

SELECT SHORELINE CONSIDERATIONS DURING SEDIMENT DREDGING

Kendrick Jaglal, Heather M. Weitzner, David T. Farber and Trevor M. Staniec

WEDA Dredging & Expo 2019

RAMBOLL

Bright ideas. Sustainable change.

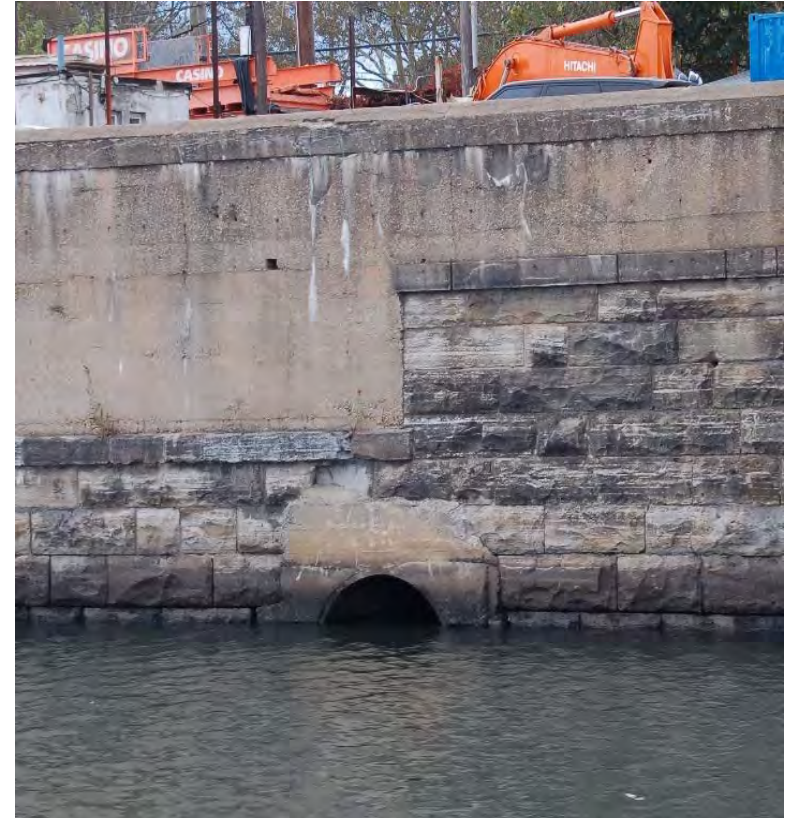
AGENDA

01 A Review of Key Shoreline Features

02 Significant Challenges to Dredging

03 Financial Responsibility for Bulkhead Repair

04 Potential Ways to Address Challenges



TYPES OF SHORELINES

Coastal Mostly natural, sandy beaches

Rural Also mostly natural, vegetated banks

Urban Typically contains structures above and below the water

Bulkheads, piers, docks, pilings, bridges, utility crossings, outfalls



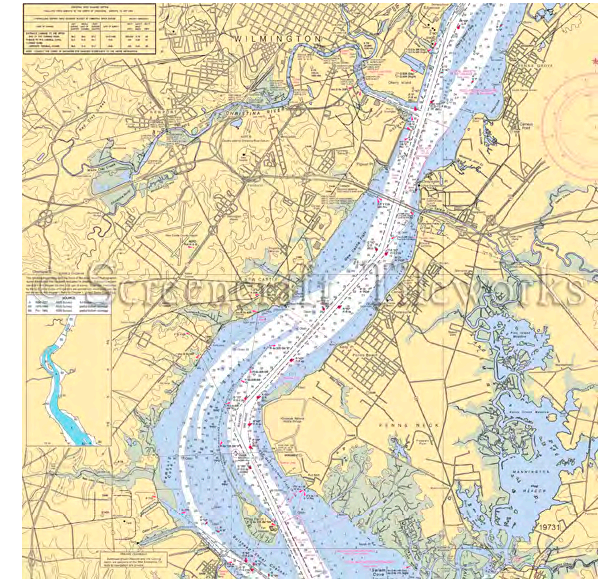
WHY CONSIDER SHORELINES DURING DREDGING?

Maintenance dredging

- Limited to navigation channel
- Typically in the middle of the channel away from the shoreline

Remediation dredging

- May extend bank to bank (e.g. Passaic River, NJ)
- May involve sediment behind bulkheads and below piers



URBAN SETTING

Docks and jetties

- May pose access limitations

Bulkheads

- Could be constructed with timber, steel, concrete
- Could be aging with evidence of deterioration
- Stability may depend on the adjacent sediment



SIGNIFICANT CHALLENGES

- Financial responsibility
- Reducing wall stability - slope failure, bank erosion (through exposed holes), limiting support of heavy equipment on shore
- Exacerbating deterioration of dilapidated bulkheads when dredging
- Access under infrastructure
- Impact from upland contamination
- Sea level rise

FINANCIAL RESPONSIBILITY



- Under Superfund, addressing bulkheads do not necessarily result in risk reduction
- Concerns over bulkheads is incidental to the remediation
- Bulkhead replacement costs are high: US \$500 to \$3,000/ linear meter
- Repair may be less costly
- Shoring during dredging may be least costly to PRPs but still carries liability
- Negotiated settlement



POTENTIAL APPROACH

Avoid

Minimize

Evaluate
(existing information
and/or inspections)

**Alternatives
to dredging**

LEVELS OF FIELD INSPECTIONS (EVALUATION)

- I General visual observations
- II Close-up visual inspection
- III Detailed inspection and testing

UFC 4-150-07
19 June 2001
Change 1, 1 September 2012

UNIFIED FACILITIES CRITERIA (UFC)

MAINTENANCE AND OPERATION: MAINTENANCE OF WATERFRONT FACILITIES



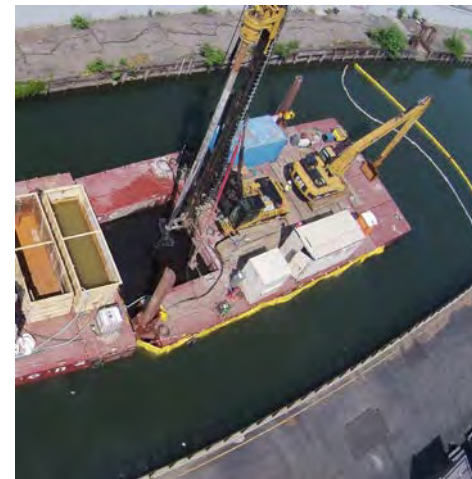
ALTERNATIVES TO DREDGING

Off-sets

Capping

Activated carbon treatment

ISS - In situ
Stabilization/Solidification



CAPPING

Comprised of various layers of construction materials

- Isolate effects of underlying contaminated sediment
- Attenuates chemical transport in groundwater
- Provides erosion control to prevent scour

Eliminates concerns associated with dredging

Could limit bulkhead maintenance to preserve cap integrity



ACTIVATED CARBON (SEDIMITE™)

Agglomerate comprised of activated carbon, inert binders and weighting agents

Targets primarily hydrophobic chemicals to reduce bioavailability

Sinks into sediment and mixed in through natural processes such as bioturbation

Increasing use with seeming success



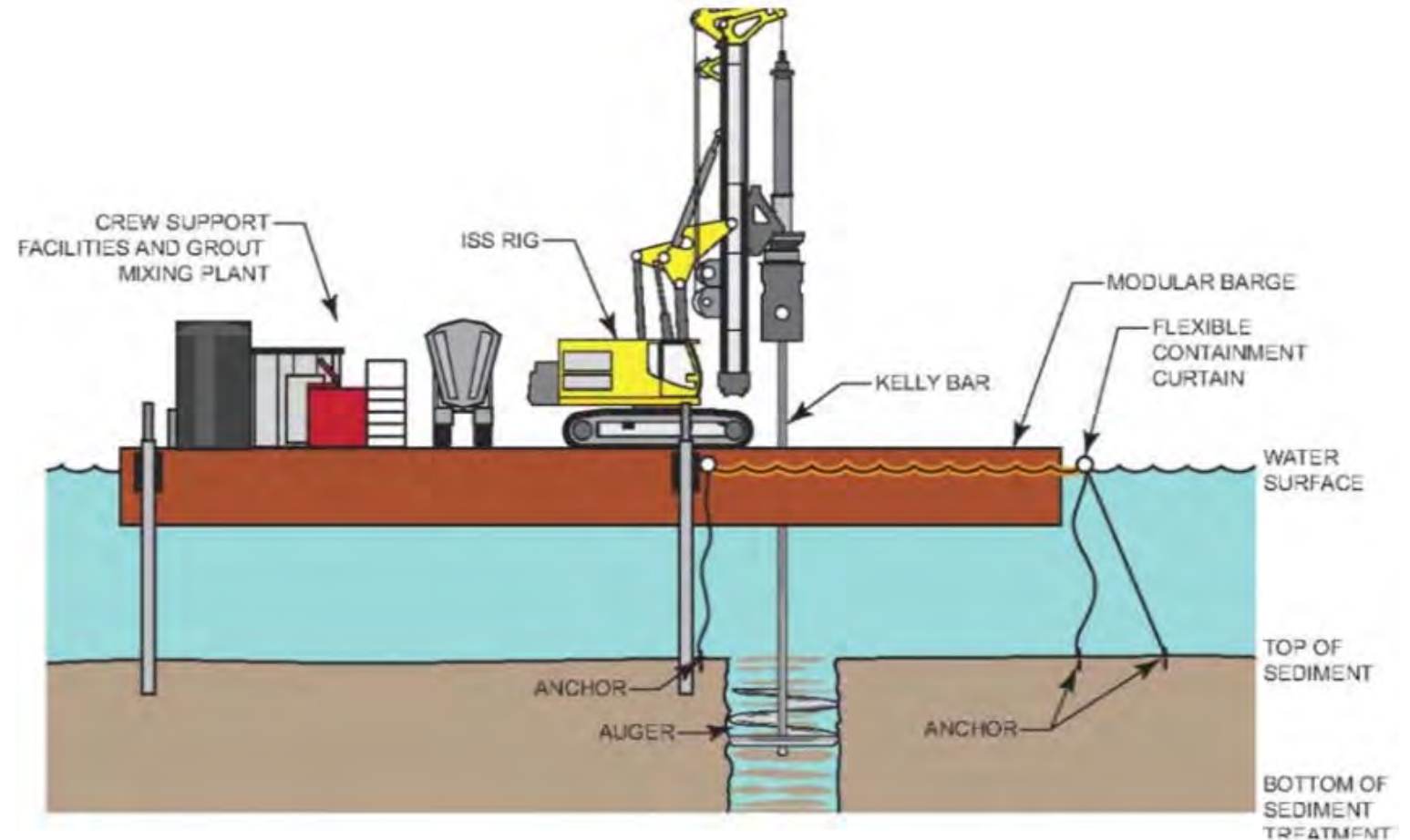
IN SITU SOLIDIFICATION / STABILIZATION (ISS)

Mixing in a pozzolanic reagent (e.g. Portland Cement) into the sediment

Strengthens sediment adjacent to bulkheads

Binds up contaminants resulting in reduced leaching potential

Reduced permeability may also address ebullition facilitated chemical transport (if present)



INTEGRATING IN-WATER WORK WITH UPLAND REMEDIATION



Tributary to Hudson River (NY)
at former Manufactured Gas Plant (MGP) site

Upland remedy

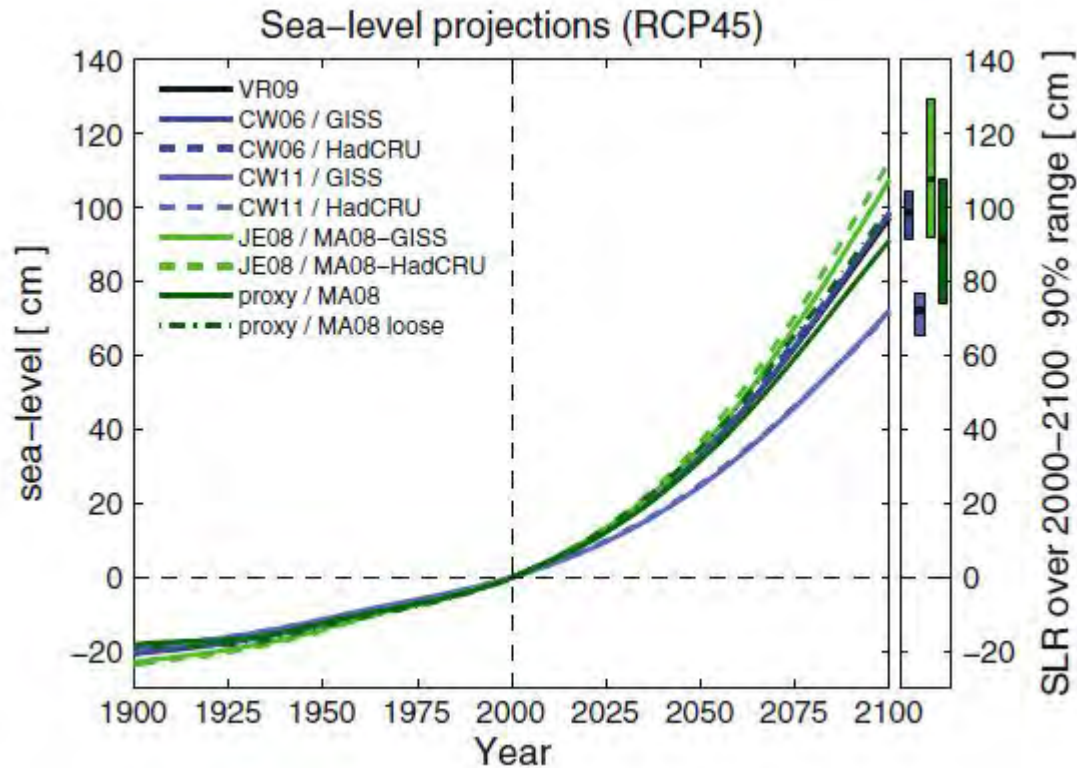
Remove 1.5 m soil, ISS to 5 m and backfill

In-water remedy

Remove sediment, cover and
replace failing timber bulkhead

Used appropriate sequencing and 6.5 m
deeper ISS to address NAPL contamination
in between old and new bulkhead

POTENTIAL IMPACT OF CLIMATE CHANGE



<https://skepticalscience.com/sea-level-rise-predictions.htm>

Sea levels are projected to rise 0.3 m (1 ft) by 2050

Increased water depth will significantly impact shorelines

Clearance under bridges decrease

Submerge other shoreline infrastructure (piers etc.)

Submerge outfalls

CONCLUSIONS

Need to evaluate and understand shoreline features

Combine dredging with upland remedy when possible, for cost savings

Consider **cost sharing** responsibility for repair/replacement

Avoid proximal dredging through off-sets and **use of alternative technologies**

Consider sea level rise when designing replacement shoreline features

THANK YOU!

Contact

Kendrick.Jaglal@ramboll.com

315.956.6465

