Spirit Lake – Former U. S. Steel Duluth Works Site

Great Lakes Legacy Act Project - Duluth, Minnesota

Proposed Remedy

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Overview

- Welcome and Introductions
- Great Lakes Legacy Act
- Roles and Responsibilities
- Site History
- Extent of Impacts
- Proposed Cleanup Approach
- Benefits of the Project
- Potential Impacts
- Schedule
- Opportunities for Input

Implementation Approach

Great Lakes Legacy Act (Cooperative)

instead of

MERLA (Enforcement)

Great Lakes Legacy Act

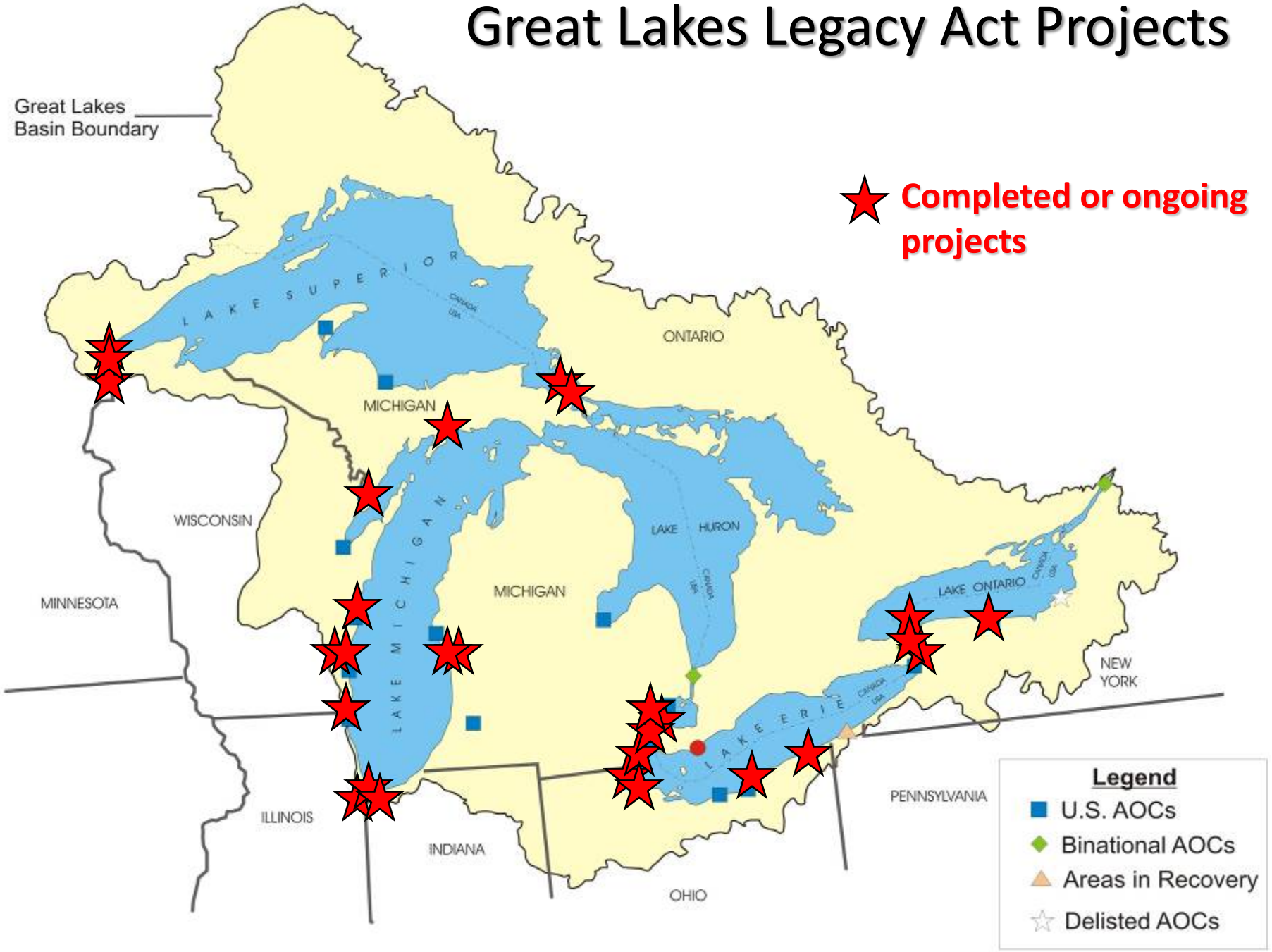
Goal:

- *Faster: Accelerate* the pace of sediment remediation at Areas of Concern (AOCs)
- *Better: Go above and beyond* the minimum requirements
- *Restore: Incorporate habitat restoration* into remediation projects

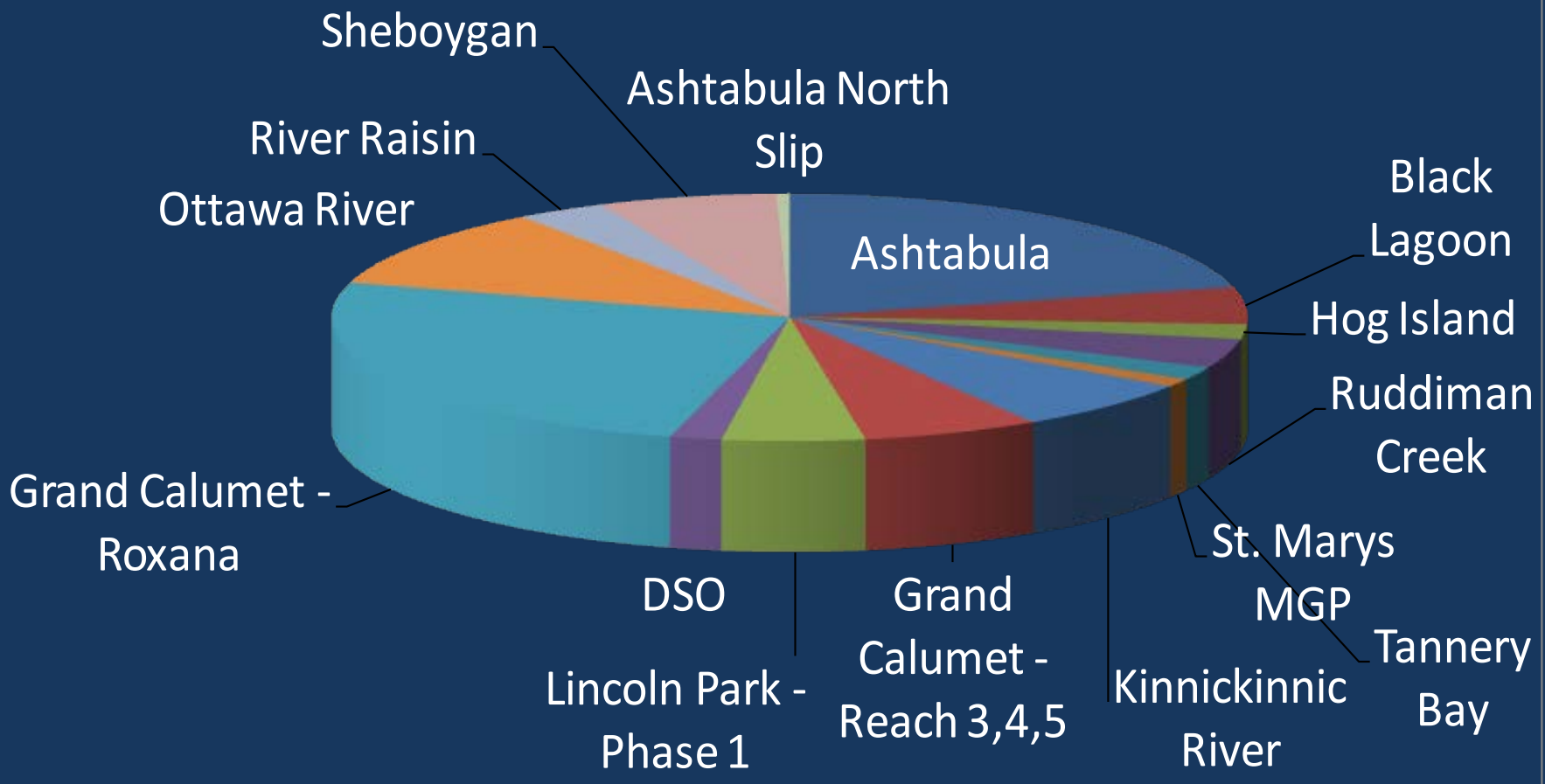
Mechanism:

- Uses public-private *partnerships* to remove roadblocks to sediment remediation

Great Lakes Legacy Act Projects



GLLA Remediation to date:



2,370,500 cubic yards remediated

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Who are the GLLA Non-Federal Sponsors?

- States
- Industries
- Municipalities
- Combinations of the above

Industries (37) Involved in GLLA Projects

- DuPont Co.
- GenCorp Inc.
- Honeywell International Inc.
- Illinois Tool Works, Inc.
- United Technologies
- Allied Waste Industries, Inc.
- Phelps Dodge (Now Freeport-McMoRan)
- Cabot Corp
- Detrex Corp
- XIK Corp
- Consumers Energy
- Varta Microbattery, Inc.
- The Mosaic Co.
- BP-Husky Refining
- BASF Corp.
- Arkema Corp
- Wisconsin Public Service
- Pollution Risk Services
- Cleveland Illuminating Co.
- Mallinckrodt Inc
- Millennium Inorganic Chemicals
- Ohio Power
- Olin Corp
- Occidental Chemical
- RMI Titanium Co
- Sherwin Williams
- Union Carbide
- CBS Operations (Viacom Intl)
- Elkem Metals
- Perstorp Polyols, Inc.
- Chevron USA
- Sunoco, Inc
- Pilkington North America
- U. S. Steel
- Ford
- Tyco Fire Products
- Fraser Shipyard

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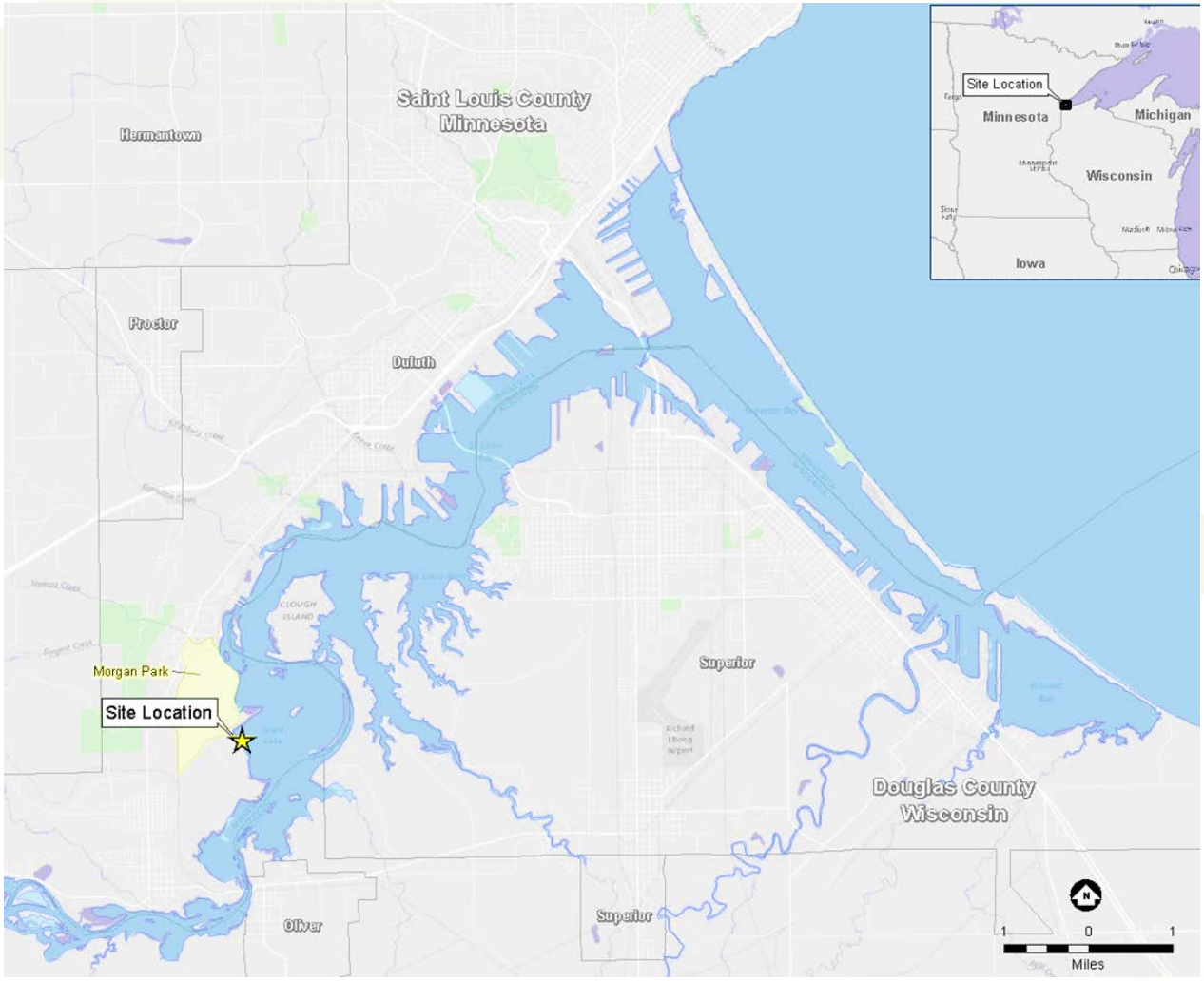
Benefits of GLLA

- Cooperative, Collaborative Approach
- Faster Implementation
- Shared Goals
- Shared Costs
- More Comprehensive Approach

Roles and Responsibilities

- U.S. EPA
  - Project Management
  - Project Implementation
  - Funding
- U. S. Steel
  - Project Management
  - Project Implementation
  - Funding
- MPCA
  - Project Oversight/Permitting
  - Technical Coordination/Technical Expertise

Project Location



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Project Location

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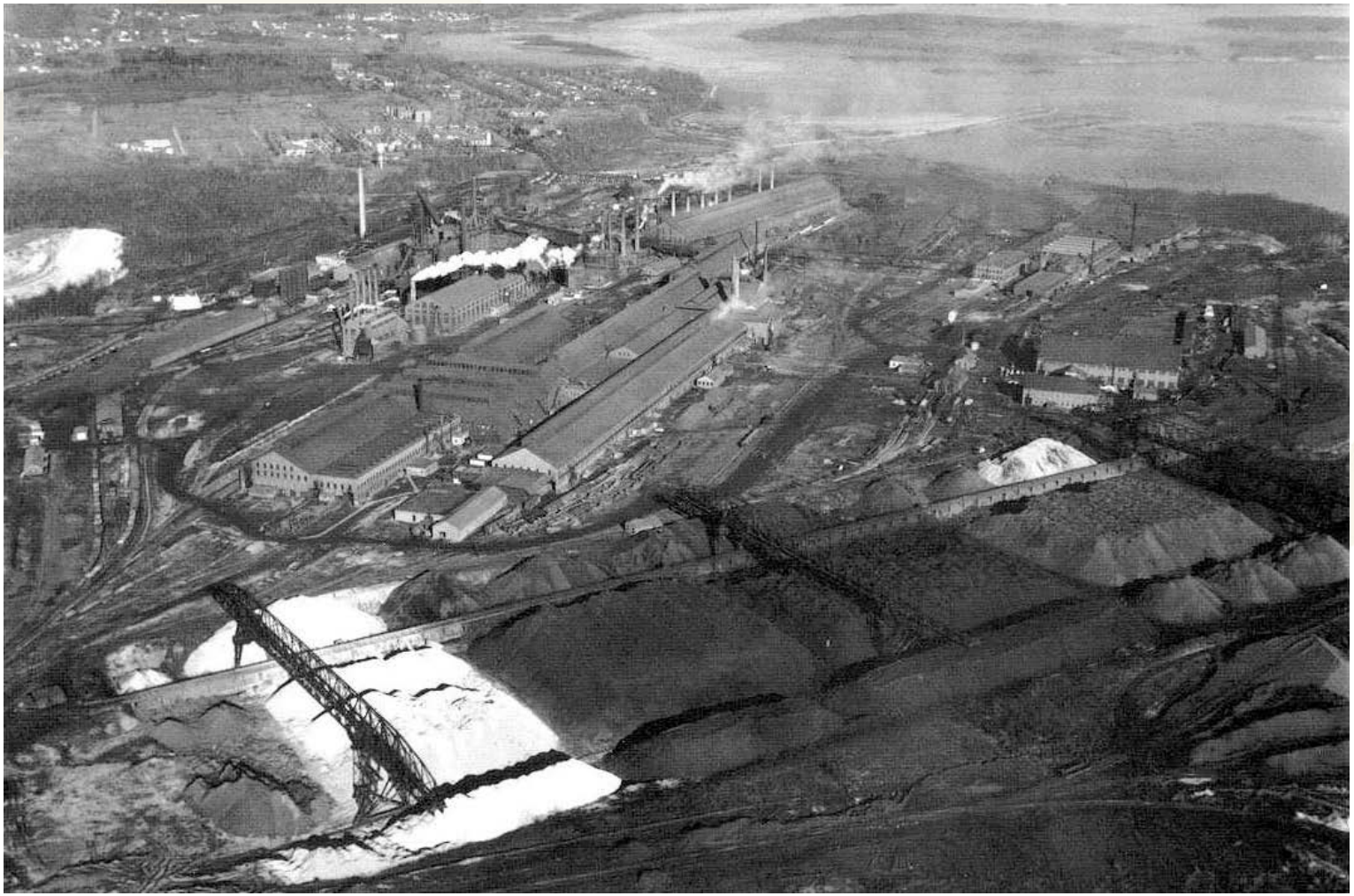
Former Duluth Works



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History of Duluth Works

- Development of steel making facility beginning in 1907
- Operations commence in 1915
- Integrated steel manufacturing plant (Coke, Iron, Steel and Finishing facilities)
- Production peaks in World War I, II and 1950s
- Shutting down by 1979
- Most structures demolished by 1988

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History of Duluth Works

- Environmental site listing 1983 (Federal and State SuperFund programs)
- Record of Decision 1989 - Prescribed upland remedies & “no action with periodic inspections/monitoring” for sediments units
- Upland remediation work completed in phases – additional work based on Agency 5 year reviews
- On-going monitoring activities
- Duluth Seaway Port Authority partnership
- U. S. Steel and EPA - partners on Spirit Lake sediment site planning since 2011

Project Area

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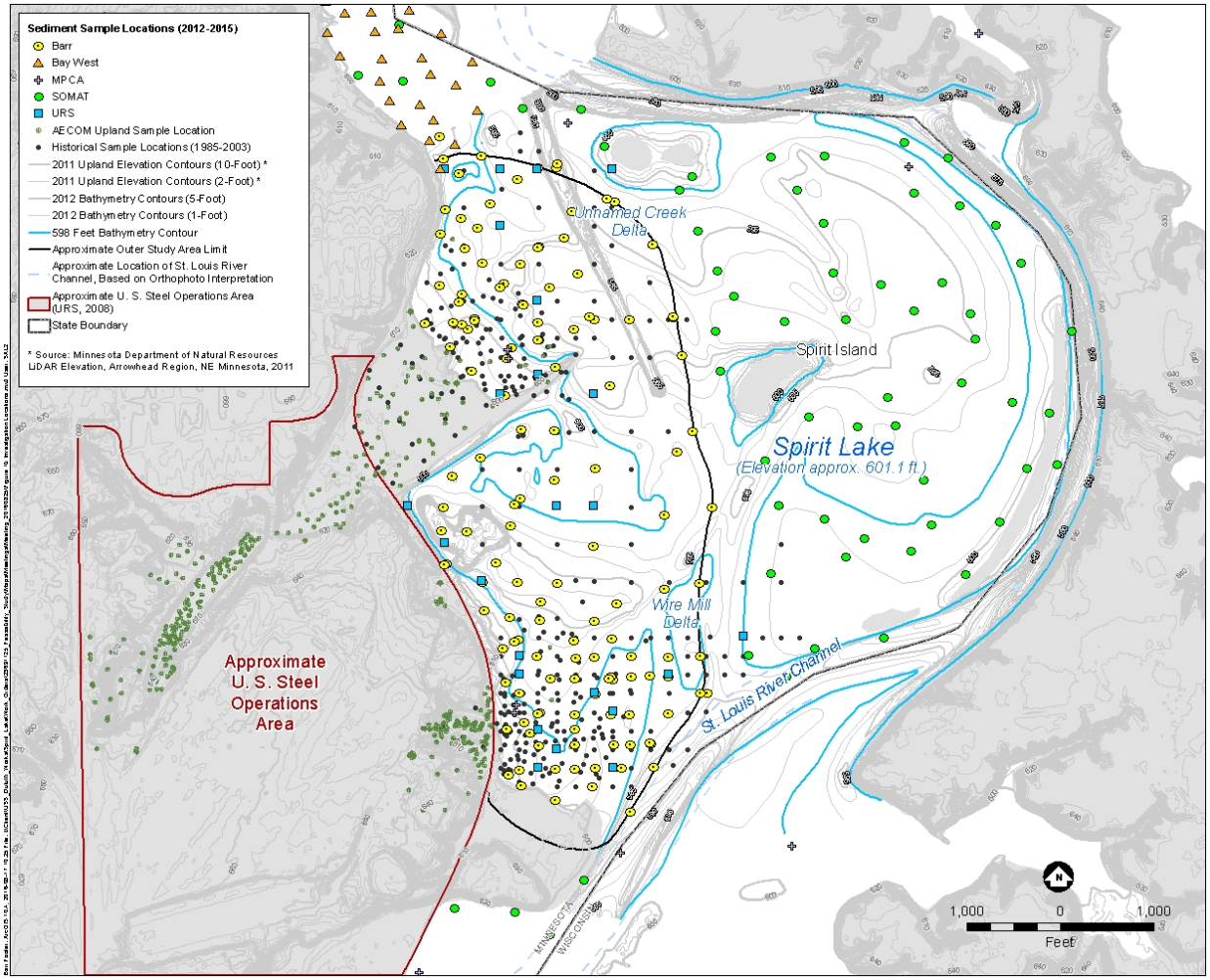
Spirit Lake Sediment Studies



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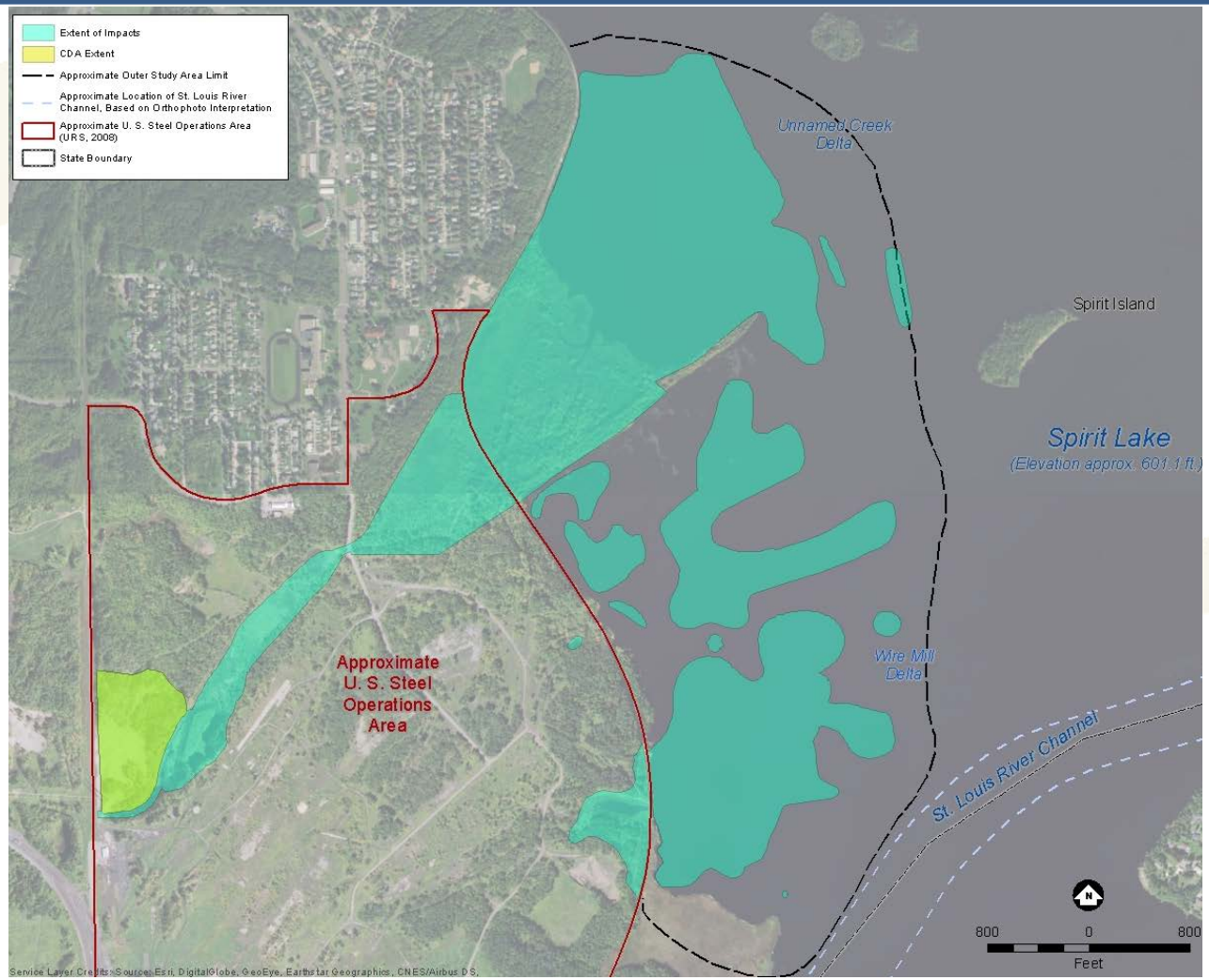
Area of Sediment Impacts



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Milestones

- Remedial Investigations (RI) 2011-2013
  - Multiple sampling events – winter and summer
- Feasibility Study (FS) 2013-2015
  - Twelve Alternatives developed and evaluated
- Seven Resource Managers meetings held along the way to obtain feedback
- Final FS Addendum December 2015
  - Incorporated additional hybrid Alternative

Potential Remedial Alternatives

- No Action
- Monitored Natural Recovery
- Capping
- Dredging
- Enhanced Natural Recovery
- Combination Remedies

Remedy Evaluation Factors

- Protection of Human Health and the Environment
- Compliance with State and Federal Laws
- Long Term Effectiveness
- Short Term Effectiveness
- Reduction in Toxicity, Mobility, and/or Volume
- Implementability
- Cost
- State and Community Acceptance

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Screening Level Evaluation of Alternatives

Table 2-2
(FS Addendum - Revision of Table 5-2 to include Alternative 8B)
SCREENING LEVEL EVALUATION OF ALTERNATIVES
Former U. S. Steel Duluth Works - Spirit Lake Sediment Site
Saint Louis River
Duluth, Minnesota

Alternative	Description	Effectiveness of Achieving RAOs and Considerations Upland RAOs and Considerations • Protect human health and the environment • Provide a stable water course for stormwater conveyance and discharge • Preserve areas for economic development Estuary RAOs and Considerations • Protect human health and the environment • Reduce beneficial use impairments for St. Louis River Area of Concern • Improve habitat (betterment)	Implementability	Relative Cost Relative Rankings: #1 = lowest cost; #12 = highest cost	Screening Level Score (sum of Effectiveness, Implementability, and Cost scores)	Additional Factors for Consideration	Retained for Detailed Evaluation?
Alternative 1 No Action	No Action.	NA - current conditions	NA	NA	NA	NA	
Alternative 2 Remedial Capping	Alternative 2 is the "cap-only" option and involves placement of a remedial cap over portions of the Upland Site and the Estuary Site. Unnamed Creek would be re-routed to discharge into the former water intake area in the northern portion of Wire Mill Delta.	Low Medium - 4 - Would be effective at protection of human health and environment as a result of physical barrier, but would not remove any impacted material. - Would not be effective at achieving RAOs and Considerations, with the exception that it would result in the loss of open water habitat.	Medium - 5 - Large volume of capping material is necessary; however, traditional earthwork and subaqueous capping equipment could be used. - Construction of the Wire Mill discharge structure would be possible, but challenging.	Low Medium - 2 Relative Cost Ranking: #2	6	As a result of cap placement, approximately 48 acres of open water would be lost.	No, because results in a net loss of aquatic habitat
Alternative 3 Dredge/Estuary CDF	Alternative 3 includes removal of impacted sediments from the Upland Site and Estuary Site with placement in a CDF that extends from the OU-M Delta into the estuary. The alternative also includes placing a remedial cap over three areas on the Upland Site and placement of a remedial cap or ENR thin cover over a portion of the Estuary Site. Unnamed Creek would be allowed to pond in OU-M and would be re-routed to discharge into the former water intake area in the northern portion of Wire Mill Delta. Stormwater management in Alternative 3 would include construction of a small base flow channel through OU-M (allowing OU-M to flood during high flow conditions).	Low Medium - 4 - Would be effective at protection of human health and environment as a result of cap placement and impacted material removal. - Would be effective at achieving RAOs and Considerations, with the exception that it would result in the loss of open water habitat.	Medium - 5 - Dredging, subaqueous capping and traditional earthwork equipment would be necessary. - Construction of the Wire Mill discharge structure would be possible, but challenging.	Low Medium - 2 Relative Cost Ranking: #3	7	CDF located in OU-M Delta and estuary. CDF is placed on top of existing OU. Net loss of approximately 11 acres of open water.	No, because results in a net loss of aquatic habitat and both upland and estuary sediments are considered as a Dredge/Estuary CDF.
Alternative 4 CDF on OU-M Delta	Alternative 4 includes the same actions as Alternative 3 except that the extent of the CDF is entirely within OU-M Delta. All dredged material would be removed from the estuary in the area that was covered by CDF in Alternative 3. Capping would involve three areas on the Upland Site and placement of a remedial cap or ENR thin cover over a portion of the Estuary Site. Stormwater management in Alternative 4 would include construction of a small base flow channel through OU-M (allowing OU-M to flood during high flow conditions).	Medium High - 2 - Would be effective at protection of human health and environment as a result of cap placement and impacted material removal. - Would be effective at achieving all RAOs and Considerations. - Results in a net gain of open water as a result of removal from the Wire Mill pond; however, significant habitat improvement is not a major component.	Medium - 5 - Dredging, subaqueous capping and traditional earthwork equipment would be necessary. - Construction of the Wire Mill discharge structure would be possible, but challenging.	Low Medium - 2 Relative Cost Ranking: #4	7	CDF is placed on top of existing OU.	Yes
Alternative 5 CDF with Open Water Bay	Alternative 5 includes removal of impacted sediments from the Upland Site and Estuary Site with placement in a CDF that extends throughout a portion of OU-M Delta into the Estuary Site. The shape of the OU-M Delta/Estuary CDF creates an open water bay. A small CDC would also be constructed at OU-J. Capping would involve three areas on the Upland Site and placement of a remedial cap or ENR thin cover over a portion of the Estuary Site. Stormwater management in Alternative 5 would include construction of a small base flow channel through OU-M (allowing OU-M to flood during high flow conditions) and discharge of Unnamed Creek into the open water bay.	High - 1 - Would be effective at protection of human health and environment as a result of cap placement and impacted material removal. - Would be effective at achieving all RAOs and Considerations. - Significant habitat betterment would be achieved through creation of the open water bay.	Medium - 5 - Dredging, subaqueous capping and traditional earthwork equipment would be necessary.	Medium - 3 Relative Cost Ranking: #6	7	Placement of excavated and dredged sediments in a CDF that extends into the estuary. CDF is placed on top of existing OU-M. Open water bay (7 ft avg. depth) has less water depth than shallow sheltered bay (8 to 9 ft avg. depth). Less open water and shallower average water depth than Alternative 8.	No, because although similar to Alternative 8, this alternative does not provide a Shallow Sheltered Bay habitat improvement element.
Alternative 6 Shallow Sheltered Bay with CDF	Alternative 6 includes removal of impacted sediments from the Upland Site and Estuary Site with placement in a CDF that extends throughout a portion of OU-M Upland and OU-M Delta and into the Estuary Site. Material removed from the Estuary Site would be placed in the estuary portion of the CDF and material from the Upland Site would be placed in the upland portion of the CDF. The shape of the CDF creates a stable sheltered bay in OU-M and the estuary. Because the footprint is larger, the CDF height is less than in Alternative 5. Capping and stormwater management are generally the same as in Alternative 5.	High - 1 - Would be effective at protection of human health and environment as a result of cap placement and impacted material removal. - Would be effective at achieving all RAOs and Considerations. - Significant habitat betterment would be achieved through creation of a shallow sheltered bay.	Medium - 5 - Dredging, subaqueous capping and traditional earthwork equipment would be necessary.	Medium - 3 Relative Cost Ranking: #5	7	Creation of shallow sheltered bay. Placement of dredged sediments in a CDF constructed within the OU-M Delta and estuary. CDFs are placed on top of existing OUs.	Yes, because this alternative follows the AOC habitat plan more closely than Alternative 5.
Alternative 7 Shallow Sheltered Bay and Site-Cap Areas with Upland CDFs	Alternative 7 includes removal of impacted sediments from the Upland Site and Estuary Site with placement in several CDFs that are located entirely within the Upland Site. A remedial cap would be placed over impacted materials on the bottom of the OU-M Delta. Removal of impacted material from the landward side of the OU-M Delta would create a shallow sheltered bay. Construction of a CDF in OU-M would present stormwater challenges that would require additional permitting effort and construction will require extensive soil stabilization, riprap, channel, river barrier, and erosion protection to protect a large flood event that will impact the SMU, CDF and OU-M CDFs. Capping of the CDA at the Upland Site and capping of impacted sediments in portions of the Estuary Site would also be completed.	High - 1 - Would be effective at protection of human health and environment as a result of cap placement and impacted material removal. - Would be effective at achieving all RAOs and Considerations. - Significant habitat betterment would be achieved through creation of a shallow sheltered bay.	Low-Medium - 4 - Dredging and traditional earthwork equipment would be necessary. - Construction of CDF in OU-M creates added stormwater management and engineering challenges - tall, steep berms and does not allow for stormwater ponding. - High flow stormwater discharge would be difficult to accommodate in this alternative.	Medium High - 4 Relative Cost Ranking: #11	9	Creation of shallow sheltered bay, with replacement of dredged sediments in OU-M Delta or the estuary. OU-M are placed on top of existing OUs. Does not allow for stormwater detention in OU-M area, creating challenges for erosion control and bank stability and considerations and long-term basis.	Yes, retained for comparison with Alternative 6 which differs mainly in location of the CDF and stormwater management capabilities.

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Screening Alternatives - continued

Table 2-2
(FS Addendum - Revision of Table 5-2 to include Alternative 8B)
SCREENING LEVEL EVALUATION OF ALTERNATIVES
Former U. S. Steel Duluth Works - Spirit Lake Sediment Site
Saint Louis River
Duluth, Minnesota

Alternative	Description	Effectiveness of Achieving RAOs and Considerations Upland RAOs and Considerations • Protect human health and the environment • Provide a stable water course for stormwater conveyance and discharge • Preserve areas for economic development	Estuary RAOs and Considerations • Protect human health and the environment • Reduce beneficial use impairments for St. Louis River Area of Concern • Improve habitat (betterment)	Implementability	Relative Cost Relative Rankings: #1 = lowest cost; #12 = highest cost	Screening Level Score (sum of Effectiveness, Implementability, and Cost scores)	Additional Factors for Consideration	Retained for Detailed Evaluation?
Alternative 8 Shallow Sheltered Bay with Delta Sediment CDF and Upland CDFs	Alternative 8 is similar to Alternative 7 except that material that is removed from OU M Delta and the estuary site to create the shallow sheltered bay would be consolidated with the east side of OU M Delta in a delta sediment CDF. All other material would be placed in CDFs located within OU V Upland and/or OU Z. Additional stormwater management actions would be necessary; however, they would likely be more readily constructed and permitted than those in Alternative 7. Stormwater management along Unnamed Creek, from OU J to OU M Upland would be similar to that described for Alternative 5. Capping of two areas in the Upland Site and capping of impacted sediments in portions of the Estuary Site would also be completed.	High - 1 - Would be effective at protection of human health and environment as a result of cap placement and impacted material removal - Would be effective at achieving all RAOs and Considerations - Significant habitat betterment would be achieved through creation of a shallow sheltered bay.	Medium - 5 - Dredging, subaqueous capping, and traditional earthmoving equipment would be necessary.	Medium - 5 Relative Cost Ranking: #7	11	Contaminated bars removed to create the shallow sheltered bay is consolidated within the OU M Delta CDF (same material is consolidated together). CDFs are placed on top of existing CDFs.	Yes
Alternative 8B Shallow Sheltered Bay with Delta Sediment CDF Above MWL and Upland CDFs	Alternative 8B includes elements of Alternatives 8 and 12. The OU M Delta CDF does not extend beyond the OHWL into the estuary. Only estuary sediments will be placed in the OU M Delta CDF. All other material would be placed in CDFs located within OU V Upland and at OU J. The berm height for the OU M Upland would be taller than Alternative 8. Both a Shallow Sheltered Bay and "Open Water" Bay will be created for this alternative. Stormwater management along Unnamed Creek, from OU J to OU M Upland would be similar to that described for Alternative 8. Capping of two areas in the Upland Site and capping of impacted sediments in portions of the Estuary Site would also be completed.	High - 1 - Would be effective at protection of human health and environment as a result of cap placement and impacted material removal - Would be effective at achieving all RAOs and Considerations - Significant habitat betterment would be achieved through creation of a shallow sheltered bay and open water bay.	Low-Medium - 4 - Dredging, subaqueous capping, and traditional earthmoving equipment would be necessary. - Combination of large volume of sediment in OU M Upland results in tall berms.	Medium - 6 Relative Cost Ranking: #8	11	Contaminated bars removed to create the shallow sheltered bay is consolidated within the OU M Delta CDF (same material is consolidated together). CDFs are placed on top of existing CDFs.	Yes
Alternative 9 Upland CDF and Delta Cover	Alternative 9 is similar to Alternative 7 in that all material is consolidated in an upland CDF. However, in Alternative 9, there is not a CDF in OU J, since less total sediment is being removed. Another difference is that a sand cap is placed throughout the OU M Delta, eliminating the creation of a shallow sheltered bay. Capping of two areas in the Upland Site and capping of impacted sediments in portions of the Estuary Site would also be completed.	Medium-High - 2 - Would be effective at protection of human health and environment as a result of cap placement and impacted material removal - Would be effective at achieving all RAOs and Considerations - Results in a net gain of open water as a result of Upland sediment removal from the Inner Mi Delta; however, significant habitat improvement is not a major component	Low-Medium - 4 - Dredging, subaqueous capping, and traditional earthmoving equipment would be necessary.	Medium - 5 Relative Cost Ranking: #5	11	Placement of impacted sediments in upland CDFs. CDFs are placed on top of existing CDFs. Significant habitat improvement is not a major component. Capping OU M Delta may require wetland mitigation. Stormwater conveyance and storage at outer OU M Delta.	No, lacks significant habitat betterment at Unnamed Creek Delta
Alternative 10 Targeted Removal with Coke Plant Area CDF	Alternative 10 involves removal of impacted sediments from the Upland Site and Estuary Site for placement in an approximately 75 acre CDF located in the potentially developable area of the Upland Site. Capping of the exposed in the Upland site and capping of impacted sediments in portions of the Estuary Site would also be completed.	Medium - 3 - Would be effective at protection of human health and environment as a result of cap placement and impacted material removal - Would be effective at achieving all RAOs and Considerations except for preserving areas for economic benefit (construction of large CDF in Upland Site would eliminate possibility for development) - Results in a net gain of open water as a result of Upland Site removal; however, significant habitat improvement is not a major component	Low-Medium - 4 - Dredging, subaqueous capping and traditional earthmoving equipment would be necessary. - Large volume of sediment to remove and transport to Upland CDF. - Would cause a high degree of disruption to the Site. - Large volume of water to be treated.	High - 9 Relative Cost Ranking: #12	17	Significant habitat improvement is not a major component. Developable upland area lost due to the construction of an upland consolidation area.	No
Alternative 11 Removal with Large Coke Plant Area CDF	Alternative 11 is the "remove all" option and involves removal of all sediments that exceed criteria in the Estuary Site and Upland Site. Removed materials would be deposited in a nearly 80 acre CDF located in the potentially developable area of the Upland Site. Capping is not included in this alternative, though the CDF will include a final cover.	Medium - 7 - Would be effective at protection of human health and environment as a result of cap placement and impacted material removal - Would be effective at achieving all RAOs and Considerations except for preserving areas for economic benefit (construction of large CDF in Upland Site would eliminate possibility for development)	High - 9 - Dredging, subaqueous earthmoving equipment would be necessary. - Large volume of sediment to remove and transport to CDF. - Would cause a high degree of disruption to the Site. - Large volume of water to be treated.	High - 9 Relative Cost Ranking: #11	17	Developable upland area lost due to the construction of an upland consolidation area.	No
Alternative 12 Open Water Bay with Upland CDFs	Alternative 12 involves removal of impacted sediments from the Upland Site and the Estuary Site and placement in several Upland CDFs. Alternative 12 is unique from other alternatives for several reasons: 1) no material is placed in the OU M Delta; 2) some removed material will be placed in a CDF that will be constructed in an area referred to as the "Border Site;" 3) removal of material from the OU M Delta will create an open water bay that is larger than other alternatives with a similar feature. Capping of two areas in the Upland Site and capping of impacted sediments in portions of the Estuary Site would also be completed.	Medium-High - 2 - Would be effective at protection of human health and environment as a result of cap placement and impacted material removal - Would be effective at achieving all RAOs and Considerations except for preserving areas for economic benefit (construction of large CDF in Upland Site would eliminate possibility for development)	Low-Medium - 3 - Dredging, subaqueous capping, and traditional earthmoving equipment would be necessary. - Significant habitat betterment would be achieved through creation of the shallow sheltered bay. - Combination of large volume of sediment in OU M Upland CDF results in high berms.	Medium-High - 8 Relative Cost Ranking: #10	13	More area of open water generated but all shallower except water depth at the shallow sheltered bays (other alternatives). No placement of removed material in OU M Delta. CDF constructed in non impacted portion of site.	Yes, retained for comparison based on feedback from project partners.

Screening Key:

Effectiveness	Implementability	Cost	Overall Score
Highest Effectiveness - 1 point	Highest Implementability - 1 point	Lowest Cost - 1 point	3-4
Medium-High Effectiveness - 2 points	Medium-High Implementability - 2 points	Low-Medium Cost - 2 points	5-7 points
Medium Effectiveness - 3 points	Medium Implementability - 3 points	Medium-High Cost - 5 points	8-10 points
Low-Medium Effectiveness - 4 points	Low-Medium Implementability - 4 points	Medium Cost - 6 points	11-13 points
Lowest Effectiveness - 5 points	Lowest Implementability - 5 points	Highest Cost - 8 points	14 points

Lowest score is the most desirable

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Detailed Alternatives Comparison

Table 2-11
(FS Addendum - Revision of Table 5-10 to include Alternative 8B)
ALTERNATIVES COMPARISON
Former U. S. Steel Duluth Works - Spirit Lake Sediment Site
Saint Louis River
Duluth, Minnesota

	Alternative 4 CDF on OU-M Delta (within shoreline)	Alternative 6 Shallow Sheltered Bay with CDF	Alternative 7 Shallow Sheltered Bay and Delta Cap Area with Upland CDFs	Alternative 8 Shallow Sheltered Bay with Delta Sediment CDF and Upland CDFs	Alternative 8B Shallow Sheltered Bay with Delta Sediment CDF above OHWL and Upland CDFs	Alternative 12 Open Water Bay with Upland CDFs
Overall protection of human health and the environment	Score: 1 Protective	Score: 1 Protective	Score: 1 Protective	Score: 1 Protective	Score: 1 Protective	Score: 1 Protective
Compliance with regulatory requirements (ARARs)	Score: 1 Compliant	Score: 2 Compliant. Requires additional permit considerations as part of CDF is located within assumed OHWL.	Score: 1 Compliant	Score: 2 Compliant. Requires additional permit considerations as part of CDF is located within assumed OHWL.	Score: 1 Compliant. CDF footprint entirely west of the OHWL results in less permitting requirements.	Score: 1 Compliant
Long-term effectiveness and permanence	Score: 2 More stormwater structures to maintain.	Score: 1 Effective	Score: 3 Stormwater management and three CDFs would require more O&M than other alternatives and would be more likely to result in greater potential risk of short and long-term failure than the other alternatives.	Score: 2 Effective. Three CDFs would require more O&M than other alternatives.	Score: 2 Effective. Three CDFs would require more O&M than other alternatives.	Score: 2 Effective. Three CDFs would require more O&M than other alternatives.
Reduction of toxicity, mobility (overall risk)	Score: 1 Effective at reducing overall risk	Score: 1 Effective at reducing overall risk	Score: 1 Effective at reducing overall risk	Score: 1 Effective at reducing overall risk	Score: 1 Effective at reducing overall risk	Score: 1 Effective at reducing overall risk
Short-term effectiveness	Score: 2 Effective. Stormwater diversion south of spit.	Score: 1 Effective.	Score: 3 Stormwater management presents risks during construction. Less effective than other alternatives because of longer construction duration.	Score: 1 Effective	Score: 1 Effective	Score: 2 Less effective than other alternatives because of longer construction duration.
Implementability	Score: 3 Implementable; however, Upland material must be moved longer distance to CDF.	Score: 5 Implementable; however, height of delta CDF creates potential sight-line impairments and geotechnical loading concerns. In addition, elimination of the LS&M Railroad is required.	Score: 5 Implementable; however, has the most uncertainty because of the complications of stormwater management in a confined channel, and CDF construction, which includes steeper berms and requires soil stabilization, is more complicated than other alternatives. Height of OU-M Delta CDF has potential to create view-shed impacts. Longer construction schedule than other alternatives.	Score: 2 Implementable. Consolidation areas are proximal to source removal areas.	Score: 4 Implementable. Consolidation areas are proximal to source removal areas. Height of OU-M Upland CDF and its berms requires soil stabilization and has the potential to create view-shed impacts.	Score: 5 Implementable; however, removed material must be moved greater distance than other alternatives retained for detailed analysis. Height of OU-M Upland CDF berms requires soil stabilization and has the potential to create view-shed impacts. Longer construction schedule than other alternatives.
Cost	Score: 2 Lowest cost of the alternatives retained for detailed analysis	Score: 3 Moderate cost, more than Alternatives 4 and 8, but less than Alternatives 7 and 12	Score: 5 Most expensive of the alternatives retained for detailed analysis	Score: 3 Moderate cost	Score: 3 Moderate cost	Score: 4 Second highest among the alternatives retained for detailed analysis
Compliance with 11 Sediment Principles/Sediment Guidance	Score: 1 Compliant	Score: 1 Compliant	Score: 1 Compliant	Score: 1 Compliant	Score: 1 Compliant	Score: 1 Compliant
Total Score	13	15	20	13	14	17

Scoring Key: 1 through 5, lowest score is the most desirable

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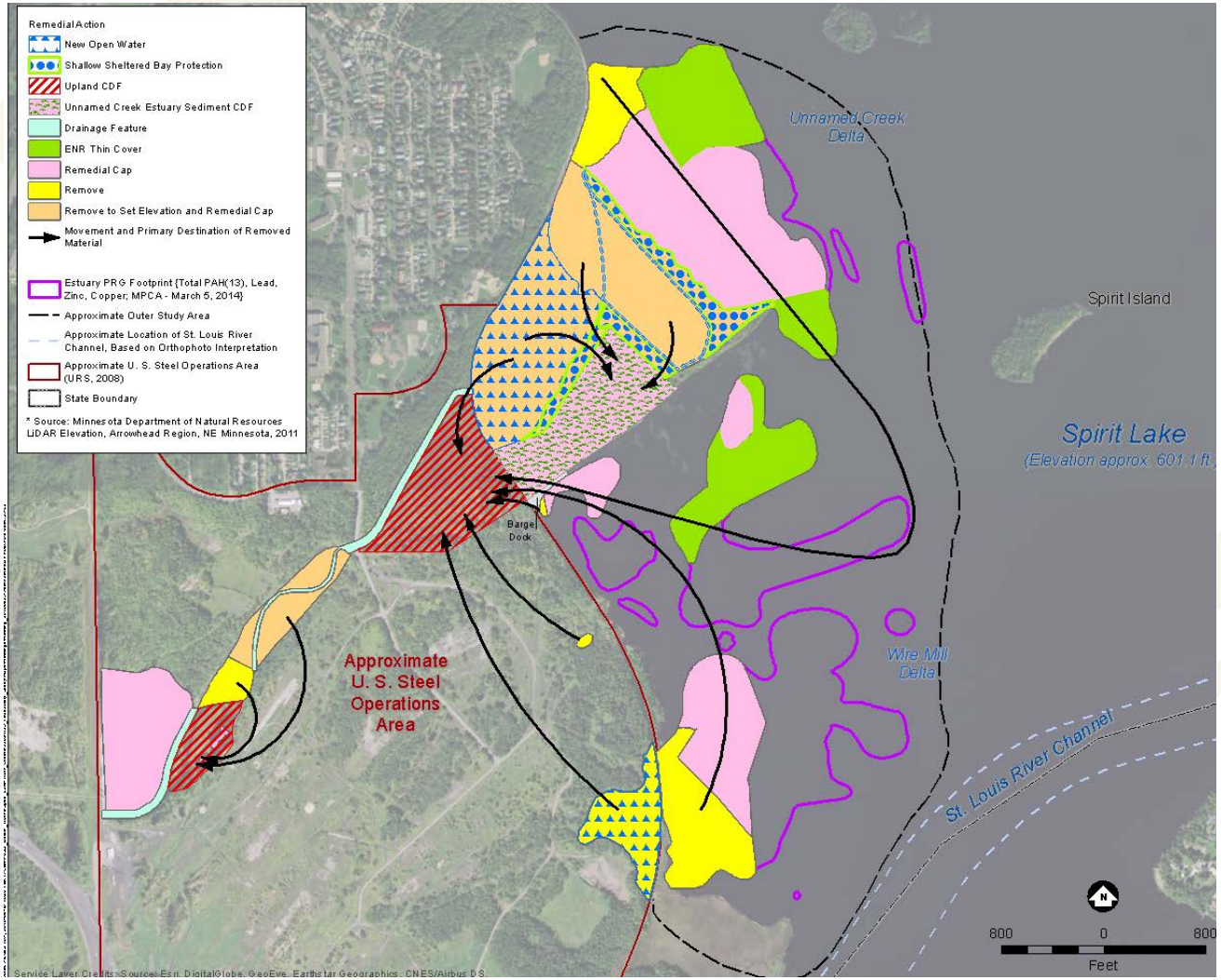
Alternative 8B Recommended



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Components of the Proposed Remedy

- Dredging (697,000 cubic yards)
- Underwater Capping (109 acres in the estuary)
- Enhanced Monitored Natural Recover (30 acres)
- Monitored Natural Recovery (59 acres)
- On Site Confined Disposal Facilities (CDFs)
- Long-Term Monitoring
- Habitat Restoration
- Estimated Cost is ~$70M

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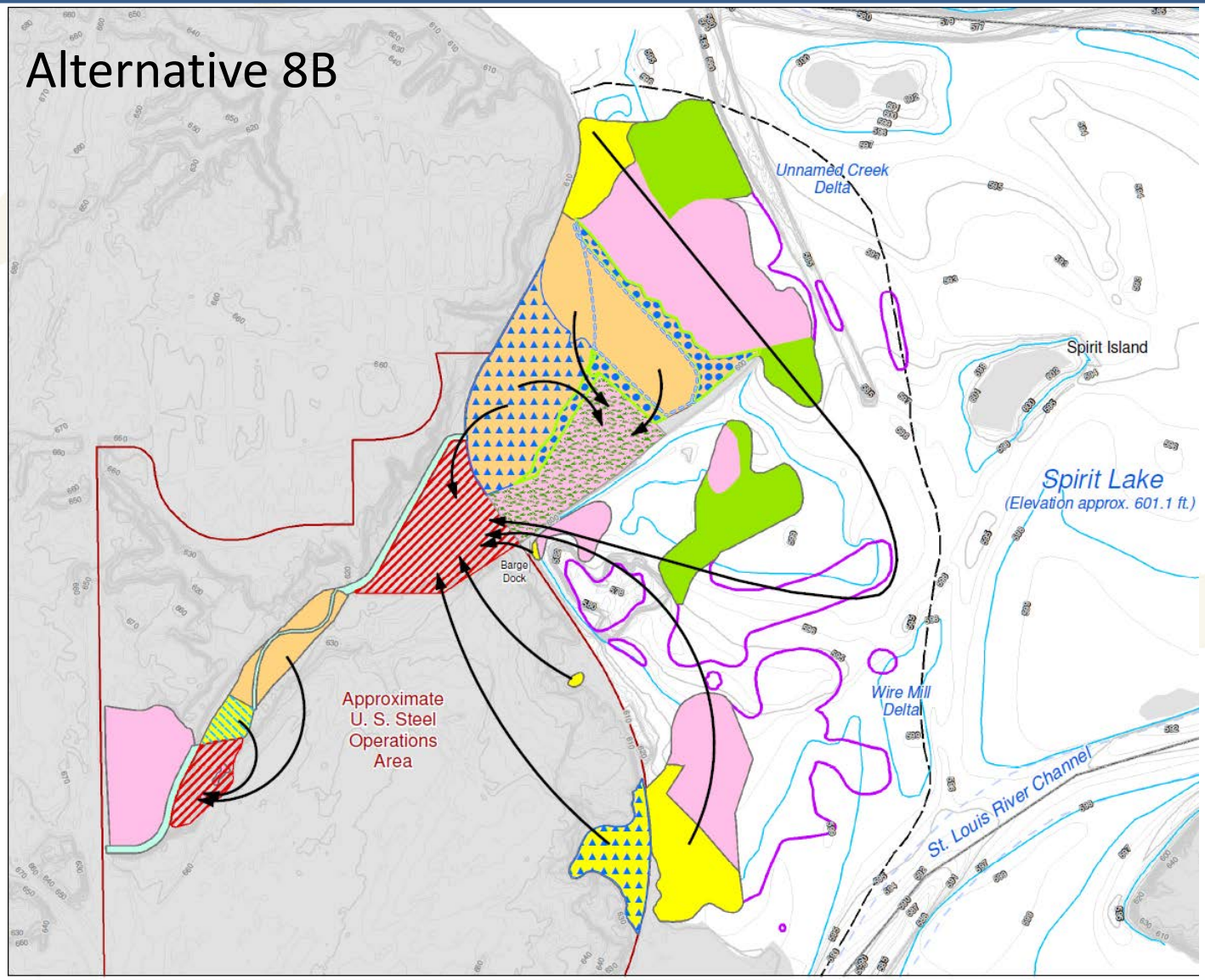
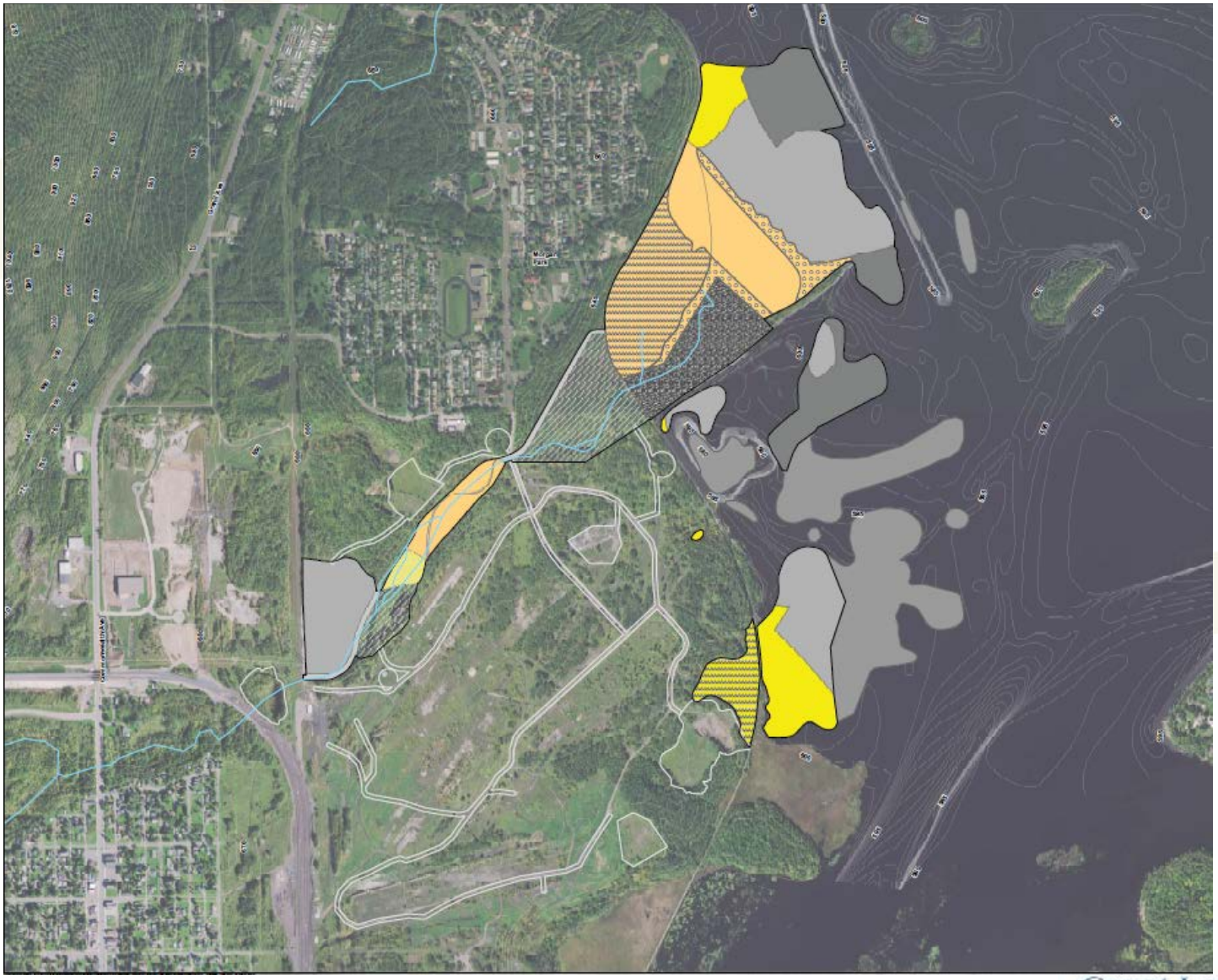
Proposed Remedy



Dredging



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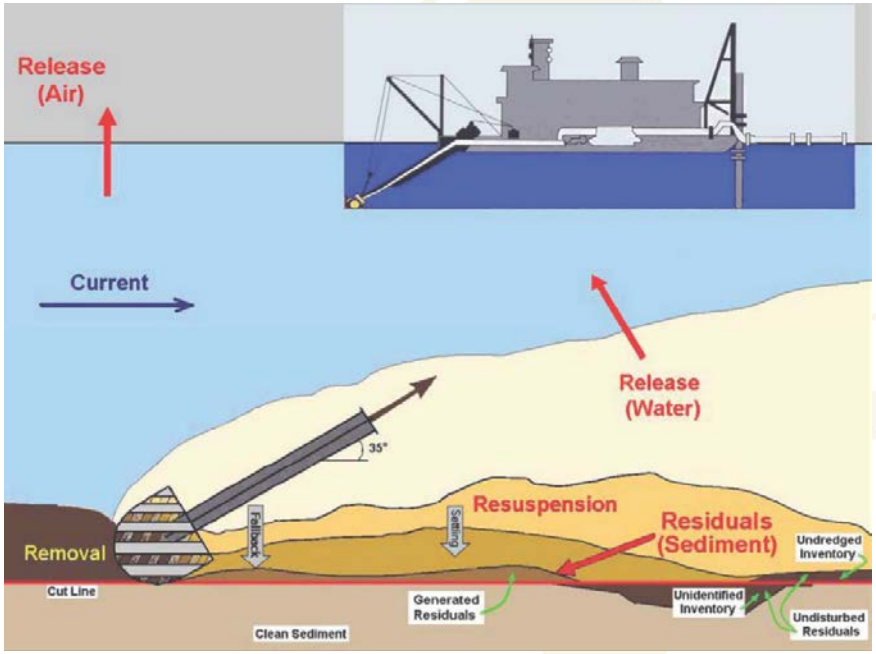
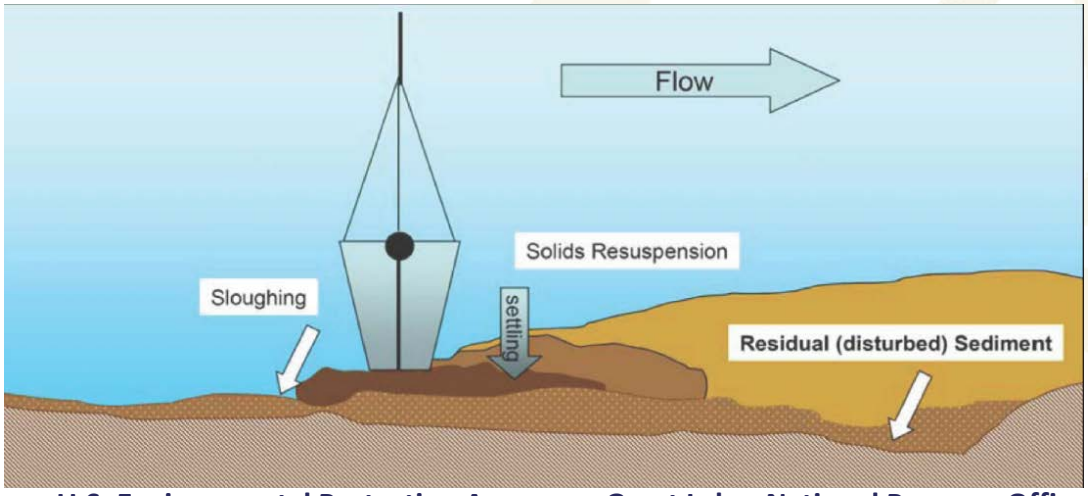
Dredging





U.S. Environmental Protection Agency Great Lakes National Program Office

Great Lakes RESTORATION

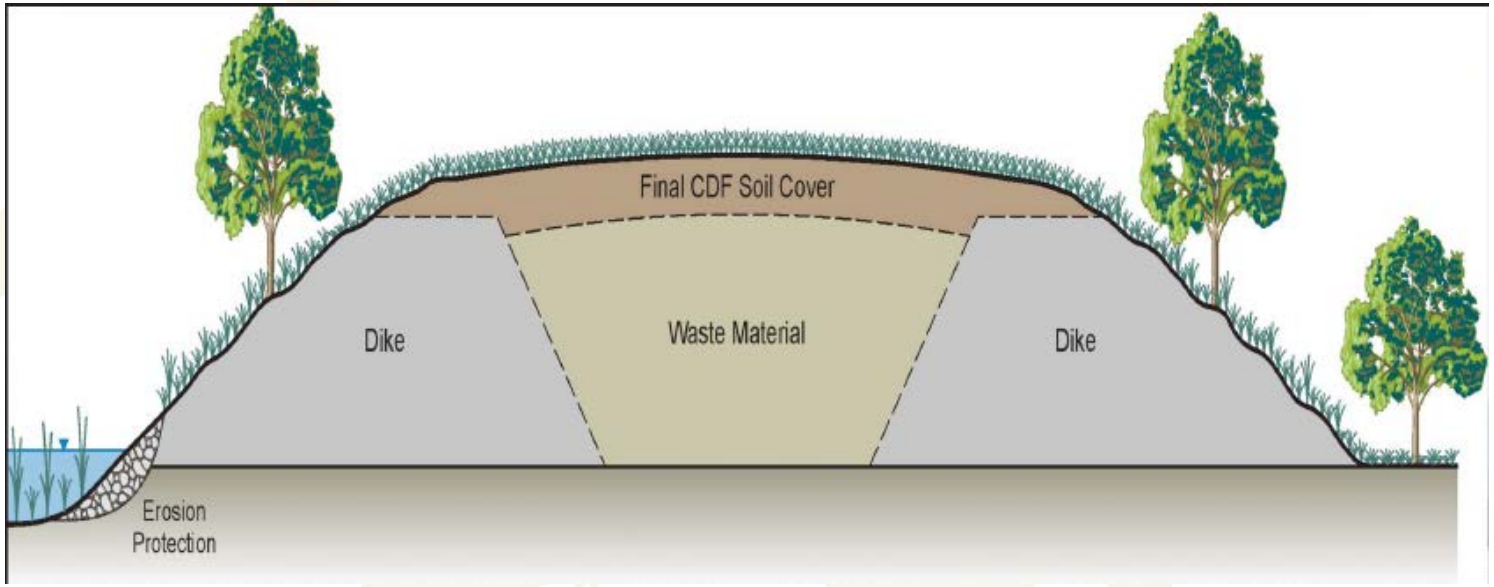
Dredging

- Dredging is the mechanical or hydraulic removal of sediments from the waterbody.
- Targeted for areas of higher contamination and where additional water depth is desired for ecological and human use.
- Most complicated remedial approach requiring multiple components
  - Dredging
  - Transport
  - Processing/Dewatering
  - Water Treatment
  - Disposal
  - Control of Residual Contamination

Confined Disposal Facilities

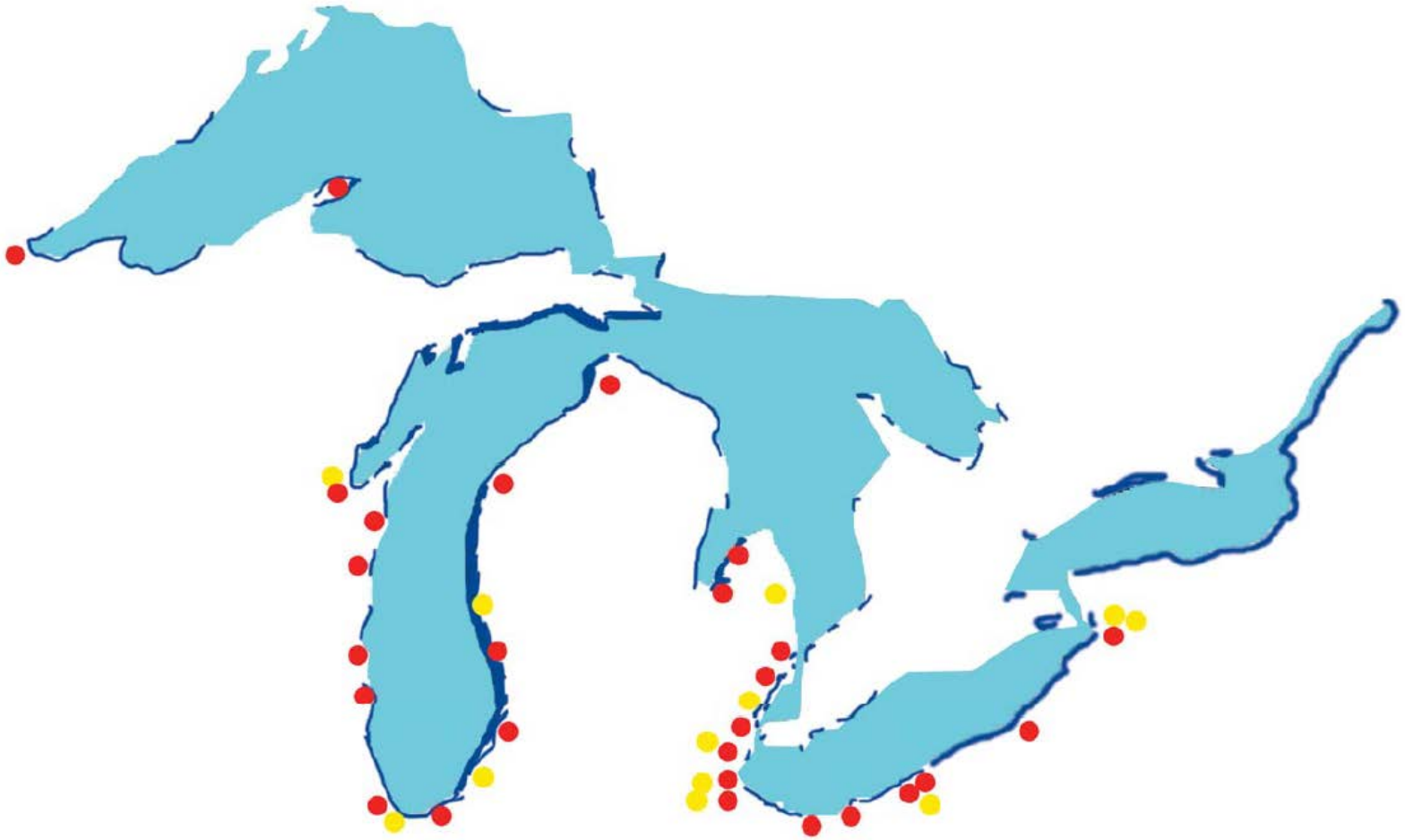
Great Lakes RESTORATION

Confined Disposal Facilities



Great Lakes RESTORATION

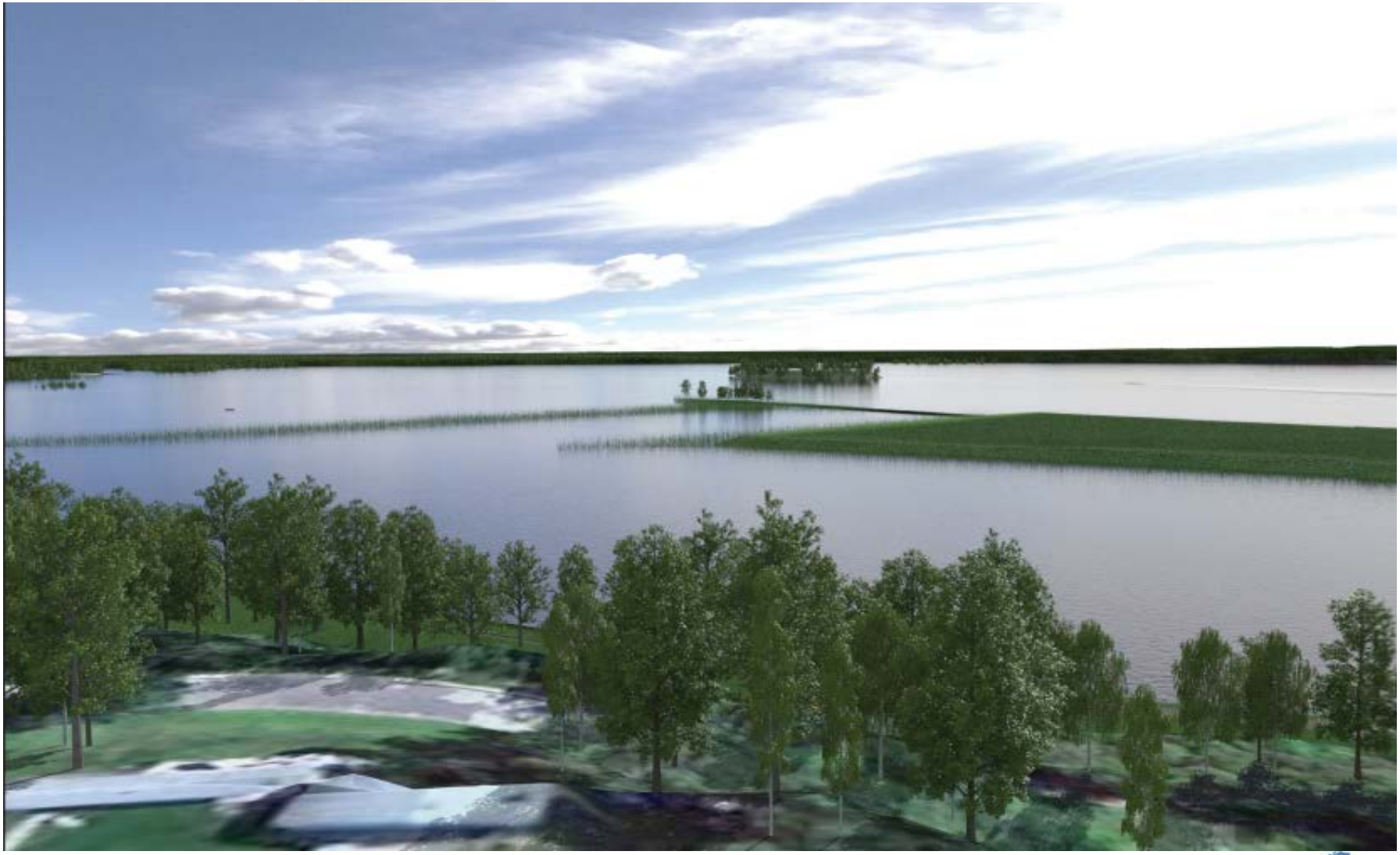
Confined Disposal Facilities



Confined Disposal Facilities

- Disposal cells specifically designed to manage and contain contaminated sediments.
- Targeted for impacted areas adjacent to Unnamed Creek and the Unnamed Creek Delta (total of 40 acres).
- Used successfully throughout the Great Lakes
- Require long-term maintenance and monitoring (U. S. Steel responsibility)
  - Overseen by EPA and MPCA
- Could include habitat/access enhancements

Confined Disposal Facilities



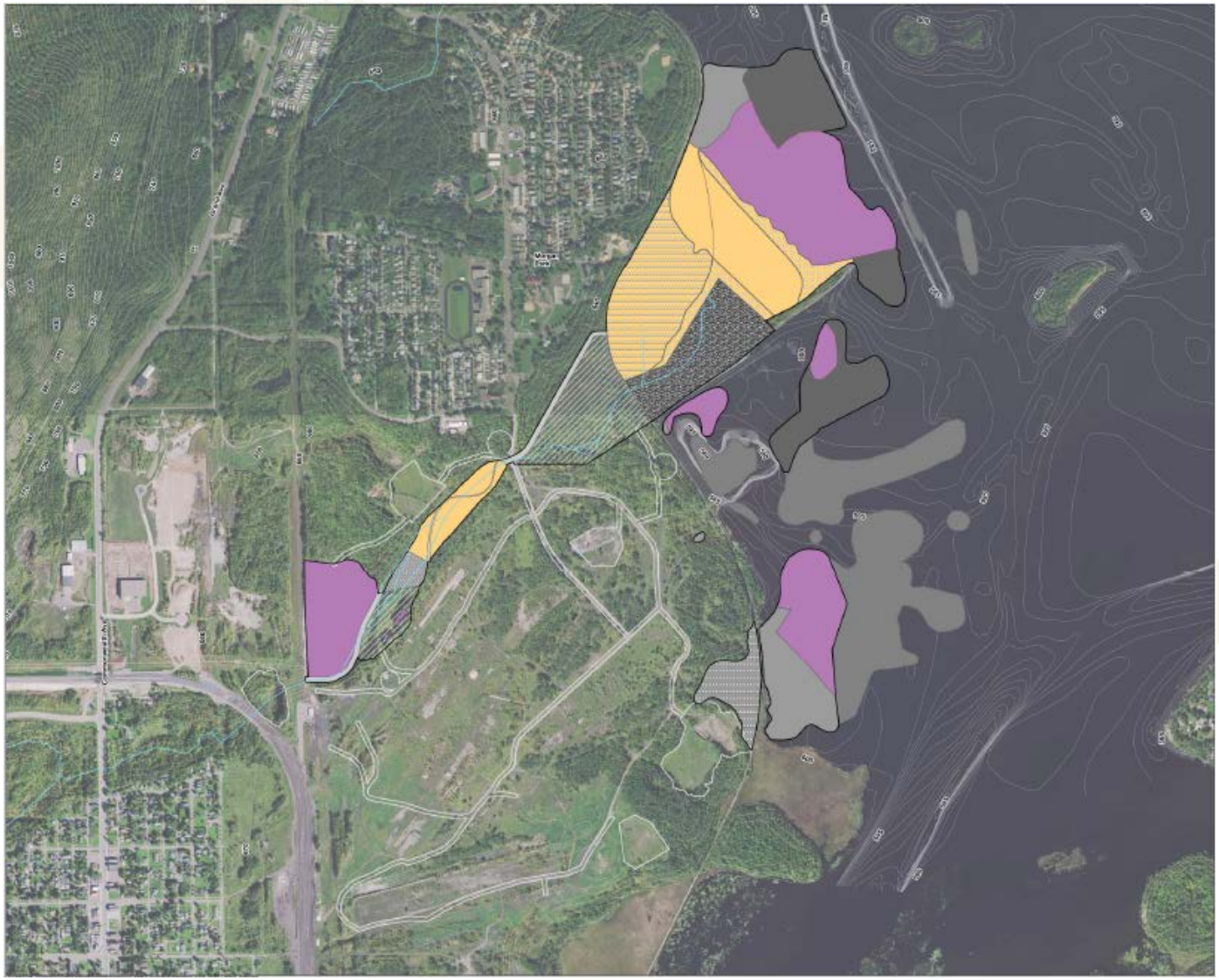
Great Lakes RESTORATION

Confined Disposal Facilities

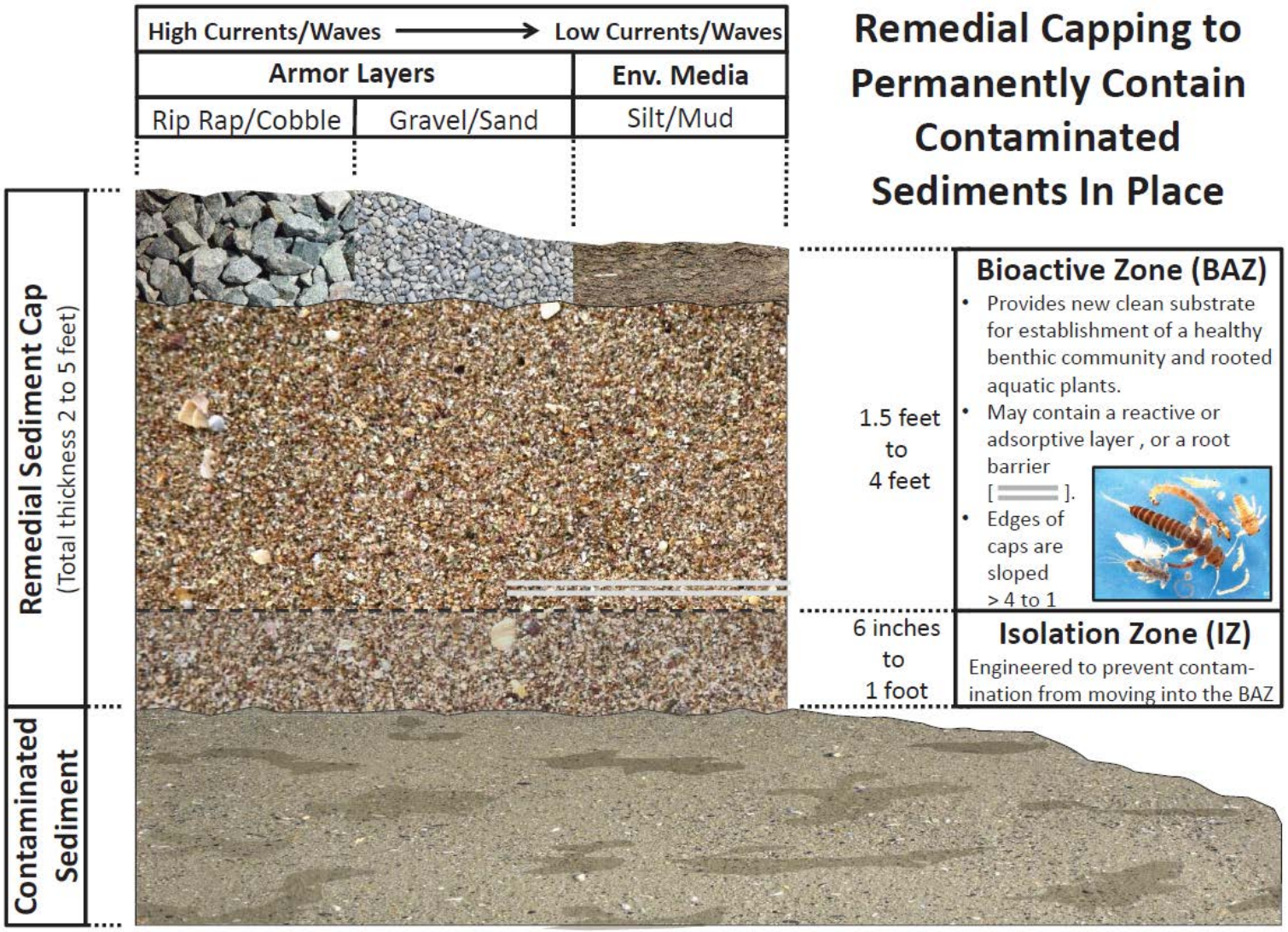
Great Lakes RESTORATION

Confined Disposal Facilities

Capping



Capping



Great Lakes RESTORATION

Capping

Great Lakes RESTORATION

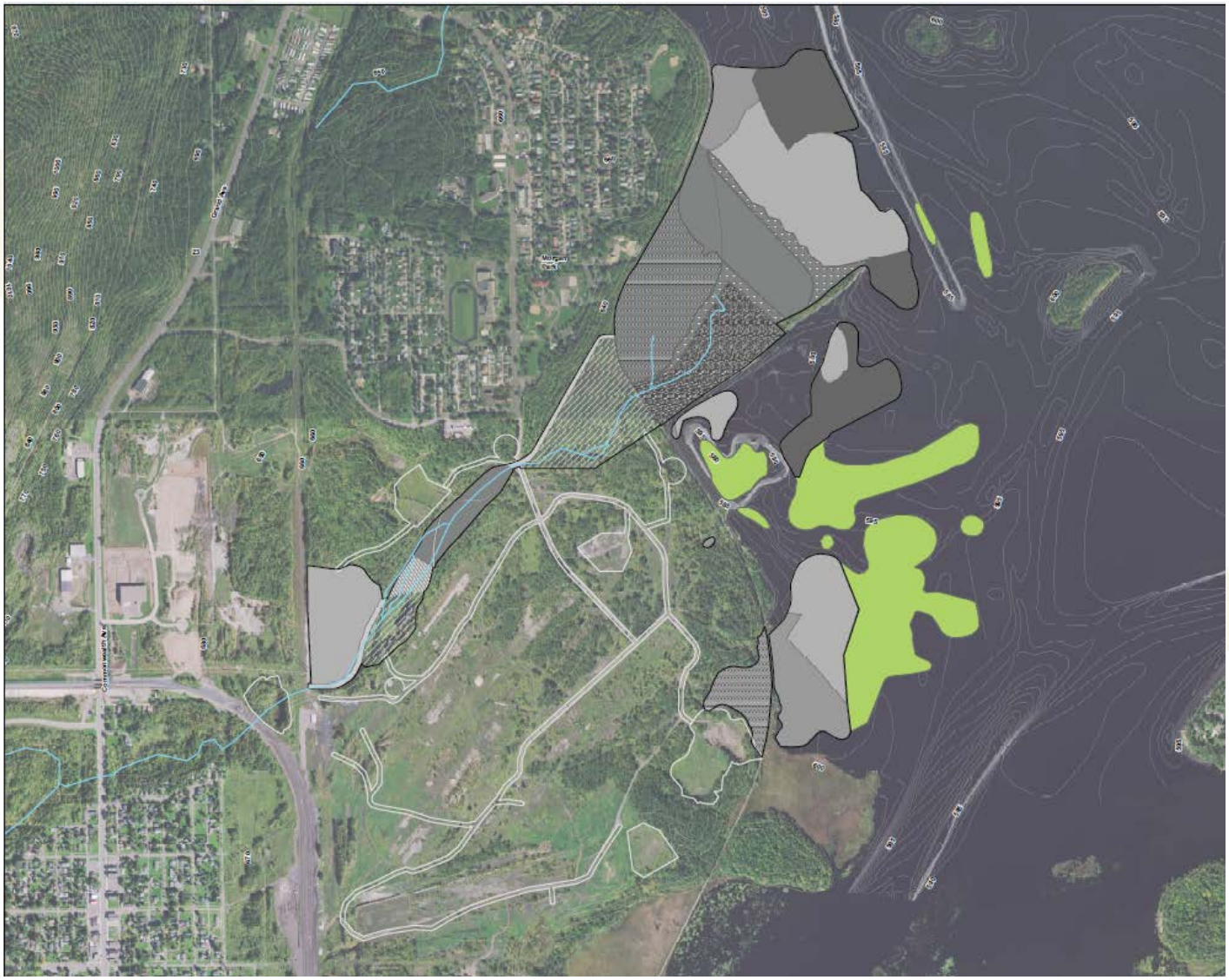
Capping

- Placement of clean material (cap) over contaminated sediments that will remain in place.
- Creates a physical and chemical barrier to prevent exposure to contaminants.
- Highly effective at immediately reducing exposures.
- Can be utilized to efficiently create targeted water depth for aquatic habitat restoration.
- Requires long-term monitoring and maintenance.

Monitored Natural Recovery

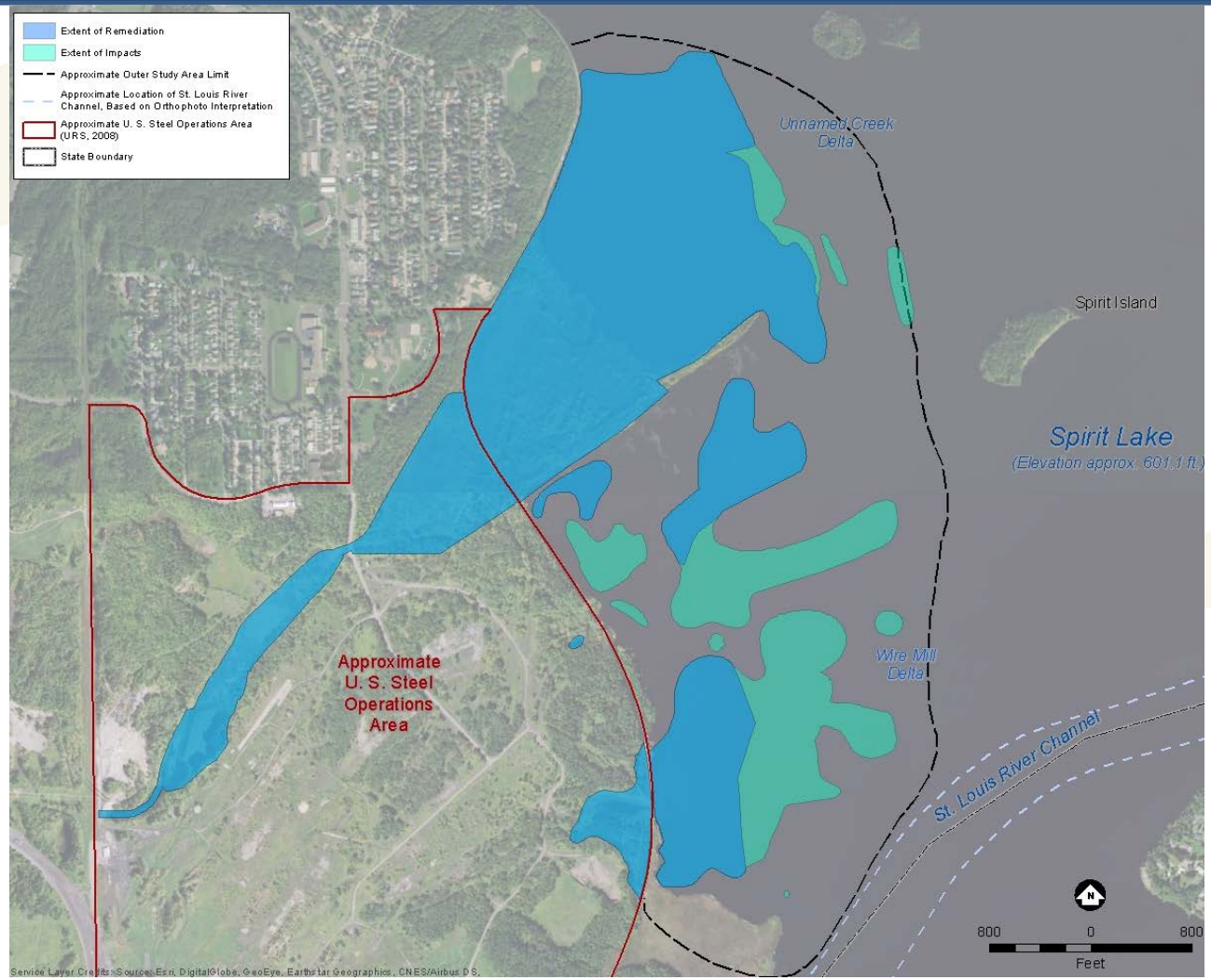
- Utilizes, on-going, naturally occurring processes to contain, destroy, or reduce the bioavailability or toxicity of contaminants.
- Targeted for areas where natural sedimentation has buried historical contamination.
- Primary MNR Mechanism: Sedimentation
- Secondary MNR Mechanism: Contaminant Breakdown (for PAHs)

Monitored Natural Recovery



Great Lakes RESTORATION

Natural Cover Areas

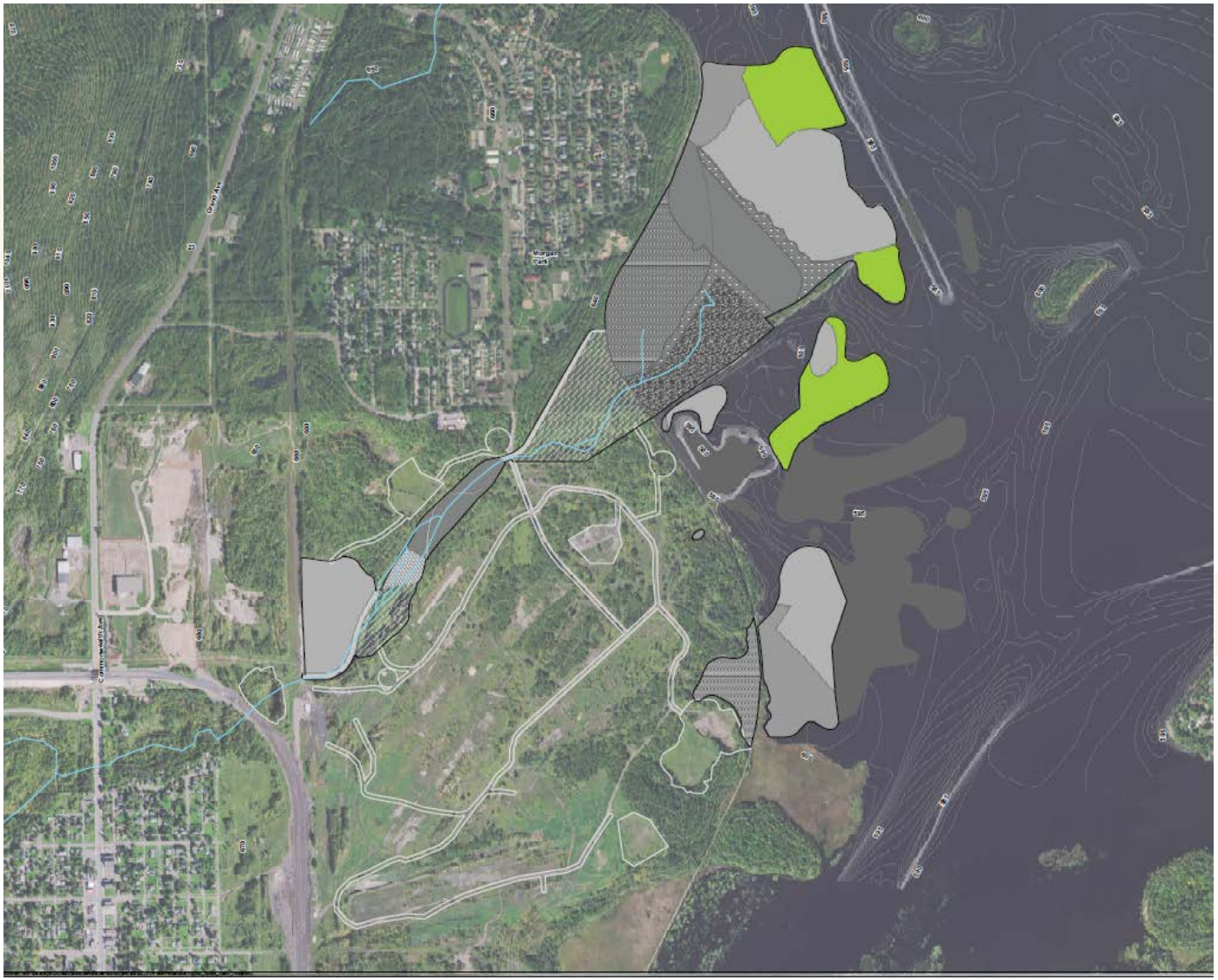


Great Lakes RESTORATION

Enhanced Monitored Natural Recovery

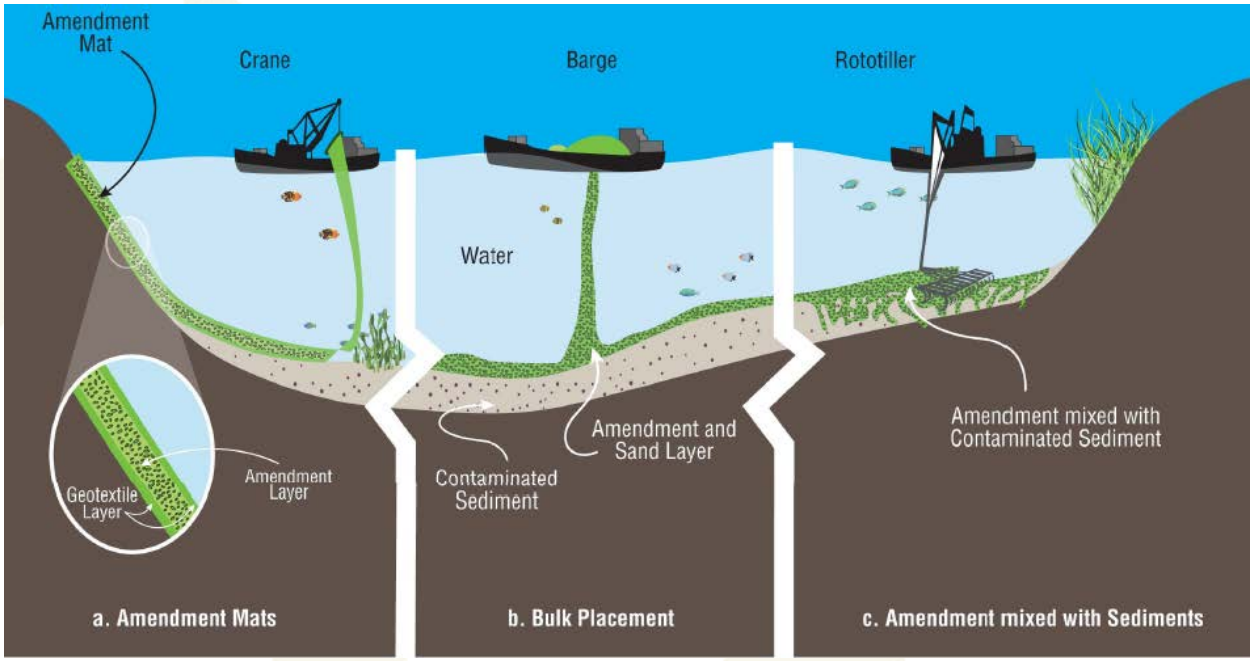
- Provides an additional thin layer cap to speed up the naturally occurring sedimentation processes taking place at the site.
- Targeted for areas where:
  - Surface contamination is low
  - Natural sedimentation has partially buried contamination
  - Models predict on-going sedimentation to occur
  - Areas of low energy
  - Areas of higher habitat quality

Enhanced Monitored Natural Recovery



Great Lakes RESTORATION

Enhanced Monitored Natural Recovery



Great Lakes RESTORATION

Restoration

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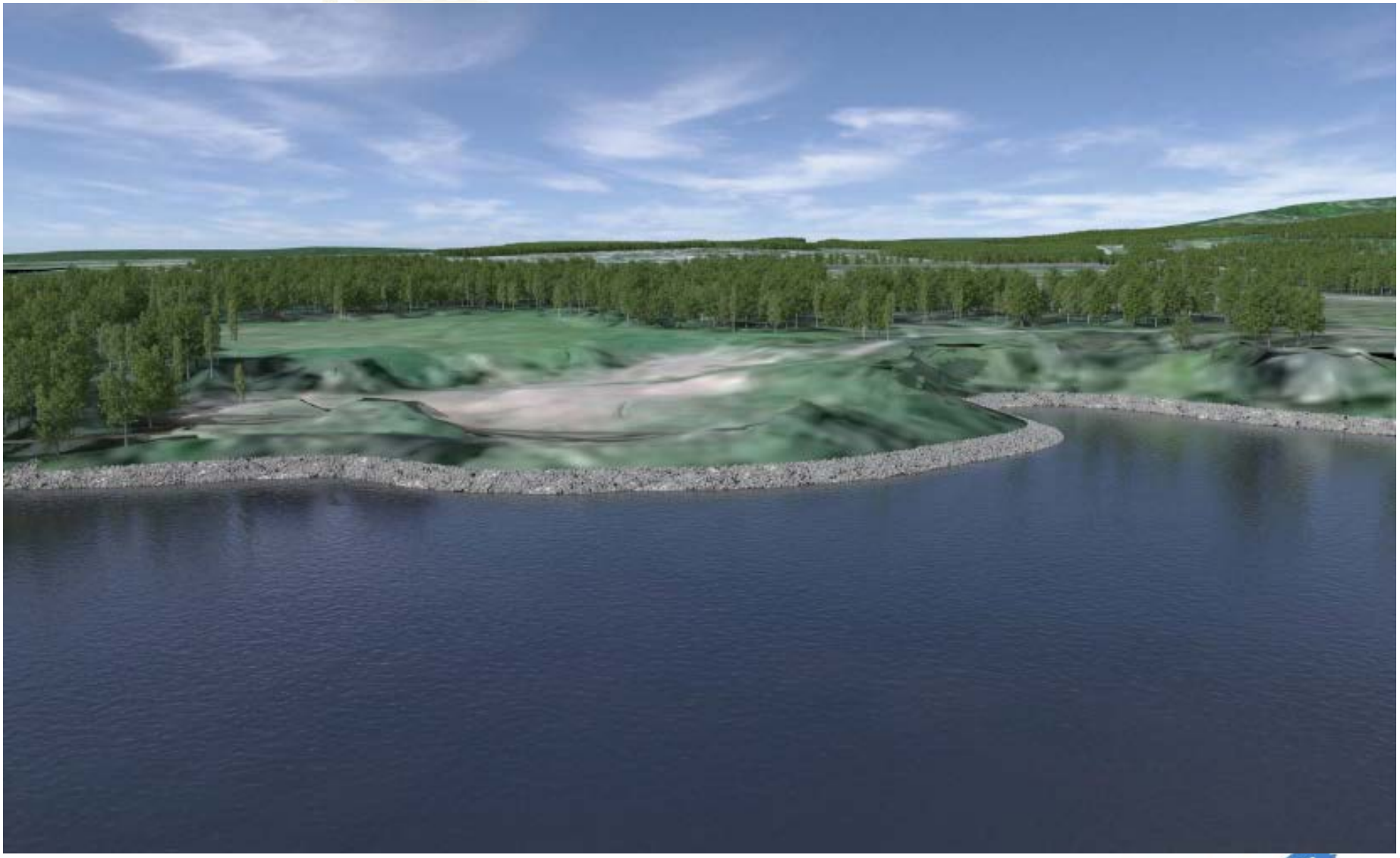

Potential Restoration Opportunities

- Submerged Aquatic Plants
- Emergent Aquatic Plants
  - Wild Rice
- Fish Habitat
  - Shallow, Sheltered Bay
  - Structure
  - Spawning Habitat
- Public Access
  - Canoe/Kayak Launch
  - Hiking Trails

Summary of Project Benefits

- Protection of Human Health and the Environment
- Creation of Open Water (30 acres)
- Creation of Shallow, Sheltered Bay Habitat
- Shallow Water Vegetation
- Potential to Enhance Public Access to the River

Potential Short-term Impacts

- Noise During Construction
- Increased Truck Traffic
- Interruption of Railroad Operations
- Construction Lighting

Project Schedule

- Public Input/Finalize FS (November 2016)
- Design and Permitting (December 2017)
- Construction (January 2018 to December 2019)
- Long-Term Monitoring (Forever)

Opportunities for Input

- Q&A Session
- Poster Session
- Comment Forms
- Email
- Written Comments
- Additional Meetings During Design Phase
- EPA and U. S. Steel to Prepare a Response to Comments Document