



Great Lakes Beneficial Use Testing Manual

*What does it entail, and
How do I use it?*

Great Lakes Dredging Team Meeting September 2023

Karen Keil



The quest for a beneficial use testing manual began...



Beneficial Use of
Dredged Material
Workshop, Duluth MN
November 2014

Unclassified





GREAT
LAKES
DREDGING
TEAM

Annual Meeting

June 10, 2019

Great Lakes Beneficial Use Testing Manual

- ✓ Objective is to support beneficial use of dredged material by developing a **standard approach for evaluating the environmental suitability** of dredged material for beneficial uses.
- ✓ Recognizing that **beneficial use of dredged material projects support regional remediation and restoration efforts** throughout the Great Lakes



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Agencies which reviewed and provided input





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Engineer Research and
Development Center



Dredging Operations Technical Support Program

Environmental Evaluation and Management of Dredged Material for Beneficial Use

A Regional Beneficial Use Testing Manual for the Great Lakes

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Approved for public release; distribution is unlimited.

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<https://dots.el.erdcdren.mil/guidance.html>

<https://budm.el.erdcdren.mil/guidance.html>

This manual is dedicated to Mr. Tony Friona, who was an early proponent of the beneficial use of dredged material to support remedial and restoration efforts across the Great Lakes. Officially, Tony served as the USACE Regional Working Group co-lead for the Great Lakes Restoration Initiative. Unofficially, he was so much more: a visionary colleague and friend who, with his contagious enthusiasm, inspired us to work together to better our region. His light will continue to shine on in the work that we do and in the relationships we form along the way.

Great Lakes Beneficial Use Testing Manual Sections

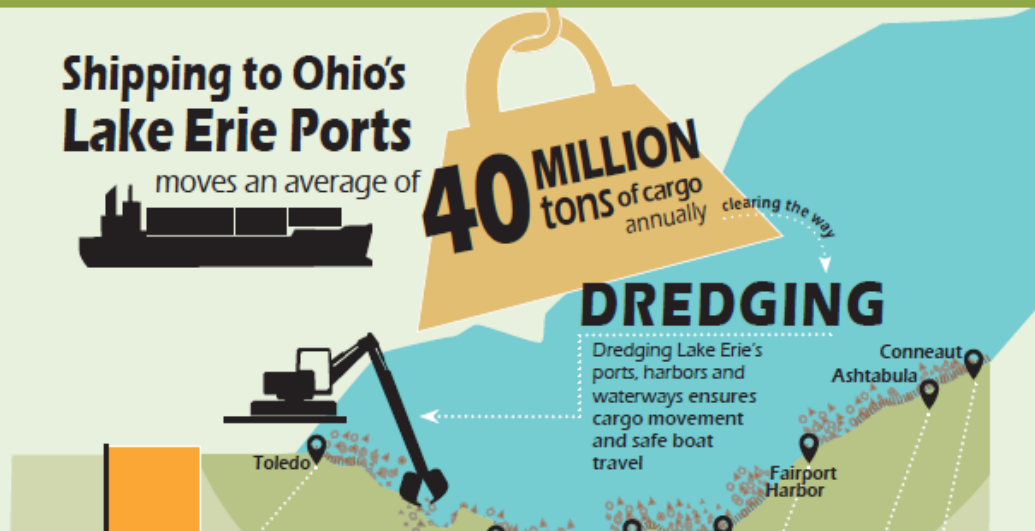
1. Historical context and **Great Lakes-specific** perspective
2. Provides **regulatory considerations** and requirements
3. Aligns **beneficial use categories** with evaluations
4. Provides **risk-based framework** for evaluations
5. **Draws on existing GLTM / ITM** for aquatic pathway evaluations
6. Aligns upland evaluations with **state-specific environmental frameworks** and **USEPA guidance**
7. Describes **risk management options**

APPENDICES

Great Lakes Beneficial Use Testing Manual APPENDICES

- A. Sources of regional soil / sediment **background concentrations**
- B. State Environmental Guidance and Regulations for Beneficial Use**
- C. Ecological **Soil Screening Levels (Eco-SSLs) — Plant Pathway**
- D. Treatment of Impaired Sediments**
- E. Water Management for Upland Placement of Dredged Material**
- F. Interpreting Laboratory Bioaccumulation Test Results on Dredged Sediment Proposed for Open-Water Placement**

Dredged Material → Make it Your Business



2. State policies for beneficial use

- Some states have policies in place regarding beneficial placement of dredged material
- In other states, upland beneficial use of dredged material may fall under the purview of solid waste regulations



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Beneficial Use Determinations (BUDs)

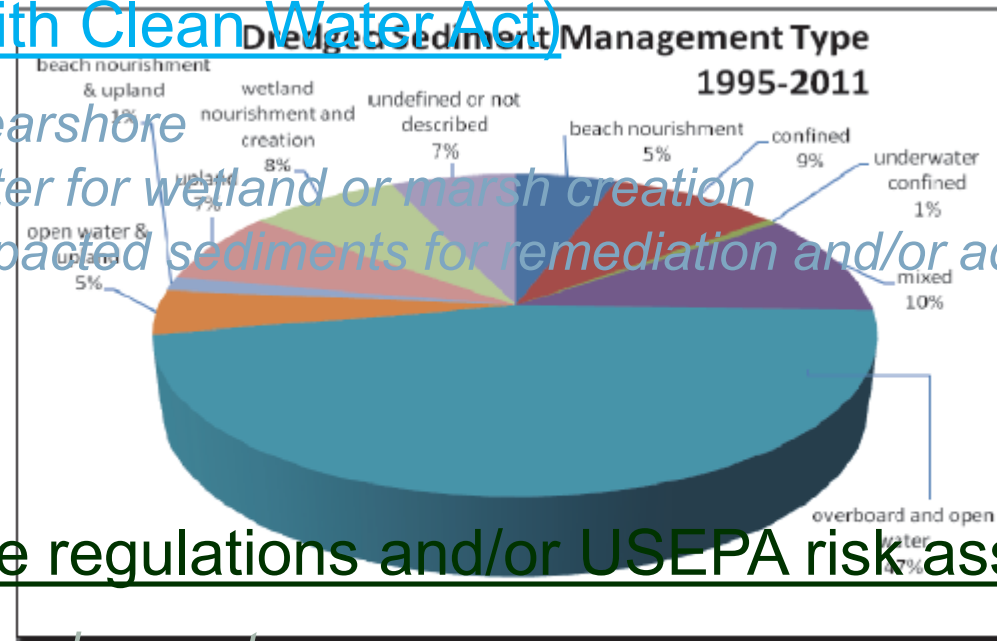
A Beneficial Use Determination (BUD) is a designation made by the Department pursuant to 6 NYCRR Part 360.12, whether Parts 360-365 Solid Waste Management Regulations have jurisdiction over waste material which is to be beneficially used. Once the Department grants a BUD, the waste material ceases to be considered a solid waste (for the purposes of Parts 360-365) when used as described in the BUD.

Great Lakes Beneficial Use Testing Manual Highlights

Section 3. Beneficial Use Categories

Aquatic (comply with Clean Water Act)

- *Beach or nearshore*
- *Shallow water for wetland or marsh creation*
- *Cover of impacted sediments for remediation and/or aquatic habitat restoration*



Upland (follow state regulations and/or USEPA risk assessment guidance)

- *Brownfield re-development*
- *Ecological habitat*
- *Agricultural field amendment*

Figure 2. Navigation dredging by Corps-operated dredges and Corps contract dredges between Fiscal Years 1995 and 2011 (DIS database 29 February 2012 with "actual cy" sorted as preferred volume estimate).



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4. Risk Based Framework for Beneficial Use Evaluations

Evaluation protocols circa 1998

Tier	<u>Sediment Evaluation</u> : Contaminant Determination (CWA)
I	Initial Evaluation and Determination of Exclusions
II	Screening potential impacts
III	Testing potential impacts
IV	Site-specific risk assessment




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4.

Crosswalk between traditional tiers and risk-based processes

Tier	<u>Sediment Evaluation: Contaminant Determination (CWA)</u>	 Risk-Based Process
I	Initial Evaluation and Determination of Exclusions	Develop project goals and Conceptual Site Models
II	Screening potential impacts	Chemical analysis and modeling
III	Testing potential impacts	Bioassays and/or additional site-specific exposure assumptions
IV	Site-specific risk assessment	Site-specific evaluations

4. Crosswalk between traditional tiers and risk-based processes

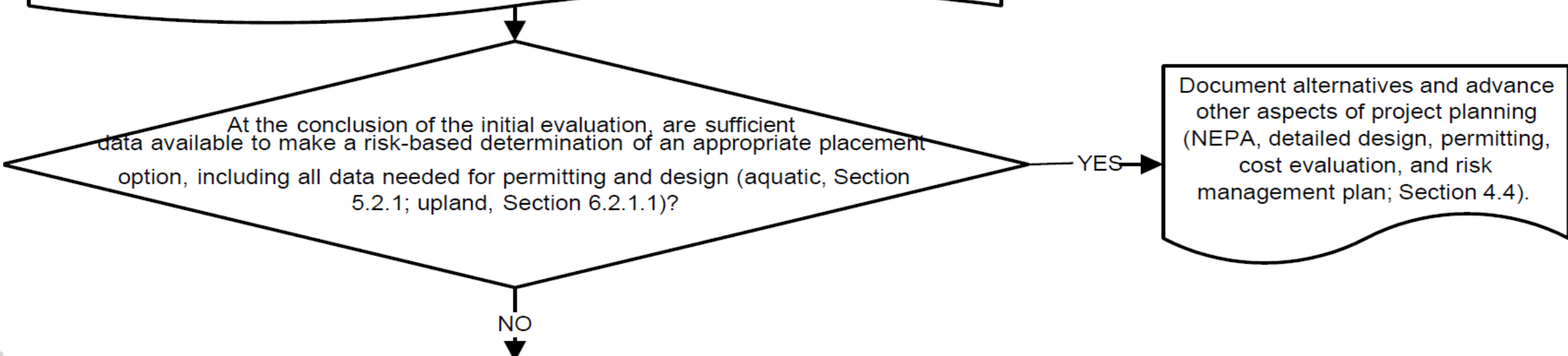
Tier	Risk-Based Process	Aquatic Pathways		Upland Pathways	
		Water Column	Benthic Exposure	Human Health	Environmental Health
I	Develop project goals and Conceptual Site Models	Comparison to placement/reference site sediment concentrations		Comparison to placement/reference site soil concentrations	
II	Chemical analysis and modeling	Elutriate chemistry, dispersion/dilution modeling	Theoretical bioaccumulation potential	Comparison to generic soil screening levels	Modeling and/or further chemical analysis
III	Bioassays and/or additional site-specific exposure assumptions	Elutriate toxicity tests	Sediment toxicity and bioaccumulation tests	Site-specific risk-based screening levels, modeling or extractions	Soil toxicity Bioaccumulation Plant growth and uptake tests
IV	Site-specific evaluations	Site-specific sampling, analysis, and/or evaluations		Site-specific sampling, analysis, and/or evaluations	

4. Risk Based Framework for Beneficial Use Evaluations

Begin Tiered Evaluations (Sections 5.2.1 and 6.1.1). Develop management goals (Section 4.2) consistent with Engineering With Nature principles (Section 1.1). Define area, depth, and volume to be dredged. Collect and summarize any existing data, including historical information (Section 5.1 and 6.1.1). Consider regulatory compliance.

Develop a conceptual site model (Section 4.3) based on knowledge of the sediment, the area and site specific conditions. Include stakeholders at the earliest opportunity to identify potential beneficial uses (Section 3). Establish criteria for exposure pathways.

Document available data, pre-existing conditions at the dredging site, any conclusions that can be made (Section 4.4) as part of the initial evaluation.



Making Sediment Beneficial Use Decisions: A Risk-Based Approach

Advance to next step/tier of evaluation (Sections 5 and 6). Develop a sampling strategy for the pathways identified in the conceptual model (Section 4.5). Key components may include physical, engineering, chemical, and agronomic data, water quality data regarding potential water discharges, biological testing results and interpretation, and reference and background selection and comparison considerations (Section 4.6).

Prepare sampling plan using appropriate level of evaluation or tier (Section 4.5). Important considerations include: the number and location of samples, the analyses needed, quality control/quality assurance, representative sampling methods, equipment needed to obtain samples, and laboratory reporting limits. Determine appropriate evaluation methods (Sections 5 and 6) for guiding the development of a sampling plan (1).

Obtain sampling results and evaluate data using all available lines of evidence. Interpret results using a risk-based approach (see Section 5 for aquatic and Section 6 for upland).

Document the chosen alternative and advance project planning (NEPA, detailed design, permitting, cost evaluation, etc.). Document management plan (if needed) including all engineering and operational controls to manage or adaptively manage risks (Section 7).

Making Sediment Beneficial Use Decisions: A Risk-Based Approach (continued)

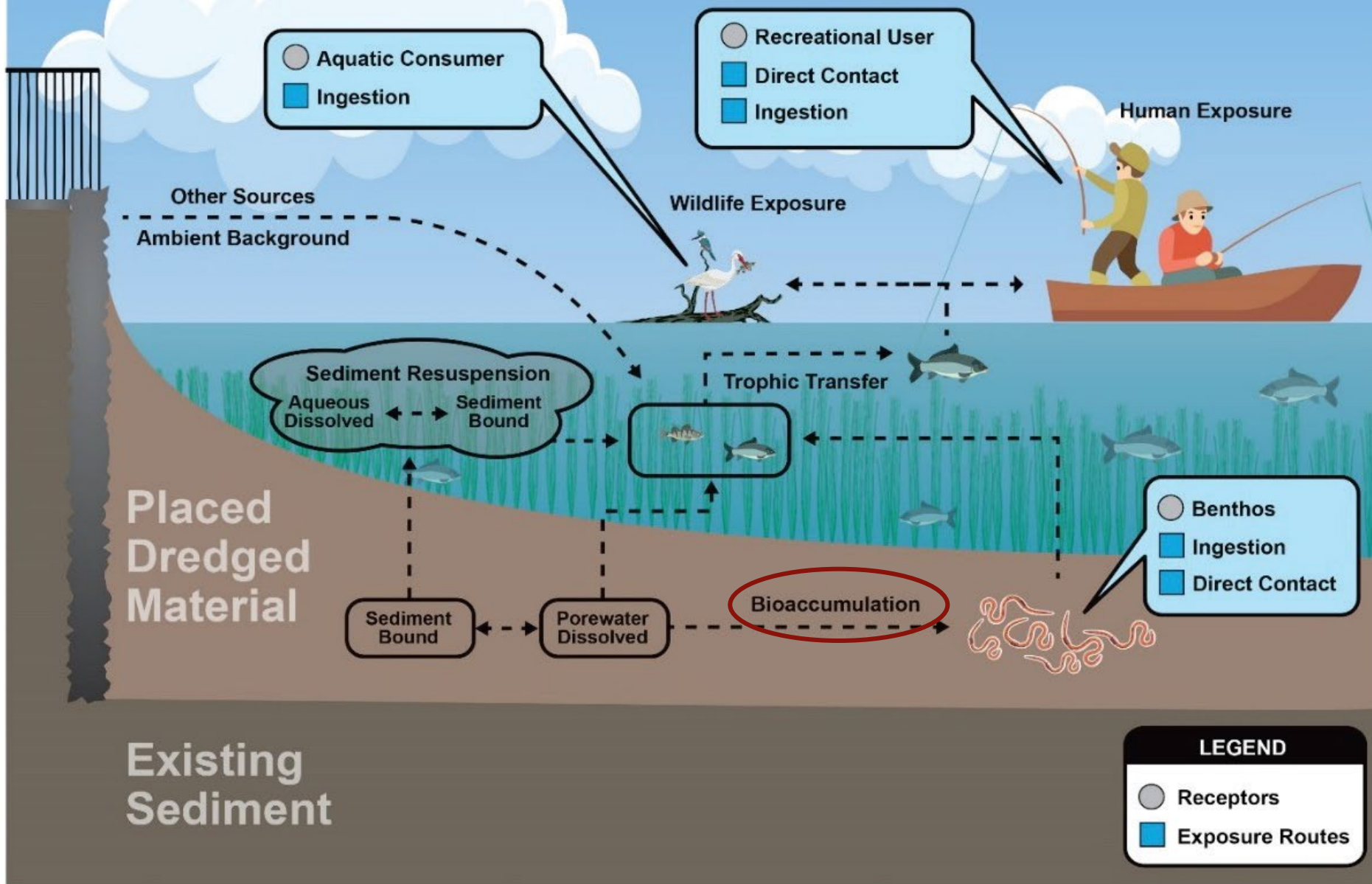


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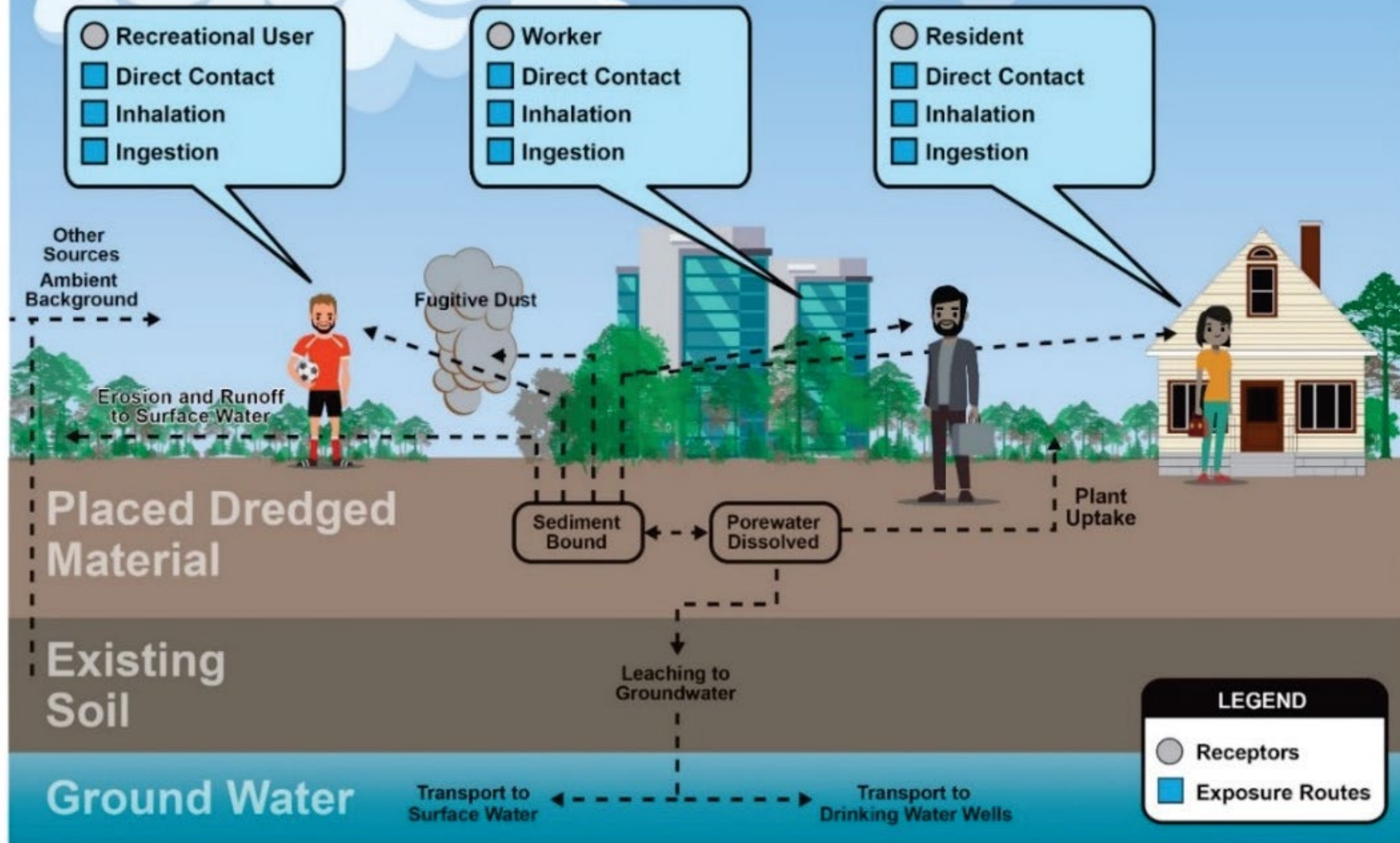
5.

Aquatic Habitat Restoration

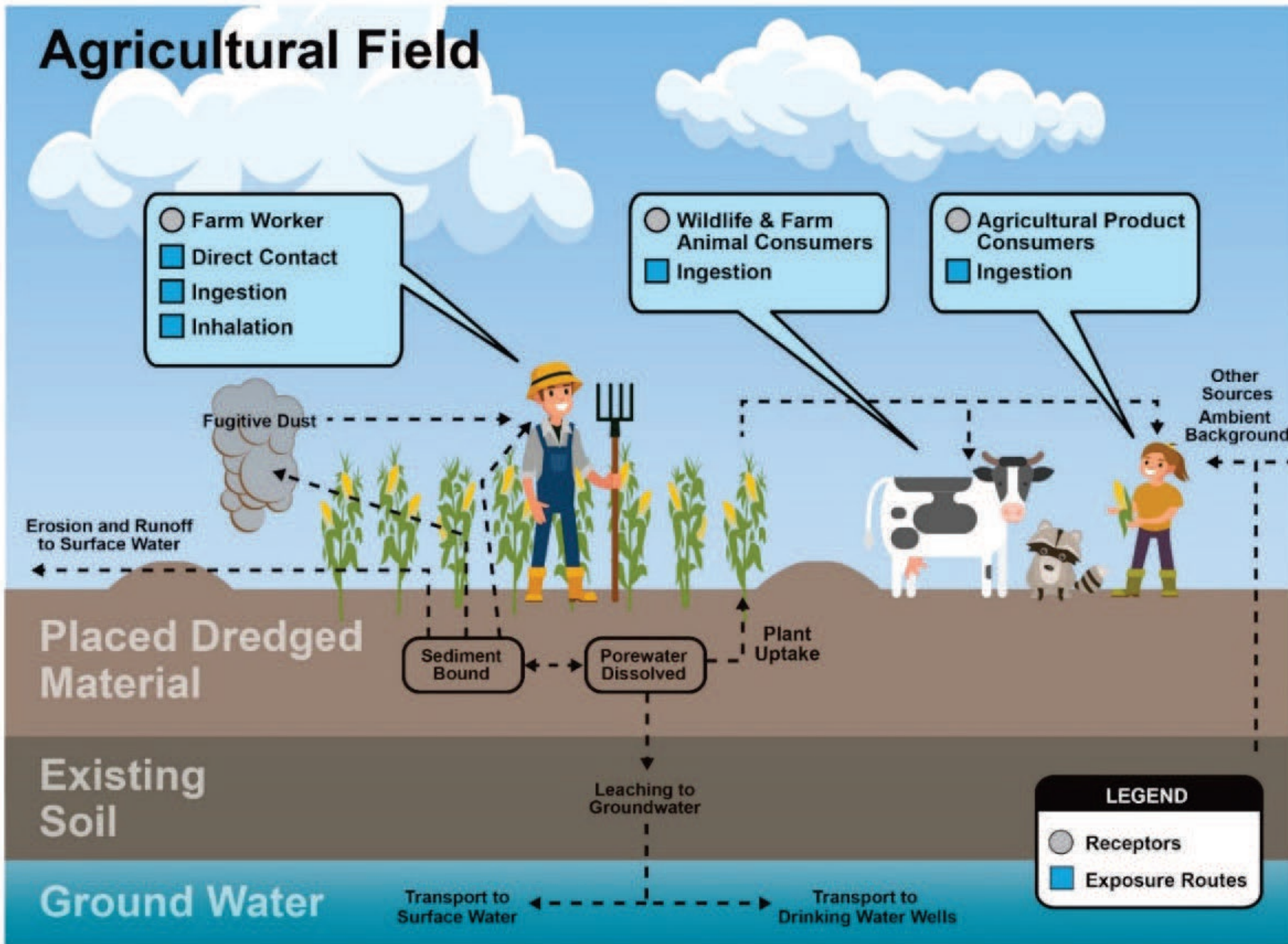


6.

Upland Brownfield Placement



6.



6. Upland Beneficial Use Evaluation Methods

Table 6-1a. Summary of upland pathway procedures for environmental protection.

Tier	Ecological Exposure Pathways for Upland Placement Scenarios				
	Direct contact	Inhalation (volatiles or particulates)	Run-off to surface water (aquatic life)	Leachate (groundwater and surface water seepage)	Plant bioaccumulation and consumption
Tier I: Existing Information	Comparison to regional or reference unimpacted (<i>background</i>) sediment and also soil concentrations. Evaluate particle size.				
Tier II: Screening Level Assessment	Bulk sediment chemistry: Comparison to (adjusted ¹) ecological soil screening levels	Estimate volatile emissions using bulk sediment chemistry, total organic carbon, Kd, K _{oc} , Henry's Law constants, diffusivities in air, bulk density of dredged material	Bulk sediment chemistry, total organic carbon, Kd, KOC: Predict porewater concentrations ² , apply basic mixing considerations, Compare to surface water quality criteria	Bulk sediment chemistry, total organic carbon, Kd, KOC: Predict porewater concentrations ² , apply basic mixing considerations, Compare to surface water quality criteria	Diethylene-triaminepentaacetic acid (DTPA) extract
Tier III: Effects-Based Chemical and Biological Testing	Screening level ecological risk assessment	Conduct Volatile Flux Chamber Test	Modified Elutriate Test, Simplified Laboratory Runoff Procedure, or Synthetic Precipitation Leachate Procedure: Compare to surface water quality criteria	Sequential Batch Leaching Test: Compare to surface water quality criteria	Plant bioaccumulation test; Compare to screening levels derived according to Appendix C ²
Tier IV: Site-Specific Risk Assessment and Relative Risk and Benefit Analysis	Site-specific assessment of ecological impacts				

Table 6-1b. Summary of upland pathway procedures for human health.

Tier	Human Health Exposure Pathways for Upland Placement Scenarios						
	Direct contact	Inhalation (volatiles or particulates)	Ingestion of crops	Ingestion of game	Drinking water (surface water source)	Drinking water (groundwater source)	Ingestion of fish (surface water runoff) ¹
Tier I: Existing Information	Comparison to regional or reference unimpacted (<i>background</i>) sediment and also soil concentrations, evaluate particle size.						
Tier II: Screening Level Assessment	Comparison to generic USEPA and state-specific risk-based soil screening levels ² for residential and/or industrial use	Comparison to generic USEPA and state-specific risk-based soil screening levels for residential and/or industrial use, <i>inhalation pathway only</i>	DTPA extract	TBP calculation	Bulk sediment chemistry, total organic carbon, Kd, Koc: Predict runoff concentrations ³ , apply basic mixing considerations, and compare to USEPA Safe Drinking Water Act Levels	Bulk sediment chemistry, total organic carbon, Kd, Koc: Predict porewater concentrations ³ , apply basic mixing considerations, and compare to USEPA Safe Drinking Water Act Levels	Bulk sediment chemistry, total organic carbon, Kd, Koc: Predict runoff concentrations, apply basic mixing considerations, and compare to surface water quality criteria for protection of human health, fish consumption
Tier III: Effects-Based Chemical and Biological Testing	Comparison to scenario—specifically modified soil screening levels	Conduct Volatile Flux Chamber Test	Plant bioaccumulation test	Animal bioaccumulation test	Modified Elutriate Test, Simplified Laboratory Runoff Procedure, or Synthetic Precipitation Leachate Procedure: Compare to USEPA Safe Drinking Water Act Levels	Sequential Batch Leaching Test: Compare to USEPA Safe Drinking Water Act Levels	Modified Elutriate Test, Simplified Laboratory Runoff Procedure, or Synthetic Precipitation Leachate Procedure: Compare to surface water quality criteria for protection of human health, fish consumption
Tier IV: Site-Specific Risk Assessment and Relative Risk and Benefit Analysis	Scenario and/or site-specific assessment of human health risks ⁴						

Great Lakes Beneficial Use Testing Manual Highlights

7. Risk Management

- ✓ Uncertainty vs. risk
- ✓ Operational, engineering, and institutional controls
- ✓ Adaptive management

Appendices supporting risk management

D. Treatment of impaired sediments

E. Water management for upland placements

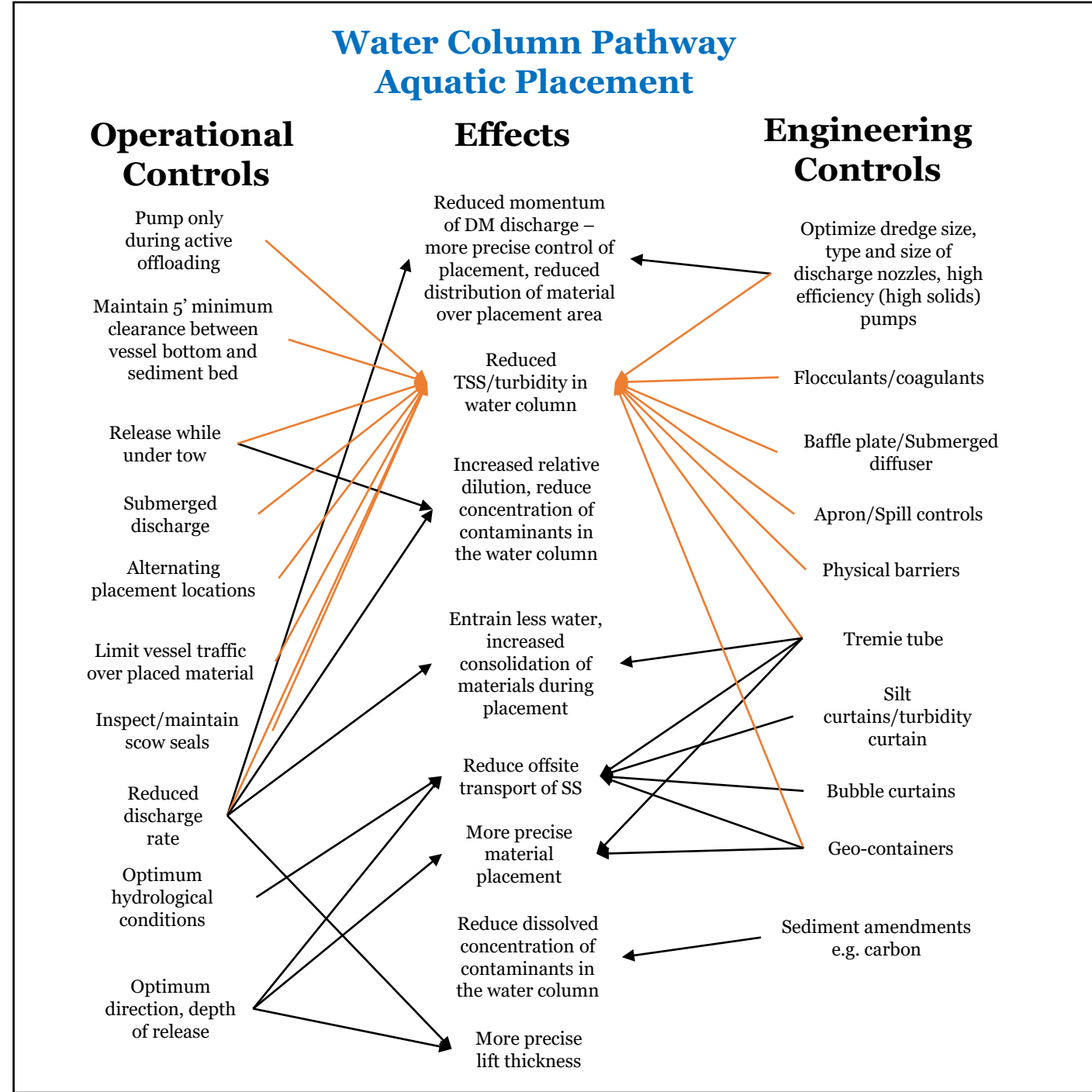


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Figure 7-1.

Operational and engineering controls relevant to water column exposure pathway for aquatic placement



Great Lakes Beneficial Use Testing Manual Highlights

Appendix A: Sources of Soil and Sediment Background (Reference) Concentrations in the Great Lakes States

- ✓ Comparison of background concentrations across the region



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Great Lakes Beneficial Use Testing Manual Highlights

Appendix B: Great Lakes State Environmental Guidance and Regulations for Beneficial Use of Dredged Material

- ✓ Responsible state agencies and POCs
- ✓ Processes for determining suitability for upland uses
- ✓ Web links for regulations and guidance



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Use of the Great Lakes Beneficial Use Testing Manual

- Refer to this manual when your beneficial use **project** is developing a **Quality Assurance Project Plan** for sampling and evaluations.
- **Harmonize** the recommendations in this Manual with state or other agency's perspectives on environmental evaluations.



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