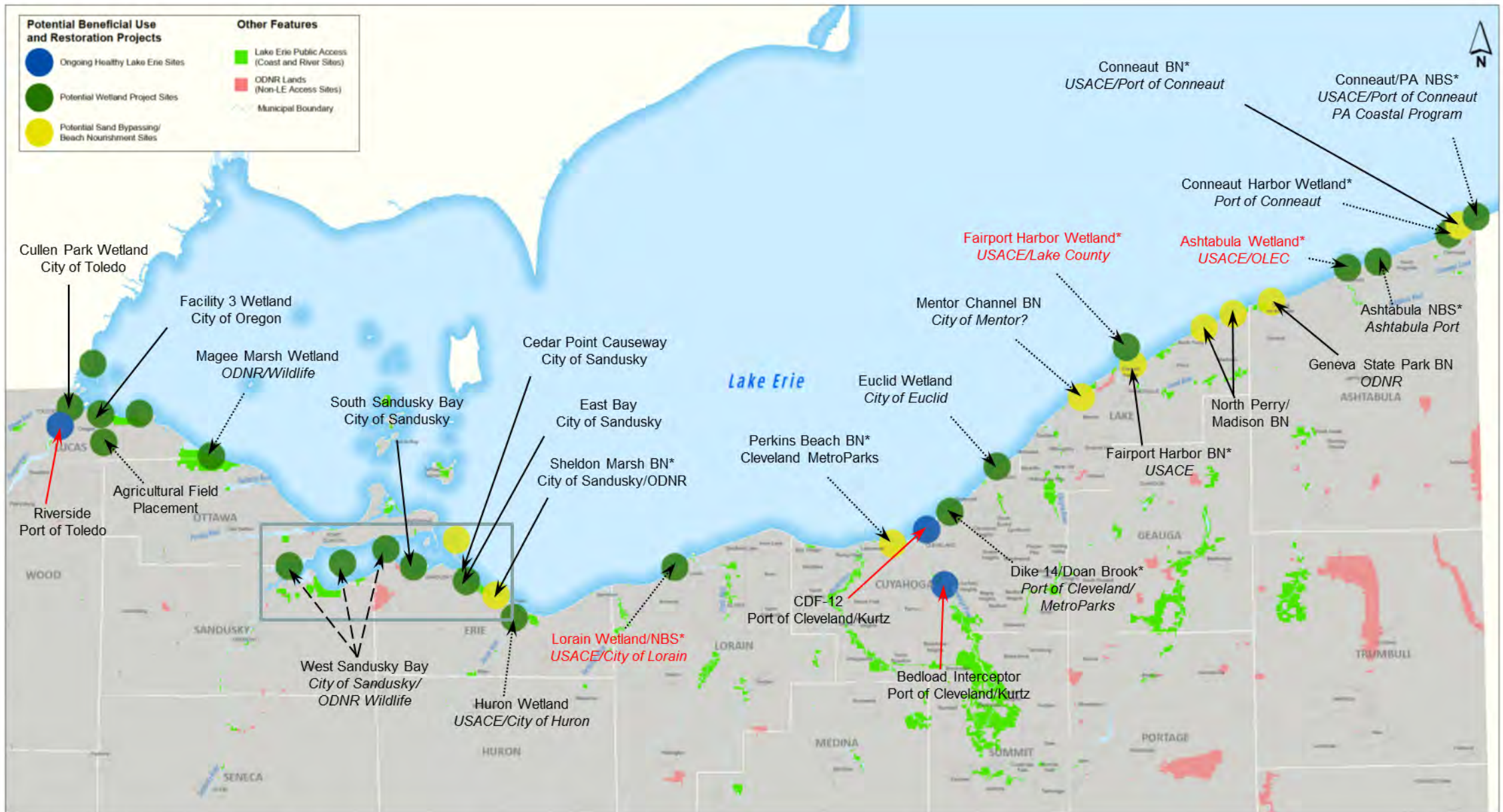


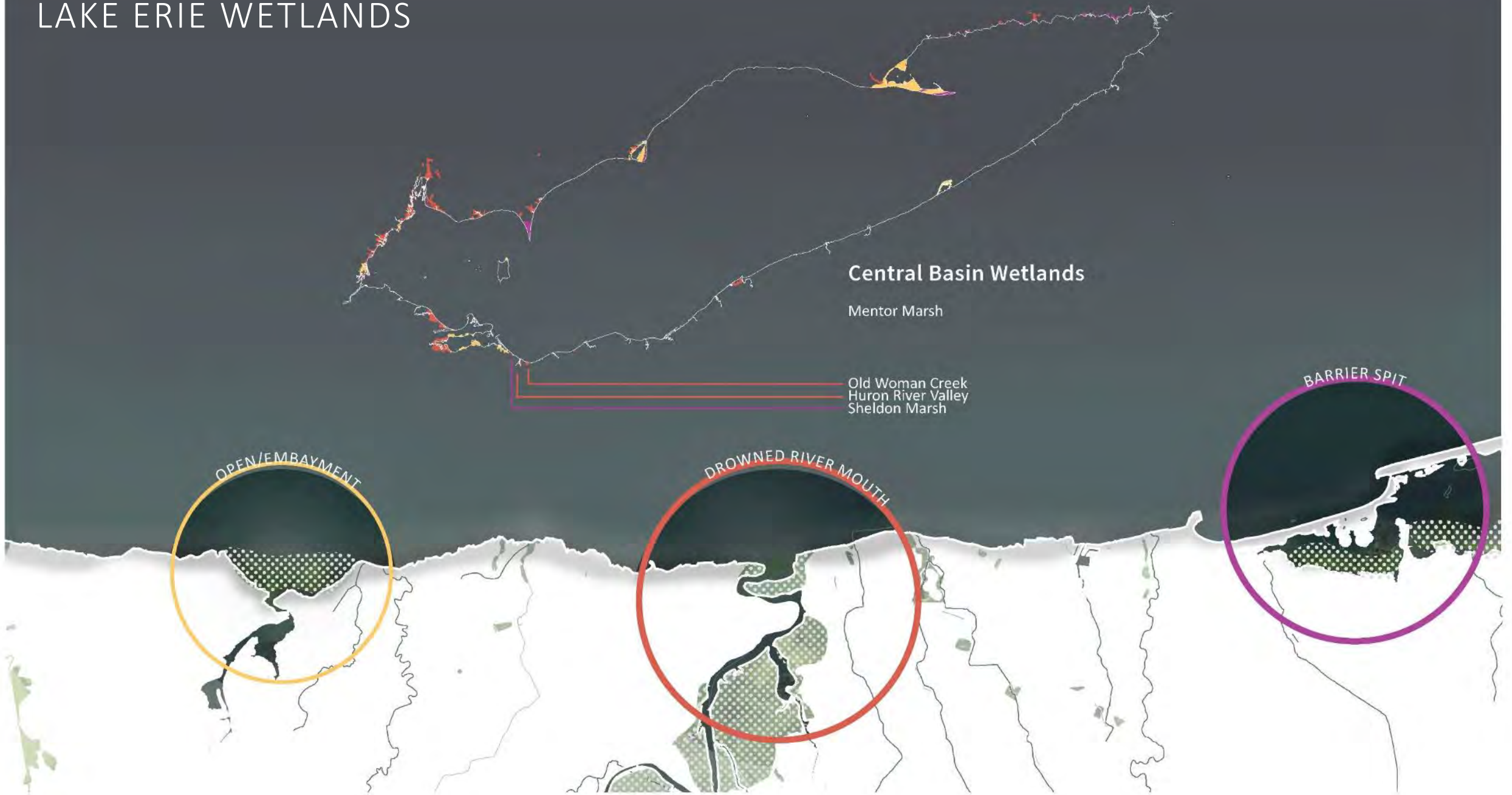


Wetland and Marsh Creation with Dredged Material: Lake Erie Cases

Sean Burkholder – University of Pennsylvania / Healthy Port Futures
Scudder Mackey – Ohio Department of Natural Resources

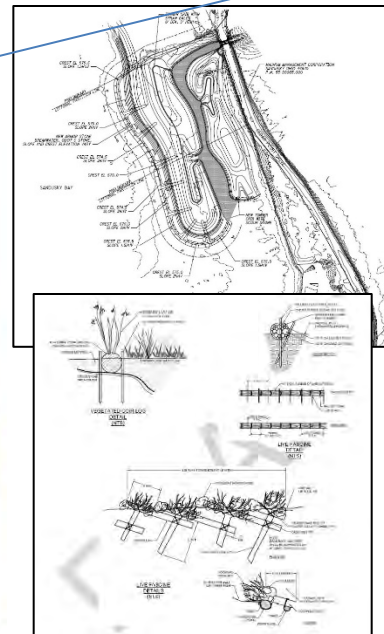
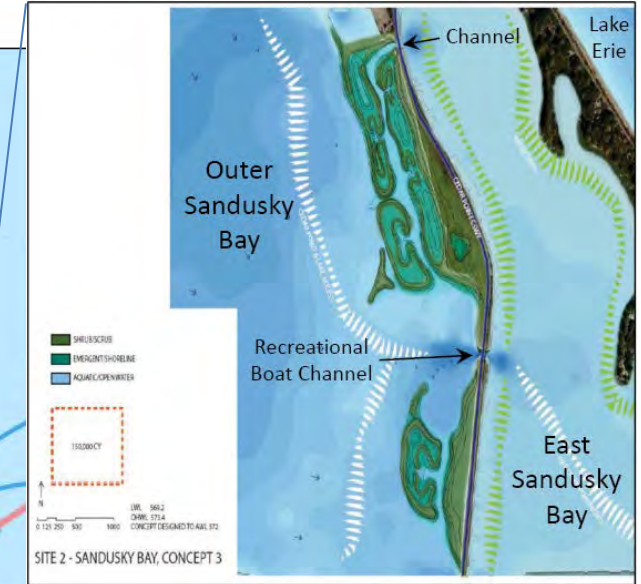


LAKE ERIE WETLANDS



Cedar Point Causeway Wetland Restoration Project

Sandusky Bay Initiative



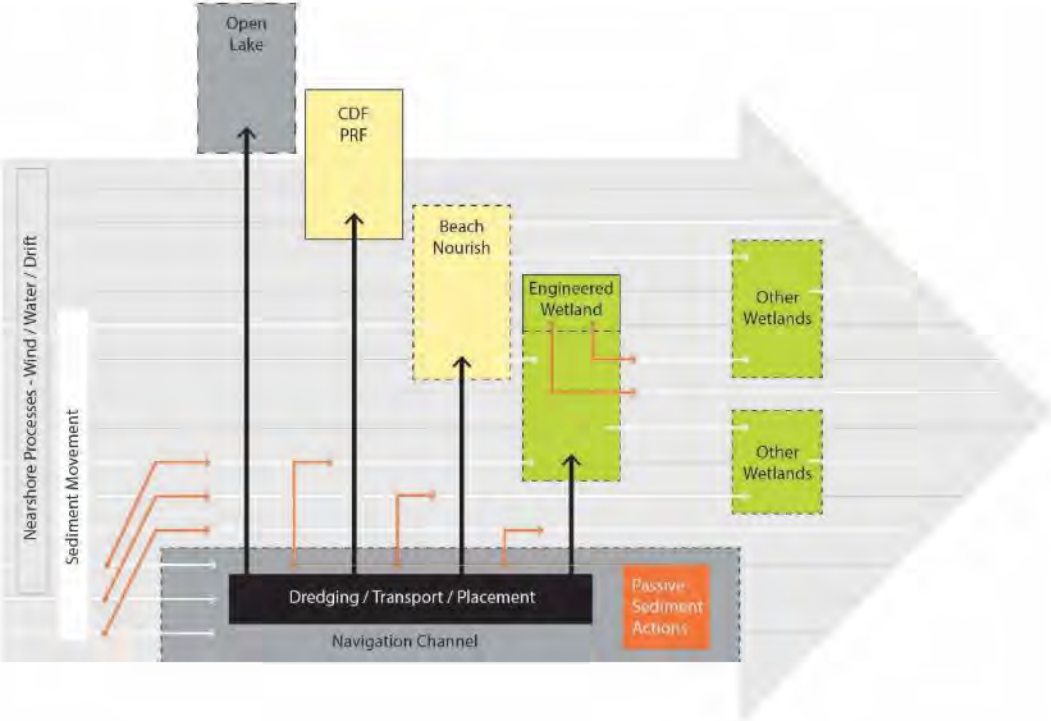
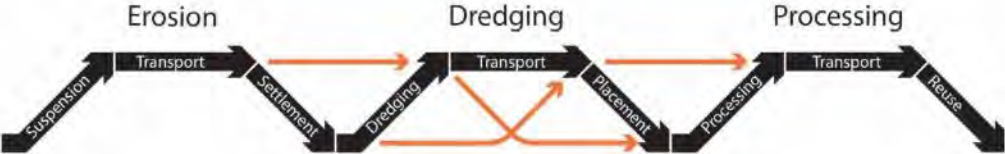
Healthy Port Futures

Port Network



PASSIVE SEDIMENT MANAGEMENT

The use of natural forces (e.g. water, wind, waves) to replace or augment one of the require steps of sediment management (uplift, transport, placement)





LORAIN | INITIAL EVALUATION

US STEEL CORPORATION

LORAIN SITES

Choosing Sites for PSM Based On:

- Hydrological Conditions
- Location from Navigation Channel
- Property Ownership
- Existing Uses
- Ecological Conditions

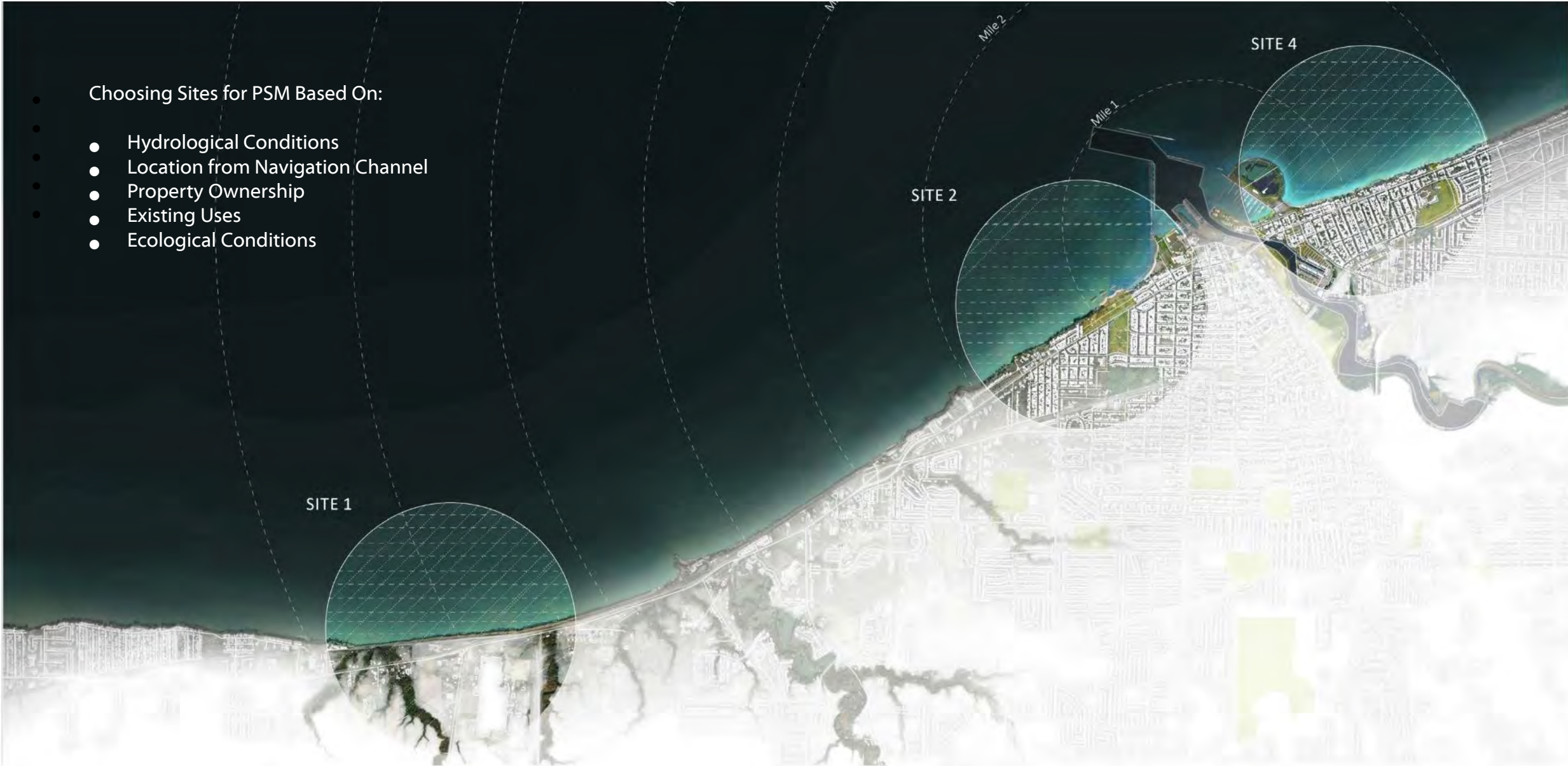
SITE 1

SITE 2

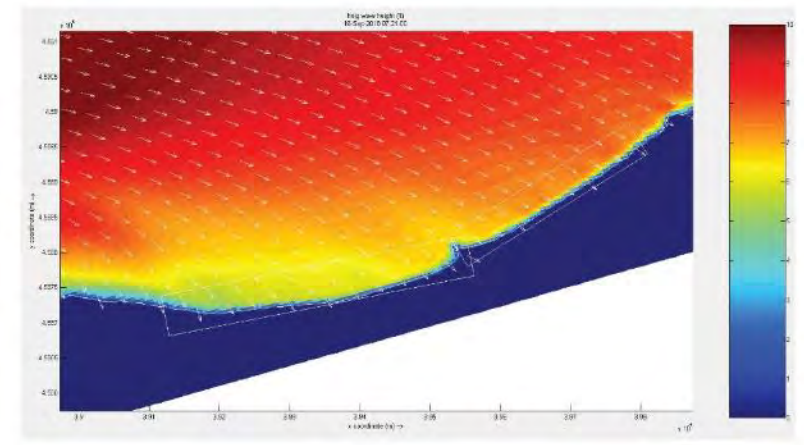
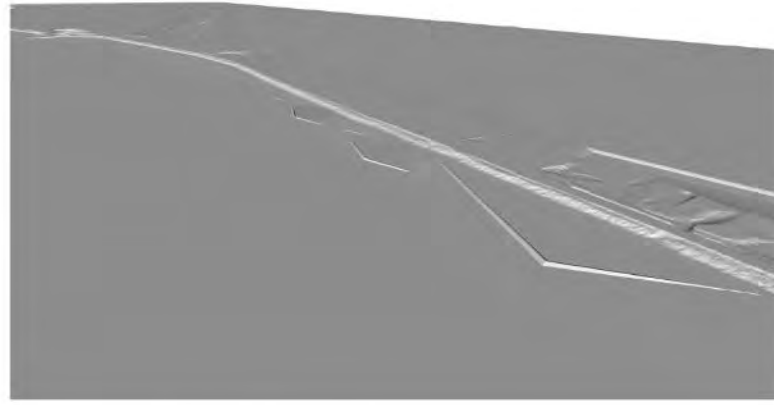
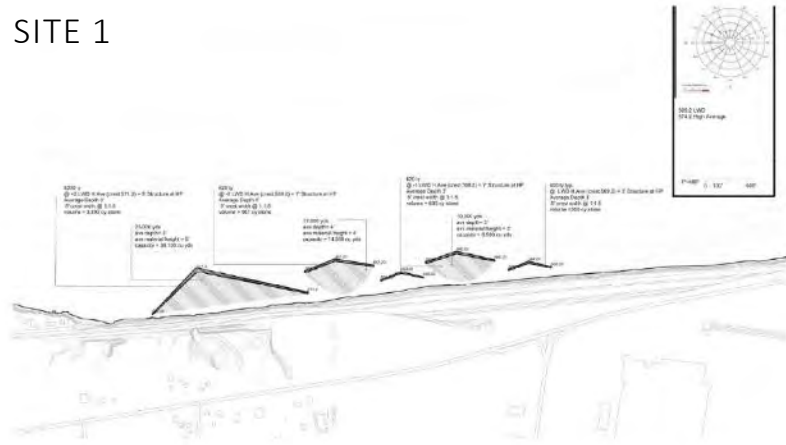
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Mile 2

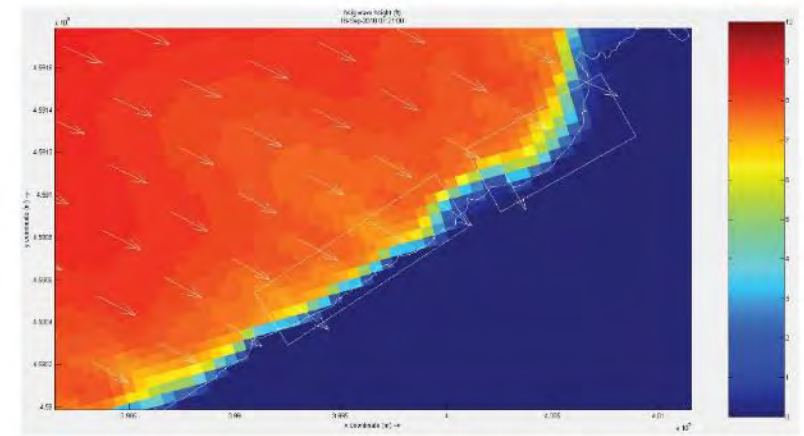
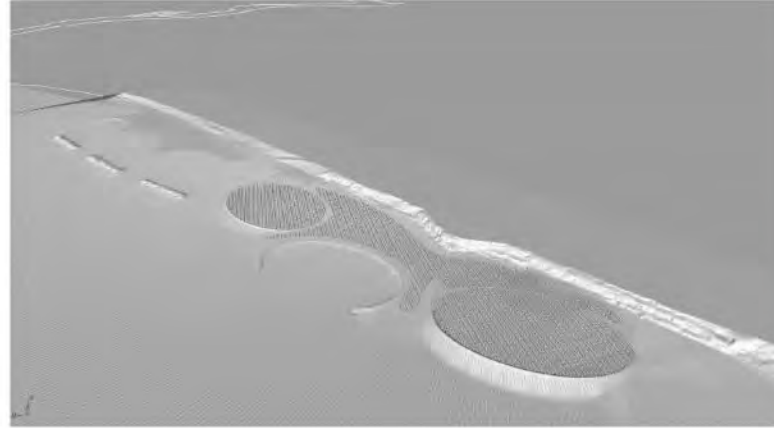
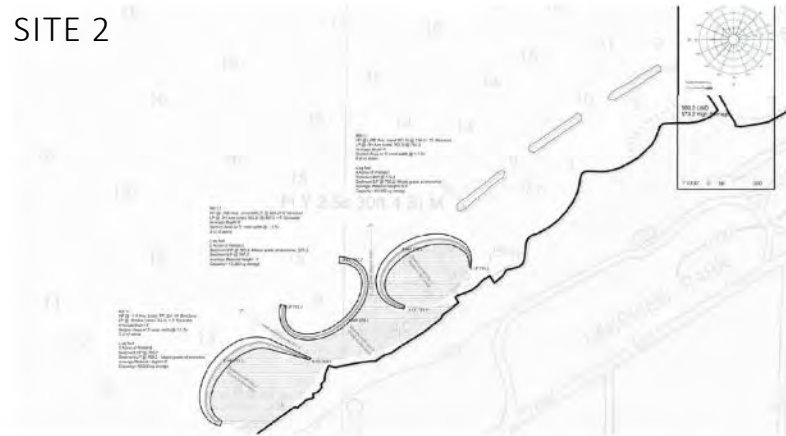
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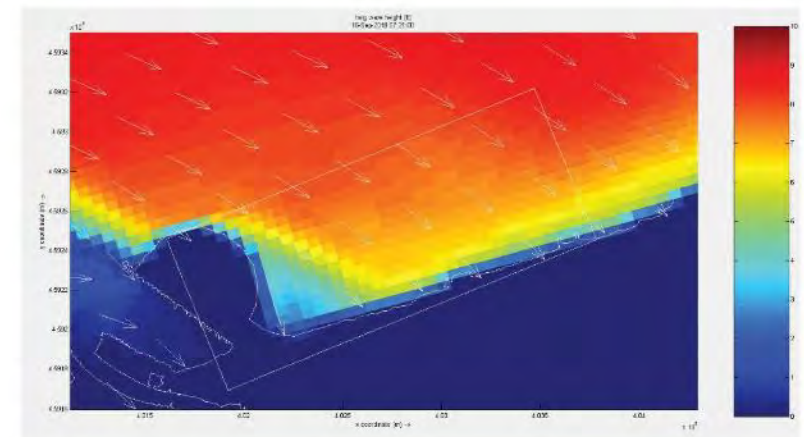
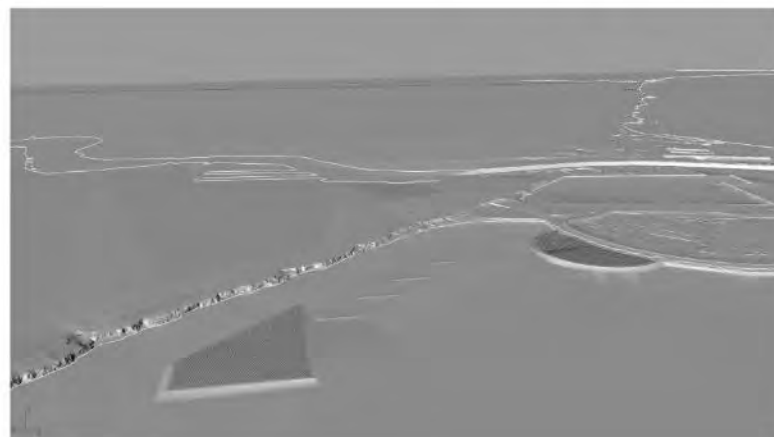
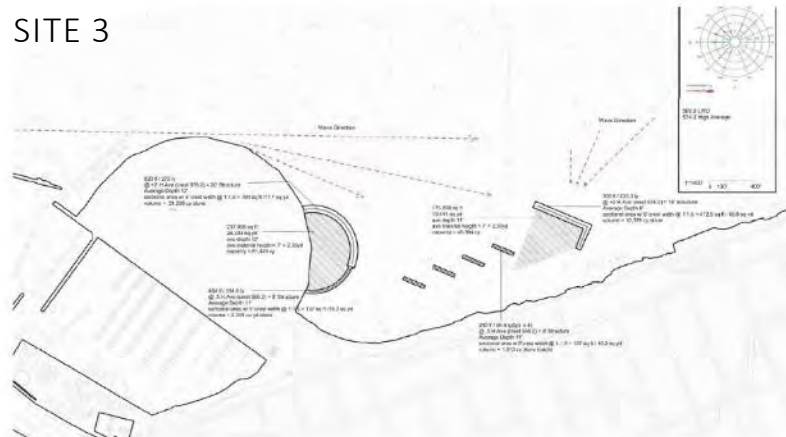
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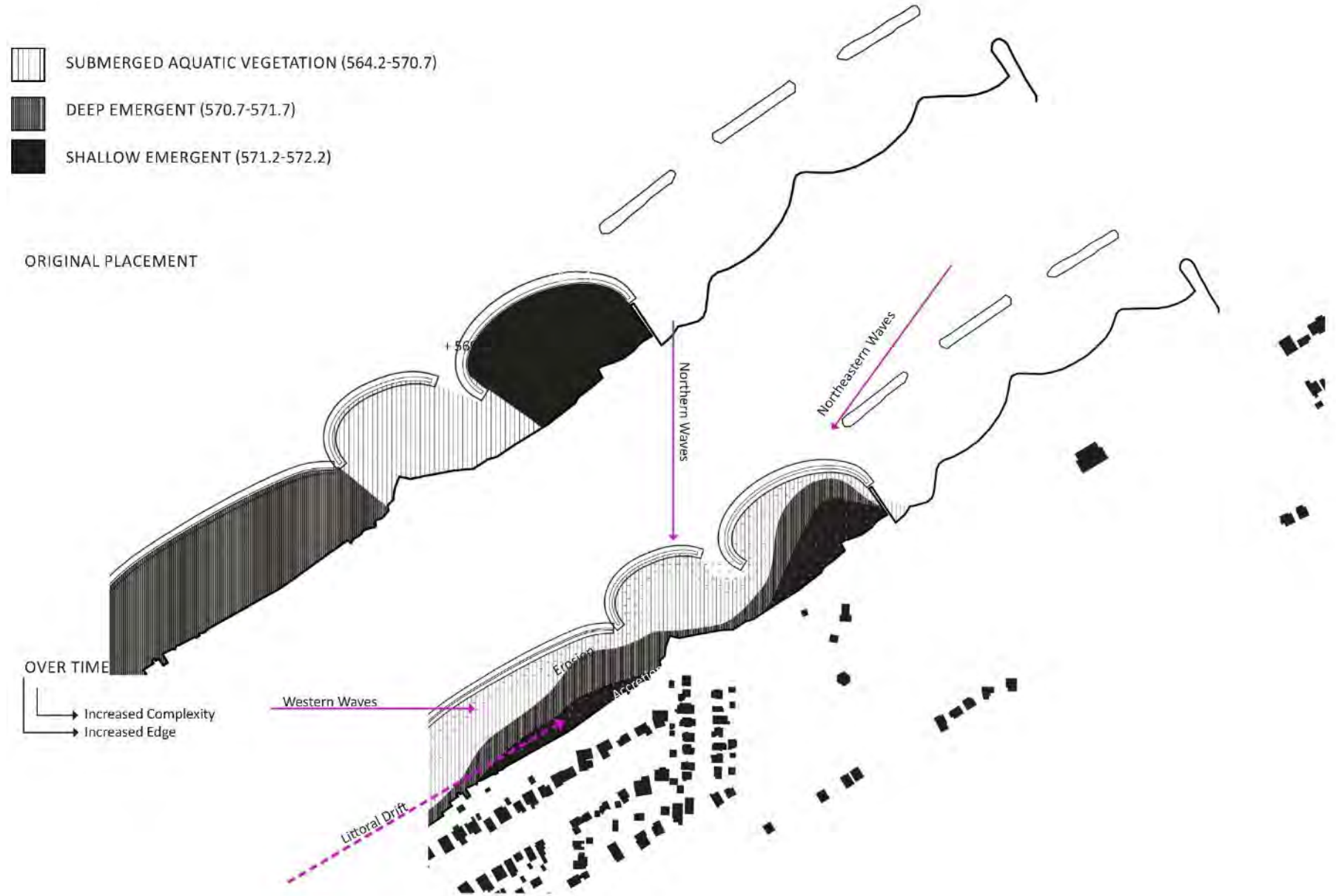
SITE 2



SITE 3

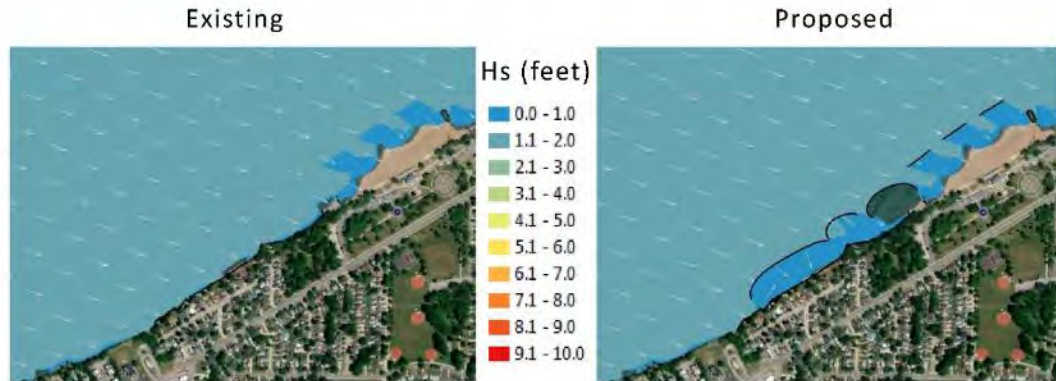


SITE 2 | TESTING A HYPOTHESIS

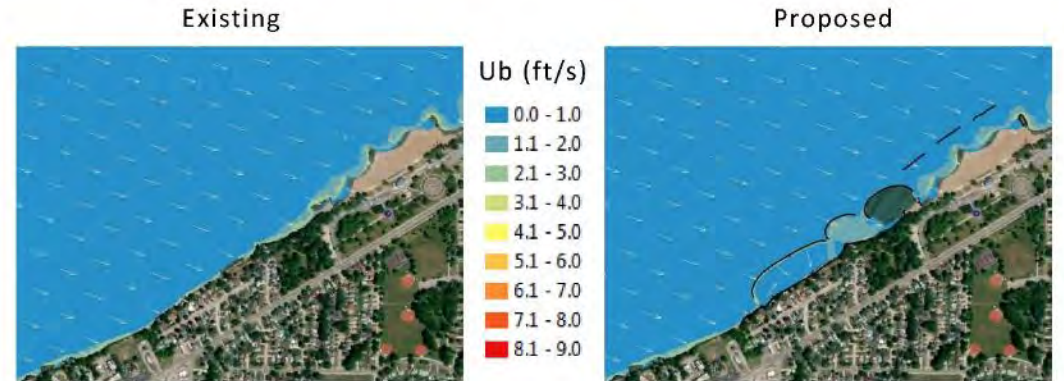


SITE 2 | WAVE MODEL

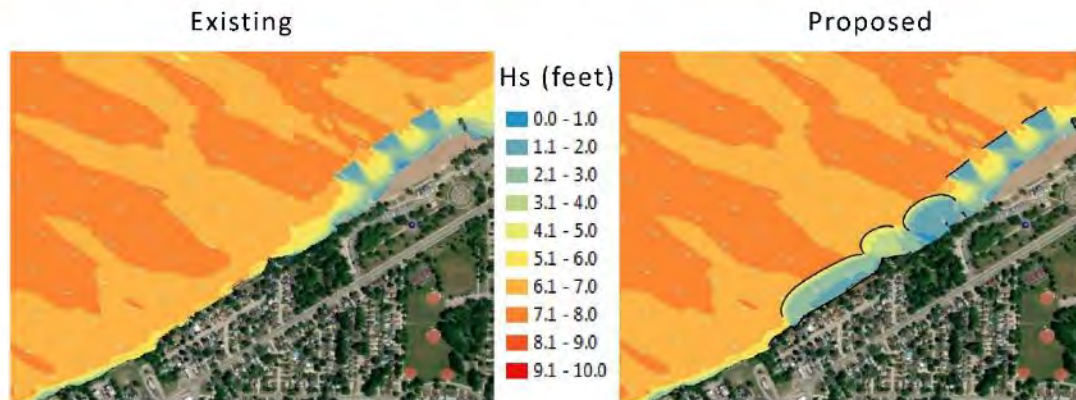
Wave Model Results – Typical Condition (West)
Significant Wave Height (Hs)



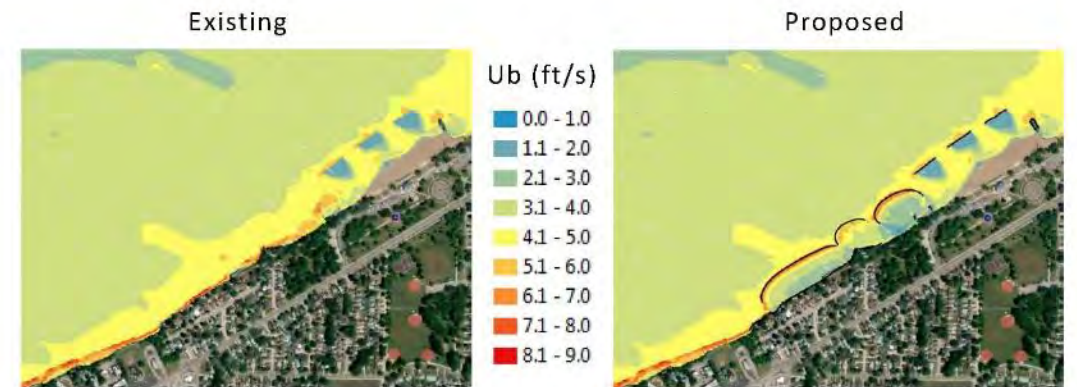
Wave Model Results – Typical Condition (West)
Orbital Velocity near Bottom (Ub)



Wave Model Results – Storm Condition (West)
Significant Wave Height (Hs)

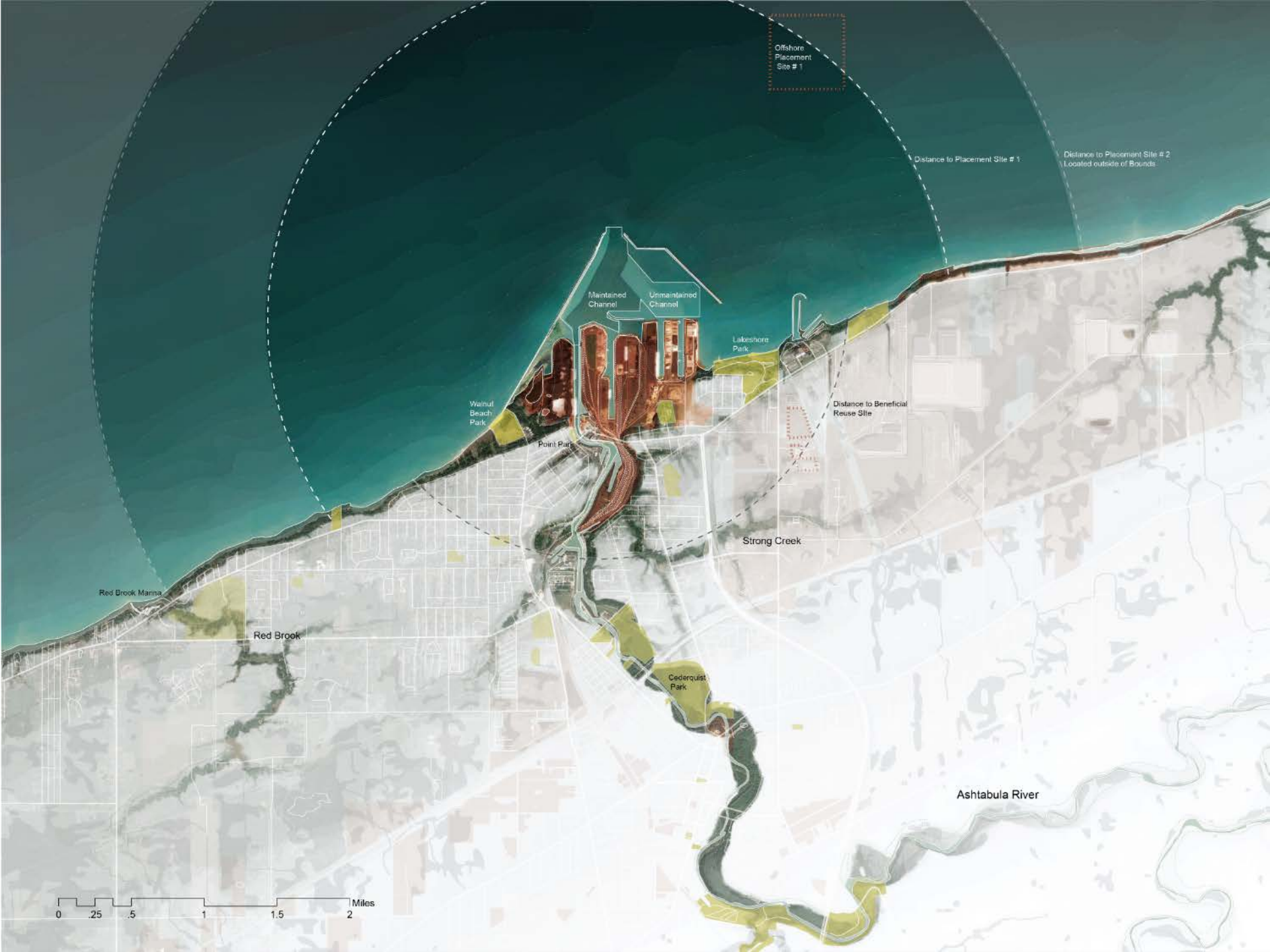


Wave Model Results – Storm Condition (West)
Orbital Velocity near Bottom (Ub)

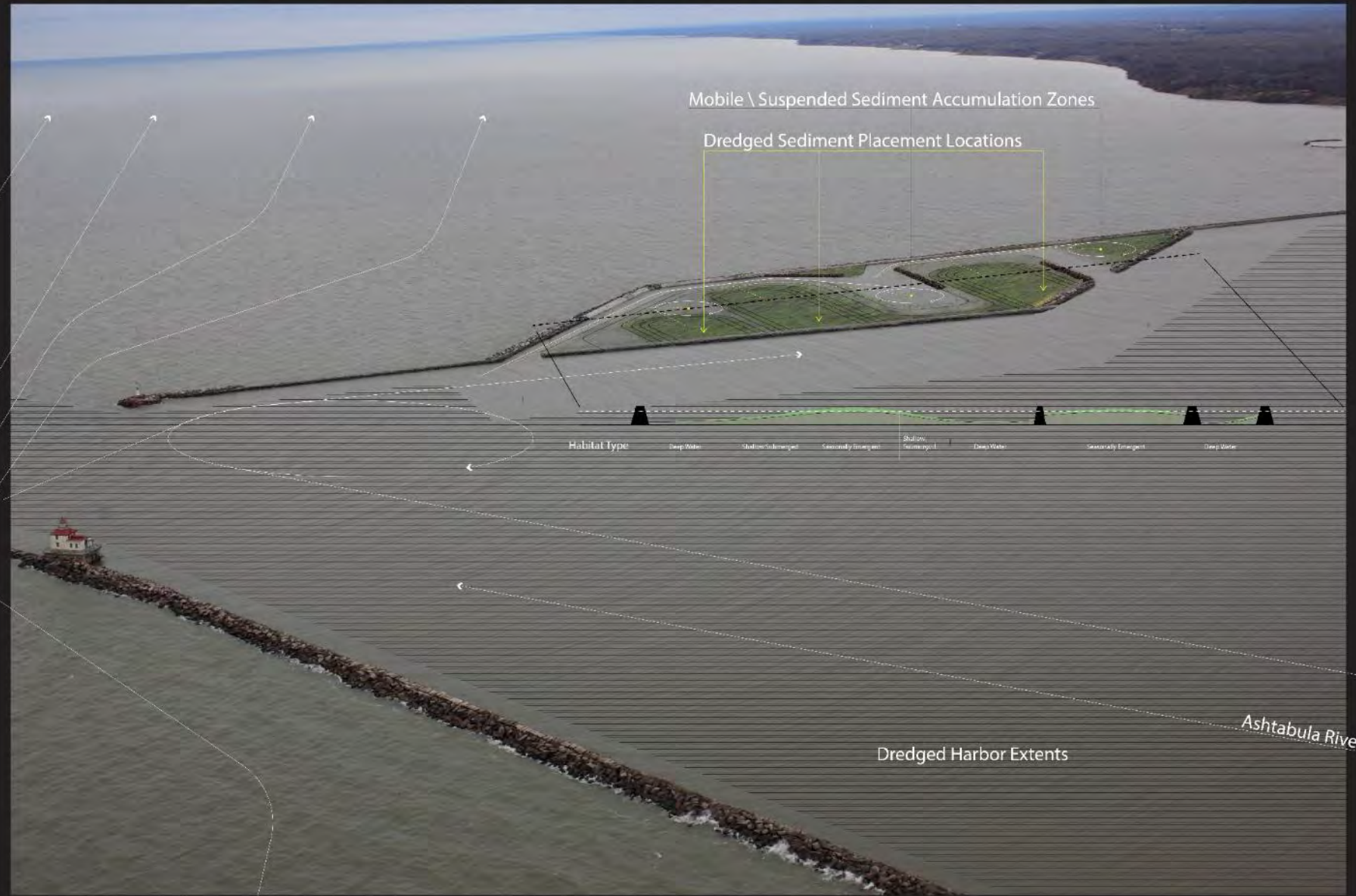


SITE 2 | DESIGNING FOR CHANGE AND UNPREDICTABILITY





HEALTHY PORT FUTURES | ASHTABULA - Dynamic Sediment Management Habitat Wetland Concept | 18 Acres | ≈ 400k cy



Mobile \ Suspended Sediment Accumulation Zones

Dredged Sediment Placement Locations

Habitat Type

Deep Water

Shallow Submerged

Seasonally Emergent

Shallow Emergent

Deep Water

Seasonally Emergent

Deep Water

Dredged Harbor Extents

Ashtabula River Flow

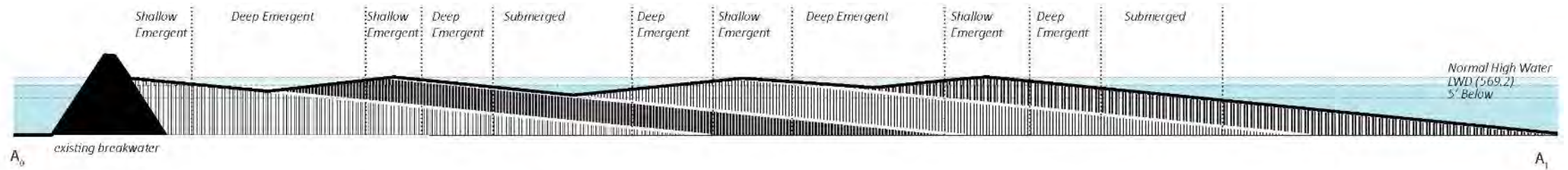
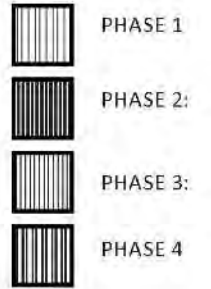
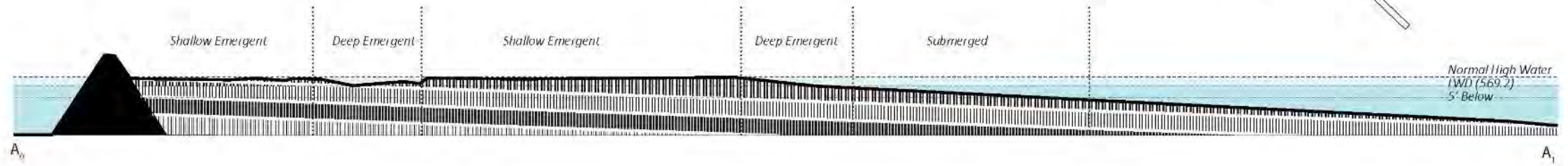
Longshore Drift



ASHTABULA

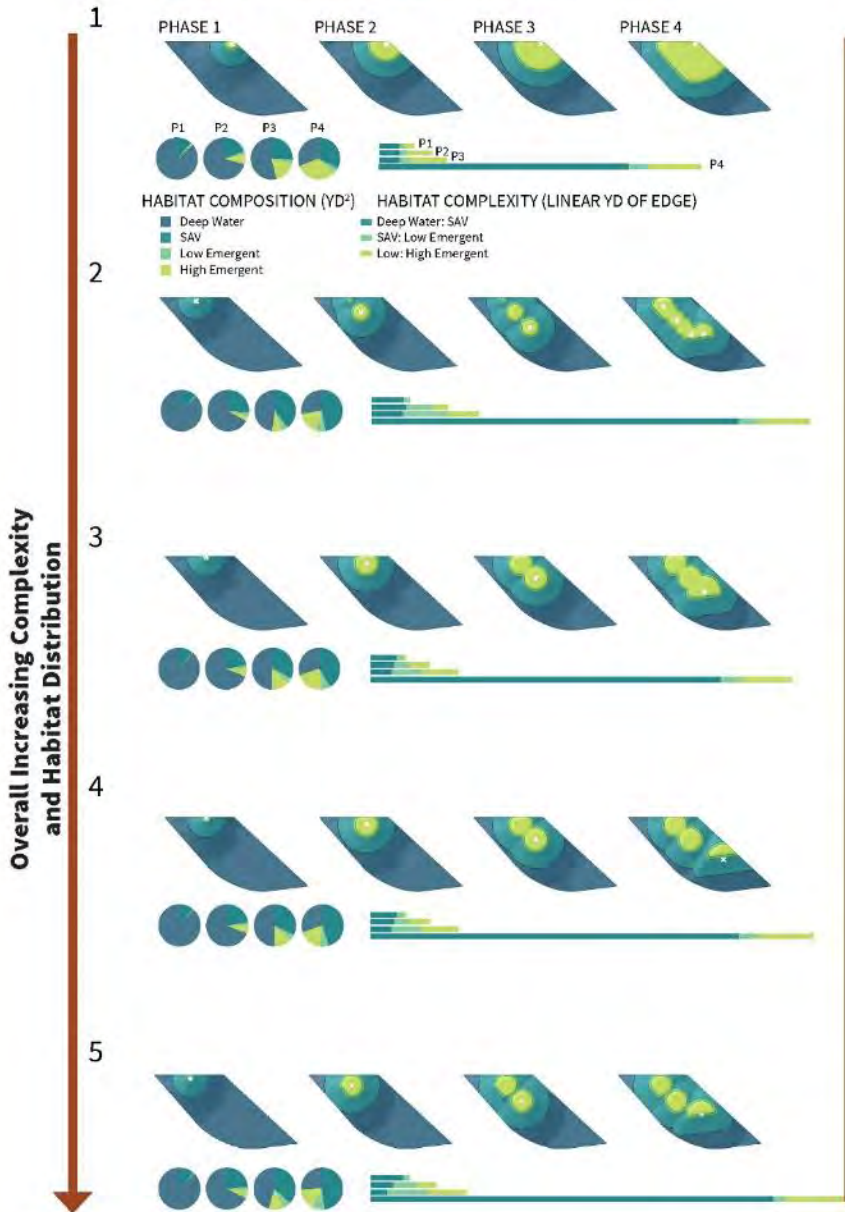
HOW WILL PLACEMENT IMPACT:

- HABITAT COMPLEXITY
- HABITAT ESTABLISHMENT/DISTURBANCE
- DESIGN RESPONSIVENESS

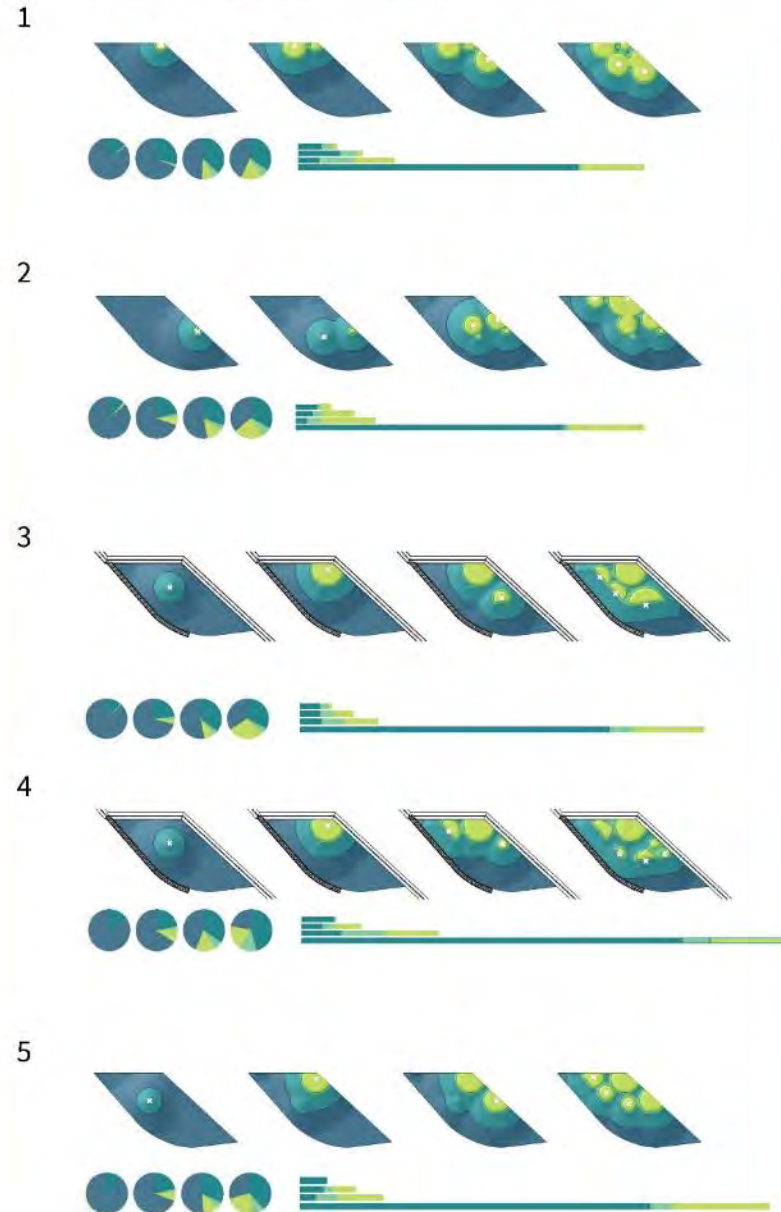


Vertical Scale 3x

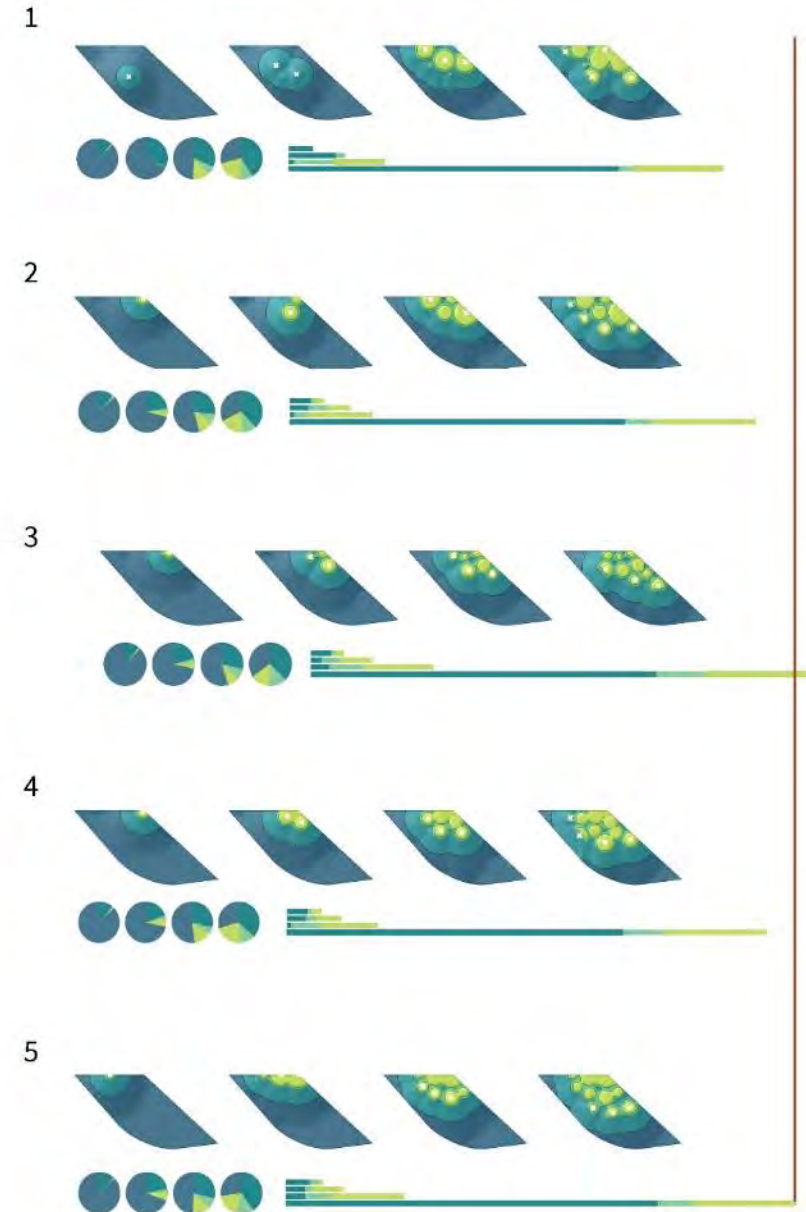
LOW_4 TOTAL PLACEMENT SITES*



MED_5-7 TOTAL PLACEMENT SITES

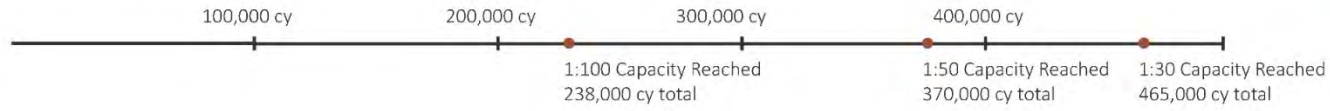


HIGH_8-10 TOTAL PLACEMENT SITES



*DURING EACH PHASE, 100,000 CYD IS PLACED EVENLY AMONGST PLACEMENT SITES

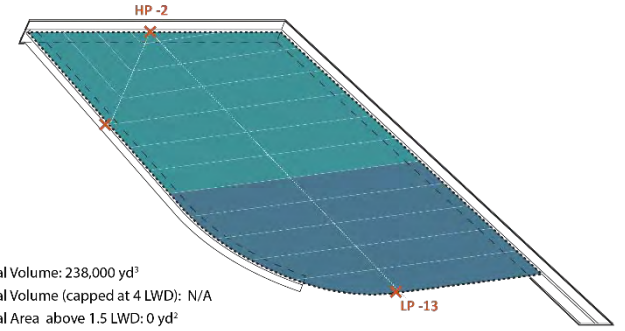
SLOPE DIFFERENCES



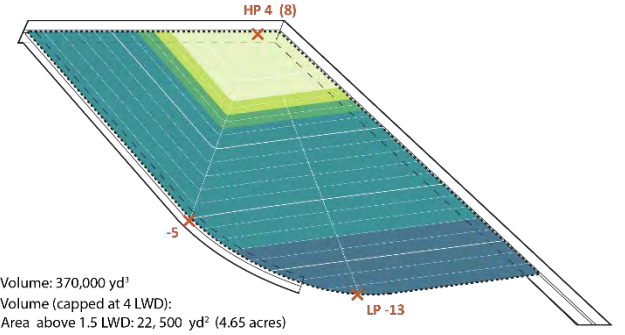
- High emergence (2.5 - 3.5 LWD)
- Low emergence (1.5 - 2.5 LWD)
- Submerged Aquatic (-8.0 - 1.5 LWD)
- Deep Water (<-8LWD)



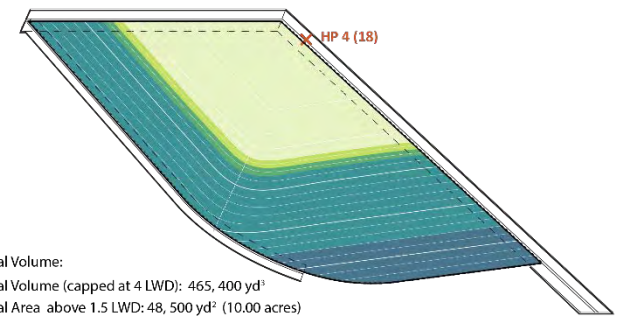
1:100 Slope



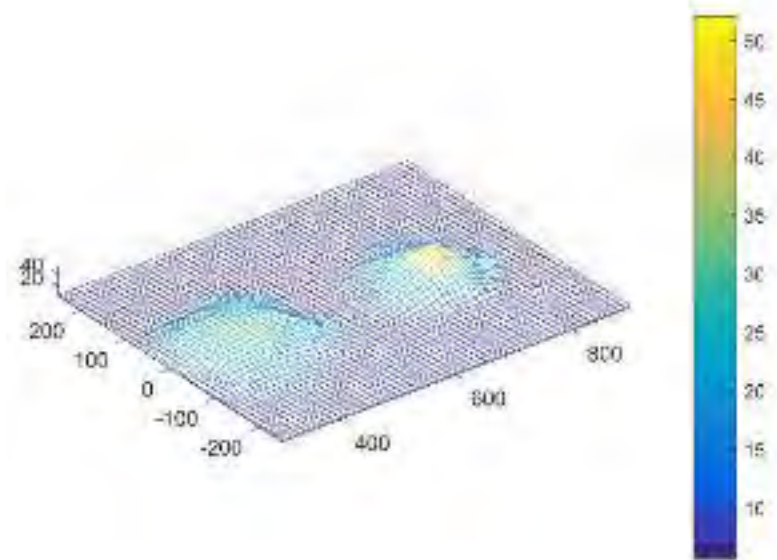
1:50 Slope



1:30 Slope

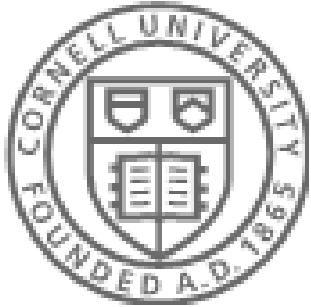






Sean Burkholder - seanburk@design.upenn.edu

Scudder Mackey - scudder.mackey@dnr.state.oh.us



Great Lakes Protection Fund