

# Addressing Uncertain Site Conditions in Sediment Remediation Bid/Tender Documents

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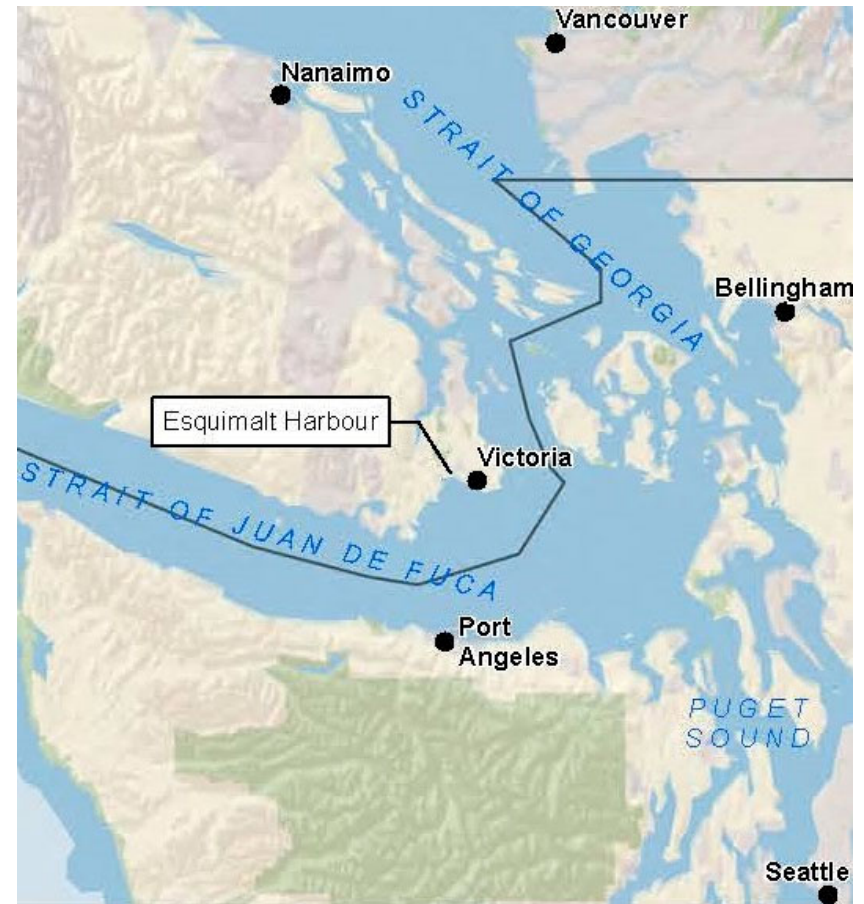
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National Defence

# Esquimalt Harbour

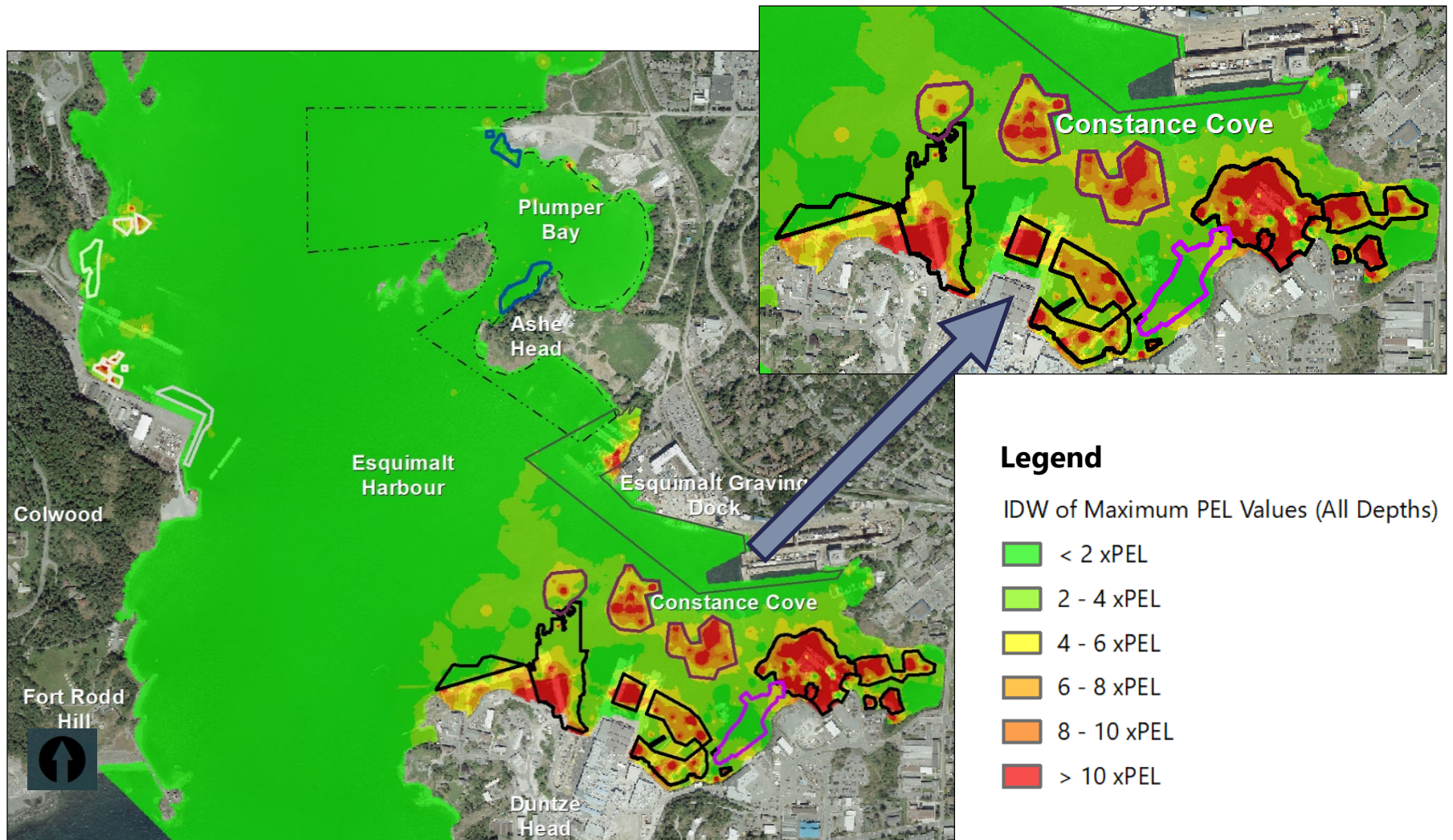
- Vancouver Island, British Columbia
- Pacific homeport of the Royal Canadian Navy (RCN)
- Crown-owned harbour, including sediment



Halifax Class Frigate

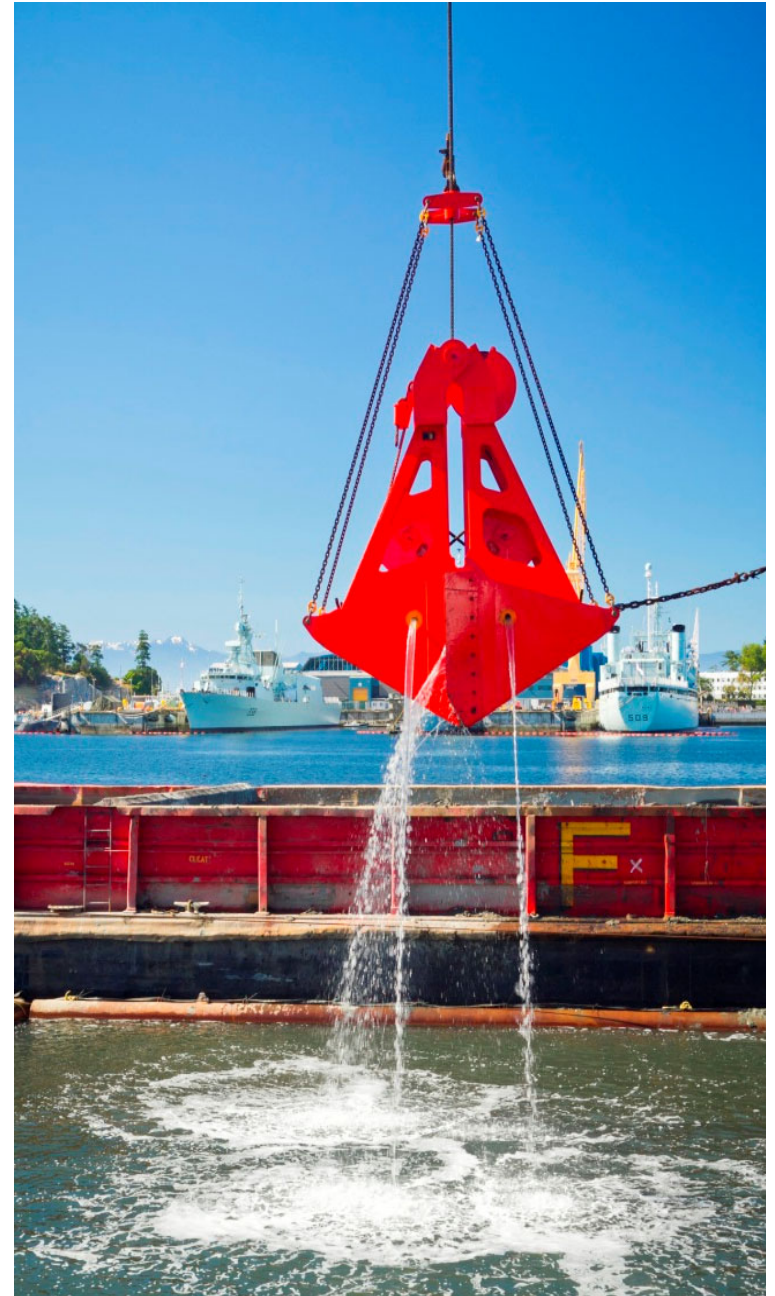


# Contaminant Distribution



# Site Conditions Will Vary from Investigation Results

- Uncertainty in extents of contamination
  - Sampling density is limited
  - Horizontal position of core
  - Core compaction
  - Mudline elevation
- Quantity and types of debris
- Subsurface bedrock/obstructions difficult to delineate
- Operational conditions or restrictions may vary



# Uncertainty Impacts Bid Cost and Claim Potential



- Bid cost
  - Causes higher variability in bid prices
  - Higher contractor built-in contingency
- Potential claims
  - Variation in estimated quantities
  - Changed conditions
  - Delays or sequencing changes



# Strategies to Address Uncertainties in Tender Documents

1. Define design and contract document philosophy up front
2. Strategically allocate risk between contractor and owner
3. Assess risk profile to help select contract type
4. Measurement and payment strategies
5. Allow adaptive management approach during construction



# 1. Philosophically Speaking



- Balance risk between contractor and owner to incentivize a fair and cost-effective bid
  - Owner preference may differ
- Minimize potential for claims
- Understand where risks are and strategically address risks
- Allow contractor flexibility
- Recognize contractor capabilities and optimize design for success
- Always ask what a “reasonable” contractor would assume

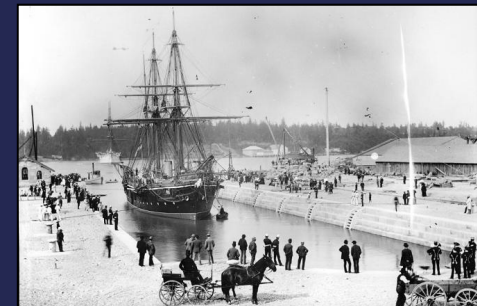


## 2. Where Risk Issues Arise

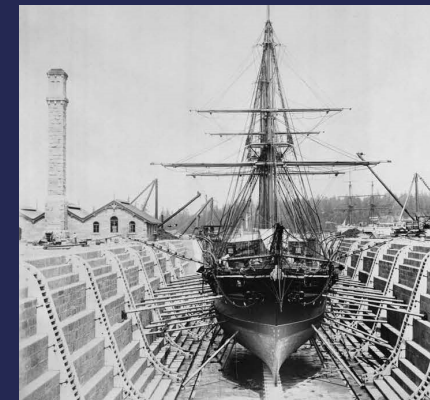
- Optimistic or unreasonable assumptions made by contractor
- Differing site conditions
  - Material composition and debris
  - Residuals
  - Unexploded ordnance
  - Site operations
- Defective or deficient contract documents
- Other areas of potential entitlement



DND Drydock under construction, 1886



HMS Cormorant entering DND Drydock, 1887



HMS Cormorant at DND Drydock, 1887



### 3. Performance vs. Method Design Approaches

Design Approach	Pros	Cons
Performance	<ul style="list-style-type: none"><li>• Contractor flexibility</li><li>• Lower bid costs – potentially</li><li>• More risk to contractor</li></ul>	<ul style="list-style-type: none"><li>• Inexperienced contractors may not meet project goals</li><li>• Acceptable means and methods?</li><li>• Requires clear specifications</li></ul>
Method	<ul style="list-style-type: none"><li>• Level bidding field</li><li>• Certainty on means and methods</li></ul>	<ul style="list-style-type: none"><li>• Reduces contractor flexibility</li><li>• May increase costs</li><li>• More risk to owner</li></ul>

## 4. Measurement and Payment Strategies

- Contract type informs measurement and payment approach
- Decide on how to structure bid items
  - Strike a balance between many vs. few bid items (e.g., lump dredging, transport, and disposal into one bid item vs. separated into multiple bid items)
- Be clear on methods for determining pay quantities
  - Be clear on whose bathymetric surveys will be used for measurement purposes
  - Common dispute is over quantities removed or placed
- In situ quantity measurement typically preferred over ex situ quantity or tonnage

## 4. Measurement and Payment Strategies (cont.)

- Pay unit (measurement type – e.g., area vs. volume)
- Payable overdredge
- Maximum overdredge
- Penalties and liquidated damages
- Standby time
- Contingency dredging or other contingency actions
- Confirmation measurements (who leads?)



## 5. Adaptive Management



- Anticipate change—it will occur
- Driven by site conditions, complexity, and uncertainty
- Can prevent problems from escalating into claims
- Effective with intensive construction management
- Contractor relationship is critical

# Esquimalt Harbour – Addressing Uncertainty

- Presence of bedrock
- Unexploded ordnance in sediment
- Active Naval Harbour
- Residual management strategies
- Satisfying stakeholders of contractor operating in safe manner

# Presence of Bedrock



- Highly variable bedrock—  
how to address?
- Design stage
  - Synthesize various datasets to create hard-bottom surface
  - Account for bedrock in volume estimates
- During construction
  - Verify presence
  - On-ramp additional dredging locations to make up volume
  - Rely on contractor delineation

# Unexploded Ordnance (UXO)

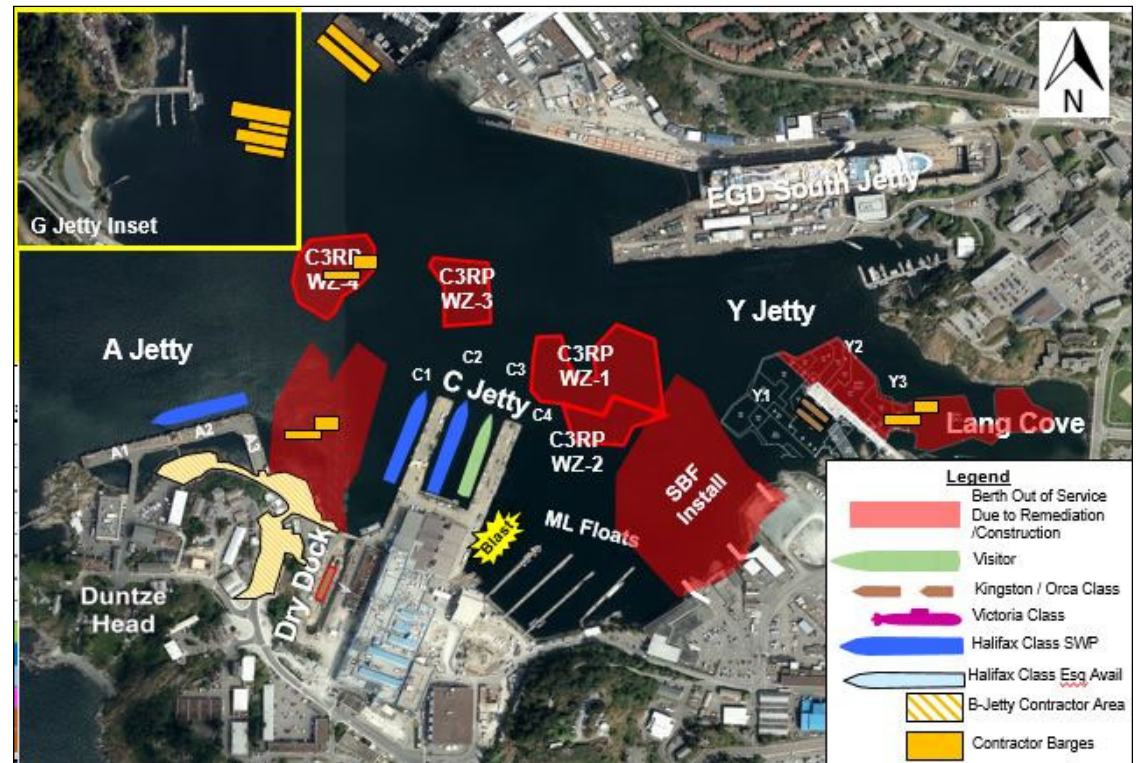
- Presence of UXO discovered during early phases of the project
  - Presence greater than anticipated
- Varying contracting approaches for subsequent projects
  - Prime cost allowance
  - Time and materials
  - Contractor requirements





# Site Operational Uses and Restrictions

- Operational readiness
- Multiple adjacent projects
- Addressing congestion in design
  - Directed moves
  - Standby time
  - Requirement to remain fixed
  - Fixed milestone dates integrated into contract



# Residuals Management

- Residuals will occur
  - 2% to 9% generated residual mass
  - Debris and bedrock complicate residuals
  - Resuspension not only factor in residuals
- Prepare for residuals
  - Residuals inform remedy and design
  - Develop realistic residual estimates
- Develop contingency plans
  - Upfront agreement on post-dredge data interpretation
  - Plan for adaptive management decisions during construction



# Summary of Key Points

- Define design and contract document philosophy up front
- Strategically allocate risk between contractor and owner
- Identify appropriate studies and design measures to reduce uncertainties
- Assess risk profile to help select contract type
- Allow adaptive management approach during construction

