



# A Beneficial Use Evaluation to Support Redevelopment in Southeast Alaska



Presented by

Julia Fitts

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# Skagway, Alaska

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# Skagway Harbor: Historical and Current Uses

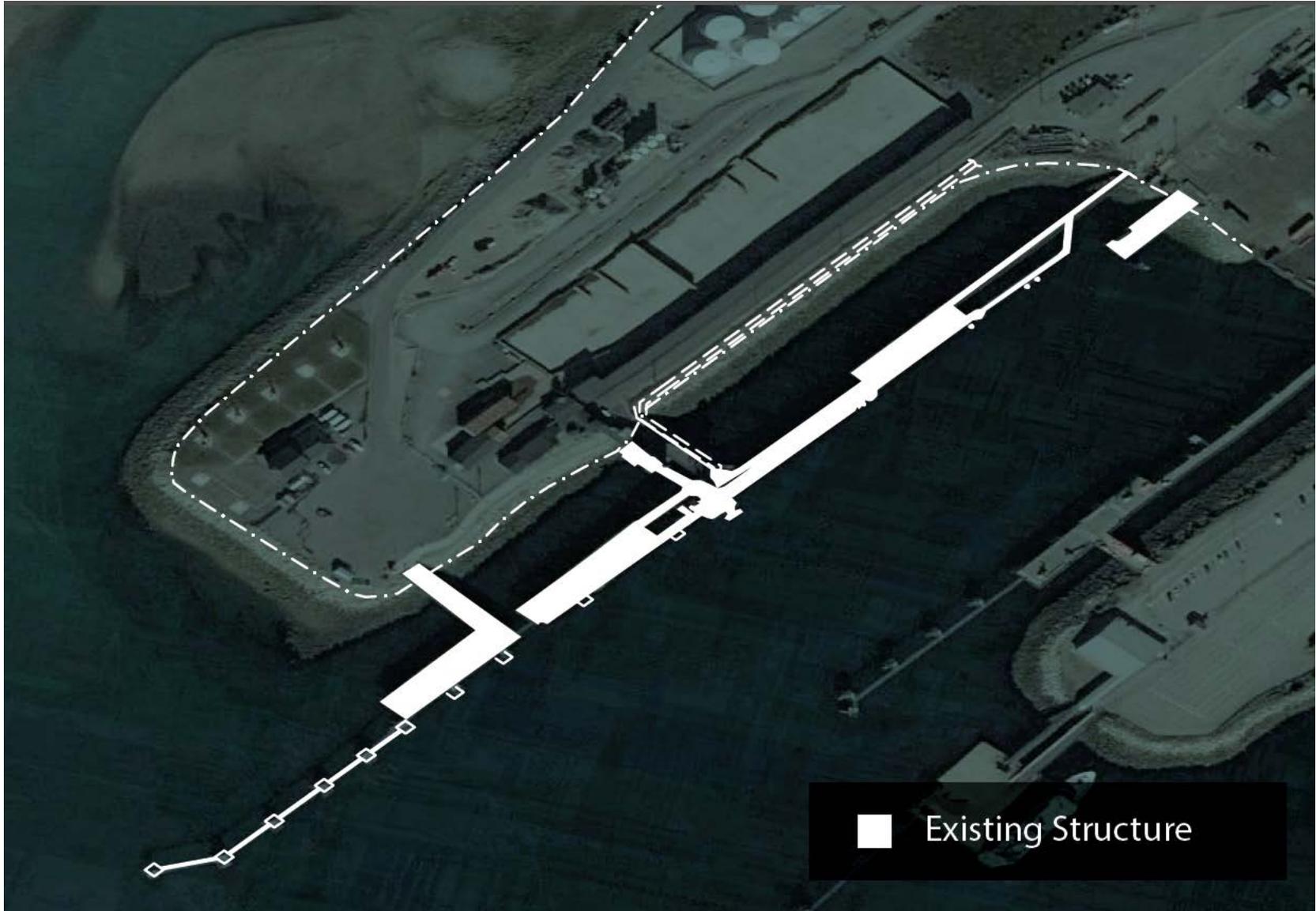
- Ore Terminal constructed in the 1960s
  - Used for transferring low-grade zinc and lead ore concentrate
  - Now primarily used for cruise ships
  - Some ore transfer and fueling still occur
- Tourism now the largest industry in Skagway



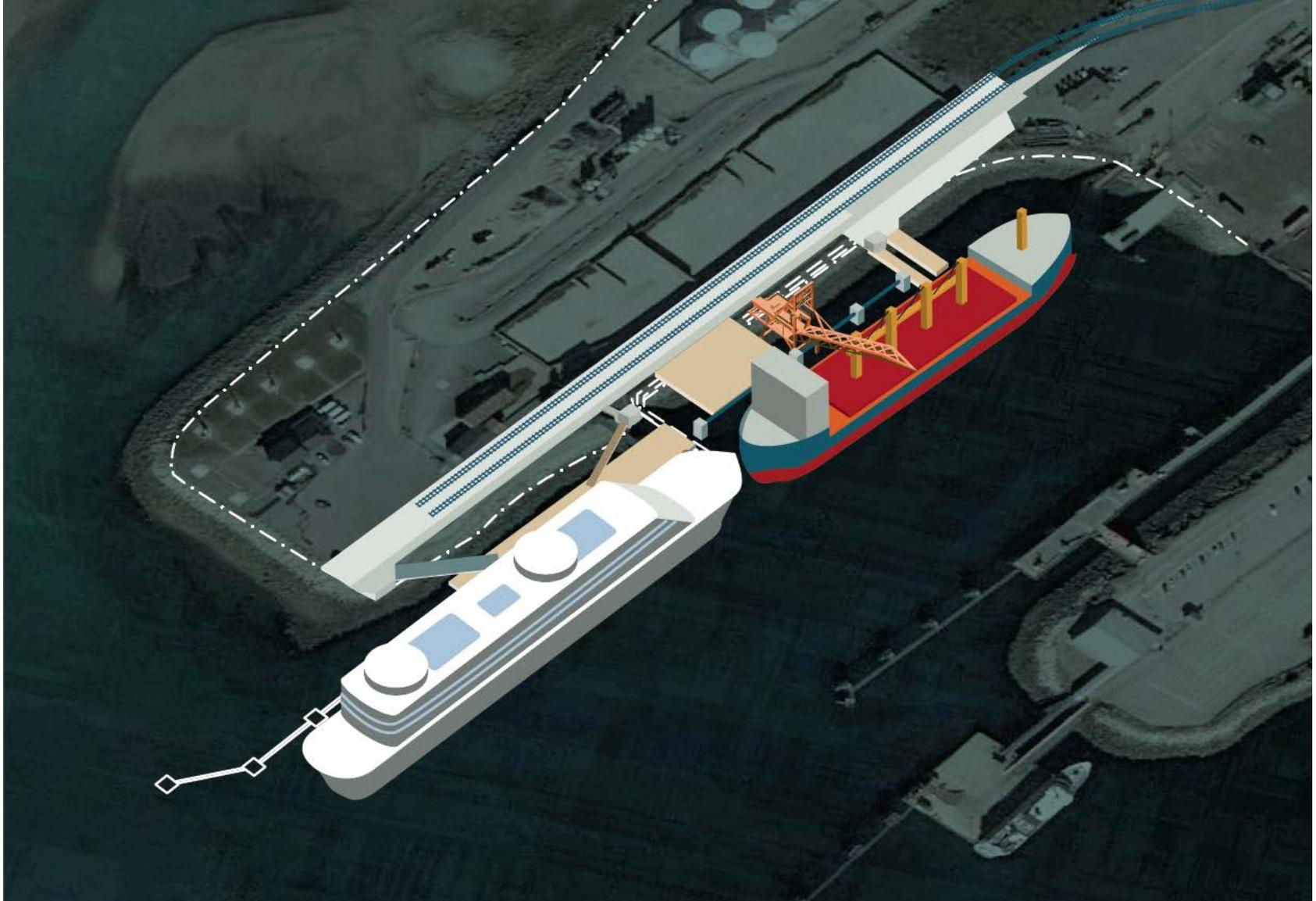
# Reconstruction Project and Mitigation Program

- Client: Municipality of Skagway, Alaska
- End goal: redevelopment of Skagway Ore Terminal and contaminated sediment cleanup
- On team with KPFF





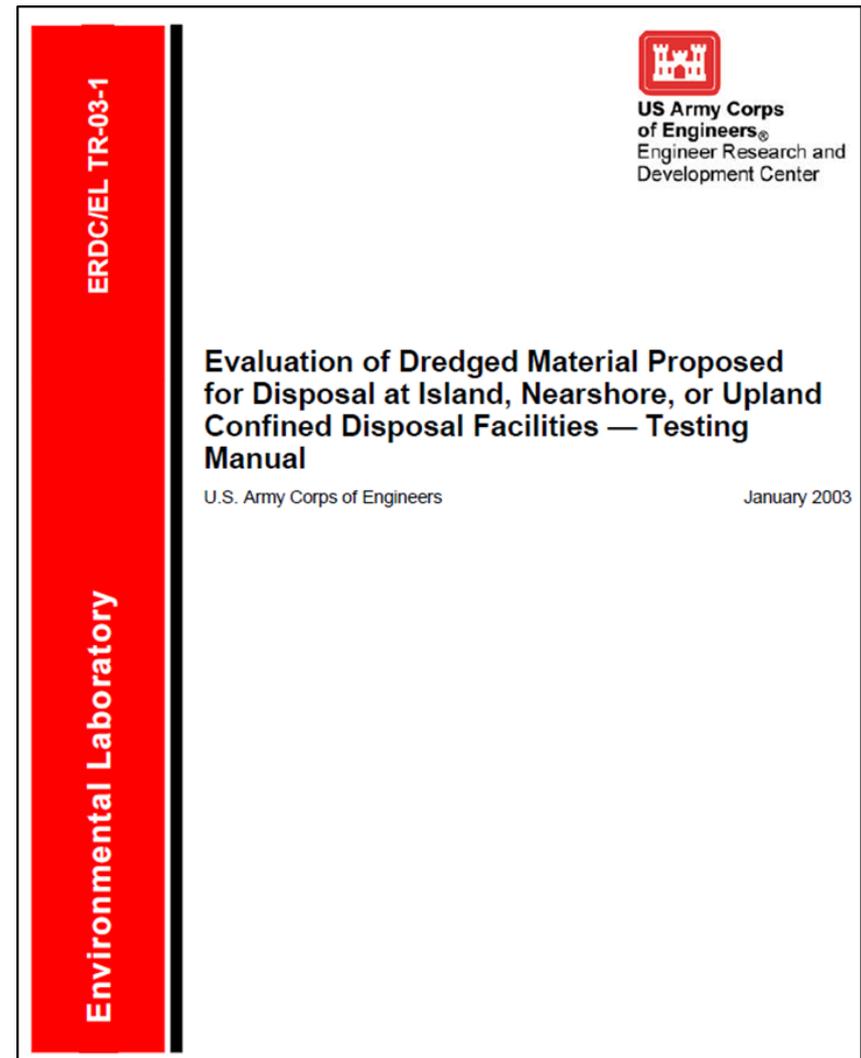
## Existing Conditions: Current Ore Loader Infrastructure



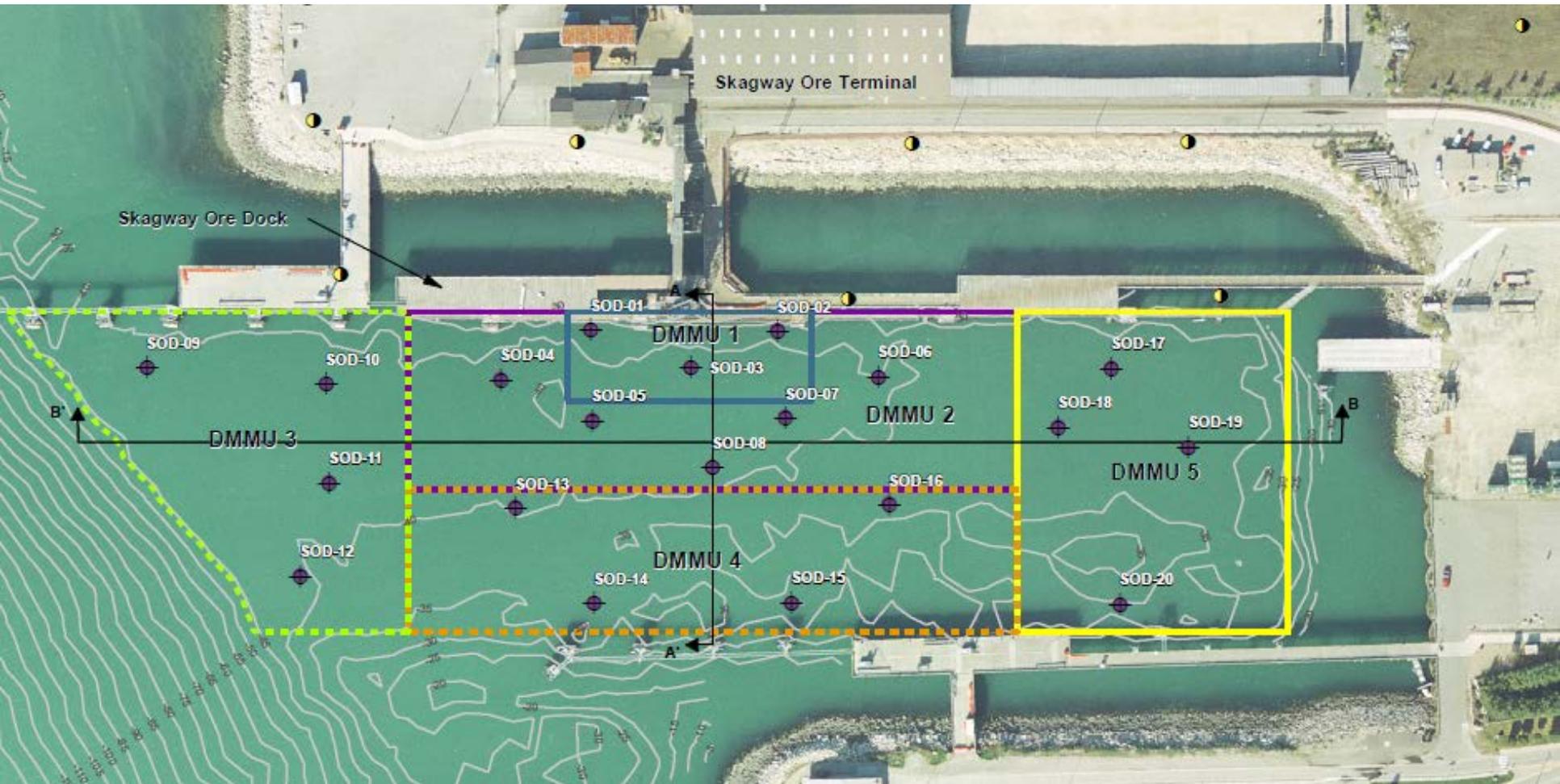
Future Development Plan: New Dock, Ore Loader

# Beneficial Use Evaluation

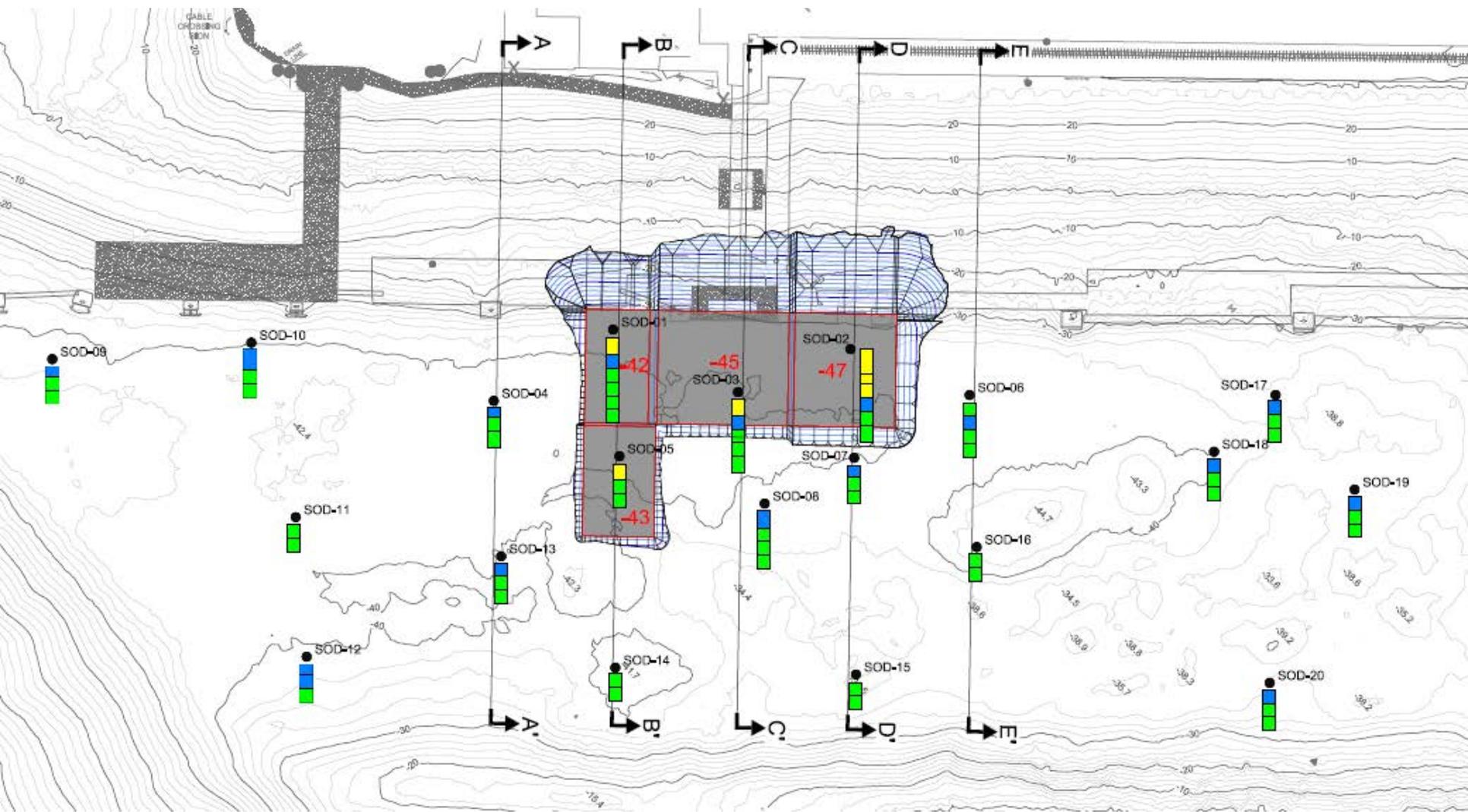
- Options:
  - In-water fill (\$)
  - Upland fill (\$)
  - Upland disposal (\$\$\$)
  - Treatment required (???)
- Approach:
  - Dredge prism characterization and design
  - Leachate testing
  - Treatability study
  - Regulatory acceptance







## Sediment Characterization Plan

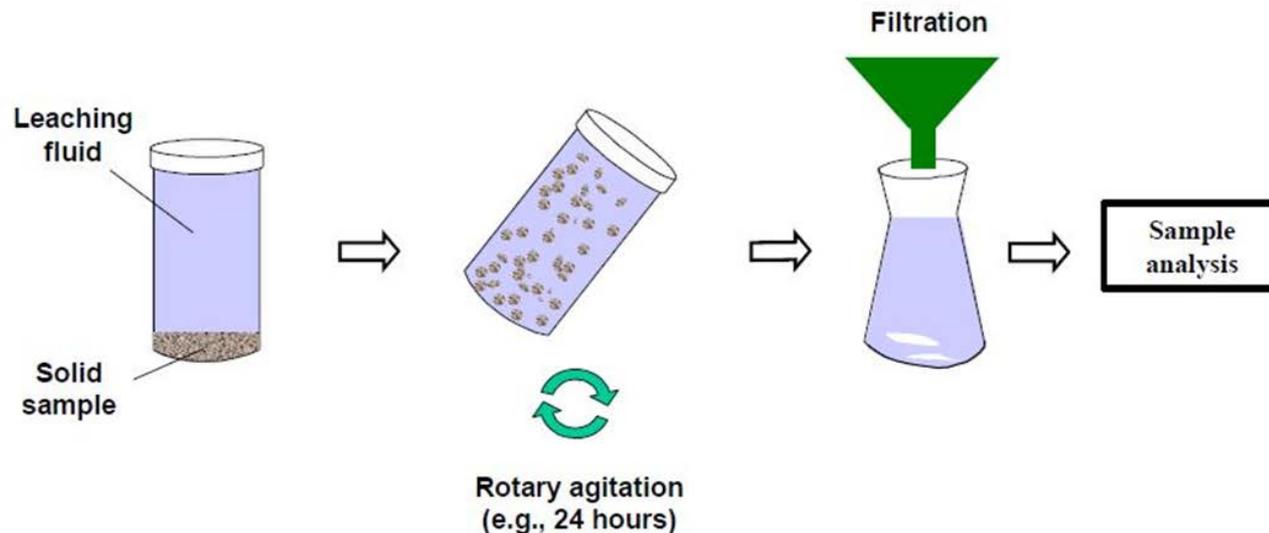


## Sediment Characterization Results

# Leachability Testing

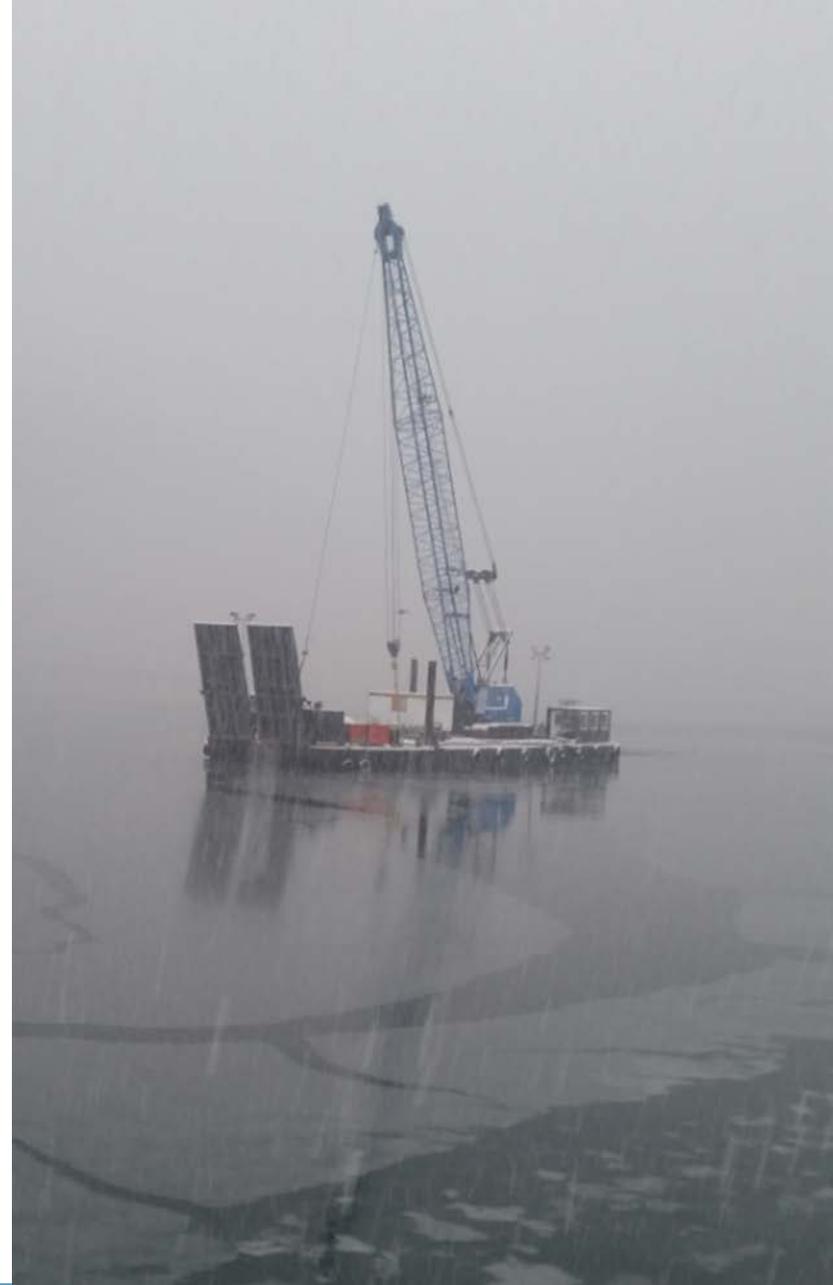
Three leachability tests were performed

1. Sequential Batch Leachate Test (SBLT) with synthetic site seawater
2. SBLT with distilled water (proxy for freshwater)
3. Toxicity Characteristic Leaching Procedure (TCLP)



# Leachability Results: Screening Criteria

- Seawater elutriate –  
in-water use
  - Alaska’s WQC for marine life
- Freshwater elutriate –  
upland use
  - NRWQC for aquatic life,  
freshwater
- TCLP elutriate – landfill
  - Federal toxicity criteria for  
hazardous waste  
[40 CFR § 261.24]



# Leachability Results

- Max sediment concentrations
  - Lead: 10,000 mg/kg
  - Zinc: 12,300 mg/kg
  - Total HPAHs: 14,667  $\mu\text{g}/\text{kg}$
- Exceedances of lead, copper, and zinc water quality criteria
- All samples exceeded the hazardous waste threshold for lead – pre-treatment required for solid waste landfilling
- Notable: no PAH exceedances



# Initial Conclusions

- In-water use
  - Materials not recommended for use as fill in the marine environment without treatment
- Upland use
  - Materials not recommended for use as upland fill exposed to freshwater sources without treatment
- Upland disposal
  - Material designates as hazardous waste (Subtitle C) without treatment
- Next Step: Perform Treatability Study

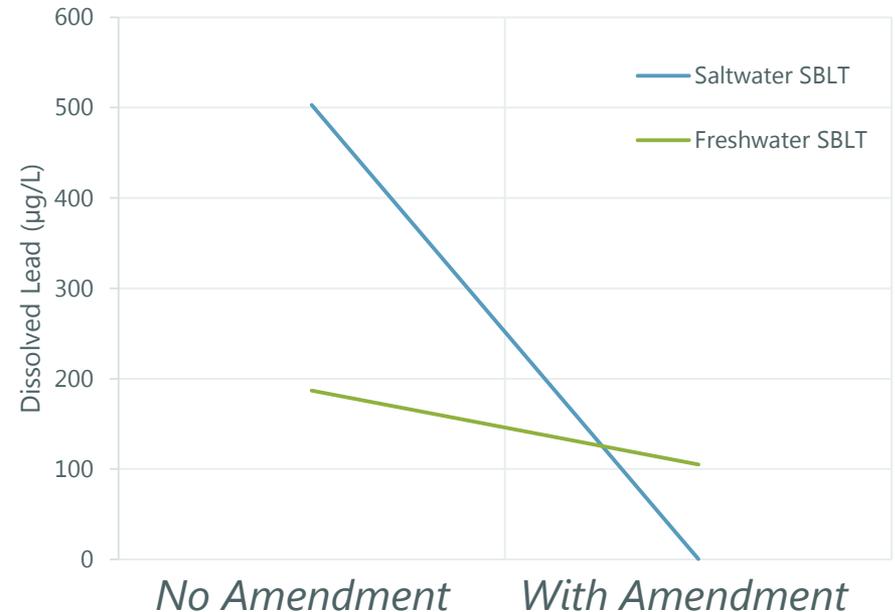
# Treatability Study



- Amendments (and mixtures) added at various dosage rates
  - Bone meal (2%, 5%, and 10%)
  - Portland cement (2% and 5%)
  - Granular activated carbon (combined with BM and PC)
  - Ferrous sulfate (combined with BM and PC)

# Treatability Results

- Bone meal alone
  - Lower amendment rates (2% and 5%) were more effective
- Bone meal with Portland cement
  - Addition of 2% Portland cement improved performance
- Most effective mix
  - 5% bone meal, 3% ferrous sulfate, and 2% Portland cement



# Recommendations

- Best amendment for beneficial use in a marine setting
  - 5% bone meal
  - 3% ferrous sulfate
  - 2% Portland cement
- Amendment mixture also appropriate for upland use with exposure to freshwater
  - Pending site-specific dilution-attenuation factors (e.g., 10 – 20x) for placement scenarios

# Next Steps



- Obtain agency approvals for preferred use option
- Incorporate results into final design
- Discuss construction implications

# Questions

