

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

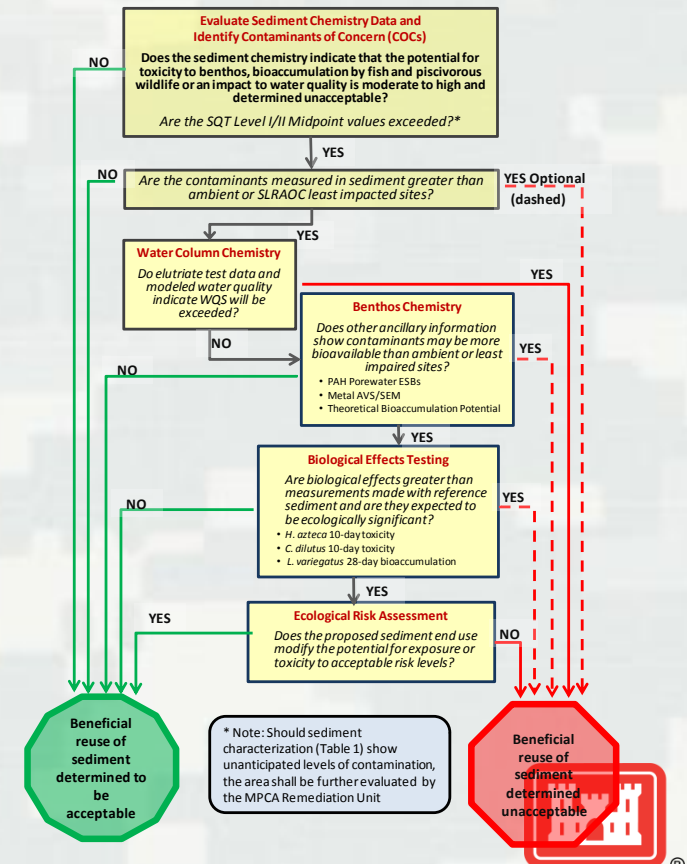
- ✓ Create 30 acres of new shallow water habitat
 - +++ emergent marsh, invertebrate richness, waterfowl habitat and SAV associated fish
- ✓ Create 22 acres of near shore island/upland habitat
 - + +Piping Plover and Common Tern habitat
 - ++ migratory songbird habitat
- ✓ Soften bulkhead / riprap shoreline by creating emergent vegetation beds given constraints on constructability and sustainability
- ✓ Maintain 1/4 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 NRRRI and USEPA-MED developed models - significant technical support!!*



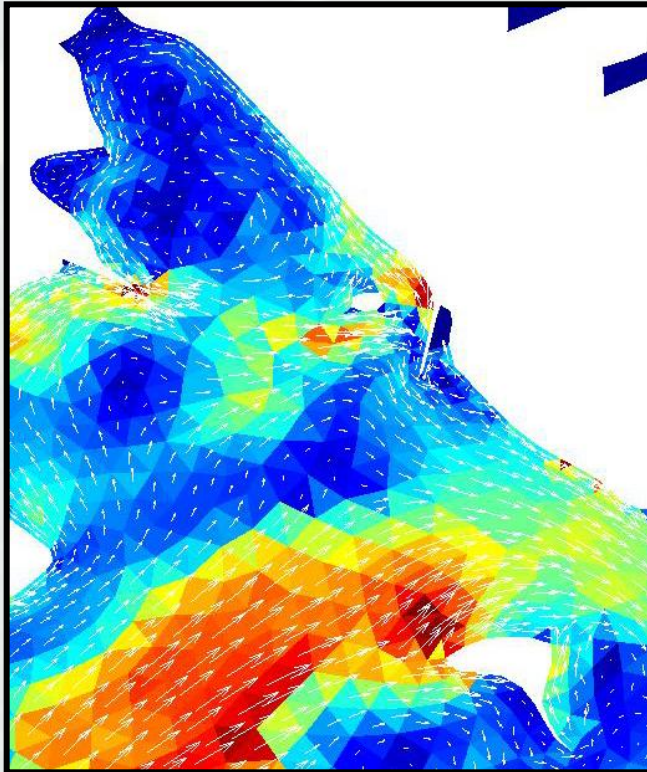
Biological Outcome Models For Predicting Macroinvertebrate Communities Have Been Developed



- *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!!*



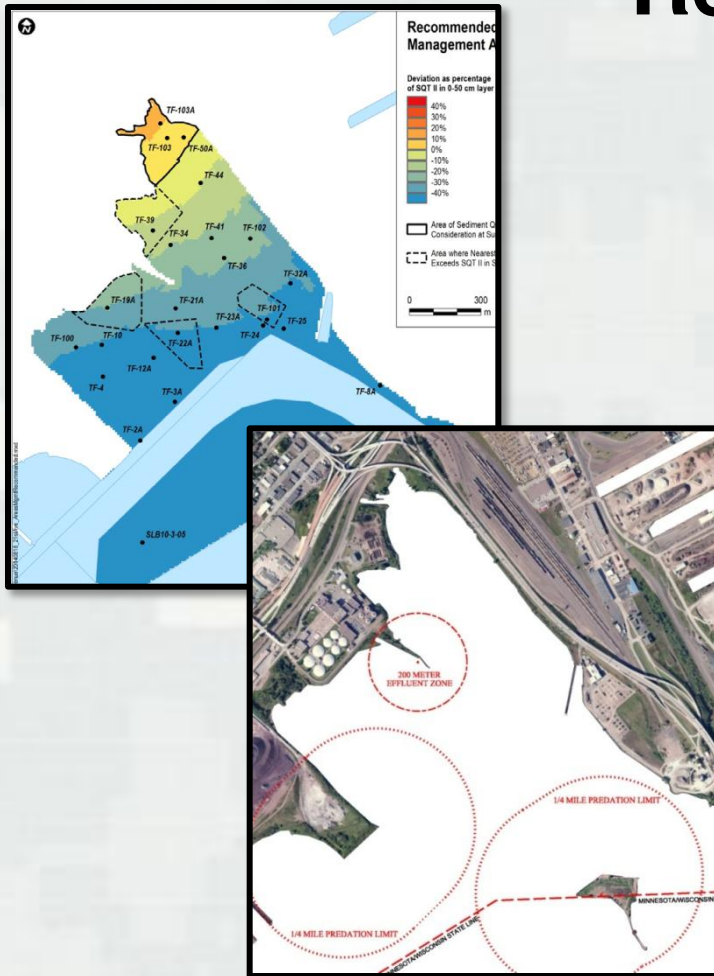
Hydrodynamic/Sediment Transport Model to Evaluate Sediment Stability, Habitat Resiliency, Climate change



- *Short term stability and constructability of new shoreline, shoals and islands*
- *Impact of bathymetric design on modeled REI, aquatic vegetation and benthic macroinvertebrates*
- *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.

