Engineering with Nature – In Action: SLR AOC Living Shoreline Design Basis

Engineering With Nature and Buffalo District Collaborative Meeting
Introducing the EWN Opportunity and Implementation Guide
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BUILDING STRONG®

DULUTH EWN

21st Ave West Habitat Restoration Project

Project Goals and Objectives

- ***Removal of SLR AOC beneficial use impairments (BUIs)***
  - ***Loss of fish and wildlife habitat***
  - ***Degraded Benthos***
- ***Cost effective and environmentally acceptable dredged material (DM) management***
- ***Maximize habitat improvements using EWN approach***
  - ***Given budget, schedule and engineering constraints***
- ***Evaluate engineering feasibility of shallow water DM in pilot study***
  - ***Data & experience needed for two more habitat restoration sites in the AOC!!***

STAKEHODERS and Stakeholders, and stakeholders…

Maximizing the economic, environmental, and social benefits of the project requires collaboration!

- *City of Duluth*
- *Duluth Seaway Port Authority*
- Fond du Lac Tribe
- *Minnesota DNR*
- *Minnesota Land Trust*
- *Minnesota PCA*
- *Wisconsin DNR*
- *University of MN**
- *USACE –LRE, MVP*
- *USEPA/GLNPO*
- *USEPA/ORD MED **
- *USFWS*
- *USGS**
- *Western Lake Superior Sanitary District (WLSSD)*
- *And more NGOs!*

**** Providing significant technical support***

21st Ave West Habitat Design Basis

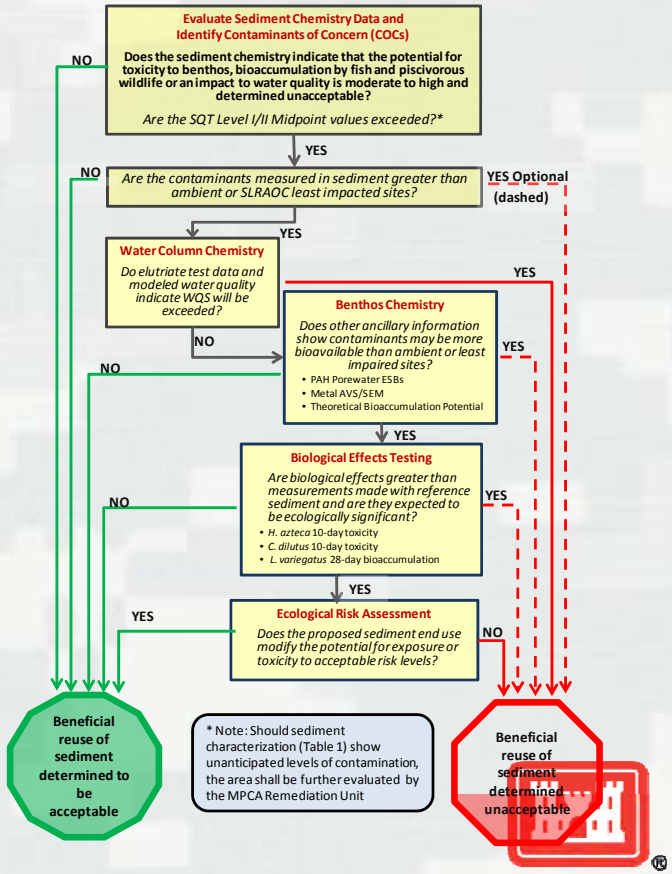
Ecological Concept Plan Goals

- ✓ Create 30 acres of new shallow water habitat
  - +++ emergent marsh, invertebrate richness, waterfowl habitat and SAV associated fish
- ✓ Create 22 acres of near shore island/upland habitat
  - + +Piping Plover and Common Tern habitat
  - ++ migratory songbird habitat
- ✓ Soften bulkhead / riprap shoreline by creating emergent vegetation beds given constraints on construability and sustainability
- ✓ Maintain ¼ mile distance predation barrier from new shoreline and existing Interstate Island PP habitat

Restoration Program Specific Guidelines For Evaluating Sediment Quality are Being Drafted by MPCA

- ✓ ***MPCA Guidelines being developed specifically for AOC Habitat Restoration program***
- ✓ ***Close coordination with USACE's federal requirements!***
- ✓ **Tiered approach for risk management decisions**
- ✓ ***Recognition that sediment screening values are predictors of potential toxicity***
- ✓ ***Biological effects data maybe required in addition to sediment screening values***
- ✓ ***Consistent with existing MPCA guidance and Federal guidelines***

In-Progress DRAFT



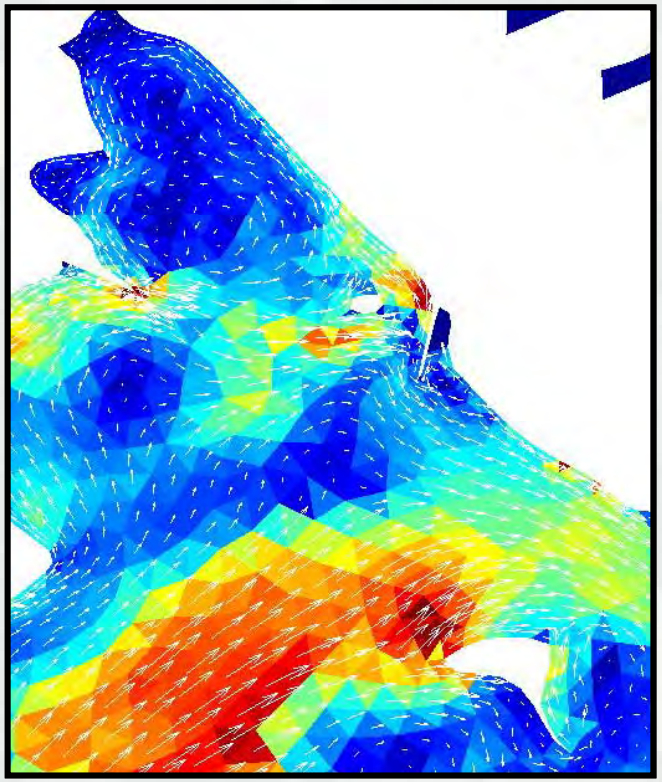
Biological Outcome Models For Predicting Aquatic Vegetation Habitat Zones Have Been Developed

- ***Statistical models predict probability of Emergent marsh , Floating Leaf and Submerged Aquatic vegetation***
- ***Incorporates water depth and Relative Exposure Index (fetch) as primary variables***
- ***Used for evaluating design options***
- ***UM-Duluth NRRI and USEPA-MED developed models - significant technical support!!***

Biological Outcome Models For Predicting Macroinvertebrate Communities Have Been Developed

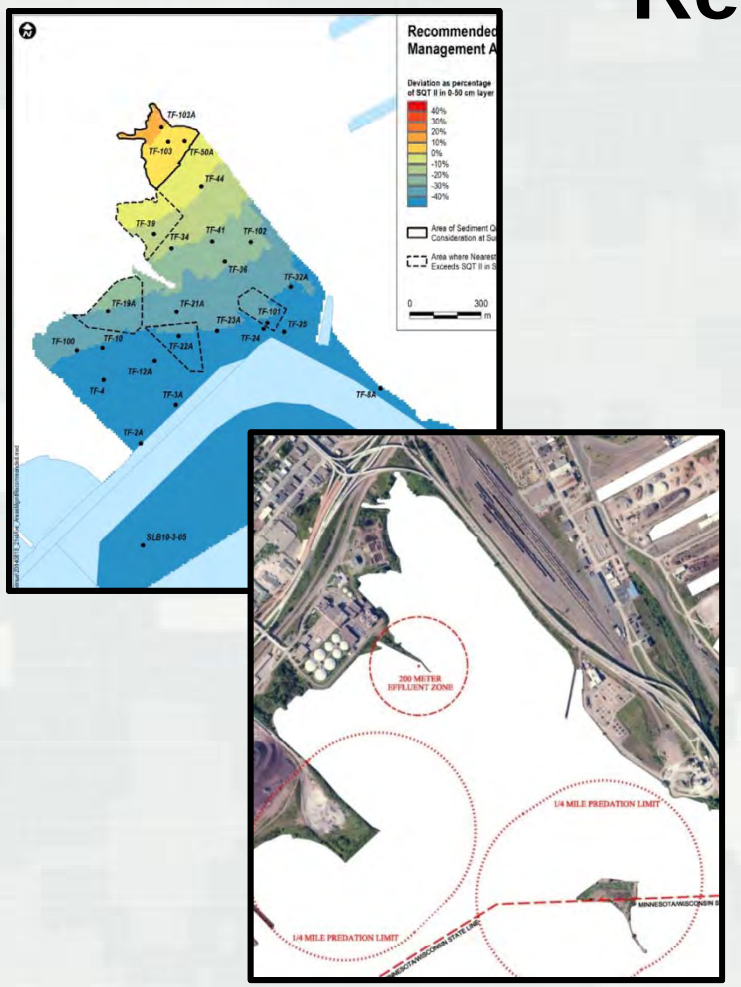
- ***Macroinvertebrate multimetric index (SLRLCI) developed based on least impaired sites within AOC***
- ***Graphical models created for predicting total taxa and SLRLCI***
- ***Incorporates water depth and Relative Exposure Index (fetch) as primary variables***
- ***Used for evaluating design options***
- ***USEPA-MED providing technical support!!***

Hydrodyanmic/Sediment Transport Model to Evaluate Sediment Stability, Habitat Resiliency, Climate change



- ***Short term stability and constructability of new shoreline, shoals and islands***
- ***Impact of bathymetric design on modeled REI , aquatic vegetation and benthic macroinverteebrates***
- ***Predicted long term resiliency of aquatic macrophyte beds***

Other Design Constraints For Habitat Restoration



- ***Hydraulic placement of DM in shallow water***
- ***Contaminated sediments at depth***
- ***Mixing zone for WLSSD outfall***
- ***1/4 mile offset for islands to prevent predation of T&E species***
- ***Federal navigation channel***
- ***Dredged material availability and schedule***
- ***Public land /real estate ownership***
- ***Design calibration: construction tolerances***

A 3-year Pilot Demonstration To Evaluate Construction Methods and Outcomes.