BENEFICIAL USE OPPORTUNITIES REALIZED AT CONTAMINATED SEDIMENT SITES

Ramboll

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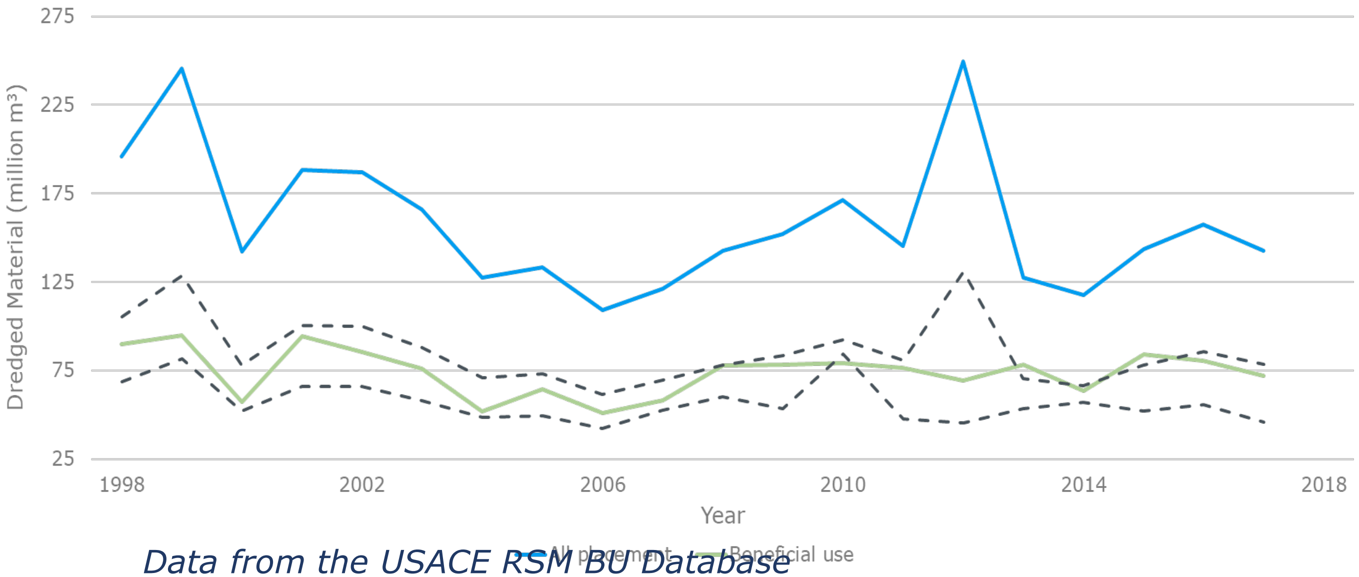
U.S. BU FRAMEWORK HIGHLIGHTS

- No federal law mandating Beneficial Use (BU)
- WRDA 2020 integrates consideration of national and regional benefits and environmental quality
- USACE 2023 BU Command Philosophy Notice established the 70/30 Goal
- BU continues to grow out of advocacy



Data from the USACE RSM BU Database (https://rsm.usace.army.mil/BUDB). Adapted from Searcy Bell et al.(2021).

RISK-BASED EVALUATION OF INDUSTRIAL BYPRODUCTS APPLIED TO DREDGED MATERIAL

Planning & Scoping

Develop a Conceptual Site Model

Impact Analysis

Assess impacts to potential human and ecological receptors

Final Characterization

Establish beneficial use opportunities and limitation based on understanding of risk

- Most beneficially used dredged sediment is "clean"
- "Clean" sediment is not managed under hazardous waste regulations

(Adapted from USEPA 2016).

BU DEFINITIONS

Source	BU Definition
PIANC (2009)	"…any use of dredged material, rather than mere disposal is regarded as beneficial use"
CEDA (2019a) and PIANC (2023)	"…the use of dredged or natural sediment in applications that are beneficial and in harmony to human and natural development"
Searcy Bell et al. (2021)	"…using dredged sediment to achieve additional benefits beyond the purposes related to its removal, including other economic, environmental, or social benefits"

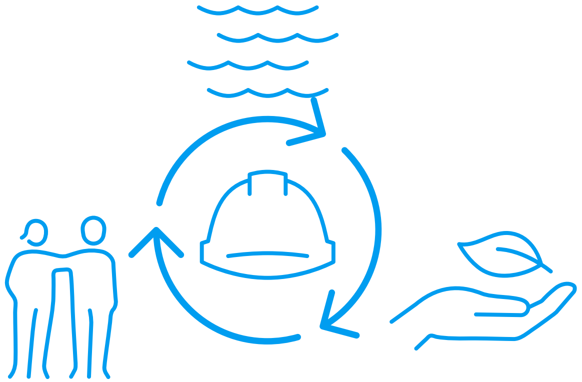
BU Benefits of Natural Sediment, Even If Contaminated

Circular Economy Opportunity

- Avoids extracting new raw material
- Avoids wasting reusable materials

Restoration Opportunity

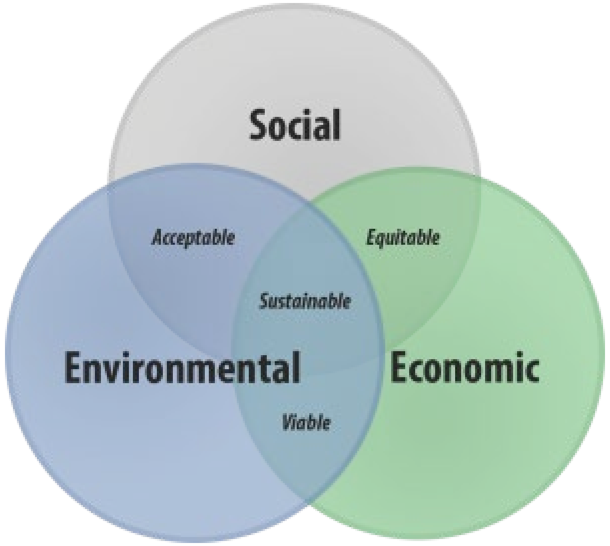
- Integrates ecosystem and socio-economic functions beyond the cleanup



Natural Capital Accounting Opportunity

- Captures societal and ecological benefits

Engineering with Nature® (EWN)

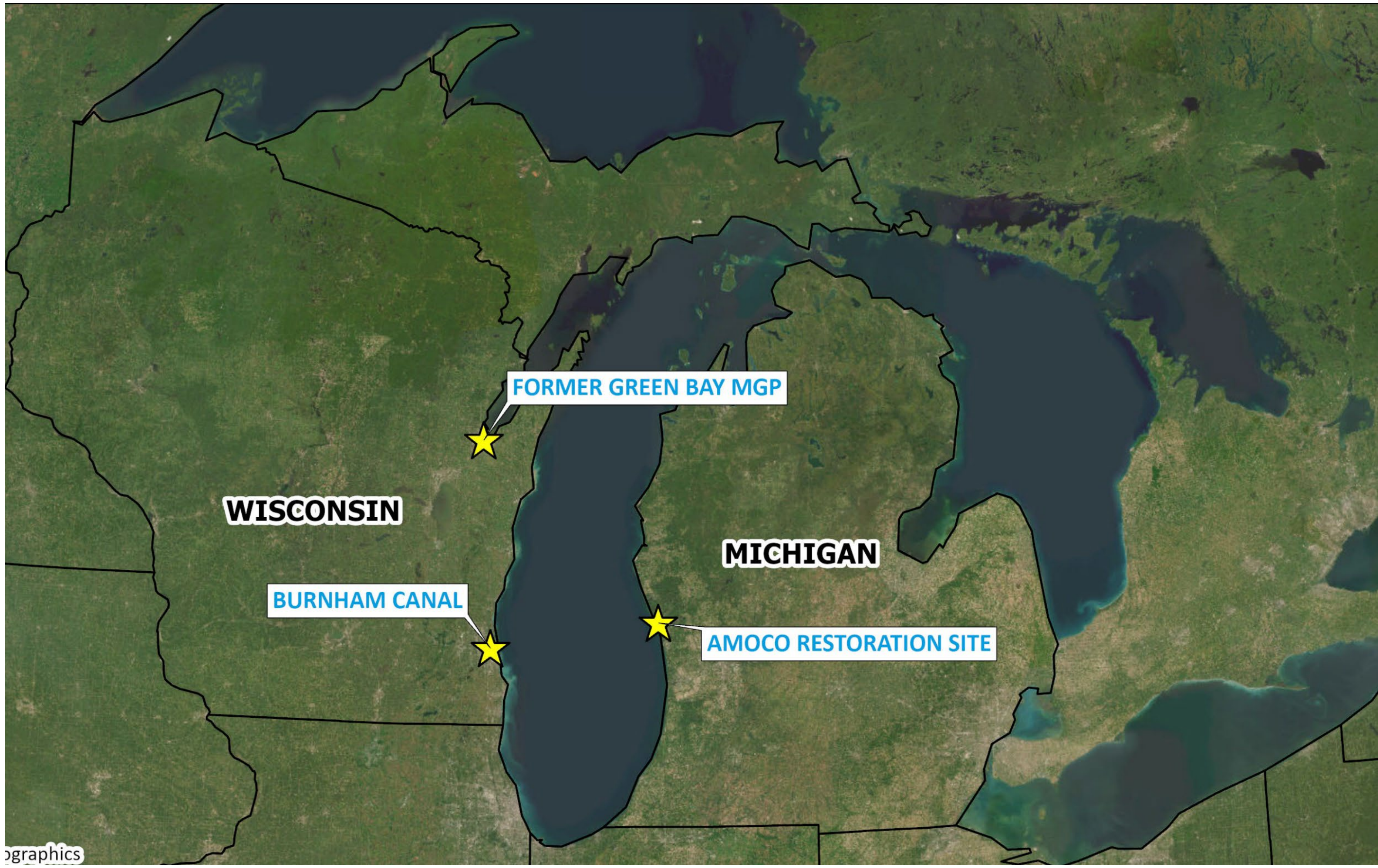


https://ewn.erdc.dren.mil

- **Holistic** – an ecosystems approach
- **Innovative** – science-based, solutions-oriented
- **Collaborative** – from design through implementation and monitoring
- **Adaptive** – supporting system sustainability and resilience
- **Socially responsive** – engaging stakeholders
- **Cost-effective** – efficient and value-adding

CASE STUDIES

- Burnham Canal, WI
- Former Green Bay MGP, WI
- Amoco Restoration Site, MI



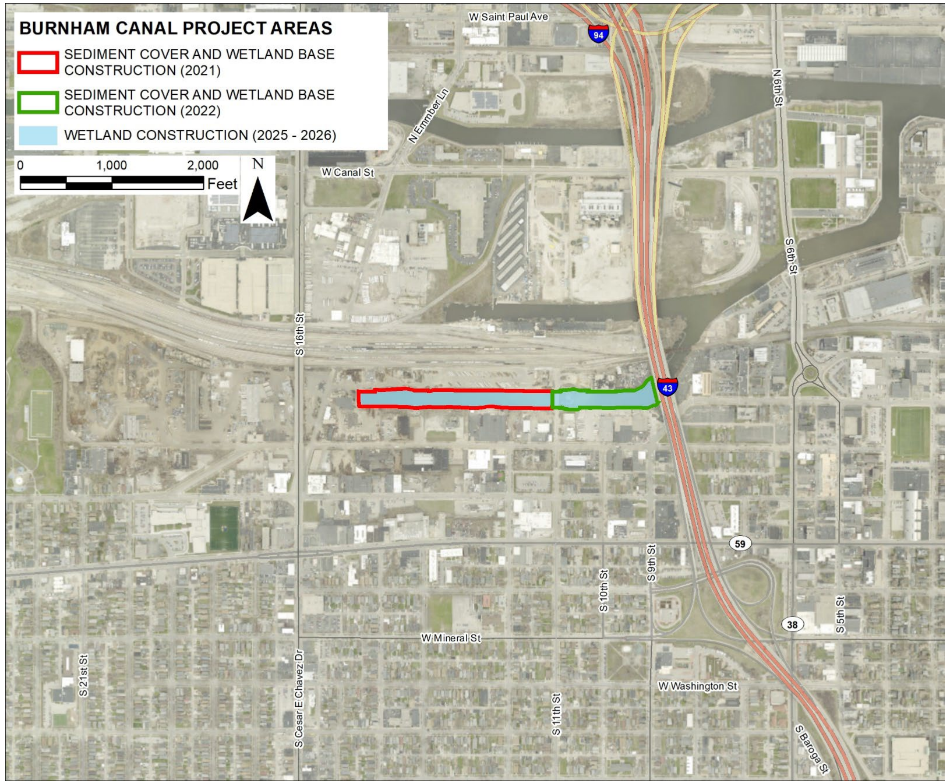
CASE STUDIES' COMMON THEMES

- Addressed contamination
- In-place sediments used to support habitat restoration
- Improved waterway infrastructure
- Agency-project owner-stakeholder partnerships
  - Delivered projects faster and cheaper
  - Innovative funding/partnership mechanisms
  - Linked multiple projects

Photo: Great Lakes Dock and Materials

BURNHAM CANAL

- Removal
  - 1,000 cubic yards
- Capping
  - 66,667 cubic yards capped by 12-inch aggregate
- Reuse
  - 1,400 cubic yards
- Betterment to remedy
  - 5-feet aggregate for wetland habitat



ENGAGED STAKEHOLDERS

- Miller Compressing Company
- City of Milwaukee
- U.S. Army Corps of Engineers
- Milwaukee Metropolitan Sewerage District (MMSD)
- U.S. EPA
- WDNR

BURNHAM CANAL

BU Type

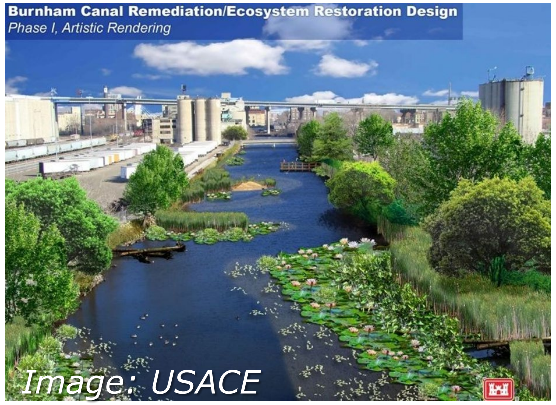
Remediation BU: “Like on like” dredged material and material dredged to create hydraulic capacity placed under the cap

Risk Summary

Residual sediment required isolation to control pathway exposures for BU

Nature-based Solution

Ecosystem restoration, supported by habitat betterment through BU



Natural Infrastructure

Construction of wetland for water quality treatment

BURNHAM CANAL RESTORED ECOSYSTEM SERVICES

Services Restored	
Provisioning	Fishery, Freshwater
Regulating	Water purification, Erosion control, Climate regulation, Pollination
Cultural	Aquatic recreation
Supporting	Nutrient cycling, Combined sewer outfall improvements

FORMER GREEN BAY MGP – NORTH FOCUS AREA

- Removal
  - 28,890 cubic yards
- Capping
  - 12,300 cubic yards capped by 13-inch chemical isolation layer and armored grouted mattress
- Buttressing layer to support infrastructure stability
- Habitat layer betterment
  - 6-inch sand

ENGAGED STAKEHOLDERS

- Wisconsin Public Service Corporation
- U.S. Army Corps of Engineers
- U.S. Coast Guard
- Port of Green Bay
- Individual Port Operators and Shippers
- Lower Fox River Remediation LLC
- U.S. EPA
- WDNR

FORMER GREEN BAY MGP – NORTH FOCUS AREA

BU Type

Remediation BU: use of dredged material not acceptable for BU (physical/ chemical characteristics) except to support habitat and bulkhead stability betterments

Photo: JF Brennan

Risk Summary

Residual sediment required treatment and isolation to control pathway exposures for BU

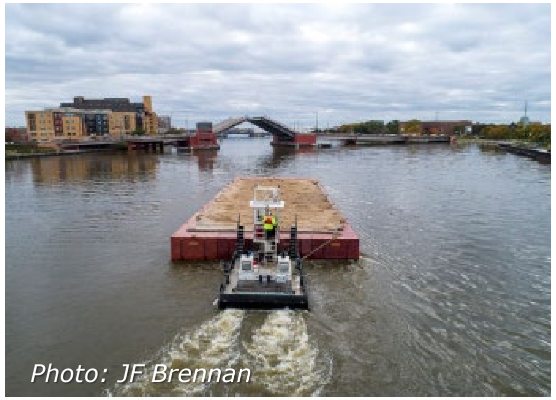
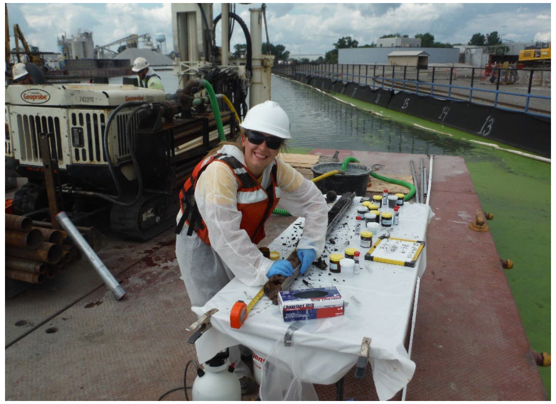


Photo: JF Brennan

Nature-based Solution

Ecosystem restoration supported by hybrid cap and habitat betterment



Natural Infrastructure

None

GREEN BAY MGP RESTORED ECOSYSTEM SERVICES

Services Restored	
Provisioning	Fishery, Freshwater
Regulating	Erosion control
Cultural	Aquatic recreation
Supporting	Nutrient cycling, Bulkhead wall buttressing

AMOCO RESTORATION SITE

- Lake connection re-established
- Removal
  - 900 tons concrete
  - 40 tons debris
  - 2,700 tons historical fill
- Grading
  - Shaped bed for habitat
- NbS shoreline
- NbS coastal structures

ENGAGED STAKEHOLDERS

- West Michigan Shoreline Regional Development Commission
- NOAA/Great Lakes Regional Partnership and the Great Lakes Restoration Initiative
- City of Muskegon
- Muskegon Lake Watershed Partnership

AMOCO RESTORATION SITE

BU Type

Restoration BU: Remaining sediments graded for habitat

Risk Summary

Acceptable risk for BU after remediation of dredge material, remaining sediments graded for habitat

Nature-based Solution

Wave attenuation shoals providing coastal resiliency / stabilized shoreline delivering flood risk mitigation, ecosystem restoration

Natural Infrastructure

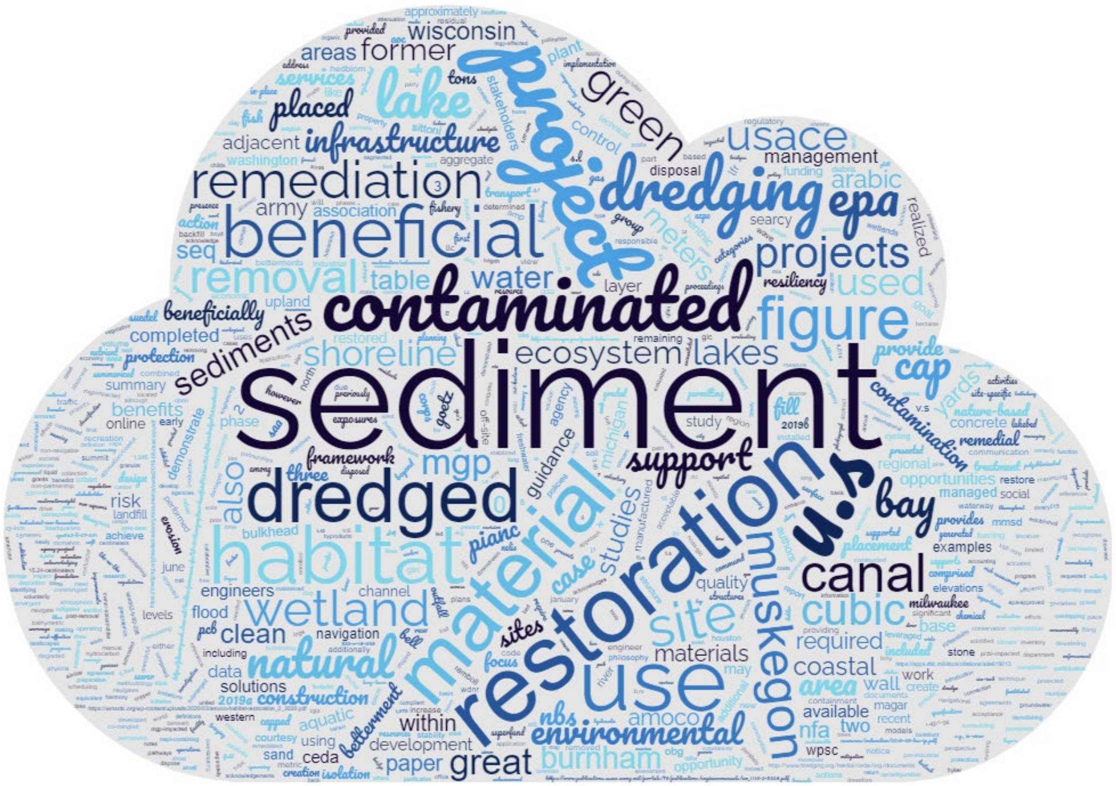
Landforms (lakebed, wetland, shoreline) restored for erosion and flood control. Wetland restored for water quality

AMOCO SITE RESTORED ECOSYSTEM SERVICES

Services Restored	
Provisioning	Fishery, Wildlife Habitat, Freshwater
Regulating	Water purification, Wave attenuation/coastal flood control, Climate regulation, Pollination
Cultural	Aquatic and upland recreation
Supporting	Nutrient cycling

BENEFITS REALIZED OF CONTAMINATED SEDIMENT BU

- Societal benefits are demonstrated through the partnerships
- Ecological benefits demonstrated through restored ecosystem services
- Contaminated sediment BU, with risk management:
  - Avoided dredging
  - Minimized treatment and disposal to landfill
  - Limited imported clean backfill before creating new habitat



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