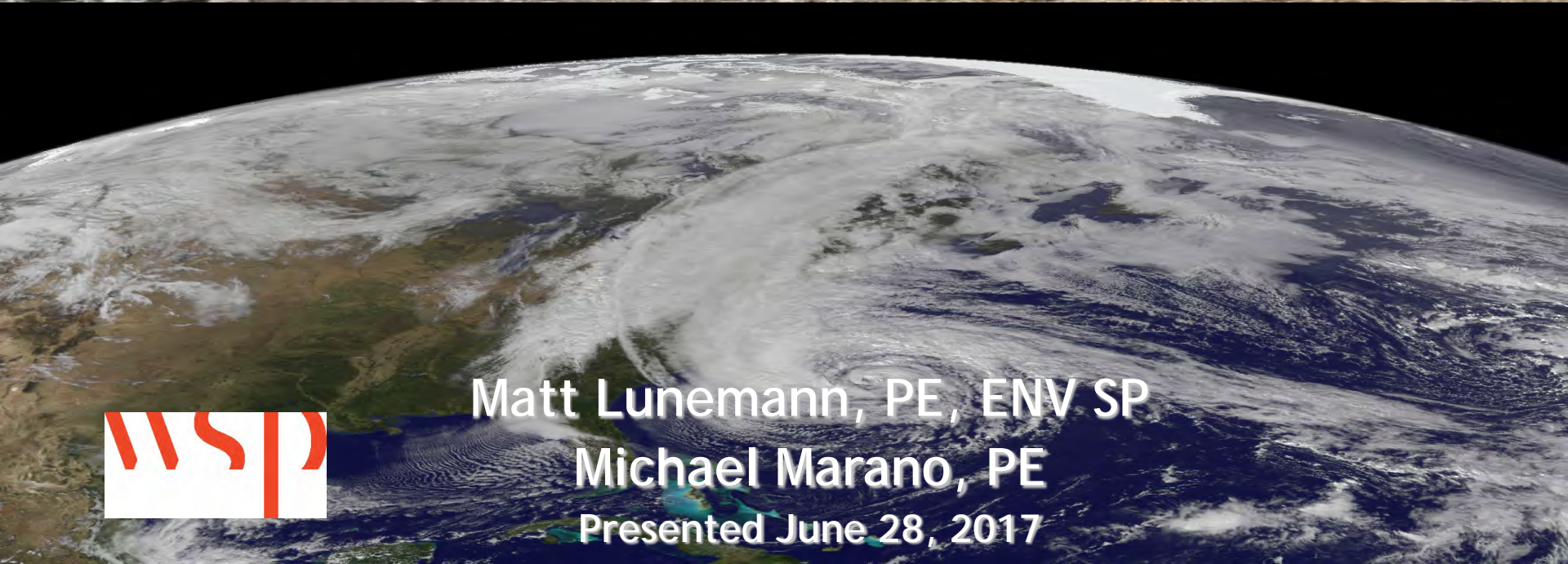


Resilience of Upland CDFs & Beneficial Re-Use of Dredged Material for Coastal Protection



Matt Lunemann, PE, ENV SP

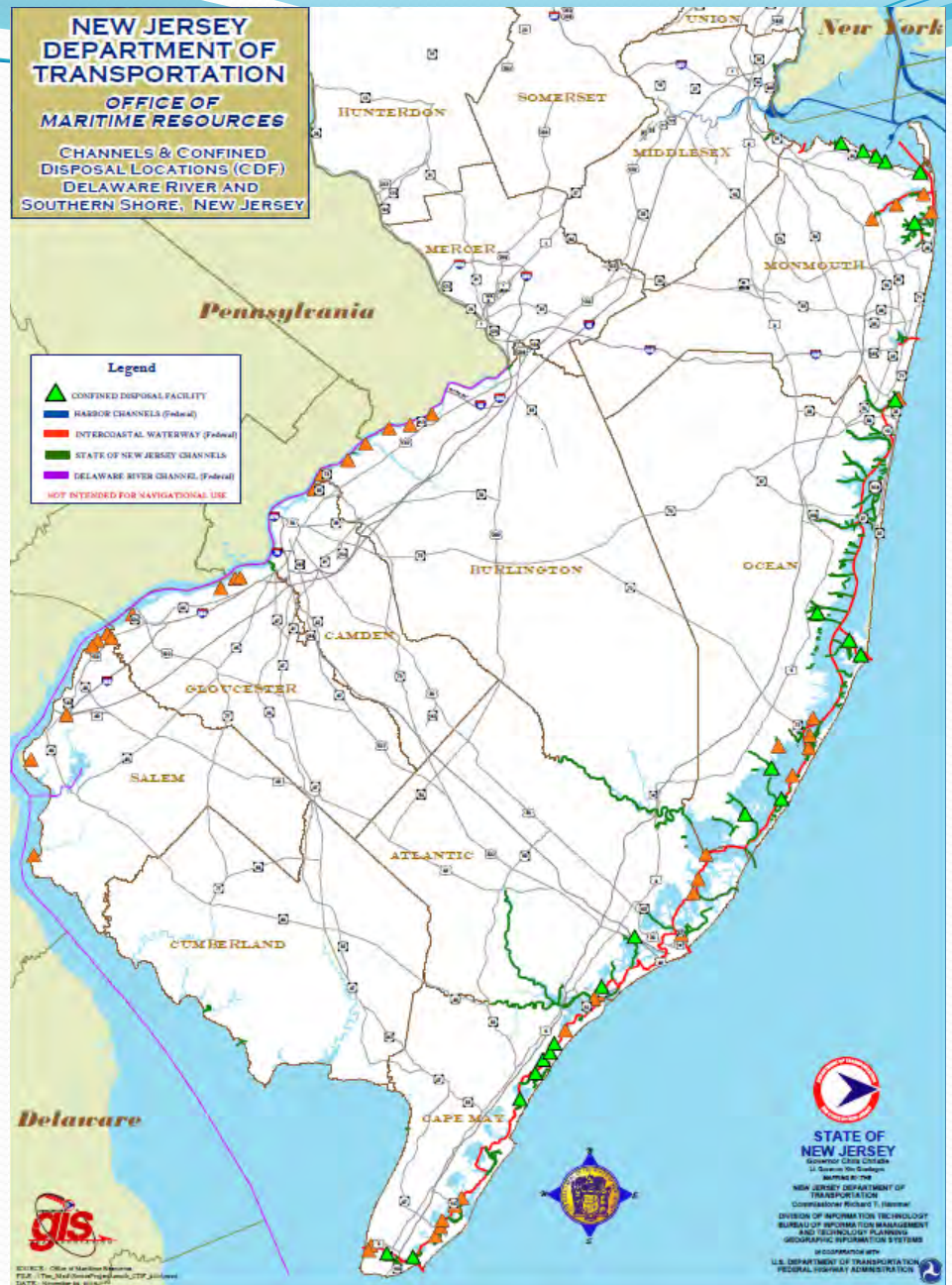
Michael Marano, PE

Presented June 28, 2017

Defining Resilience

- National Academy of Sciences
 - “the ability to **prepare and plan** for, **absorb**, **recover** from, and more successfully **adapt** to adverse events”
- PIANC TG 193
 - The capacity to:
 - **Anticipate and plan** for disruptions
 - **Resist loss** in operations and/or **absorb** the impact of disturbances/stressors
 - Rapidly **recover** afterwards, and
 - **Adapt** to short- and long-term stressors, changing conditions and constraints

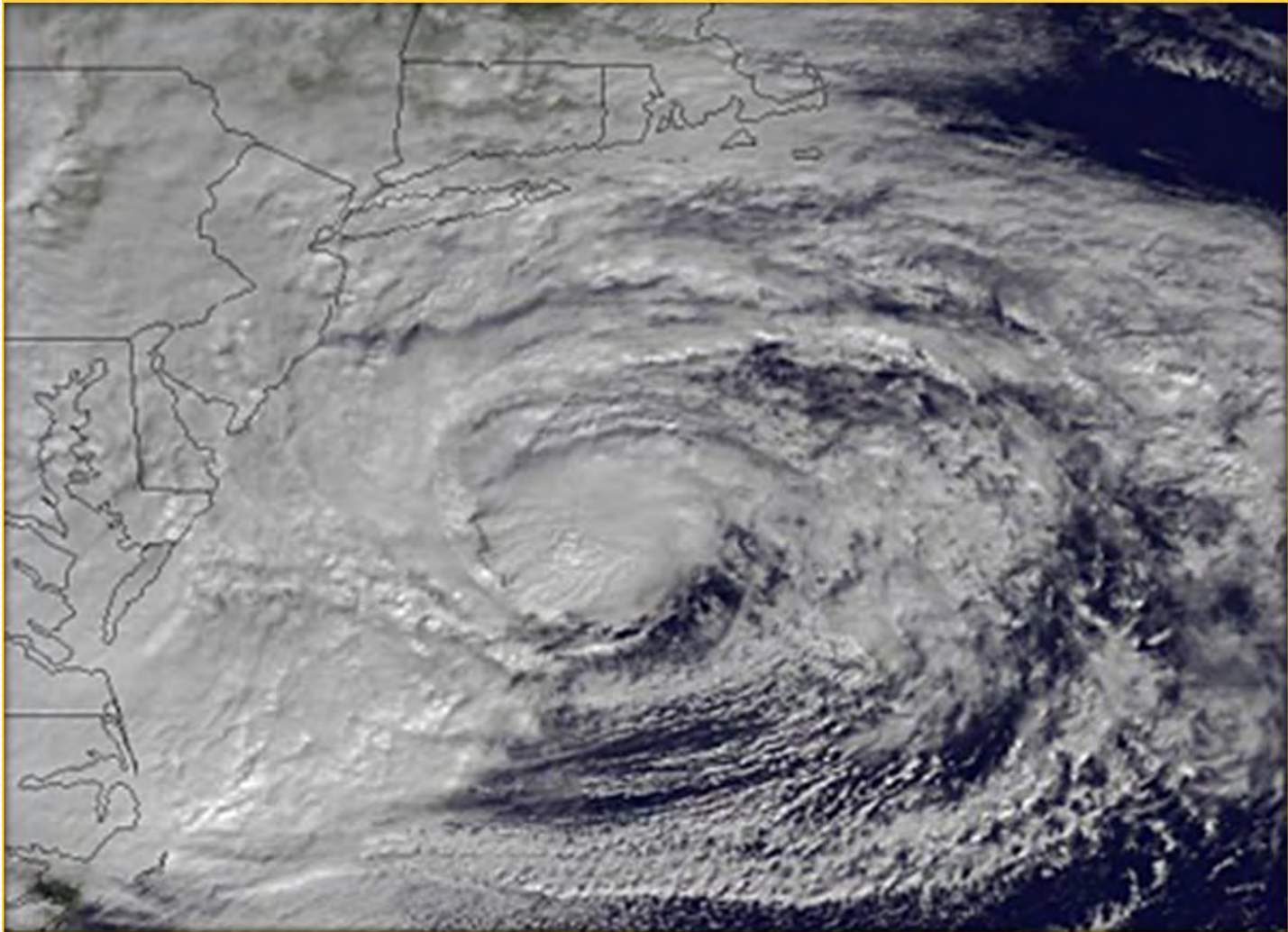
NJ State-Maintained Coastal Channels & CDFs



Confined Disposal Facilities (CDF)



Superstorm Sandy

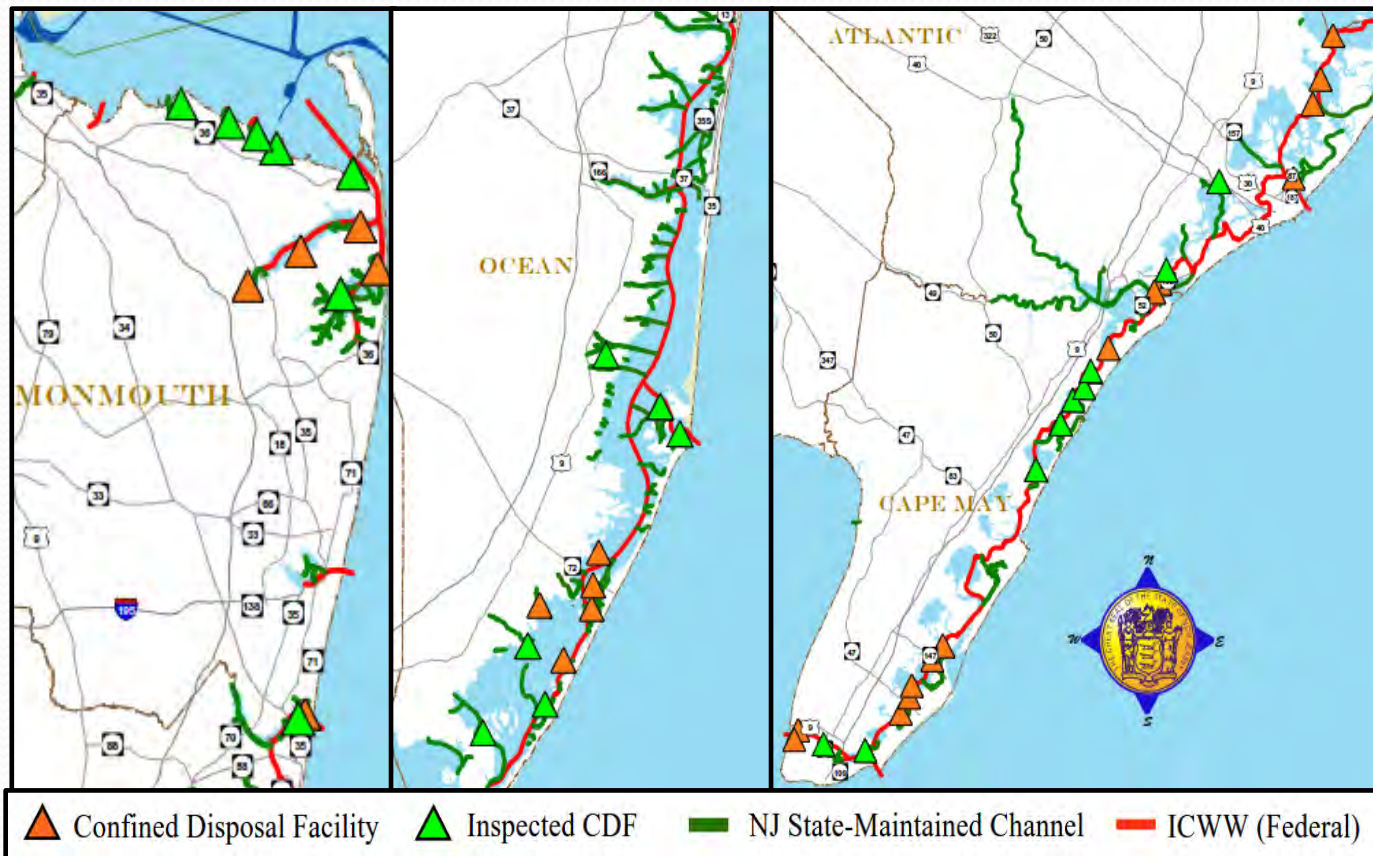


Superstorm Sandy

- Superstorm Sandy – October 29-30, 2012
- Sediment → 2.3M m³
- Where to put dredged material?
 - CDF Damage
 - Need for Repairs prior to Dredging

Assessment Phase

- CDF Screening
- On-Site CDF Inspection (22 CDFs)
 - Conducted between Sandy & W.S. Jonas



Damage Assessments

- 5 Qualitative Levels to Categorize Damage
 - ~~High to Low Severity~~



Story Island

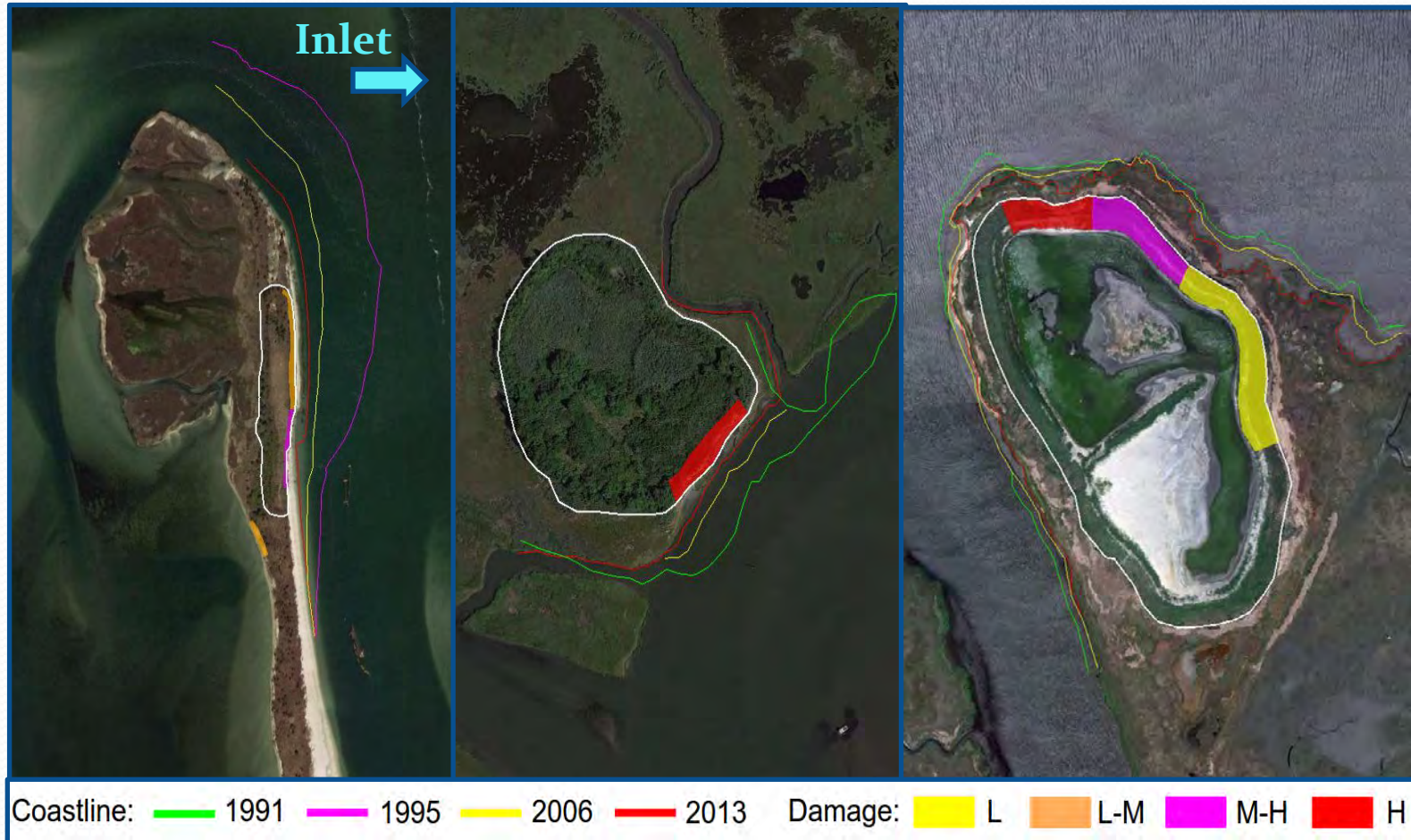


- ~~PostSandy~~ **PostSandy**

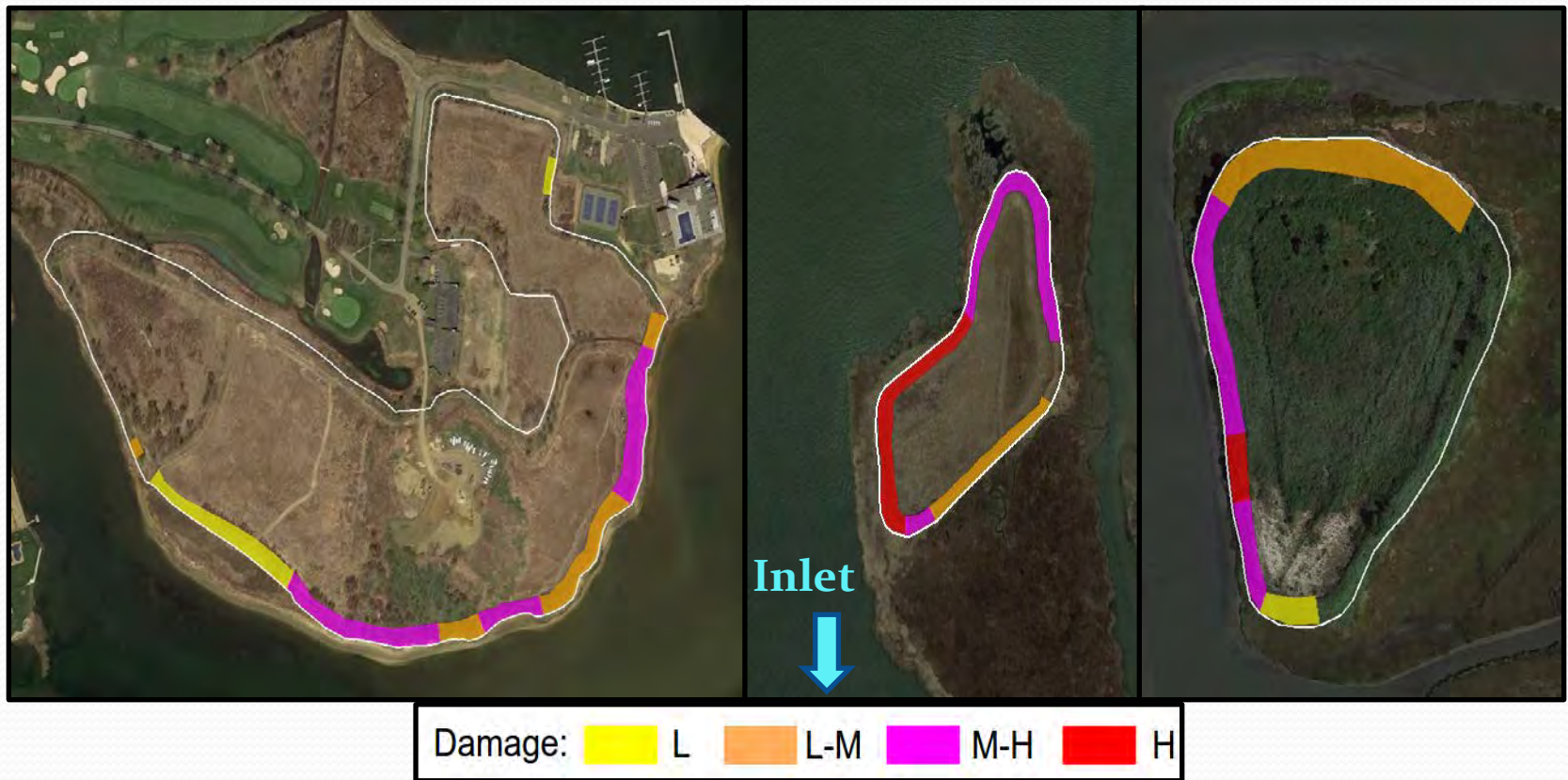
Findings

- Factors Contributing to Damage (or Resilience)
 - Dike Geotechnical Composition
 - Original Construction
 - Proximity to Inlets
- History of Shoreline Erosion
- Marsh or Beach Buffer*

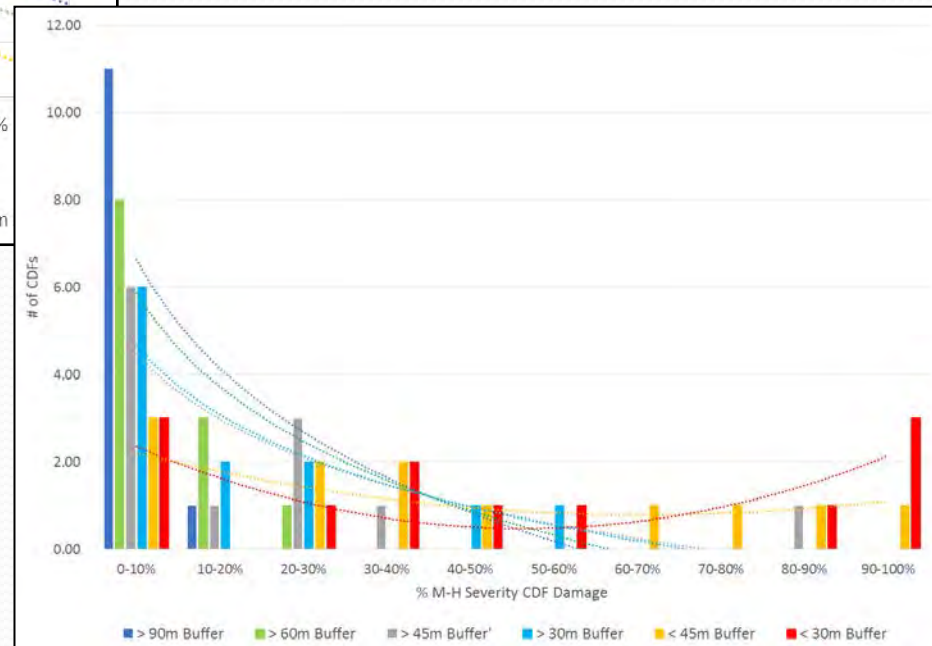
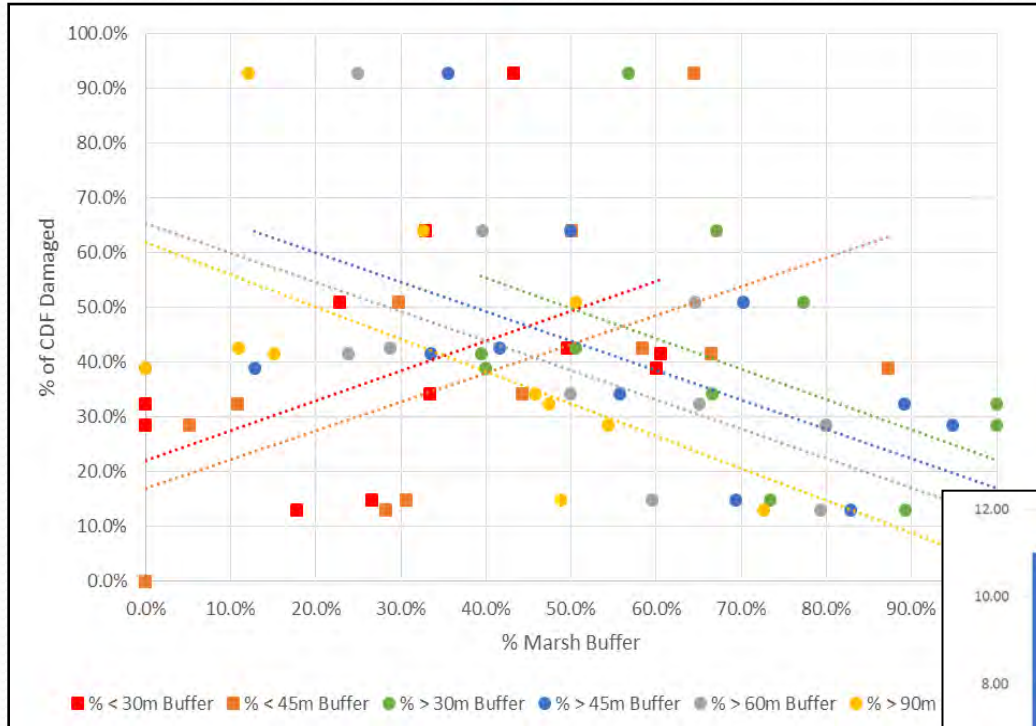
Geomorphology



Marsh or Beach Buffer



Marsh or Beach Buffer



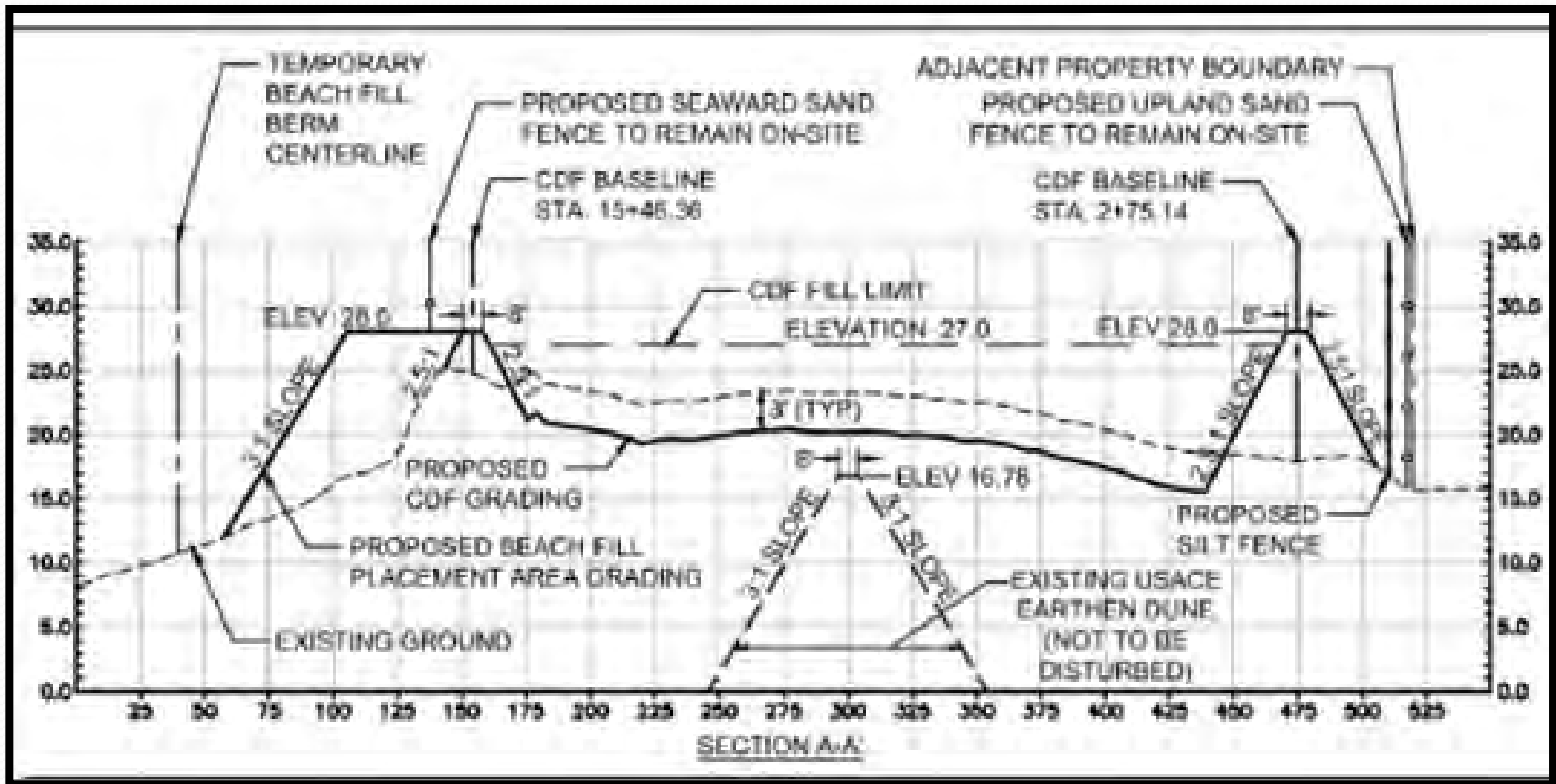
Keansburg CDF

- Borough of Keansburg – Raritan Bayshore region of NJ coast
- Mostly below MHW – Sandy surge 2.8 m higher than MHW
- USACE flood protection levee and tide gate built in 1960's
- Locals were opposed to emptying the existing CDF
 - Them: *Bring us your dredge material!!*
 - Us: *WHAT?? OK!!*
- Waackaack (WAY-cake) Creek and Thorns Creek – 24,100 m³
- Material was split - beach quality sand outside flood gate and fine-grained on the interior
- Raised the dikes with the existing material
- Created a seaward protective dune adjacent to the confining dike
- Placed the fine-grained material into the newly constructed CDF
- Town so pleased with the outcome that they asked the State to consider constructing more CDF's adjacently and parallel to the coastline

Keansburg CDF



Keansburg CDF



Keansburg CDF



Keansburg CDF



Keansburg CDF



Fortescue Thin Layer Placement (TLP)

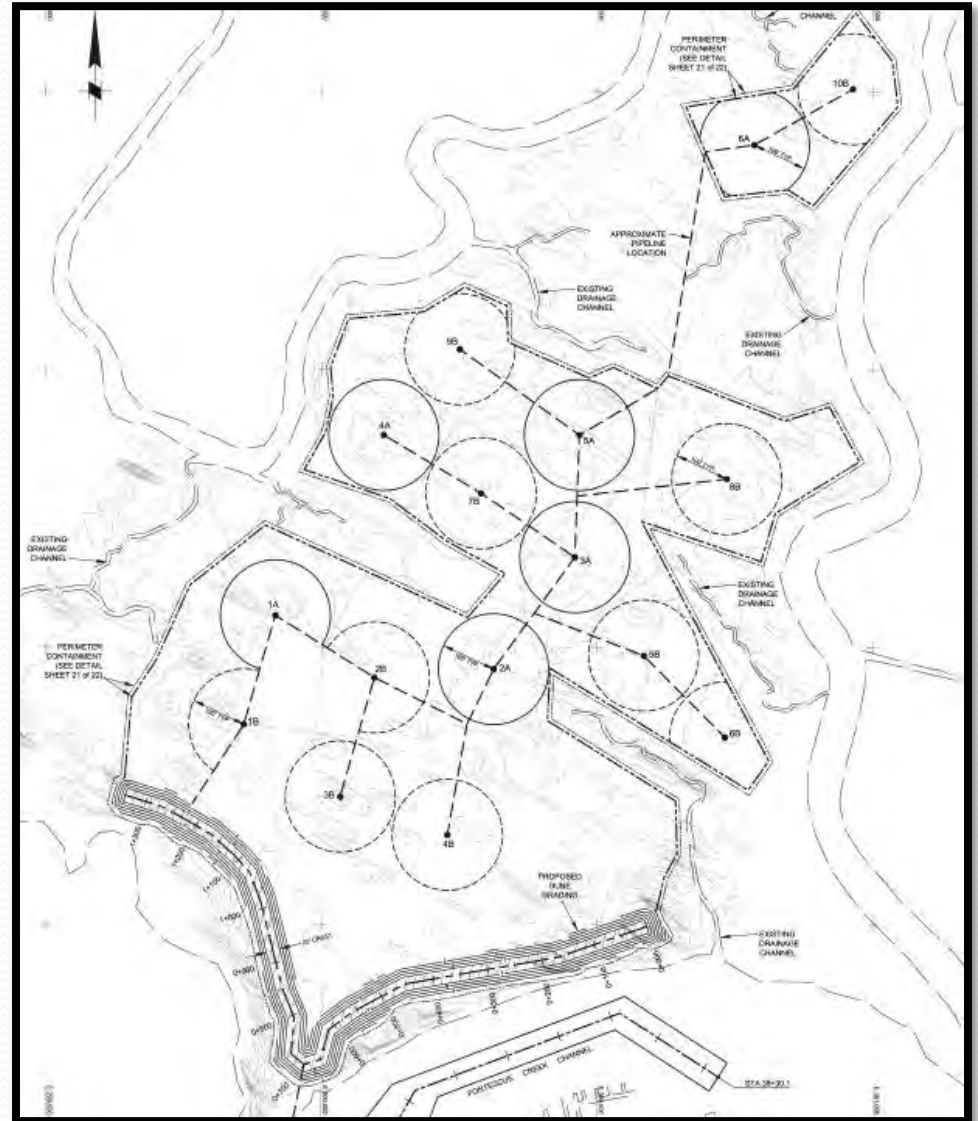
- Fortescue Section of Downe Township – Delaware Bay region of NJ coast
- Small fishing village dependent upon maritime revenue
- NJDOT OMR pilot project building upon previous USACE Philadelphia Demonstration projects in NJ
- Partnership with NJ Department of Environmental Protection and their consultant team
- Placement sites permitted as Habitat Restoration using DM
- Extensive grain-size sampling in channel and placement sites
- Marsh fill - fine-grained, Beach Fill - 75% sand Dune Restoration 90% sand
- Dune and Beach Fills – conventional construction methods
- Marsh Fill – Pipe and valving network designed for placement flexibility and to maximize production rates
- Two construction seasons Winter 2016 & Winter 2017
- Spring/Summer 2017 NJDEP very pleased with the results

Fortescue TLP



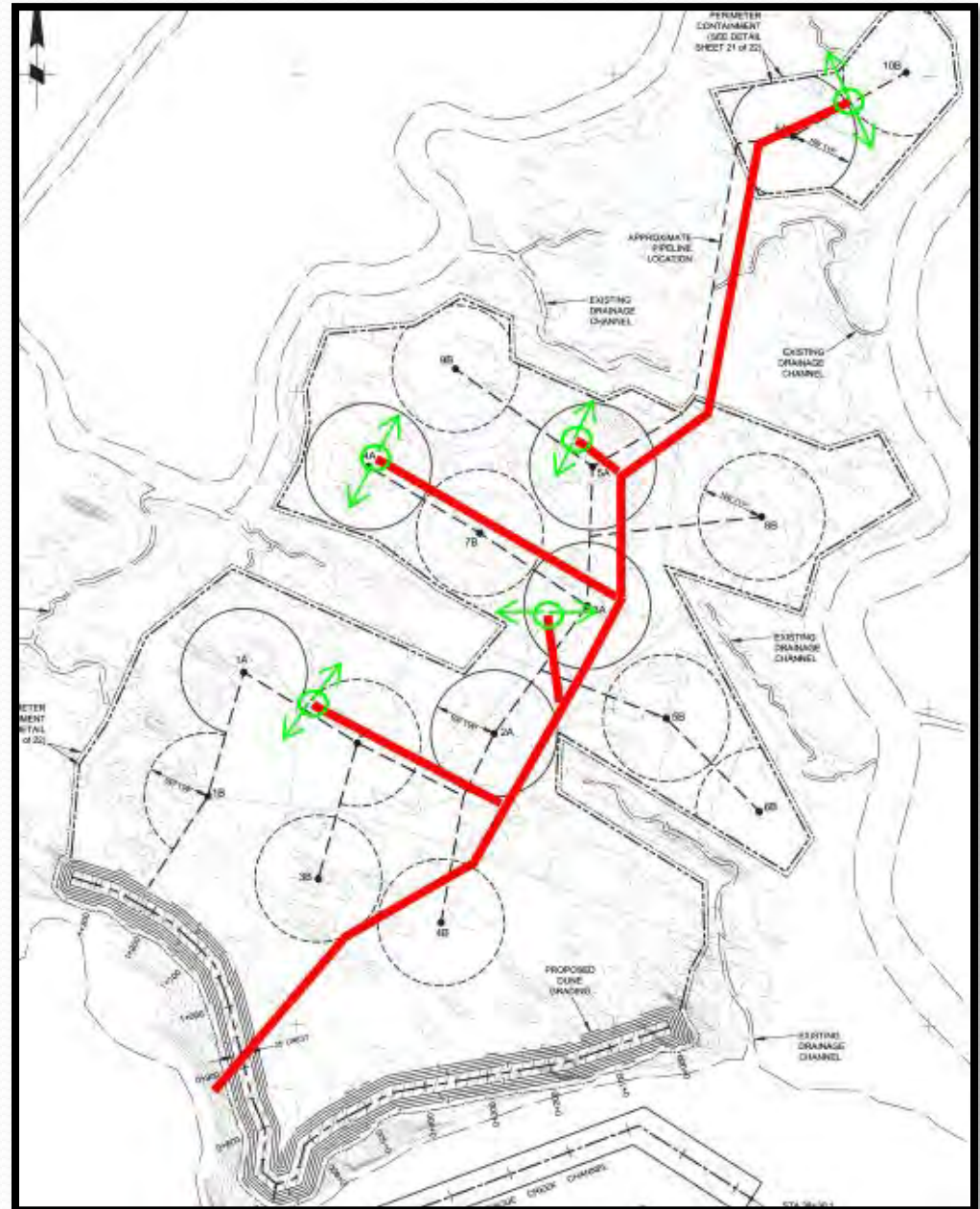
Fortescue TLP

- Proposed Pipe and Valving Network



Fortescue TLP

- As-Built Pipe and Valve Network



Fortescue TLP

Marsh Fill



Fortescue TLP

Dune Construction



Mar 30, 2017, 3:44:01

Fortescue TLP

Horseshoe Crab Beach Fill



Questions?

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