# The Dredge Materials Decision Tool: Helping You Decide Where/Whether to Beneficially Use Sediments Since 2021

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Great Lakes Dredging Team Meeting
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# Brief Background

- Region 5 developed a **Dredged Materials Decision Tool (DMDT)**
  - As an alternative to open lake disposal
  - Help communities and agencies better beneficially use dredged materials
  - Characterize and quantify the environmental, economic, and social benefits

# More Background

- 2017-18: Region 5 and Ohio stakeholders held workshops and brainstorming events
- 2018: Initial tool draft
- 2018: Region 5 began work with Great Lakes Toxicology and Ecology Division (GLTED)
  - Refine and enhance
- 2018-2020: GLTED conducted participatory research

# User-centered Design



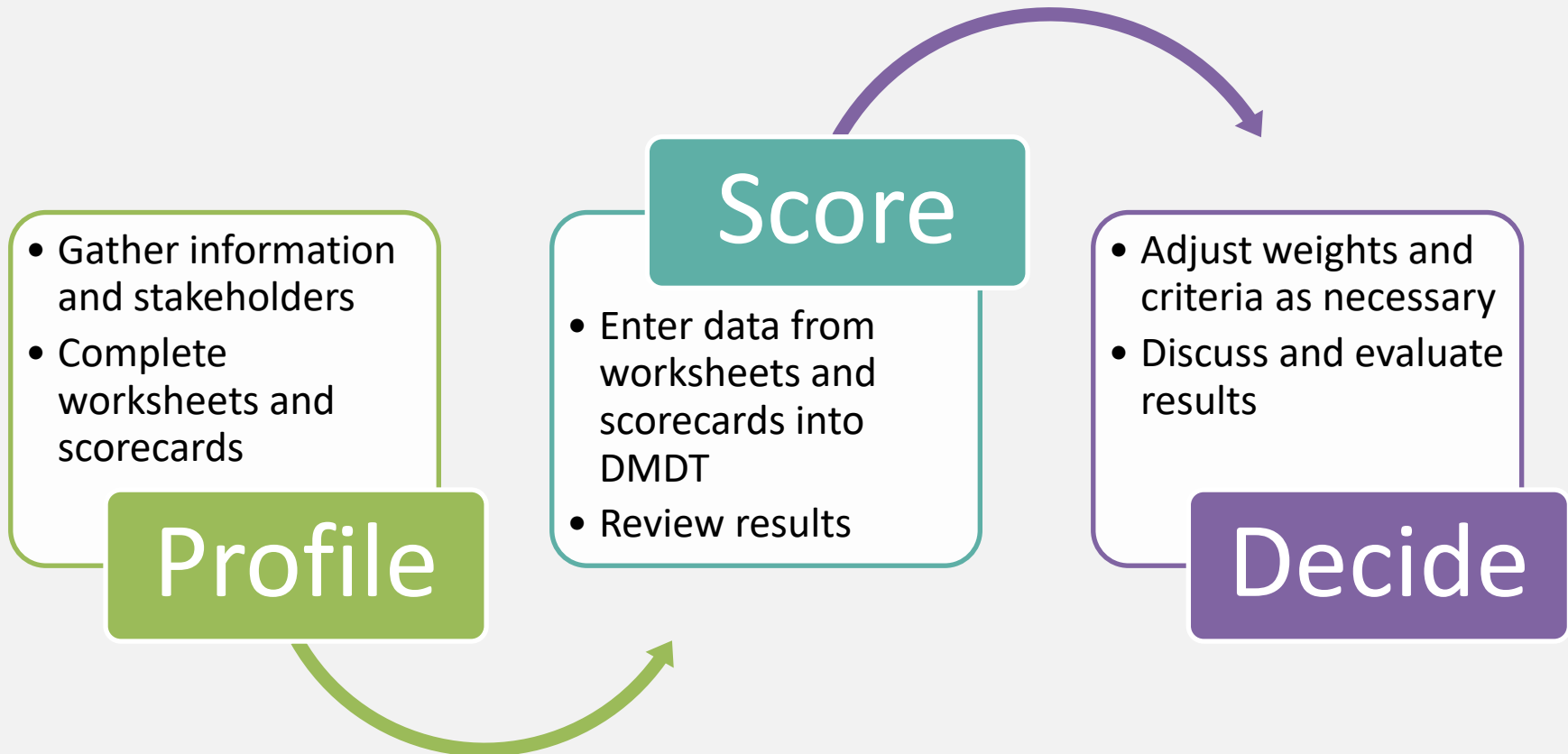https://usability.gov/what-and-why/user-centered-design.html

- DMDT and subsequent iterations are based on user-centered design
- Ethnographic research
  - Identify decision elements
  - Defined workflow
  - Flexible
  - Iterative
- Tested and refined with users

# DMDT Overview

- Designed to compare **multiple projects** based on **multiple criteria**
  - Positive or negative (direction)
  - Size of change (magnitude)
  - Certainty of effect
- Criteria can be weighted to reflect importance
- DMDT is a bundle of worksheets and a spreadsheet

# Flow of Information through DMDT

**Profile**
- Gather information and stakeholders
- Complete worksheets and scorecards

**Score**
- Enter data from worksheets and scorecards into DMDT
- Review results

**Decide**
- Adjust weights and criteria as necessary
- Discuss and evaluate results

# Criteria Categories

| Category | Description |
| --- | --- |
| Biophysical environment | The habitat restoration applications of dredged materials |
| Economic | Funding details, placement costs and options, and transportation |
| Governance | The rules, regulations, and organizational decision factors |
| Social | Benefits to the community including improving ecosystems services |
| Built environment | How dredge is utilized for construction |

# Worksheet: Biophysical Environment

- Aquatic habitat
- Shoreline habitat
- River habitat
- Wetland habitat
- Terrestrial habitat
  - Habitat quality
  - Habitat quantity
- Priority habitat

- Restoration of native species
- Reduction of invasive species
- Stormwater management/control
- Contamination reduction

# Worksheet: Economic Costs & Benefits

- Funding pathway secured

- Application prepared

- Partnerships established

- Partnerships identified

- Transportation is feasible

- Project can accept materials (<5 years)

- Project can accept materials in the long-term

- Lead to business growth

- Secondary benefits

- Long-term maintenance?

# Worksheet: Governance

- Maintain navigation channels
- Voluntary program
- Environmental windows
- Included in guidance documents
- Permit timeline is reasonable
- Zoning requirements
- Contingency plan
- Replicability
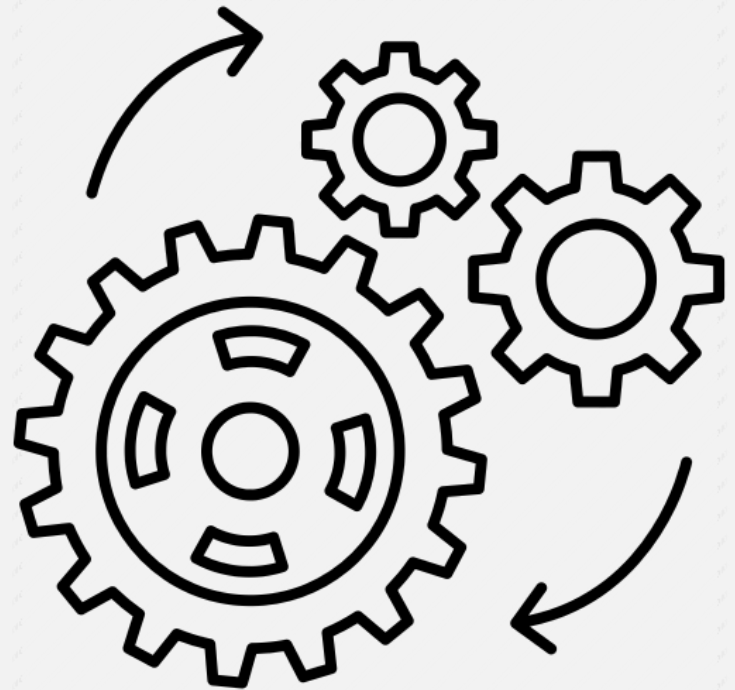
# Woramsheet: Social Benefits

- Improve park access
- Potential for job creation
- Improve aesthetics
- Involve local community
- Reduce exposure
- Improve ecosystem services
- Improve infrastructure
- New infrastructure



http://duluthmn.gov

# Worksheet: Built Environment

- Reduce contamination or risk of exposure
- Reduce demand on borrow sources

- Provide fill or cap
  - Development site
  - Construction
  - Road
  - Parks or greenspace



https://center4eleadership.org/built-environment/

# Flow of Information through DMDT

| Profile step: gather info | → | Profile step: work-sheets | → | Profile step: score-cards | → | Score step: enter data into DMDT | → | Decide step: review scores | → | Decide step: make decision or start again |

## Project and Site Information

**Name of Site:** Interstate Island

**Type of Site:** Shoreline erosion or recession

**Owner:** State

**Name of Owner:**

**State:** WI, MN

**Purpose of project:** Terrestrial habitat restoration, creation, development

## Dredging Information

**Dredging location (lat/long):** 46.749175, -92.110075

**Volume (c/y):** 60,000

**Dredged material source:** Operation and Maintenance

**Primary soil type:** Sand

**List other soil types:** Organic fines

**Cost:** $ 1,000,000.00

**Funding source:** Harbor Maintenance Trust Fund, US Army Corps, Great Lakes Re

**Mode of transportation**

**Barge:** ☑

**Pipeline:** ☑

| Governance | | | | |
|---|---|---|---|---|

**Maintain navigations channels:**

| | | | |
|---|---|---|---|
| Yes | ✓ | Likelihood (of action): | High |
| No | ☐ | Magnitude (impact of action on alternative): | High |
| Unsure | ☐ | Direction (how does action impact alternative feasibility): | More feasible |

**Consideration of liability (past, present and future for project/ project site):**

| | | | |
|---|---|---|---|
| Yes | ✓ | Likelihood: | High |
| No | ☐ | Magnitude: | High |
| Unsure | ☐ | Direction: | More feasible |

**Enrolled in a voluntary program (often assessment/clean-up support):**

| | | | |
|---|---|---|---|
| Yes | ☐ | Likelihood: | Low |
| No | ✓ | Magnitude: | Low |
| Unsure | ☐ | Direction: | Neutral |

**Able to be completed inside of relevant environmental windows:**

| | | | |
|---|---|---|---|
| Yes | ✓ | Likelihood: | High |
| No | ☐ | Magnitude: | High |
| Unsure | ☐ | Direction: | More feasible |

**Referred to or included in existing guidance documents:**

| | | | |
|---|---|---|---|
| Yes | ✓ | Likelihood: | High |
| No | ☐ | Magnitude: | High |

# Flow of Information through DMDT

Profile step: gather info → Profile step: work-sheets → **Profile step: score-cards** → Score step: enter data into DMDT → Decide step: review scores → Decide step: make decision or start again
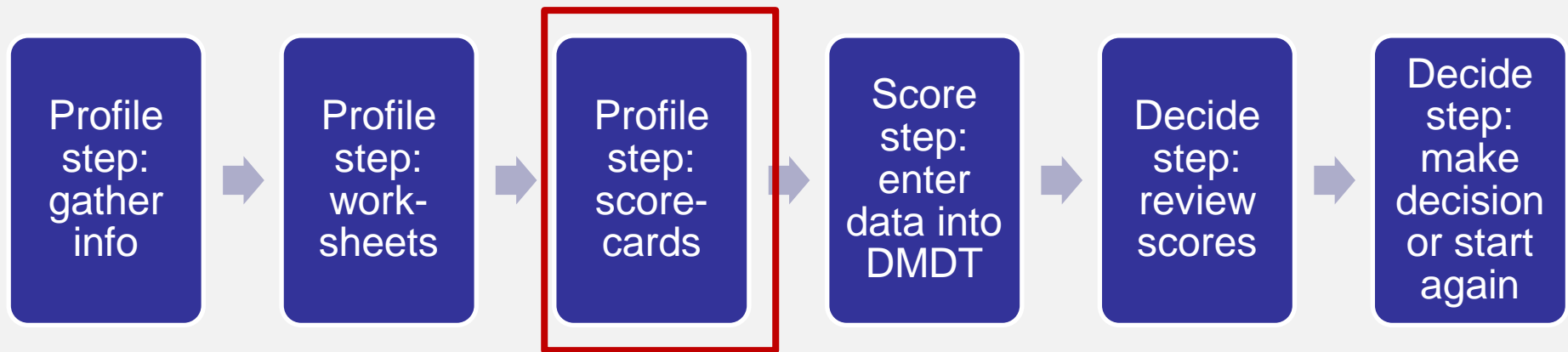
# Scorecard A: Likert Scale

| | Impact Characterization (likelihood, impact, feasibility) | | | | | |
|---|---|---|---|---|---|---|
| | 5<br>Definite | 4<br>High | 3<br>Moderate | 2<br>Somewhat | 1<br>Low | N/A |
| **Social** Improve access to parks or natural spaces | | X | | | | |
| Potential for indirect job creation | | | | X | | |
| Improve aesthetics | X | | | | | |
| Community engagement | X | | | | | |
| Reduced human exposure to contaminants | | X | | | | |
| Improved access to ecosystem services | | X | | | | |
| Improved infrastructure condition | | | X | | | |
| New/improved infrastructure services for community | | | X | | | |

| | Impact Characterization (likelihood, impact, feasibility) | | | | | |
|---|---|---|---|---|---|---|
| | 5<br>Definite | 4<br>High | 3<br>Moderate | 2<br>Somewhat | 1<br>Low | N/A |
| **Governance** Maintain navigation channels | X | | | | | |
| Enrollment in voluntary program | | | | | X | |
| Able to complete within Environmental Windows | | X | | | | |
| Included in existing guidance documents | | X | | | | |
| Permitting timeline conducive with project timeline | | | X | | | |
| Meets zoning requirements | X | | | | | |
| Flexible timeframe | | | | X | | |
| Replicable | | | X | | | |
| Site ownership | X | | | | | |

# Scorecard B: Binary Choice

| | | Scorecard B: Yes/No | |
|---|---|---|---|
| **Economy** | Funding pathway identified | yes | |
| | Funding application prepared | yes | |
| | Partnerships established | yes | |
| | Potential partnerships identified | yes | |
| | Feasible transportation of dredged materials to the placement site | yes | |
| | Accept materials (5 years) | | no |
| | Accept materials long-term (20 years) | | no |
| | Lead to creation/growth of viable business | | no |
| | Secondary benefits created | yes | |
| | Long-term maintenance required | | |
| **Social** | Improve access to parks or natural spaces | | |
| | Potential for indirect job creation | | |
| | Improve aesthetics | | |
| | Community engagement | | |
| | Reduced human exposure to contaminants | | |
| | Improved access to ecosystem services | | |
| | Improved infrastructure condition | | |
| | New/improved infrastructure services for community | | |
| | Maintain navigation channels | | |

# Scorecard C: Ranking

| Scorecard C: Ranking | |
|---|---|
| **Criteria** | **Rank** |

| | Criteria | Rank |
|---|---|---|
| **Biophysical** | Rivers and streams habitat quantity gain/loss | |
| | Lakes and ponds habitat quantity gain/loss | |
| | Near coastal marine/estuarine habitat quantity gain/loss | |
| | Open water habitat quantity gain/loss | |
| | Wetlands habitat quantity gain/loss | |
| | Urban/Suburban habitat quantity gain/loss | |
| | Barren/rock and sand habitat quantity gain/loss | |
| | Rivers and streams habitat quality improved/diminished | |
| | Lakes and ponds quality improved/diminished | |
| | Near coastal marine/estuarine quality improved/diminished | |
| | Open water quality improved/diminished | |
| | Wetlands quality improved/diminished | |
| | Urban/Suburban quality improved/diminished | |

# Flow of Information through DMDT

Profile step: gather info → Profile step: work-sheets → Profile step: score-cards → Score step: enter data into DMDT → Decide step: review scores → Decide step: make decision or start again
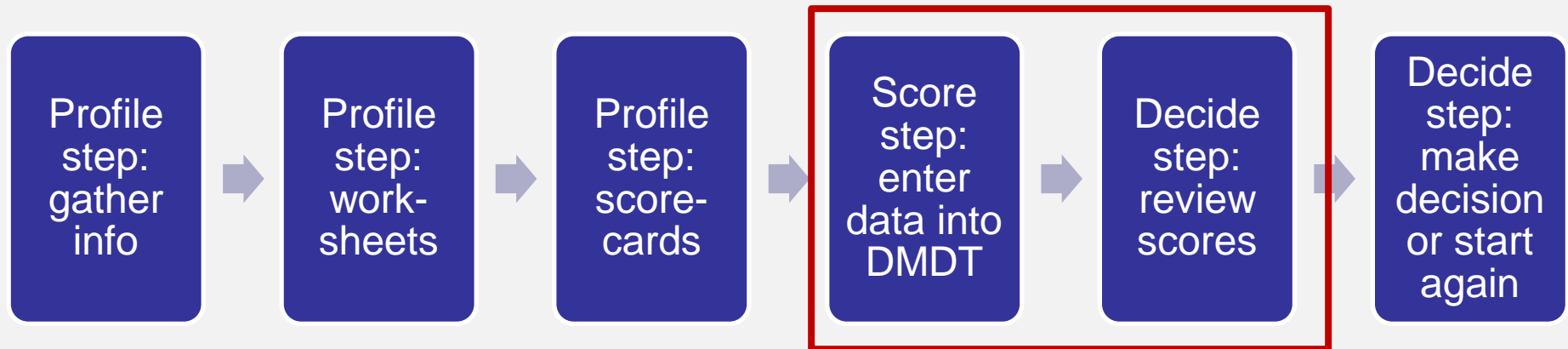
# Enter Project Data

| | A | B | C | D |
|---|---|---|---|---|
| 1 | Duluth-Superior Harbor Working Draft | | | |
| 2 | 12/11/2020 | | | |
| 3 | | | | MAINTEN |
| 4 | | | | |
| 5 | Port | Duluth-Superior Harbor | | |
| 6 | Project No. | ABC-123 | | |
| 7 | Dredge Location (lat/long) | | | |
| 8 | Volume (cy) | Alternative 1: 50K; Alternative 2: 50K; Alternative 3: 50K | | |
| 9 | Soil classification | | | |
| 10 | Elevated contaminants | | | |
| 11 | Weighting factor adjusted | No adjustment | | |
| 12 | Trial | 001 | | |
| 13 | Scorecard No. | Du-2020-2-19-001 | | |
| 14 | Prepared by | <Enter Name> | | |
| 15 | Prepared on | <Enter Date> | | |
| 16 | Checked by | <Enter Name> | | |
| 17 | Checked on | <Enter Date> | | |

# Enter Data in DMDT

| Category | Criterion | C Rank | U | W | C | U | W | C | U | W | C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Biophysical Environment (16) | Aquatic habitat gain/loss | 2 | 1 | 1.0 | | 4 | 3.9 | | 3 | 2.9 | |
| | Shoreline habitat gain/loss | 20 | 4 | 2.4 | | 5 | 3.0 | | 5 | 3.0 | |
| | River habitat gain/loss | 12 | 1 | 0.8 | | 3 | 2.3 | | 4 | 3.1 | |
| | Wetland habitat gain/loss | 25 | 1 | 0.5 | | 1 | 0.5 | | 1 | 0.5 | |
| | Terrestrial habitat gain/loss | 42 | 5 | 0.9 | | 3 | 0.5 | | 5 | 0.9 | |
| | Aquatic habitat improved/harmed | 3 | 1 | 1.0 | | 3 | 2.9 | | 3 | 2.9 | |
| | Shoreline habitat improved/harmed | 21 | 4 | 2.3 | | 5 | 2.9 | | 5 | 2.9 | |
| | River habitat improved/harmed | 13 | 1 | 0.8 | 38% | 3 | 2.3 | 62% | 3 | 2.3 | 59% |
| | Wetland habitat improved/harmed | 26 | 1 | 0.5 | | 1 | 0.5 | | 1 | 0.5 | |
| | Terrestrial habitat improved/harmed | 43 | 5 | 0.8 | | 3 | 0.5 | | 5 | 0.8 | |
| | Priority habitat | 35 | 5 | 1.5 | | 5 | 1.5 | | 5 | 1.5 | |
| | Species of management concern | 31 | 5 | 1.9 | | 5 | 1.9 | | 5 | 1.9 | |
| | Restore or manage native vegetation | 48 | 1 | 0.1 | | 5 | 0.4 | | 1 | 0.1 | |
| | Reduce invasive vegetation | 16 | 1 | 0.7 | | 3 | 2.0 | | 1 | 0.7 | |
| | Stormwater control or protection | 45 | 1 | 0.1 | | 1 | 0.1 | | 1 | 0.1 | |
| | Reduce contamination | 6 | 1 | 0.9 | | 1 | 0.9 | | 1 | 0.9 | |
| | Funding pathway | 10 | 5 | 4.1 | | 4 | 3.2 | | 5 | 4.1 | |
| | Application information prepared | 23 | 5 | 2.7 | | 3 | 1.6 | | 5 | 2.7 | |
| | Established partnerships | 29 | 5 | 2.1 | | 5 | 2.1 | | 5 | 2.1 | |

# Enter Data in DMDT

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|---|---|---|---|---|---|---|---|---|---|---|---|
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| | Shoreline habitat gain/loss | 20 | 4 | 2.4 | | 5 | 3.0 | | 5 | 3.0 | |
| | River habitat gain/loss | 12 | 1 | 0.8 | | 3 | 2.3 | | 4 | 3.1 | |
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- **A – Biophysical Environment**
- **B – Economy**
- **C – Social**
- **D – Governance**
- **E – Built Environment**
- **F – Total Scores**
- **G – Project Score Columns**

# Graphical Output



Category Scores Comparison – Scoresheet A

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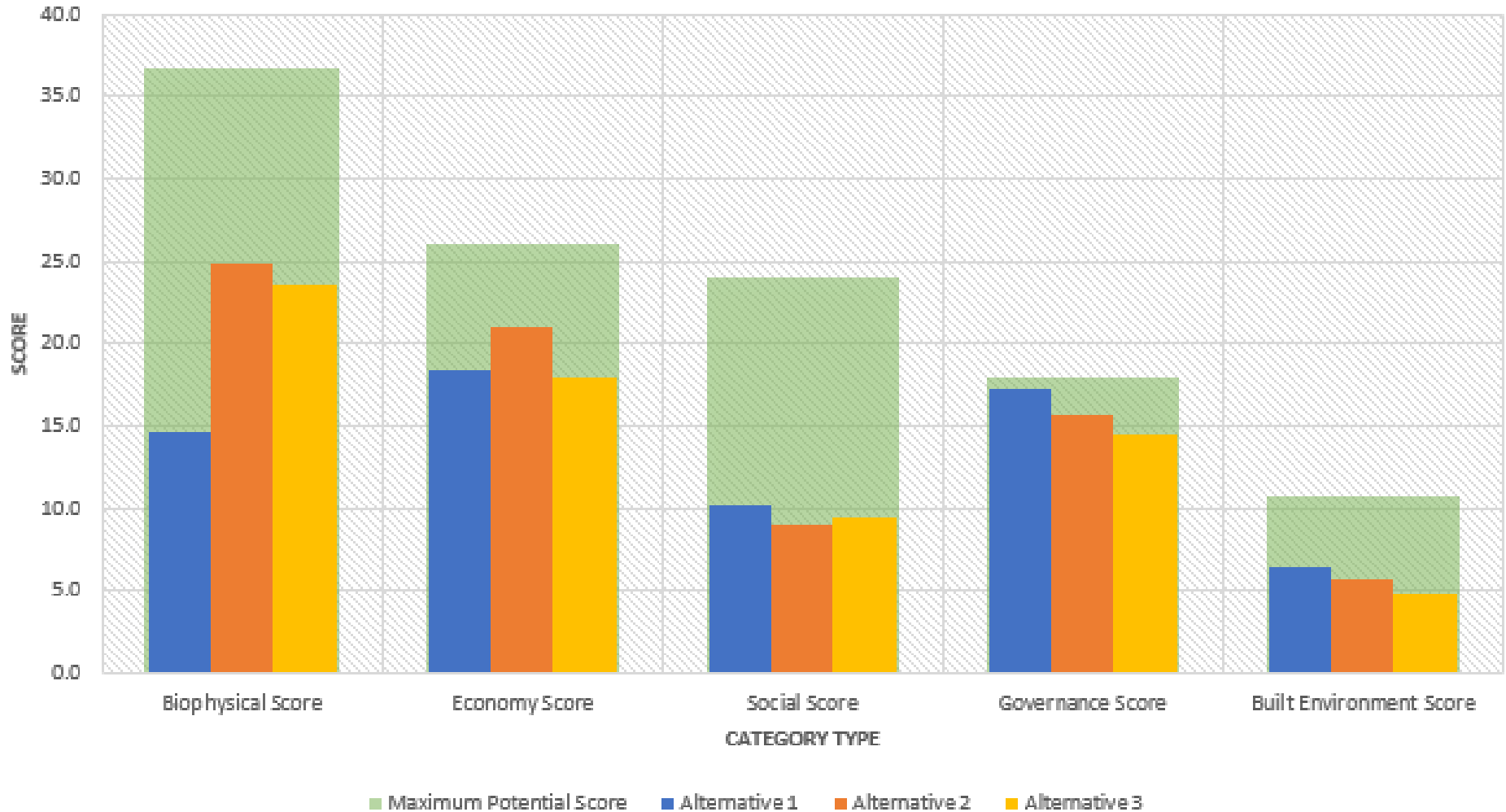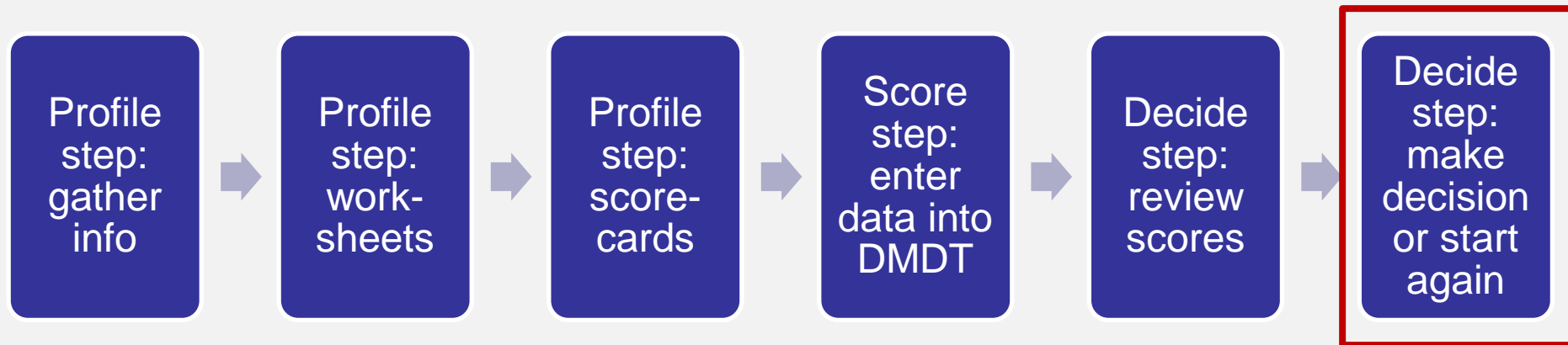
Photo source: Minnesota Land Trust

## Informational Resource

- Additional informational resource
  - Database of examples

- Materials available
  - https://www.epa.gov/research/dredged-material-decision-tool-dmdt

## Other Considerations and Applications

- DMDT explicitly considers benefits
  - Assumes that dredged materials are a resource
- DMDT can be modified
  - Duluth Natural Resource Management Program
  - Minnesota Coastal Management Program
- Explicitly considers project details, program requirements, and benefits at the same time

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