SUSTAINABLE SEDIMENT MANAGEMENT AND DREDGING SEMINAR

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SAN FRANCISCO, CA

Project Formulation:

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Overview

- Project drivers and Objectives
- Constraints
- Social, Economic, and Environmental considerations/opportunities (Sustainability)
- Other Considerations
- Regulatory Frameworks
- Conceptual Models
- LOE/WOE

Project Drivers and Objectives

What is the project purpose?

- Navigation
  - O & M dredging
  - Capital dredging (Channel Deepening/Expansion)
- Flood Control
- Coastal Protection
- Environmental Restoration
- Combination

What are the project activities and over what area and time period will these activities occur?

Constraints

What are the financial, environmental, operational constraints?

- Budget and schedule
- Cost sharing requirements
- Environmental windows
- Proximity to
  - sensitive habitat/species
  - Commercial Use Areas (shellfish beds, fish pens)
  - Recreational Use Areas (swimming surfing beaches)
  - Utilities (electric, gas)
  - Cultural/Heritage (sacred areas, shipwrecks)
- Aesthetics
- Active shipping
- Presence of UXO
- …

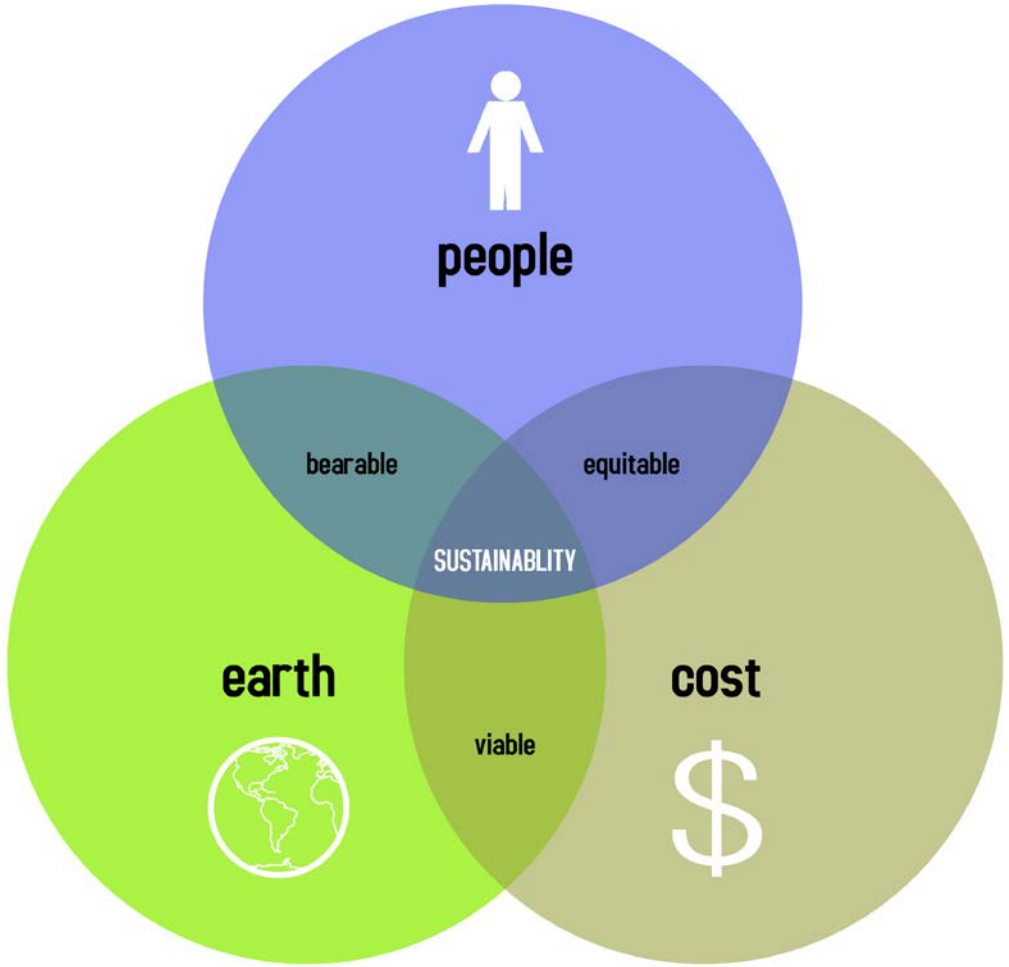
Understanding the potential effect of constraining factors on the project is critical to identification, selection, evaluation, and construction of feasible project alternatives.

Sustainability

Project Drivers, Objectives, and Constraints help frame consideration of potential Social, Economic, and Environmental opportunities

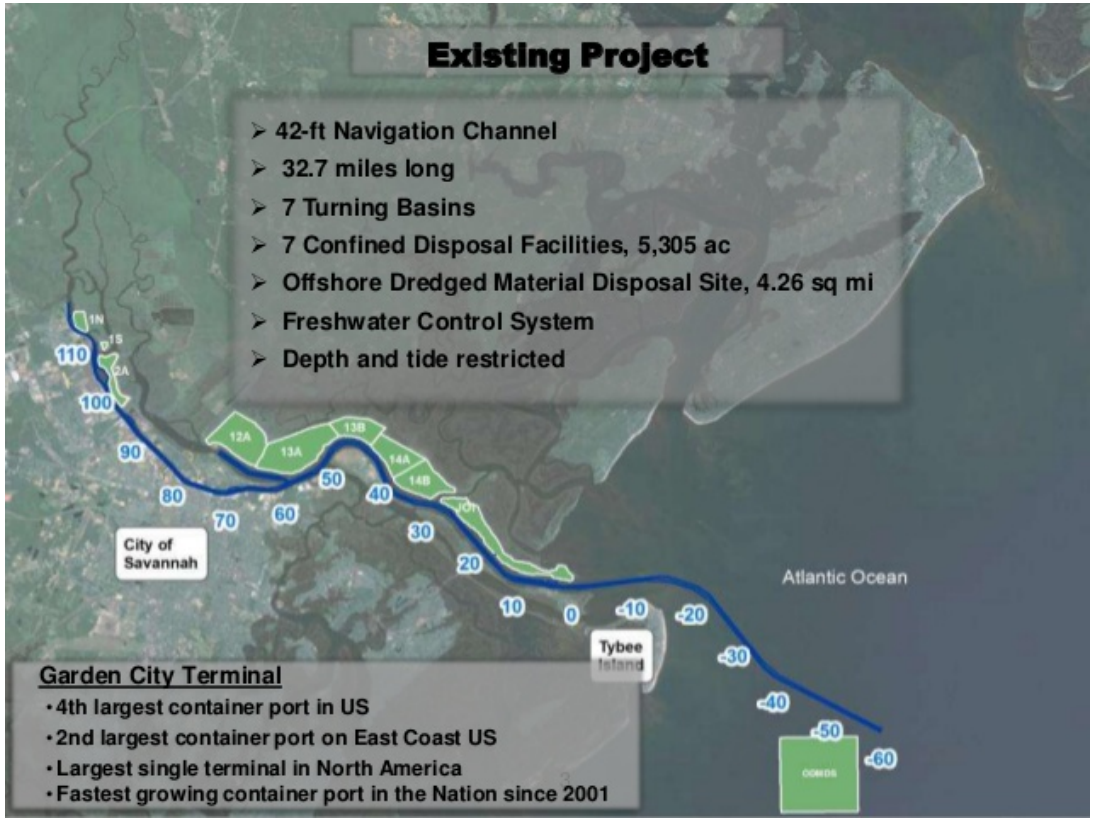
What are potential alternatives approaches to meet the project purpose?

- **Are there opportunities to couple projects to meet local needs via beneficial use (shoreline protection, habitat creation, contaminant source control, …)**
- **Are there EWN opportunities to reduce the project footprint, reduce O&M cost, facilitate higher environmental/social benefit?**



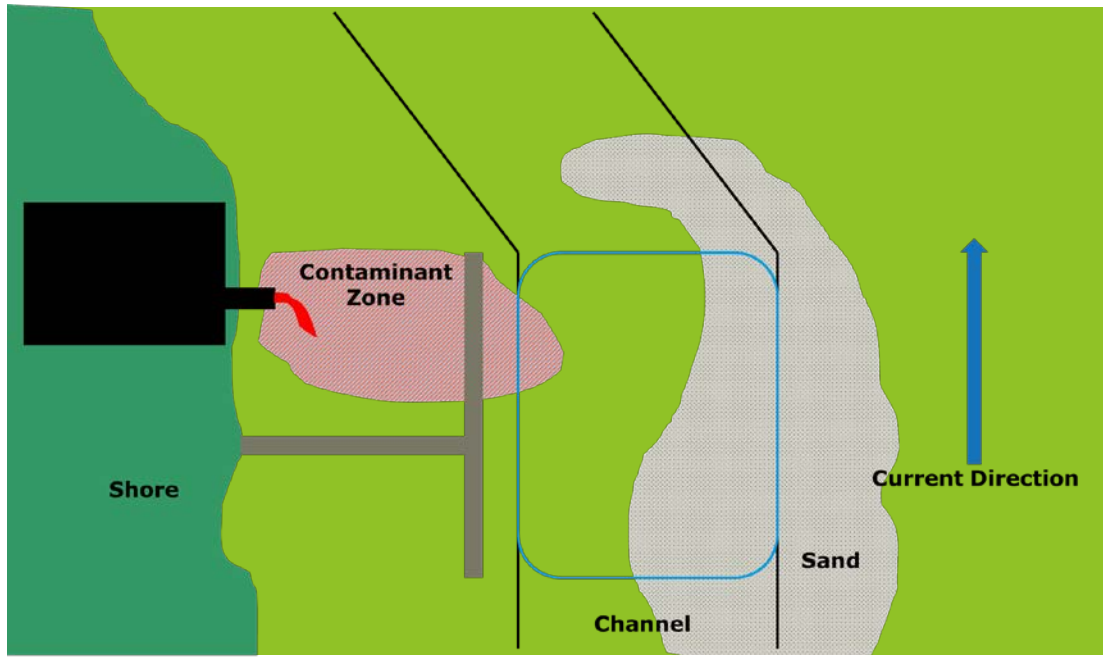
Other Considerations

- Volume of material
- Applicable management options
- How will material be handled?



Other Considerations

- Volume of Material
  - Smaller volumes <5,000 cubic meters
  - Larger volumes >100,000 cubic meters
- Site Characteristics
  - Site Configuration (outfalls, etc.)
  - Current land use
  - Site History (previous dredging/clean-up history, legacy contamination, etc.)



Other Considerations

- Material Characteristics
  - Sands & gravel
  - Silts and clays
  - Organic content
  - Contaminants
  - Geologic strata
- How the material will be handled
  - Knock down
  - Mechanical (open or closed bucket)
  - Hydraulic (pipeline or hopper)
- Sensitive species or habitats

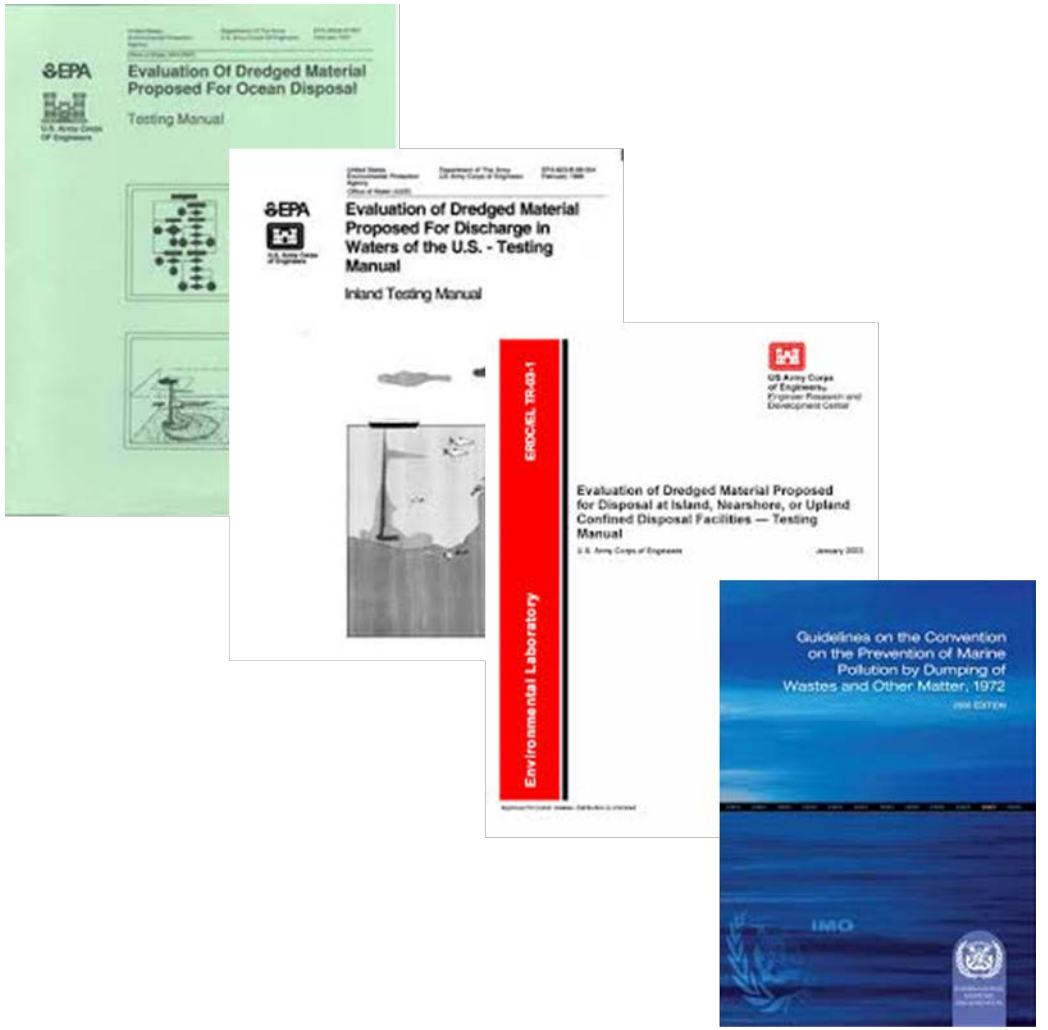
Management Alternatives

The assessment approach and required lines of evidence (LOEs) are determined by project elements and the range of management alternatives under consideration…

- **In Water Placement/Disposal**
- **Upland Placement/Disposal**
- **Beneficial Use (in water and/or upland)**

Regulatory Frameworks

- International Treaty (The London Convention for Disposal of Wastes at Sea)
- National Regulatory Frameworks (Section 10 of the Rivers and Harbors Act, CWA, & MPRSA);
- Local Regulatory Requirements (US – State Water Quality Requirements; State Residential Soil Criteria, etc.)



Conceptual models

- Used to organize, guide, and inform the collection of information for purposes of making management decisions.
- Represents a compilation of current and historical data describing site conditions, project related activities and associated potential stressors impinging on the system.
- Identification of potential stressors are based on “Reason to Believe”
- Presents the relationships between the source (S) of a stressor (or hazard), the pathways (P) by which exposure might occur, and environmental receptors (R) potentially affected.

CM of baseline conditions for mixed urban/natural setting

“Reasons to Believe”

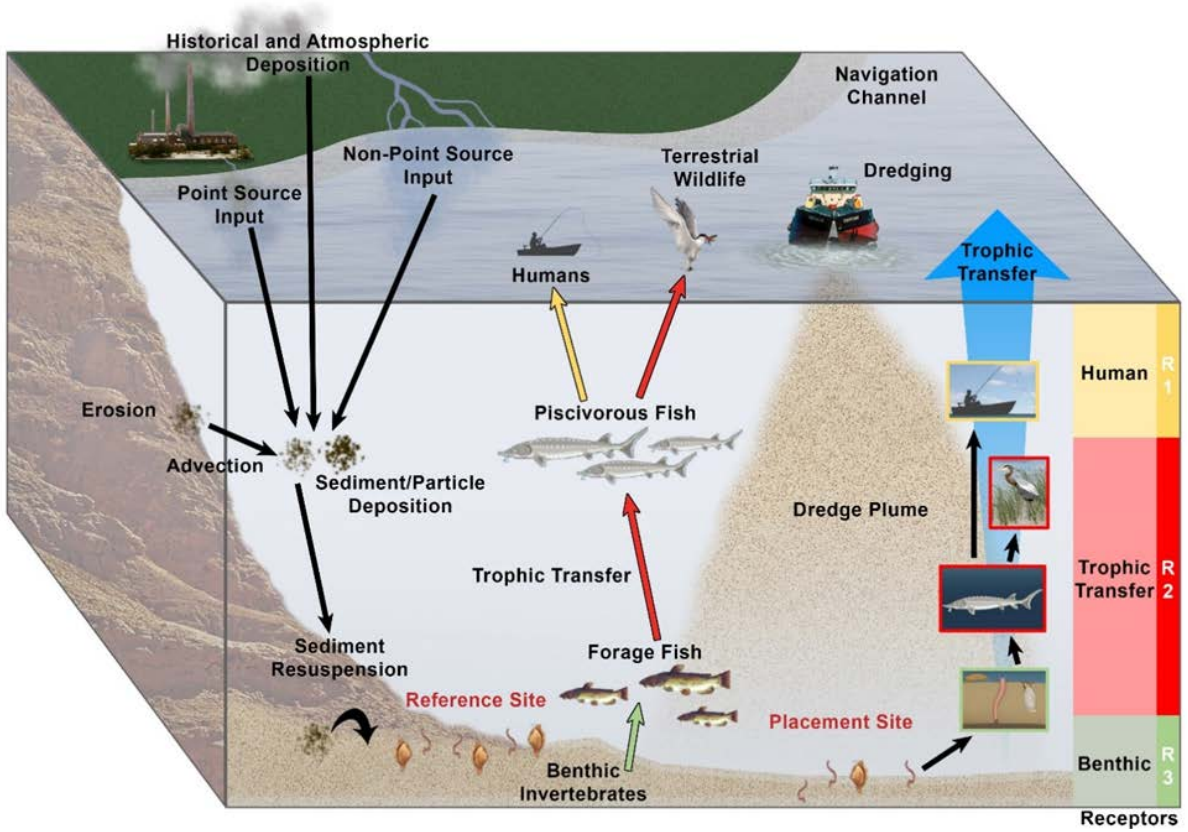
Contaminants known not to be, or unlikely to be, present in the dredged material

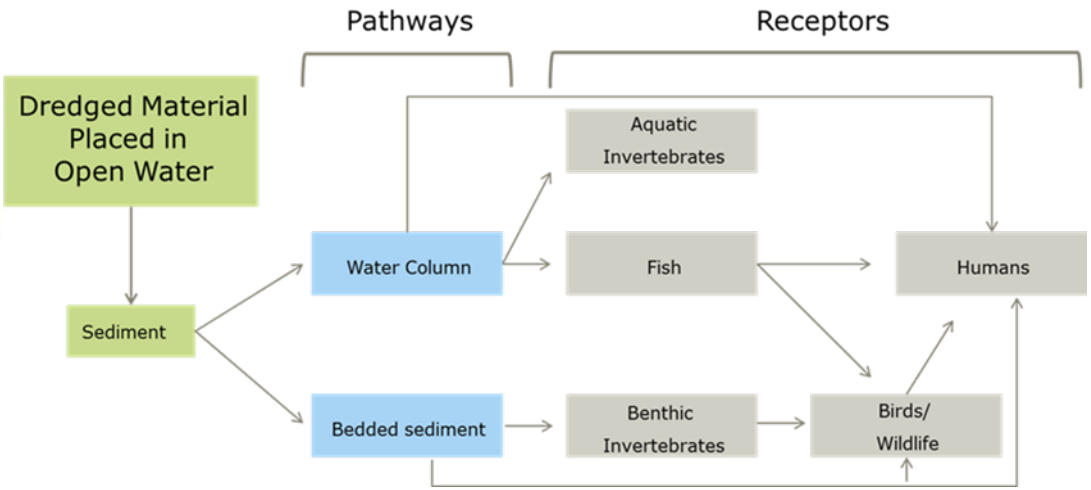
- Meets exclusionary requirements
- Removed from sources of contamination
- Results of prior testing indicate material to be suitable
- …

Contaminants known to be, or likely to be, present in the dredged material

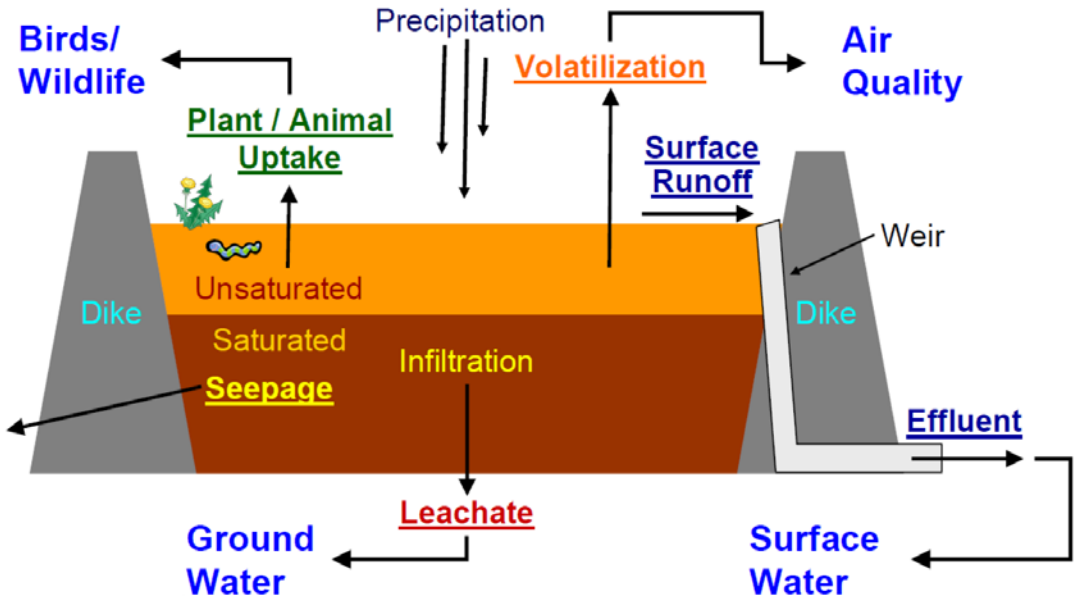
- Results of previous testing
- Knowledge of historical site activities
- Presence of outfalls
- Spill records
- …

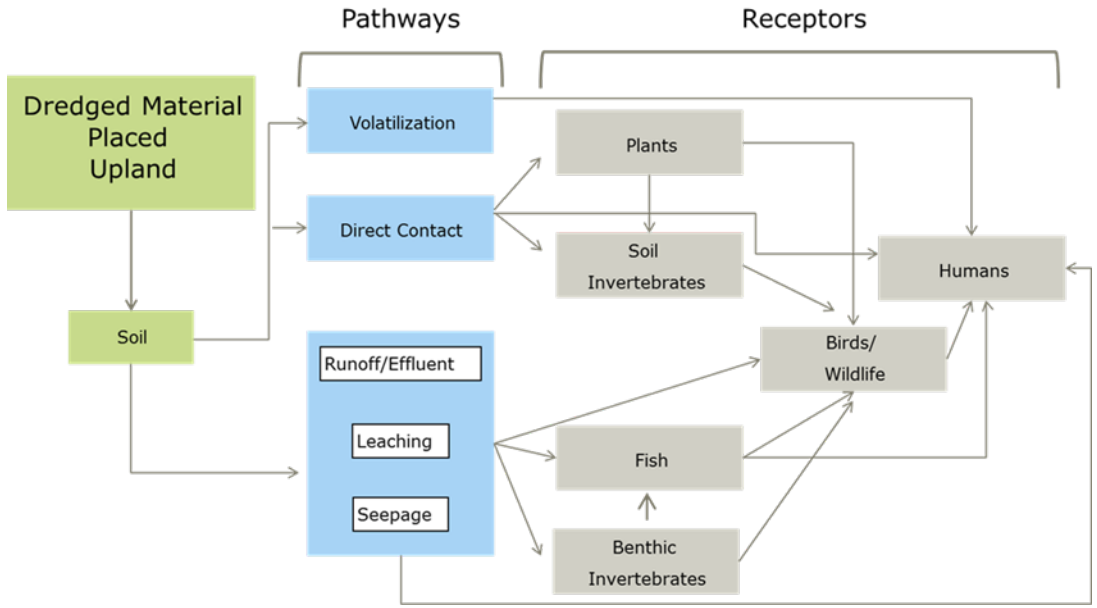
Conceptual models-In Water Placement/Disposal





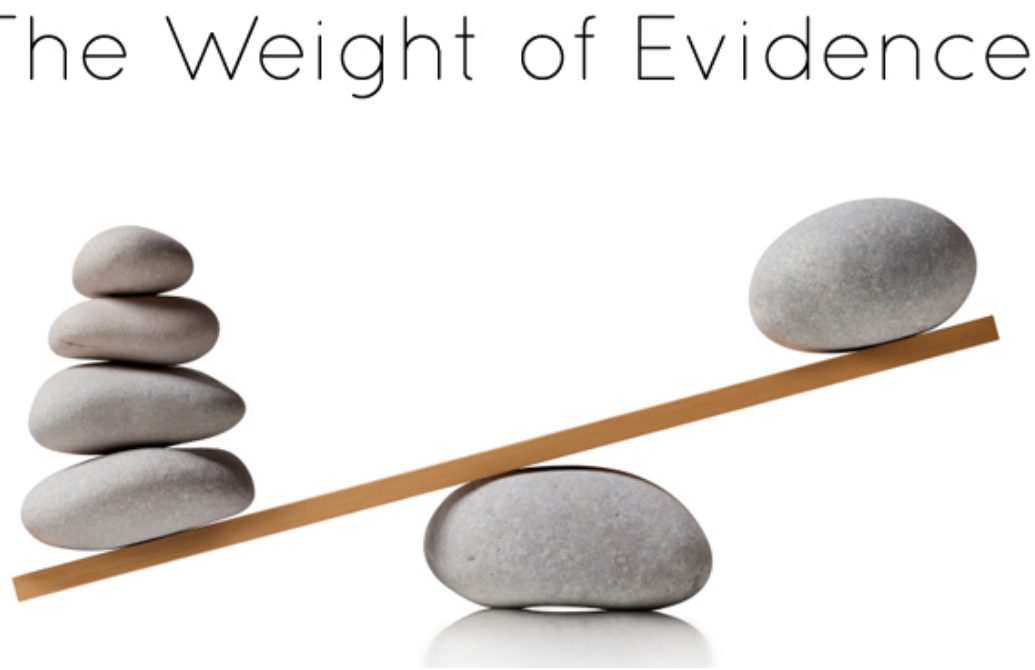
Conceptual models – Upland Disposal/Placement





Weight Of Evidence Approach

- **Process of integrating individual pieces of information (Lines of Evidence) to arrive at a conclusion with some degree of confidence/certainty.**
- **Each LOE must be assessed with regard to quality, associated level of certainty, and ultimate significance to supporting a decision.**
- **The greater the preponderance, quality, and significance of the LOEs (weight) the greater the certainty in the conclusion.**



Lines of Evidence

- Material characteristics (inert sands and gravels vs clays and silts)
- Proximity to known/suspected sources of contamination
- Exposure pathway (stressor ➡ receptor)
- Sediment and Elutriate/Leachate chemistry
- Toxicity of bedded sediments/soils
- Toxicity of sediment elutriates
- Bioaccumulation Potential of bedded sediments/soils

Exclusion from testing

Under the MPRSA material is acceptable for placement/disposal in the ocean providing that the material "…will not unduly degrade or endanger the marine environment and that the [placement] disposal will present:

- No unacceptable adverse effects on human health and no significant damage to the resources of the marine environment;
- No unacceptable adverse effect on the marine ecosystem;
- No unacceptable adverse persistent or permanent effects due to the dumping of the particular volumes or concentrations of these materials; and
- No unacceptable adverse effect on the ocean for other uses as a result of direct environmental impact. "

Additionally, under section 227.13, the regulations specify a number cases where material can be deemed suitable for disposal without further testing. These cases include:

"Dredged material is composed predominantly of sand, gravel, rock, or any other naturally occurring bottom material with particle sizes larger than silt, and the material is found in areas of high current or wave energy such as streams with large bed loads or coastal areas with shifting bars and channels;

or

Dredged material is for beach nourishment or restoration and is composed predominantly of sand, gravel or shell with particle sizes compatible with material on the receiving beaches;

or

The material proposed for dumping is substantially the same as the substrate at the proposed [placement/]disposal site; and the site from which the material proposed for dumping is to be taken is far removed from known existing and historical sources of pollution so as to provide reasonable assurance that such material has not been contaminated by such pollution."

Exclusion from testing

Lines of Evidence (LOEs) to be Considered:

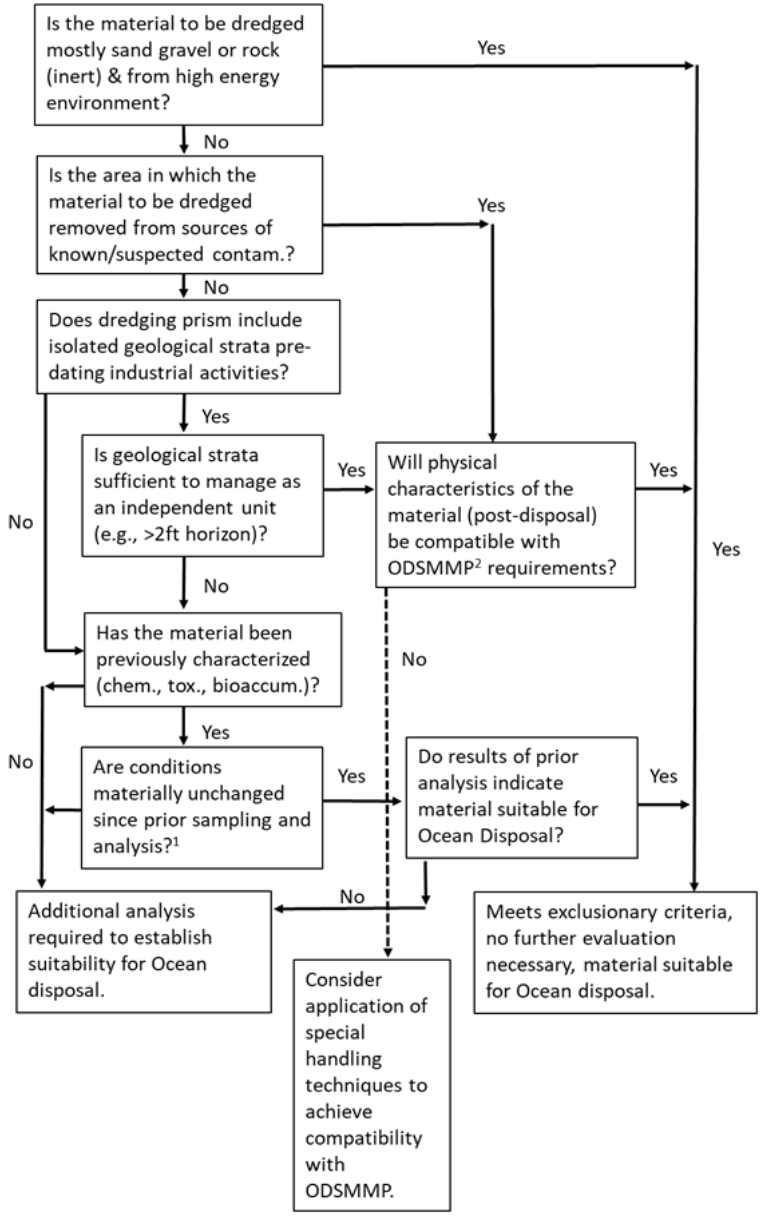
- **Location of material to be dredged (e.g., proximity to known/suspected sources of contamination)**
- **Geochemical characteristics of the material to be dredged (e.g., clay, sand, gravel, etc.)**
- **Results of any prior testing of the material to be dredged (chemical, biological)**
- **Characteristics of the proposed placement/disposal site (i.e., is the material proposed for placement reasonably similar to substrate at the placement/disposal site).**

WOE for Exclusion

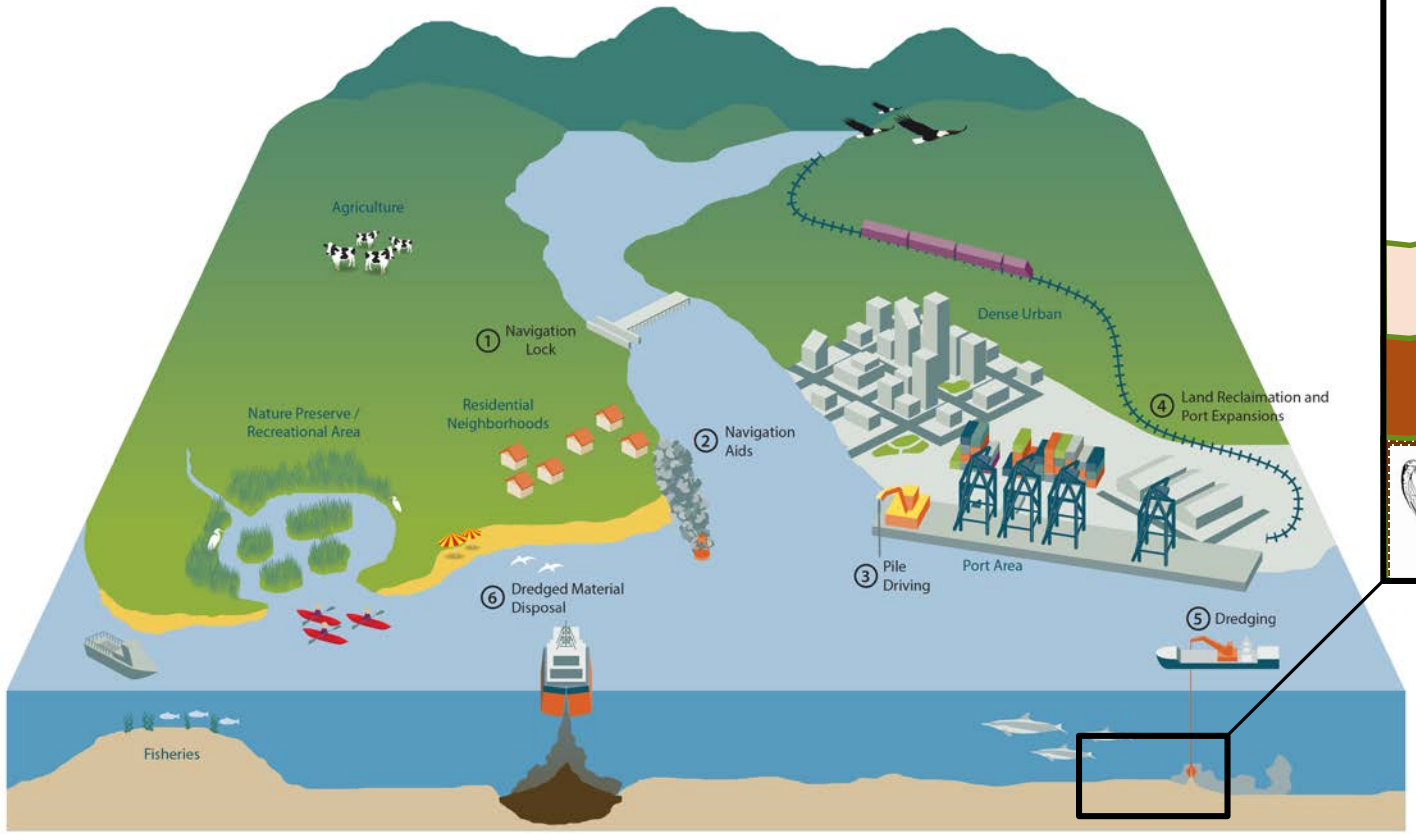
WOE used to establish whether or not material associated with a project needs to undergo testing to meet requirements under MPRSA.

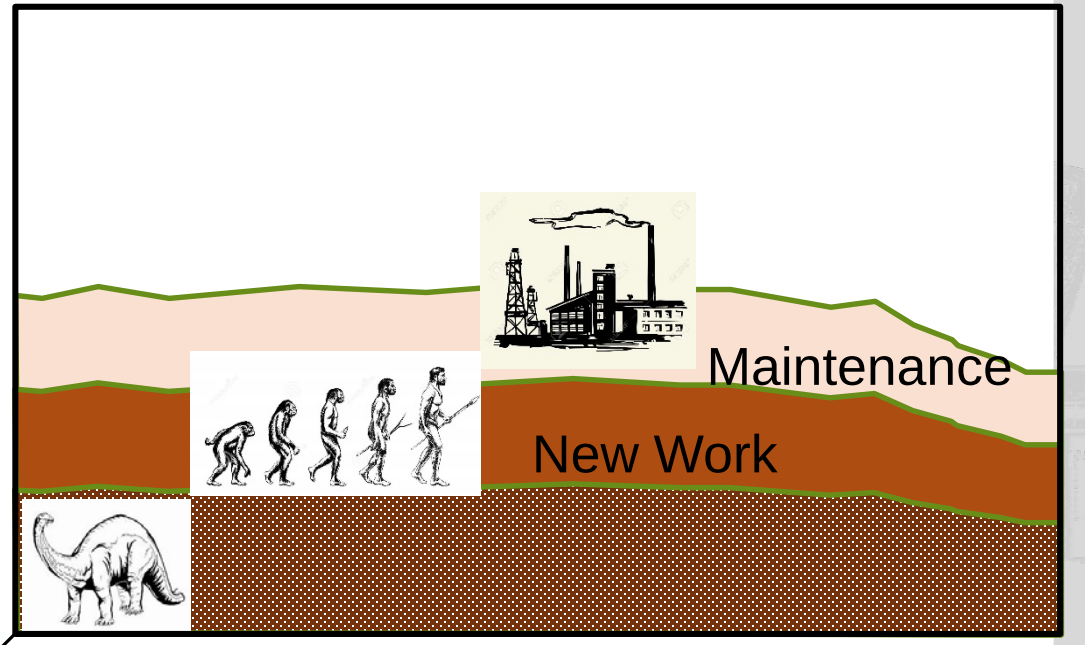
Can enter WOE framework at any point utilizing available LOEs to reach a decision.

Each box involves consideration of multiple types and sources of information.



New Work Material





“Reason to Believe” – Lines of Evidence (LOE)

For New Work, relevant LOEs may include:

- Proximity to sources of contamination (e.g., surficial vs deeply buried, nearshore vs offshore, etc.)
- Geology (e.g., consistent with pre-anthropocene geological deposits)
- Relevant Prior analysis – (geological, chemical, biological assessments)
- Confirmational physical/chemical analysis – (no elevated chemistry, grain size and mineralogy consistent with pre-anthropocene deposits)

Summary

- **Thorough understanding of project drivers, objectives, constraints and opportunities is critical to development of alternatives, decision-making requirements and associated data needs.**
- **Project conceptual models (CM) help organize, guide, and inform the collection of information.**
- **Individual Lines of Evidence are integrated via Weight of Evidence approach providing technically sound basis for management decision-making.**

Questions

- For projects with repeated testing (every 3-5 years) have you tried to reduce testing to confirmatory analysis?
- For material that may not meet specific beneficial use requirements for direct application (e.g. >80% sand for beach replenishment) could strategic placement or EWN be used as delivery mechanism?
- For clean fine grain material are there opportunitistic beneficial use possibilities (habitat augmentation, shoreline stabilization, contaminated sediment source control)? What are the barriers?