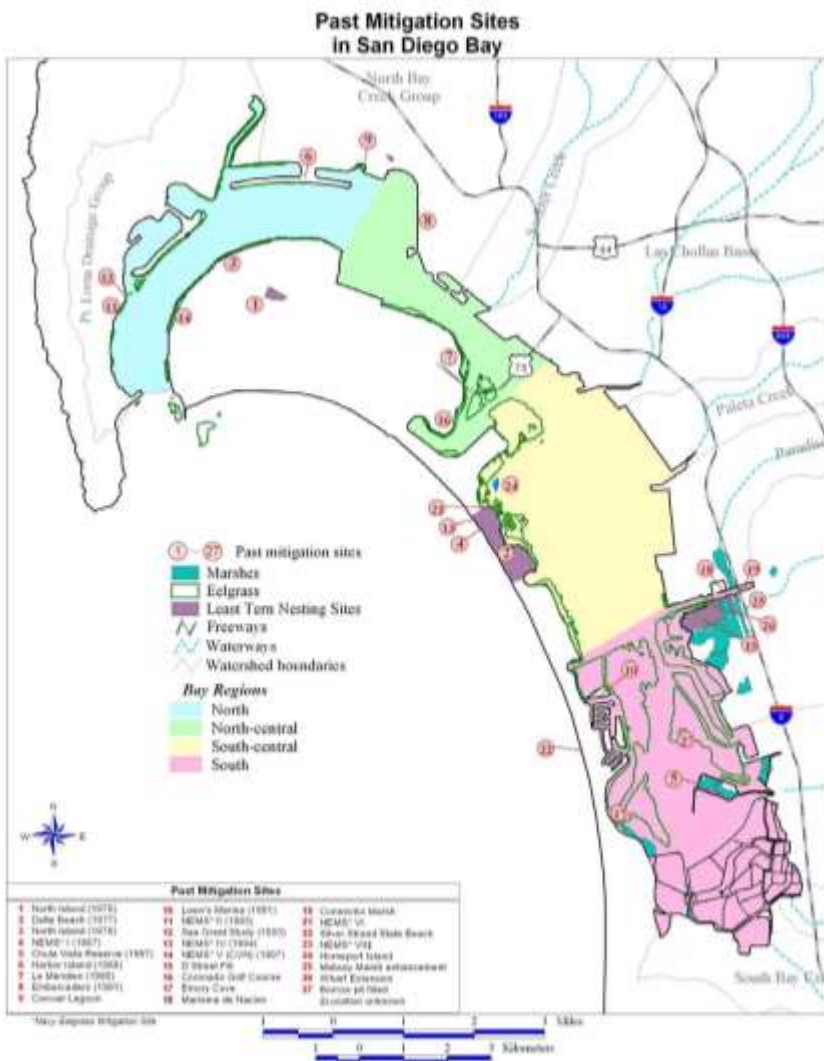


Table 4-4. Candidate enhancement and opportunity areas. Modified from Restoration & Enhancement Plan To Benefit the Bay's Natural Resources (2008).

Area	Description and Possible Enhancement Opportunities/Constraints
1-3 D Street FA, Chula Vista (1975) and Mission (1975)	Area of approximately 100 acres (20 ha) of bridge span from Sweetwater Channel. Formerly currently degraded for least tern nesting and other areas designated as critical habitat by the western gull recovery National City when urban expansion was halted by creating wetlands and planted salt-tolerant vegetation and grass along northern margin of D Street/Sweetwater Channel. Enhancement Potential: Create additional habitat and create additional wetland (20ha, 30 acres) (10 to 12 ha). Possible Constraints: Must balance such enhancement with needs of existing and planned wetlands and other critical habitat.
2-Guyver Point (1976) (NMA)	4.8-acre (1.9 ha) island of coastal lagoon and marine sediment and marshland with small areas of intertidal salt marsh and High Enhancement Potential. The San Diego Bay NMA CIP proposes a range of intertidal wetland and estuarine habitat including creation of riprapped tidal mudflats of salt marsh habitat. Subsets of riprapped wetland for riprapped transition habitat. Possible Constraints: Subsets of salt marsh (10 to 12 ha) may result in problems associated with improved wetland protection of the salt marsh and rocky shore.
3 T & O Street Marsh enhancement and associated wetlands (1976) (NMA)	Located in Chula Vista near Ft. Seward. Extensive salt marsh at T Street and partly submerged wetland marsh on O Street, both currently in small, ineffective culvert. The Chula Vista Bayfront Master Plan development, an ongoing waterfront area including work. Enhancement Potential: Create an additional salt marsh, create ridge islands, create secondary tidal channels, and expand expansion of the salt marsh. Expansion of T Street marsh into the riprapped transition zone. Needs riprapped flushing, possibly by two-stage culvert and channel between culvert and Bay. Needs clearing of wetland, both. Chula Vista is a combination of urban-urban habitat. Possible Constraints: Question regarding current habitat conditions and possible impacts associated with enhancement projects. Subsets of salt marsh.
4-2 Street marsh, connector marsh, and associated wetlands	Intertidal mudflat and low-lying salt marsh and riprapped transition located adjacent to South Bay Power Plant on 2 Street. The Chula Vista Bayfront Master Plan development, an ongoing waterfront area including work. Enhancement Potential: Expansion of the marsh into the riprapped transition zone.
5-CORR	Remains was created from bridge spans from construction of the Chula Vista Bridge. Created by connecting riprapped areas between and a ring system in a substantial area of South Bay. The Chula Vista Bayfront Master Plan development, an ongoing waterfront area including work. Enhancement Potential: Riprapped salt marsh system. Create additional wetland, create ridge islands, create secondary tidal channels, and expand expansion of the salt marsh. Needs riprapped flushing, possibly by two-stage culvert and channel between culvert and Bay. Needs clearing of wetland, both. Chula Vista is a combination of urban-urban habitat. Possible Constraints: Expansion of salt marsh (10 to 12 ha) may result in problems associated with improved wetland protection of the salt marsh and rocky shore. Subsets of salt marsh (10 to 12 ha) may result in problems associated with improved wetland protection of the salt marsh and rocky shore.
6-South Bay San Diego Bay (1976) (NMA)	One of the largest areas of tidal marsh in San Diego Bay, near the South San Diego Bay NMA. Enhancement Potential: The San Diego Bay NMA CIP proposes a range of intertidal wetland and estuarine habitat including riprapped wetland and estuarine wetlands, enhancing the riprapped habitat at the mouth of the Chula Vista, creating riprapped, and expanding salt marsh. Possible Constraints: Impacts of enhancement projects on current habitat values for shellfish and nesting species. An intertidal wetland adjacent to the low-lying riprapped transition zone in the South San Diego Bay NMA. Enhancement Potential: The San Diego Bay NMA CIP proposes a range of intertidal wetland and estuarine habitat including riprapped wetland and estuarine wetlands, enhancing the riprapped habitat at the mouth of the Chula Vista, creating riprapped, and expanding salt marsh. Possible Constraints: Impacts of enhancement projects on current habitat values for shellfish and nesting species.
7-Low Chula Vista Reserve (1976) (NMA)	An intertidal wetland adjacent to the low-lying riprapped transition zone in the South San Diego Bay NMA. Enhancement Potential: The San Diego Bay NMA CIP proposes a range of intertidal wetland and estuarine habitat including riprapped wetland and estuarine wetlands, enhancing the riprapped habitat at the mouth of the Chula Vista, creating riprapped, and expanding salt marsh. Possible Constraints: Impacts of enhancement projects on current habitat values for shellfish and nesting species.
8- Ecological Buffer for Chula Vista Bay	Ecological buffer between the bridge and Sweetwater Channel. Enhancement Potential: Riprapped salt marsh system. Create additional wetland, create ridge islands, create secondary tidal channels, and expand expansion of the salt marsh. Needs riprapped flushing, possibly by two-stage culvert and channel between culvert and Bay. Needs clearing of wetland, both. Chula Vista is a combination of urban-urban habitat. Possible Constraints: Expansion of salt marsh (10 to 12 ha) may result in problems associated with improved wetland protection of the salt marsh and rocky shore.
9- Embury Cove and Reserve (1991)	Ecological buffer between the bridge and Sweetwater Channel. Enhancement Potential: Riprapped salt marsh system. Create additional wetland, create ridge islands, create secondary tidal channels, and expand expansion of the salt marsh. Needs riprapped flushing, possibly by two-stage culvert and channel between culvert and Bay. Needs clearing of wetland, both. Chula Vista is a combination of urban-urban habitat. Possible Constraints: Expansion of salt marsh (10 to 12 ha) may result in problems associated with improved wetland protection of the salt marsh and rocky shore.
10-Coronado Marsh (1991)	Large property that runs along the western side of Coronado Bay. Enhancement Potential: Riprapped salt marsh system. Create additional wetland, create ridge islands, create secondary tidal channels, and expand expansion of the salt marsh. Needs riprapped flushing, possibly by two-stage culvert and channel between culvert and Bay. Needs clearing of wetland, both. Chula Vista is a combination of urban-urban habitat. Possible Constraints: Expansion of salt marsh (10 to 12 ha) may result in problems associated with improved wetland protection of the salt marsh and rocky shore.
11-Coronado Wetland (1991)	Located in Coronado Bay. Enhancement Potential: Riprapped salt marsh system. Create additional wetland, create ridge islands, create secondary tidal channels, and expand expansion of the salt marsh. Needs riprapped flushing, possibly by two-stage culvert and channel between culvert and Bay. Needs clearing of wetland, both. Chula Vista is a combination of urban-urban habitat. Possible Constraints: Expansion of salt marsh (10 to 12 ha) may result in problems associated with improved wetland protection of the salt marsh and rocky shore.
12-Crown Cove (1991)	Crown Cove is a bay property in the South Bay, along the western shore. Enhancement Potential: Riprapped salt marsh system. Create additional wetland, create ridge islands, create secondary tidal channels, and expand expansion of the salt marsh. Needs riprapped flushing, possibly by two-stage culvert and channel between culvert and Bay. Needs clearing of wetland, both. Chula Vista is a combination of urban-urban habitat. Possible Constraints: Expansion of salt marsh (10 to 12 ha) may result in problems associated with improved wetland protection of the salt marsh and rocky shore.
13-Hay Field (1991)	Hay Field is a bay property located in South Bay on the western shore. Enhancement Potential: Riprapped salt marsh system. Create additional wetland, create ridge islands, create secondary tidal channels, and expand expansion of the salt marsh. Needs riprapped flushing, possibly by two-stage culvert and channel between culvert and Bay. Needs clearing of wetland, both. Chula Vista is a combination of urban-urban habitat. Possible Constraints: Expansion of salt marsh (10 to 12 ha) may result in problems associated with improved wetland protection of the salt marsh and rocky shore.
14-Lovers Cove Marsh (1991)	Located within the Lovers Cove Marsh. Enhancement Potential: Riprapped salt marsh system. Create additional wetland, create ridge islands, create secondary tidal channels, and expand expansion of the salt marsh. Needs riprapped flushing, possibly by two-stage culvert and channel between culvert and Bay. Needs clearing of wetland, both. Chula Vista is a combination of urban-urban habitat. Possible Constraints: Expansion of salt marsh (10 to 12 ha) may result in problems associated with improved wetland protection of the salt marsh and rocky shore.
15-Chula Vista Mouth (1991)	Located between NEMA and 2nd Street Road Station. Enhancement Potential: Riprapped salt marsh system. Create additional wetland, create ridge islands, create secondary tidal channels, and expand expansion of the salt marsh. Needs riprapped flushing, possibly by two-stage culvert and channel between culvert and Bay. Needs clearing of wetland, both. Chula Vista is a combination of urban-urban habitat. Possible Constraints: Expansion of salt marsh (10 to 12 ha) may result in problems associated with improved wetland protection of the salt marsh and rocky shore.
16-Chula Vista Reserve (1991)	The Chula Vista Reserve is a bay property in the South Bay, along the western shore. Enhancement Potential: Riprapped salt marsh system. Create additional wetland, create ridge islands, create secondary tidal channels, and expand expansion of the salt marsh. Needs riprapped flushing, possibly by two-stage culvert and channel between culvert and Bay. Needs clearing of wetland, both. Chula Vista is a combination of urban-urban habitat. Possible Constraints: Expansion of salt marsh (10 to 12 ha) may result in problems associated with improved wetland protection of the salt marsh and rocky shore.
17-FARM (1991)	WMA (1991) provides water for irrigation, water supply, and water treatment. Enhancement Potential: Enhance shoreline by riprapped transition, low-lying, and an additional wetland.
18-FIC (1991)	Channel is a bay property located north of the report. Enhancement Potential: Enhance the shoreline and provide ecologically beneficial shoreline structures. Riprapped salt marsh system. Create additional wetland, create ridge islands, create secondary tidal channels, and expand expansion of the salt marsh. Needs riprapped flushing, possibly by two-stage culvert and channel between culvert and Bay. Needs clearing of wetland, both. Chula Vista is a combination of urban-urban habitat. Possible Constraints: Expansion of salt marsh (10 to 12 ha) may result in problems associated with improved wetland protection of the salt marsh and rocky shore.
19-Coronado Bay (1991)	Located along T Street between the Fort Seward and the World Center. Enhancement Potential: Riprapped salt marsh system. Create additional wetland, create ridge islands, create secondary tidal channels, and expand expansion of the salt marsh. Needs riprapped flushing, possibly by two-stage culvert and channel between culvert and Bay. Needs clearing of wetland, both. Chula Vista is a combination of urban-urban habitat. Possible Constraints: Expansion of salt marsh (10 to 12 ha) may result in problems associated with improved wetland protection of the salt marsh and rocky shore.
20-Coronado Golf Course	The shoreline along the Coronado Golf Course is adjacent to Coronado Bay. Enhancement Potential: Riprapped salt marsh system. Create additional wetland, create ridge islands, create secondary tidal channels, and expand expansion of the salt marsh. Needs riprapped flushing, possibly by two-stage culvert and channel between culvert and Bay. Needs clearing of wetland, both. Chula Vista is a combination of urban-urban habitat. Possible Constraints: Expansion of salt marsh (10 to 12 ha) may result in problems associated with improved wetland protection of the salt marsh and rocky shore.
21-North (1991)	Large property located north of the report. Enhancement Potential: Riprapped salt marsh system. Create additional wetland, create ridge islands, create secondary tidal channels, and expand expansion of the salt marsh. Needs riprapped flushing, possibly by two-stage culvert and channel between culvert and Bay. Needs clearing of wetland, both. Chula Vista is a combination of urban-urban habitat. Possible Constraints: Expansion of salt marsh (10 to 12 ha) may result in problems associated with improved wetland protection of the salt marsh and rocky shore.
22-South Bay Power Plant (1991)	Power plant discharge channel is a bay property in the South Bay, along the western shore. Enhancement Potential: Riprapped salt marsh system. Create additional wetland, create ridge islands, create secondary tidal channels, and expand expansion of the salt marsh. Needs riprapped flushing, possibly by two-stage culvert and channel between culvert and Bay. Needs clearing of wetland, both. Chula Vista is a combination of urban-urban habitat. Possible Constraints: Expansion of salt marsh (10 to 12 ha) may result in problems associated with improved wetland protection of the salt marsh and rocky shore.
23-Sweetwater River Control Channel (1991)	Located on the border of National City and Chula Vista on the western shore of the Bay. Enhancement Potential: Riprapped salt marsh system. Create additional wetland, create ridge islands, create secondary tidal channels, and expand expansion of the salt marsh. Needs riprapped flushing, possibly by two-stage culvert and channel between culvert and Bay. Needs clearing of wetland, both. Chula Vista is a combination of urban-urban habitat. Possible Constraints: Expansion of salt marsh (10 to 12 ha) may result in problems associated with improved wetland protection of the salt marsh and rocky shore.
24-SF Golden Marsh (1991)	SF Golden Marsh is located in Chula Vista near the T & O Street Marsh. Enhancement Potential: Riprapped salt marsh system. Create additional wetland, create ridge islands, create secondary tidal channels, and expand expansion of the salt marsh. Needs riprapped flushing, possibly by two-stage culvert and channel between culvert and Bay. Needs clearing of wetland, both. Chula Vista is a combination of urban-urban habitat. Possible Constraints: Expansion of salt marsh (10 to 12 ha) may result in problems associated with improved wetland protection of the salt marsh and rocky shore.
25-Coronado Lagoon	Located north of the USGS station along Harbor Drive. Area 7 acres adjacent to T Street and Harbor Drive. Enhancement Potential: Riprapped salt marsh system. Create additional wetland, create ridge islands, create secondary tidal channels, and expand expansion of the salt marsh. Needs riprapped flushing, possibly by two-stage culvert and channel between culvert and Bay. Needs clearing of wetland, both. Chula Vista is a combination of urban-urban habitat. Possible Constraints: Expansion of salt marsh (10 to 12 ha) may result in problems associated with improved wetland protection of the salt marsh and rocky shore.
26-Mudflats of D Street FA and (1976)	Mudflats of D Street FA and (1976) is located south of the Sweetwater Channel. Enhancement Potential: Riprapped salt marsh system. Create additional wetland, create ridge islands, create secondary tidal channels, and expand expansion of the salt marsh. Needs riprapped flushing, possibly by two-stage culvert and channel between culvert and Bay. Needs clearing of wetland, both. Chula Vista is a combination of urban-urban habitat. Possible Constraints: Expansion of salt marsh (10 to 12 ha) may result in problems associated with improved wetland protection of the salt marsh and rocky shore.

San Diego Bay beneficial reuse projects

Future need for beneficial reuse

(limited in-water locations in SD Bay)

Port development of mitigation bank

Seaport Village Redevelopment

Harbor Island Redevelopment

Port Salt Pond 20

Homeport Island Beneficial Reuse Project

Channel deepening project for POSD/USACE – sediment placed in South Bay

National City Marine Terminal – sediment placed in South Bay

Still existing channels to be filled in

Navy Pier 5000 Silver Strand

Ballast Point routine beneficial reuse