



St. Louis River AOC Remediation Lead Sites

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St. Louis River AOC

Remediation Sites

Remediation Category

-  Voluntary Site
-  Remedial Site
-  Remedial Action Monitoring
-  Navigation Channel



Minnesota Slip
Slip 2
Slip 3
Slip C

AGP Slip
Azcon Corp & DSPA Slip
DSPA Garfield Slip D

Scanlon Reservoir

Thomson Reservoir

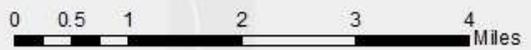
Ponds Behind Erie Pier

SLRIDT

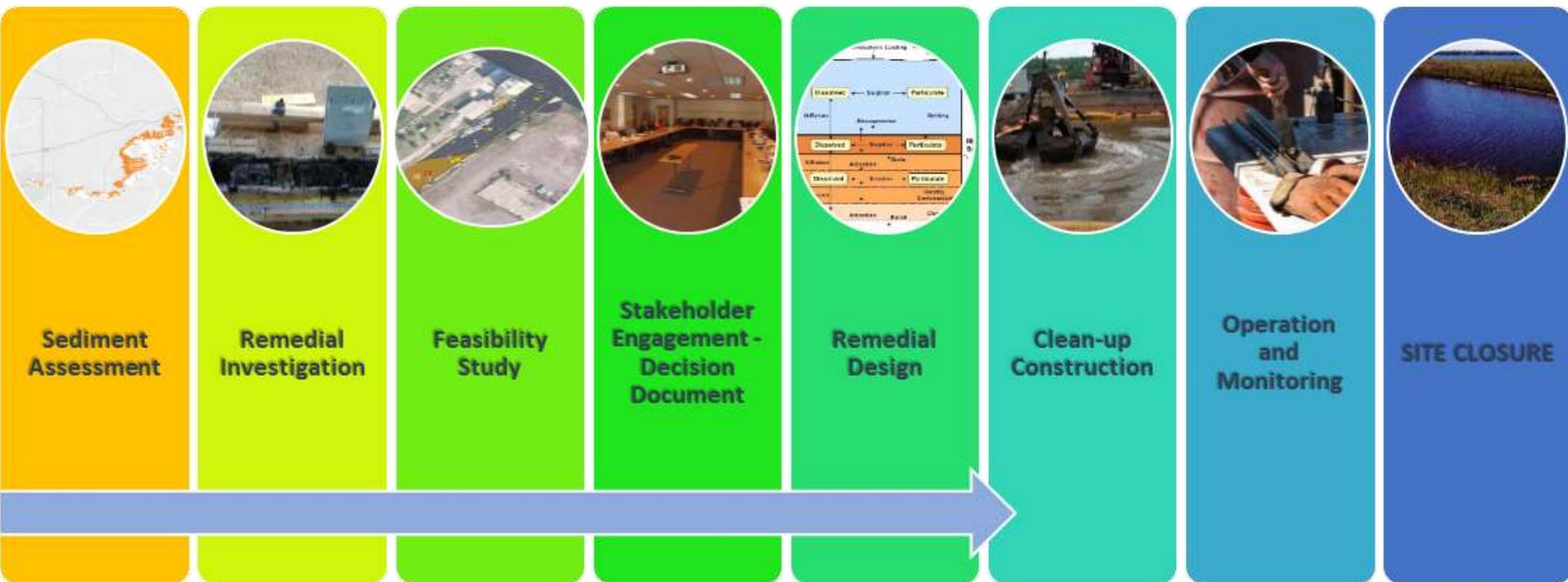
Munger Landing

U.S. Steel

Mud Lake West



MN AOC Contaminated Sediment Remediation



Project Remedial Action Objectives (RAOs)

Cleanup Objectives

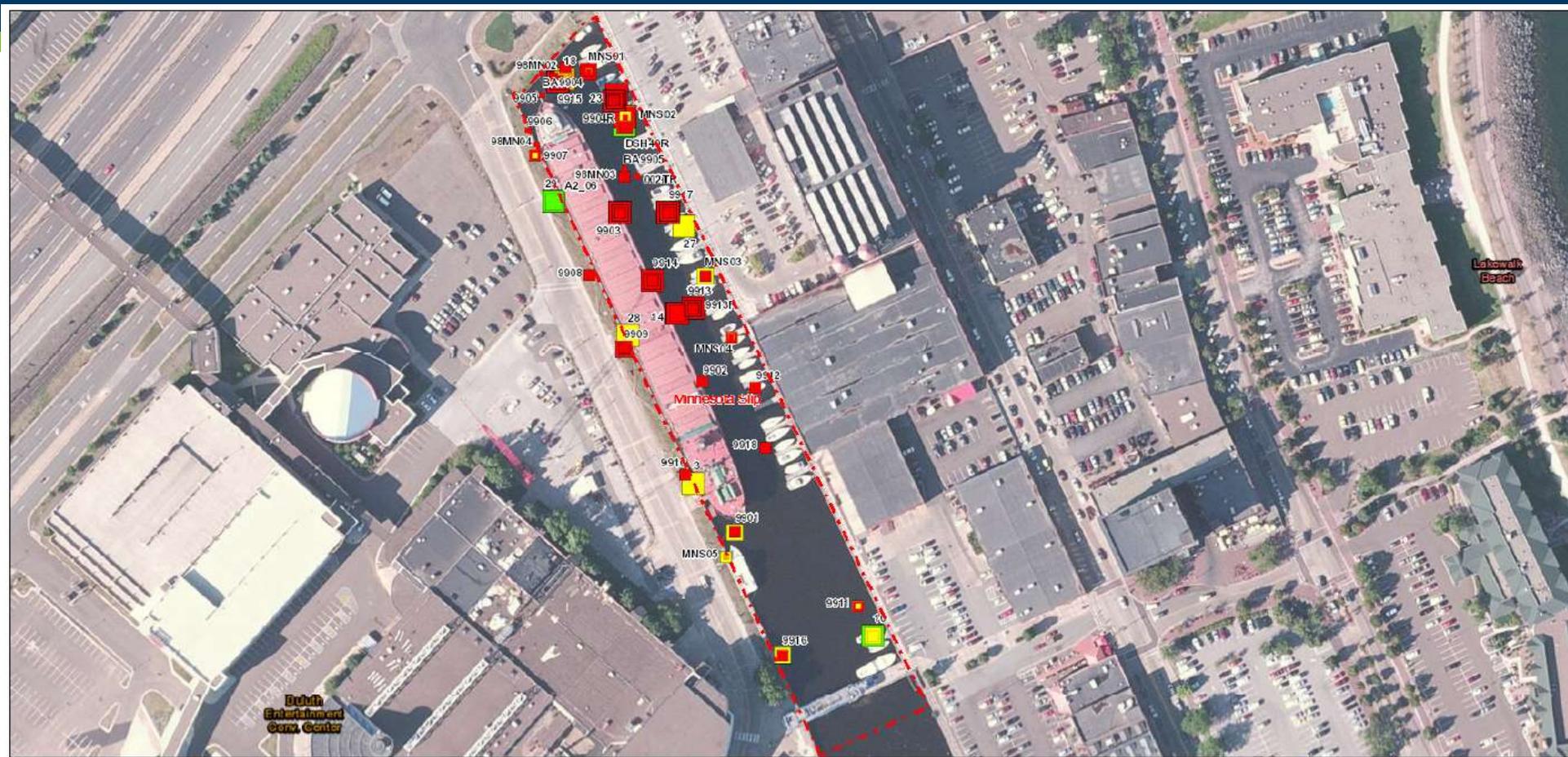
1. Minimize or remove exposure to sediment contaminants that bioaccumulate in the food chain and contribute to fish consumption advisories.
2. Minimize or remove exposure of the benthic organisms to contaminated sediments above sediment cleanup goals.
3. Preserve water depth to enable the current and/or planned use of the site.
4. Enhance aquatic habitat, if conditions allow, in a manner that contributes to the removal of beneficial use impairments (BUIs).

Minnesota Slip



- An active manmade Slip located at the mouth of the St. Louis River in the Duluth Harbor
- Charter fishing and recreation boat marina
- 3.25 acres
- S.S. William A. Irvin, former United States Steel flag ship, floating marine museum
- Vista Fleet seasonal harbor cruise vessels
- Pedestrian drawbridge
- Five active storm sewers
- 4 public and private property owners
- Active tourism area

Historical Assessment Chemistry PEC-Q 1999-2005



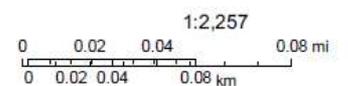
May 5, 2017

- Site Boundaries
- < Level 1
- Level 1
- Level 2
- Midpoint

- Mean PEC-Q SQT: 15-50cm Historical**
- < Level 1
 - Level 1
 - Level 2
 - Midpoint
- Mean PEC-Q SQT: 50-100cm Historical**
- < Level 1

- Mean PEC-Q SQT: Greater than 100cm Historical**
- < Level 1
 - Level 1

- Level 2
- Midpoint



Bay West, MPCAs
 Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors,
 and the GIS user community
 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics,
 CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User

Minnesota Slip



Alternative 4 - Slip Leveling & 3 ft. Cap

- Move 2,500 yds³ Contaminated Sediments
- Place 3 ft Cap of Clean Material
- No Disposal of Contaminated Sediments
- Leave 36,750 yds³ Contaminated Sediments
- \$1.6 million

Bioactive Zone - new material for aquatic bug/plant growth

CAP

Isolation Zone - Sandy Material

Contaminated Sediments

NOT TO SCALE

Contaminants of Concern: mercury, cadmium, chromium, copper, lead, nickel, zinc, PCBs (polychlorinated biphenyl), and PAHs (polycyclic aromatic hydrocarbons) are considered the primary COCs

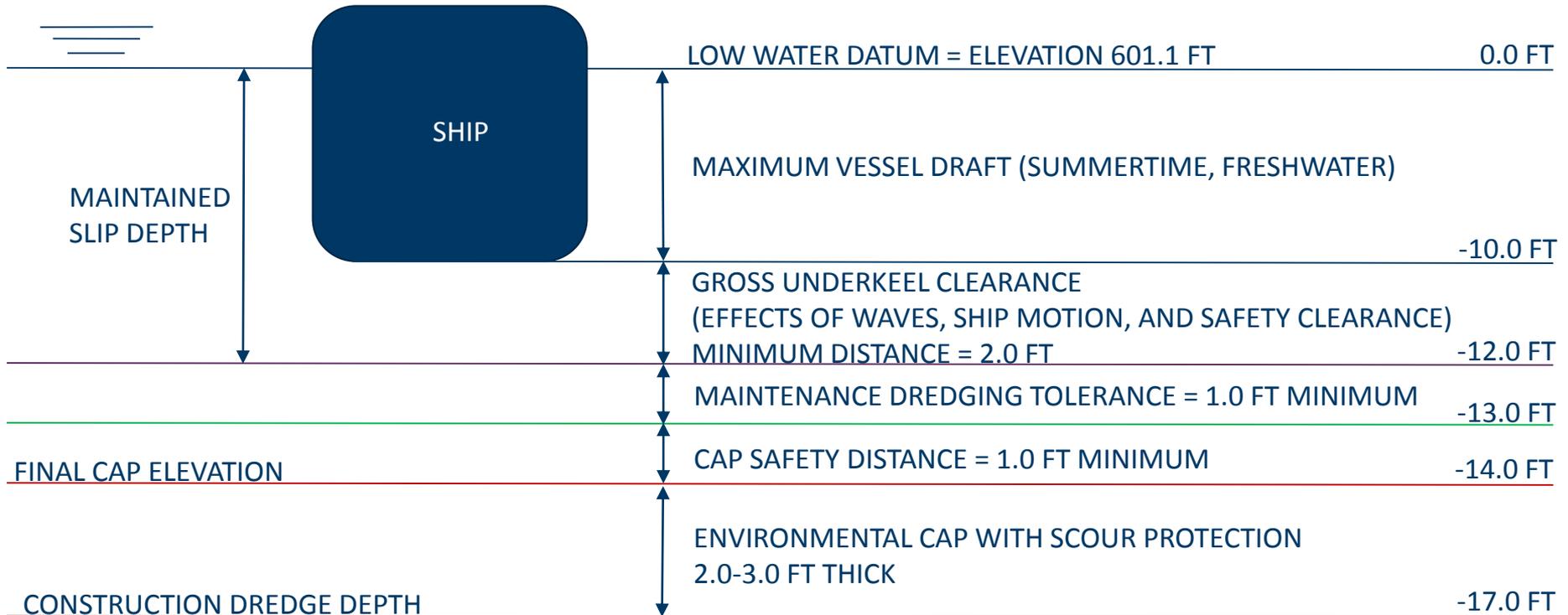
Estimated Volume of Contaminated Sediment: 37,000 cubic yds.

Selected Alternative 4: Slip Leveling with 0.8 meter Cap - \$5,500,000

Construction Schedule: October – November 2018

Conceptual Design

MAXIMUM DREDGE DEPTH IN MINNEOSTA SLIP FOR CUT AND FILL BALANCE



Slip 3



- An active manmade Slip located near the mouth of the St. Louis River in the Duluth Harbor
- 2.75 acres
- Pier B Resort Hotel to the East
- Vacant Lot D to the West- mixed-use residential/commercial development plan under consideration
- 2 storm drains from Pier B (surface water)



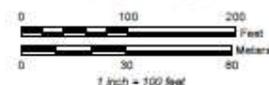
Figure 5

Total PAH Concentration Map

**Slip 3
SLR Sediment AOCs
Duluth, MN**



Map Projection: NAD 1983 UTM Zone 15 N
Basemap: Bing Aerial Imagery WMS



- Bathymetry Elevation Contour (2ft Intervals)
- Sanitary Sewer
- Storm Sewer
- Slip 3 Site Boundary

Historical Sample Interval (2010/2014)

- □ 0-0.15 m
- □ 0.15-0.50 m
- □ 0.50-1.0 m
- □ >1.0 m

Total PAH SQT Comparison

- Does not exceed Level 1 SQT (1600 µg/kg)
- Exceeds Level 1 SQT (1600 µg/kg)
- Exceeds Midpoint SQT (12300 µg/kg)
- Exceeds Level 2 SQT (23000 µg/kg)

Total PAH SQT Exceedance Areas

- Estimated Area Exceeding Midpoint SQT (0.83 Acres)
- Estimated Area Exceeding Level II SQT (0.51 Acres)

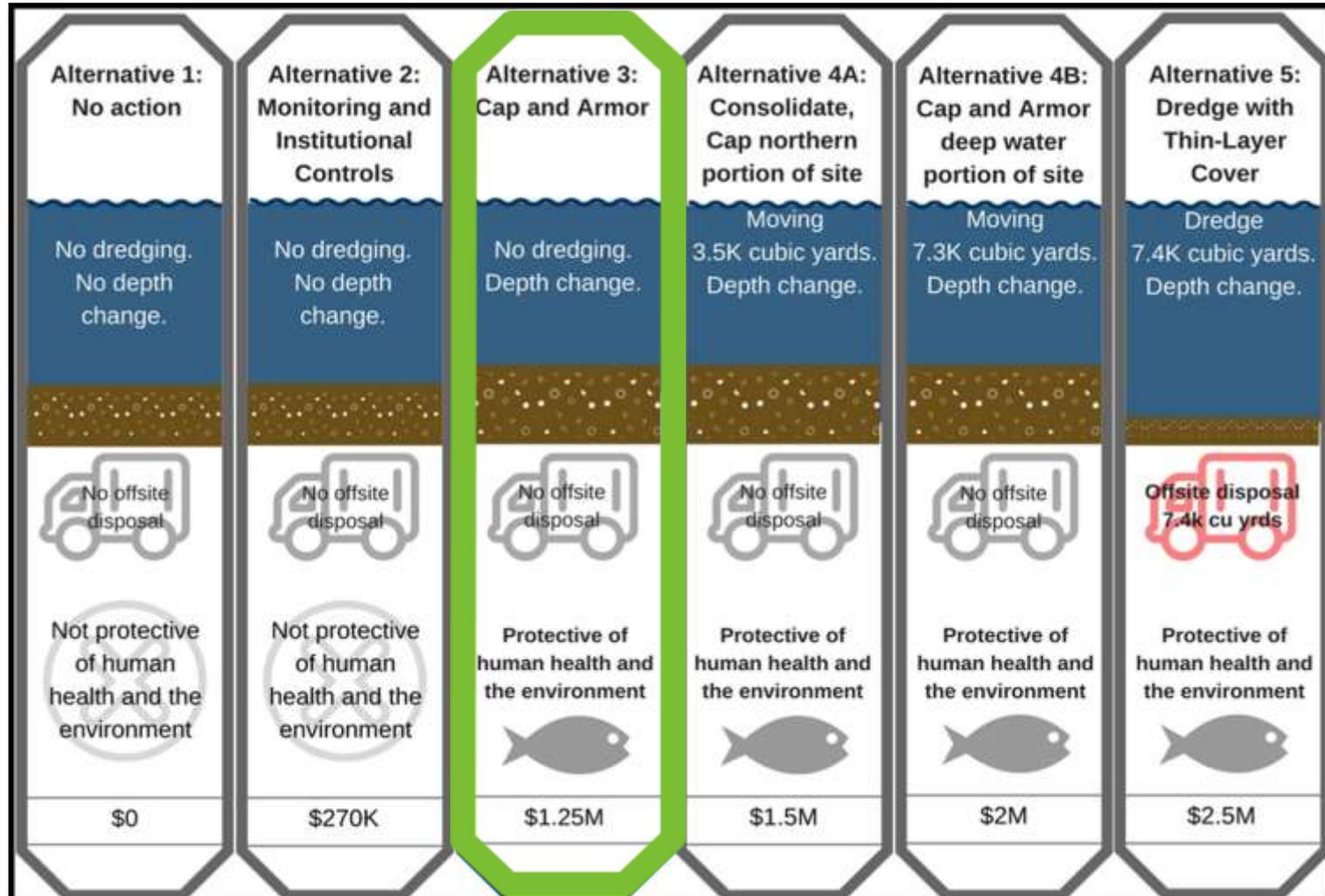


Contaminants of Concern: PAHs and lead are considered the primary COCs

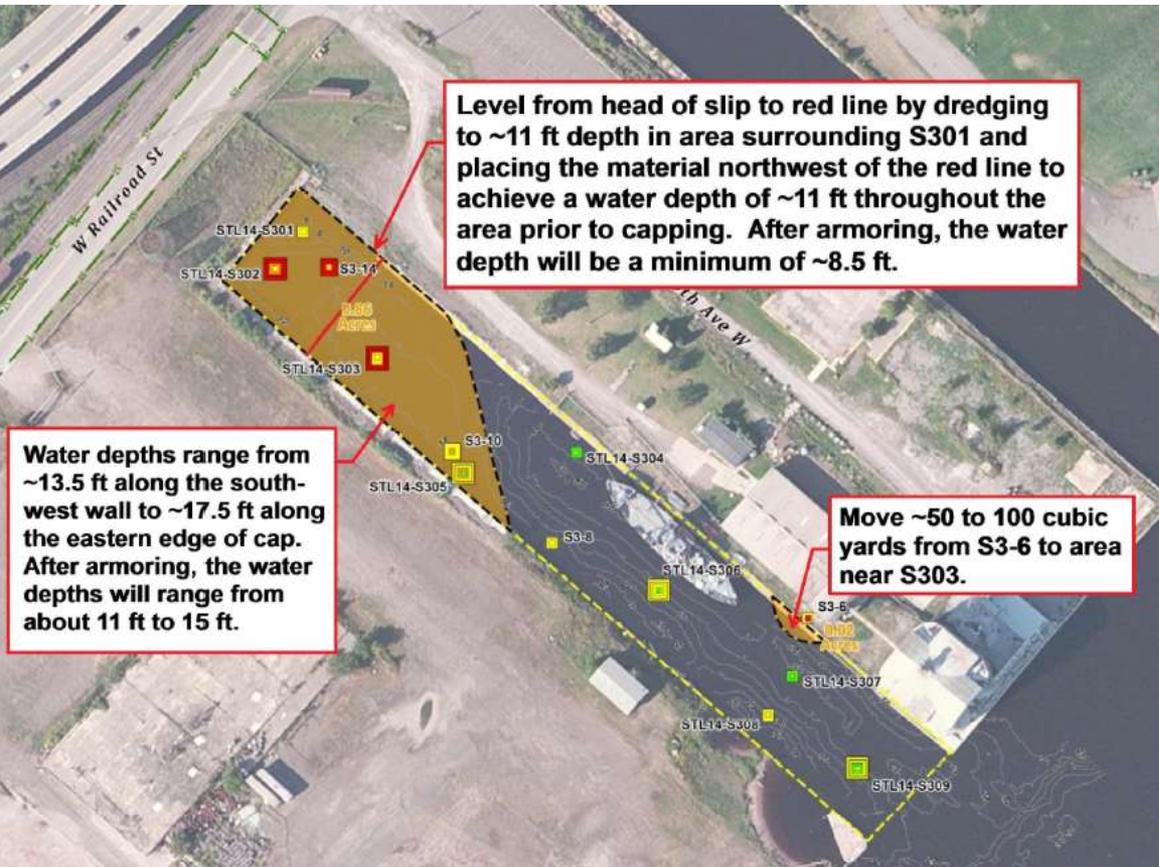
Estimated Volume of Contaminated Sediment: 5,970 cubic yds.

Alternatives: 3
Cap and Armor - \$1,328,335

Construction Schedule:
September – October 2018



Clean-up Alternative - Cap and Armor



- A remedial cap will be applied to approximately 0.88 acres of Slip 3 where sediment contaminant concentrations exceed cleanup levels
- The remedial cap proposed for Slip 3 is a 22-inch (0.55m) layer of fine sandy sediment placed over existing contaminated sediments to sequester contamination in place, and provide a clean habitat for benthic organisms
- A 6-inch thick armor layer of rock will be placed over the cap to prevent erosion

Slip C



- An active manmade Slip located near the mouth of the St. Louis River in the Duluth Harbor
- 12 acres
- 1 active storm sewers
- 3 property owners

Slip C

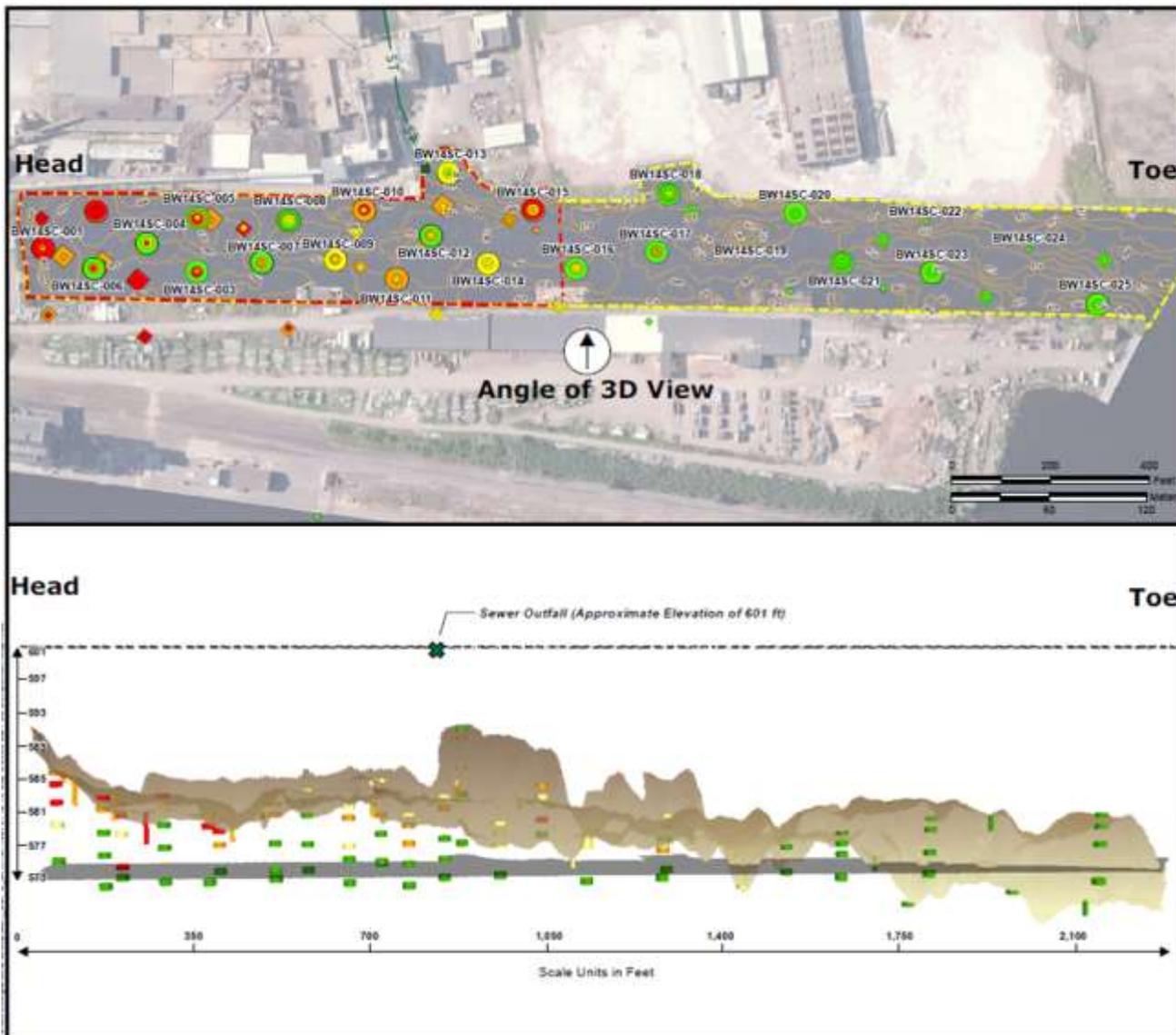


Figure 19
Slip C SR1012
Lead SQT 3D Comparison Map

SLR Sediment AOCs
Duluth, MN

Map Projection: NAD 1983 UTM Zone 15 N
 Basemap: Microsoft Bing WMS

- Green cross: Sewer Outfall
- Red dashed line: Sanitary Sewer
- Blue dashed line: Storm Sewer
- Yellow dashed line: Top Of Sediment Elevation Contour Line
- Yellow dashed line: Slip C Boundary
- Red dashed line: Estimated Area of Contamination

Sample Type

- Circle: Sediment Sample (Bay West 2014)
- Square: Sediment Sample (Historical)

Sample Interval

- Small circle: 0-0.15 m
- Medium circle: 0.15-0.50 m
- Large circle: 0.50-1.0 m
- Very large circle: >1.0 m

Lead SQT Comparison

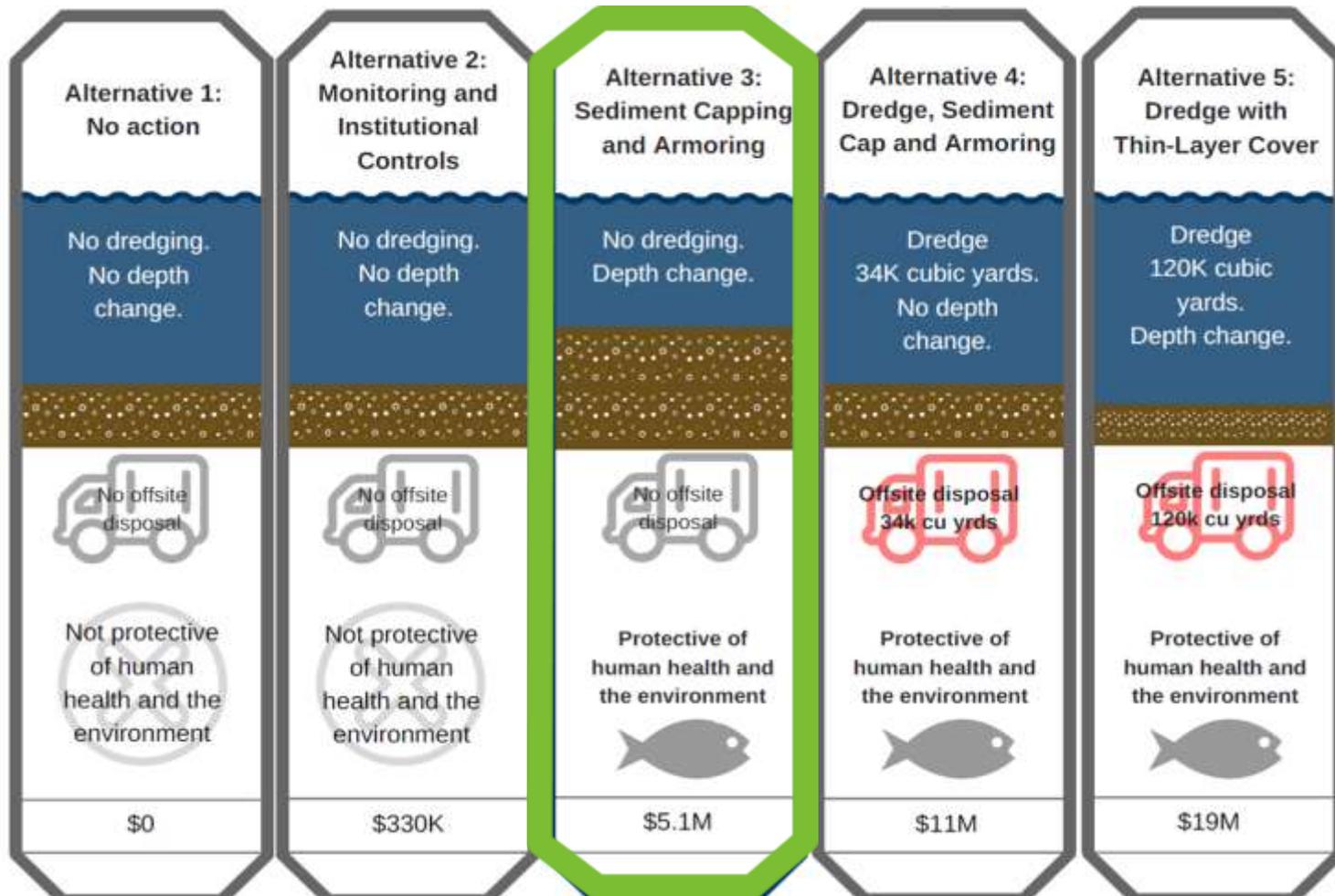
- Green: Does not exceed Level 1 SQT (36 mg/kg)
- Yellow: Exceeds Level 1 SQT (36 mg/kg)
- Orange: Exceeds Midpoint SQT (83 mg/kg)
- Red: Exceeds Level 2 SQT (130 mg/kg)

3D View

- Brown surface: Top Of Sediment - Bathymetry
- Grey line: Maximum Dredge Depth (573 Feet)
- Circle: Sediment Sample (Bay West 2014)
- Square: Sediment Sample (Historical)

Drawn By: S.G. Date Drawn: Rev 048/6/25/2015 Project No.: J140270

Slip C



Contaminants of Concern: Lead and PAHs are the primary COCs

Estimated Volume of Contaminated Sediment: 78,000 cubic yds.

Alternatives:
Alternative 3: Cap & Armor – \$5,000,000

Construction Schedule:
September – November 2018

Clean-up Alternative - Cap and Armor

- Sediments in Slip C exceed cleanup levels for Lead, Zinc, PAHs, and Dioxins
- A remedial cap would be applied to approximately 6.4 acres of Slip C where sediment contaminant concentrations exceed cleanup levels
- The remedial cap proposed for Slip C is a layer of sand placed over contaminated sediments to sequester contamination in place, and provide a clean habitat for benthic organisms
- An appropriately sized armor layer will be placed over the cap to prevent scouring



MN 2019-2020 Construction Sites

Contaminated Sediment Site	Preferred Remedial Alternative Selection	Engineering Design (start)	Engineering Design Env. Review Permits Bid Specs (complete)	GLLA Project Construction Agreement Execution	Construction (start) USEPA or USACE Contract	Construction Complete
Northland Pier/ AGP Slip	Sep-17	Apr-18	Mar-19	Feb-19	Jul-19	Nov-19
Azcon Corp/ Duluth Seaway Port Authority Garfield Slip C	Apr-18	Apr-18	Mar-19	Feb-19	Jul-19	Nov-19
Ponds Behind Erie Pier	May-18	May-18	Mar-19	Feb-19	Jul-19	Dec-20
Munger Landing	Jun-18	Jul-18	Jun-19	Feb-19	Jul-19	Nov-19
Mud Lake West	Jun-18	Jul-19	Apr-20	Feb-20	May-20	Dec-20
Thomson Reservoir	Jun-18	Jul-18	Apr-19	Feb-20	May-20	Dec-20
Scanlon Reservoir	Jun-18	Jul-18	Apr-19	Feb-20	May-20	Dec-20
US Steel (EPA GLLA/USS Project)		Oct-17	Mar-19	Mar-18	Jun-19	Dec-20

Thank you

