Class Three Landfill Piggyback Expansion Project

CRAIG FORTNER

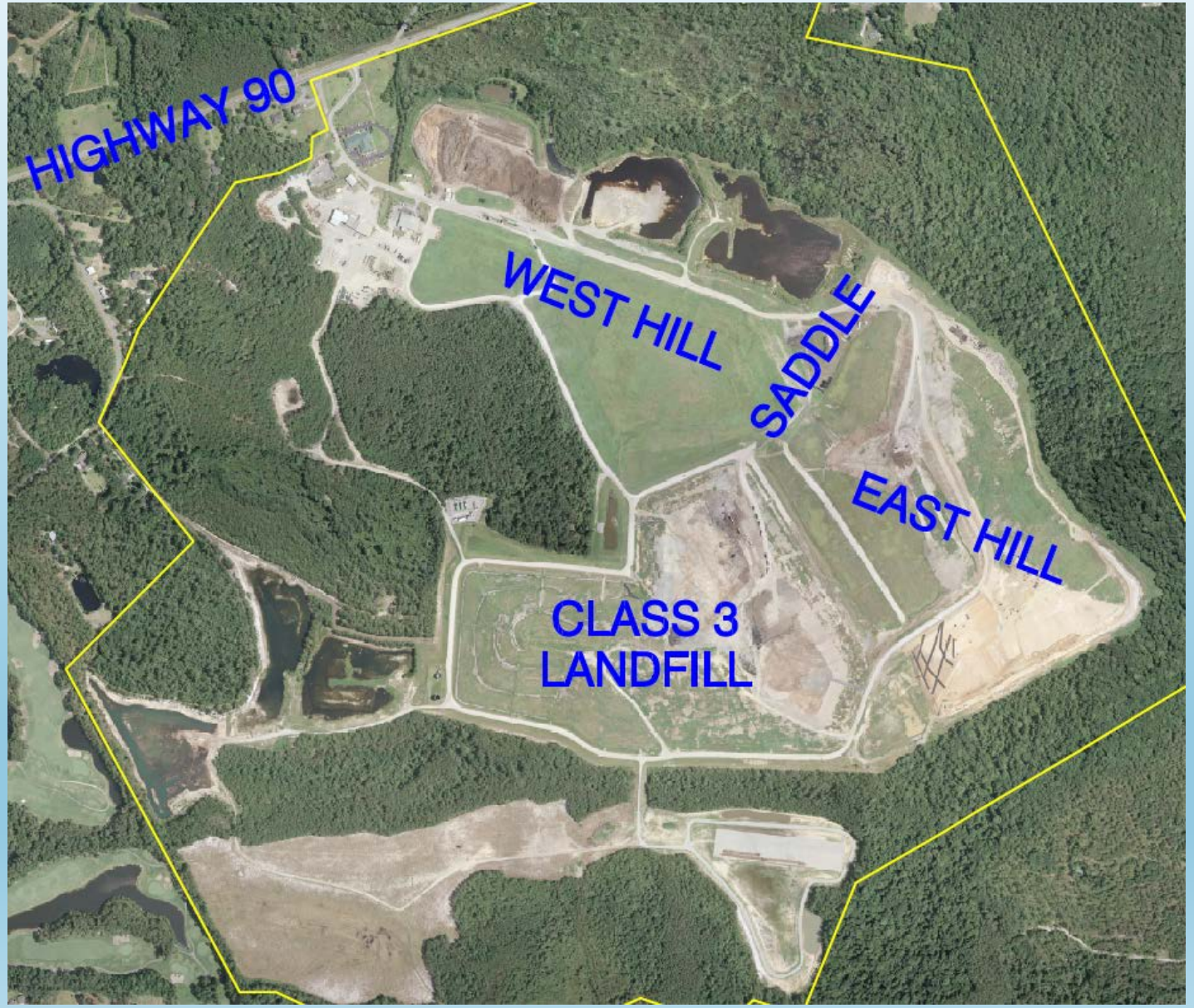
GARRETT & MOORE
Engineering for the Power and Waste Industries

Horry County Solid Waste Authority

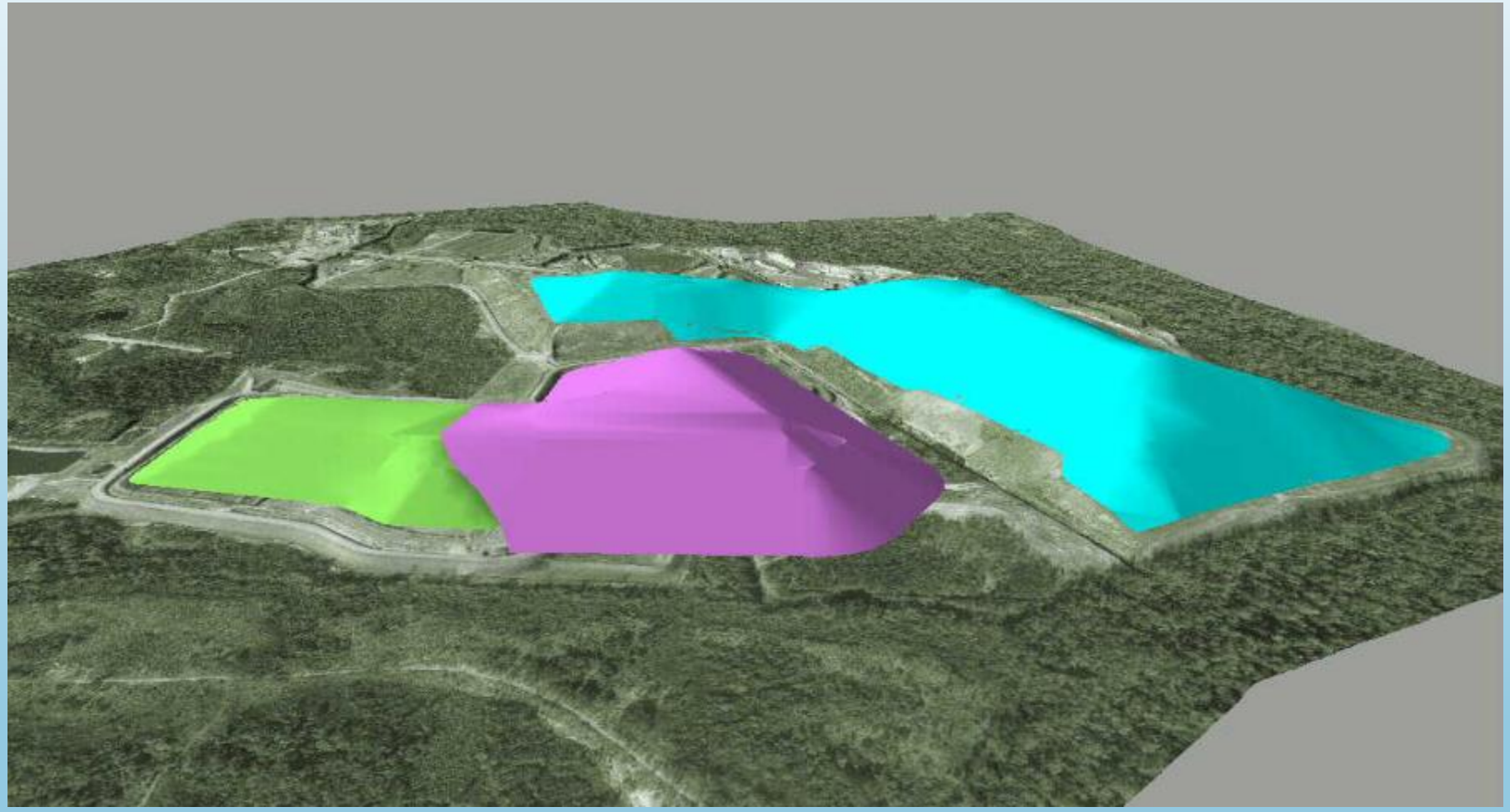
Protecting Tomorrow's Environment Today.

- Class Three Landfill
- Class Two Landfill
- Type II Compost Facility
- C&D Recycling
- Multi-Material Recycling Facility
- 24 Convenience Centers
- 4 Storm Debris Management Sites

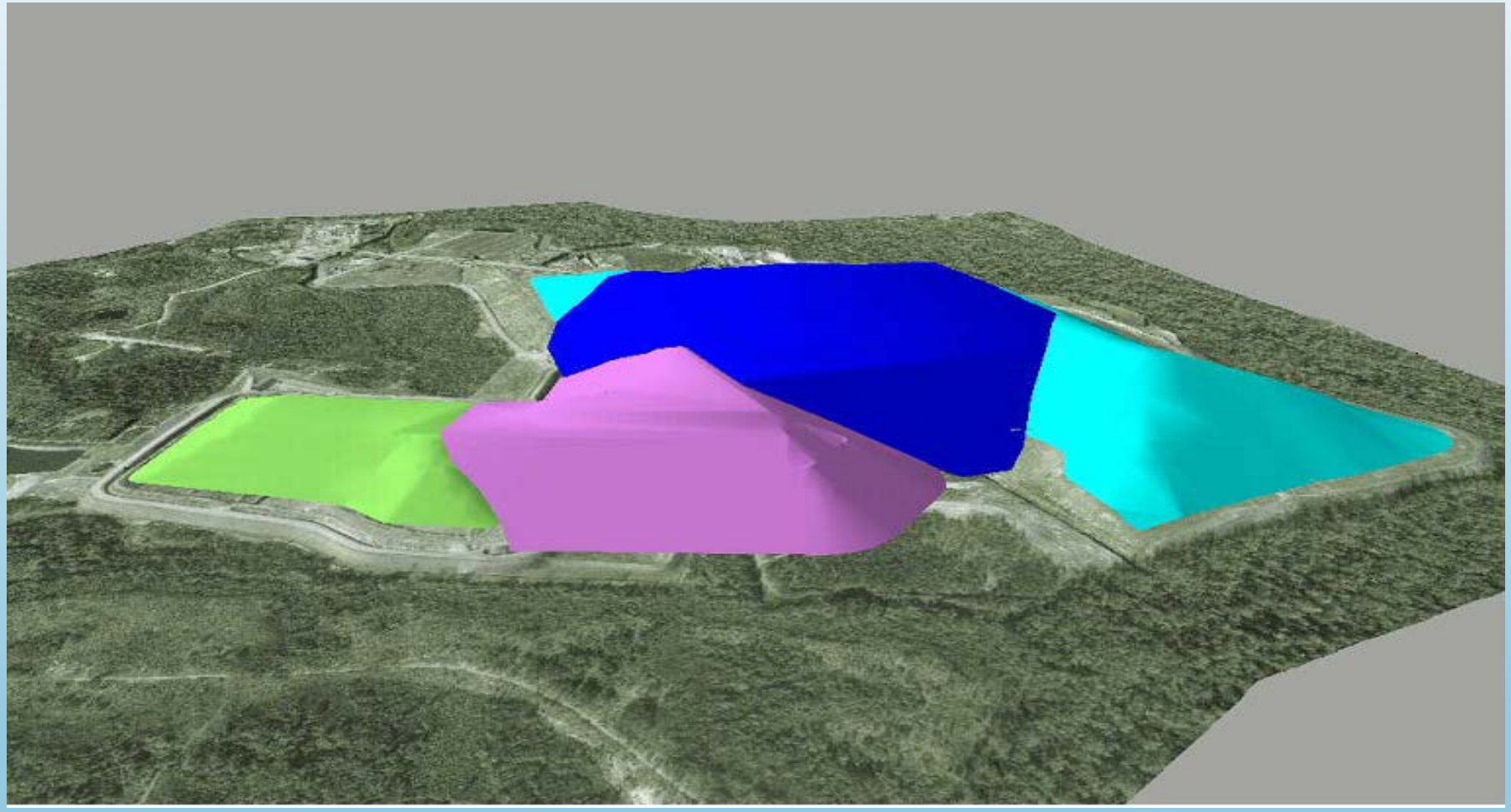
Highway 90 Facility Layout



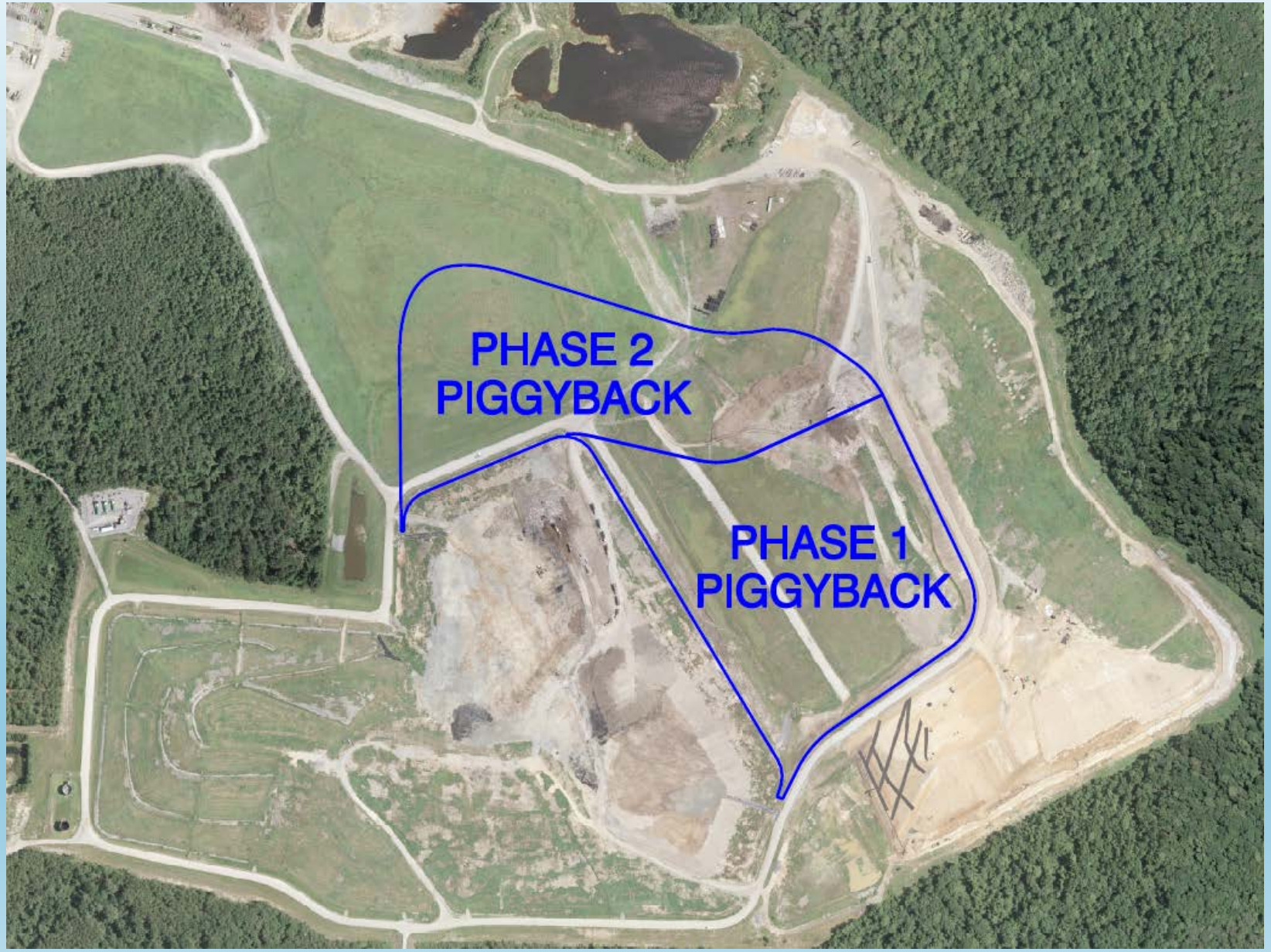
Highway 90 Landfill Development Plan



Highway 90 Landfill Development Plan



Highway 90 Landfill Development Plan



Piggyback History

- 1998 – Phase 1 (27-acre) Subtitle D Landfill Constructed
- 2000 – Piggyback Concept Initially Presented to the HCSWA Board of Directors
- 2001 – Phase 2 (40-acre) Subtitle D Landfill Expansion Designed and Permitted
- 2001 – Unlined MSW Landfills Closure
- 2001 – C&D Vertical Expansion Permitted
- 2003 – Subtitle D Landfill Peat Remediation Project
- 2004 – Phase 2a (20-acre) Subtitle D Landfill Expansion Constructed
- 2005-2006 – Piggyback Site Hydrogeologic Characterization and Geotechnical Feasibility Study
- 2007 – Phase 2b (20-acre) Subtitle D Landfill Expansion Constructed

Piggyback History

- 2008 – Electromagnetic Survey of Unlined MSW Landfills
- 2009 – Final Slope Stability Demonstration
- 2008-2009 – Landfill Determination Process (DON/LOC)
- 2009 – Initial Permit Application Made to DHEC
- 2010 – Application Technically Complete
- October 2010 – Draft Permit
- February 2011 – Final Permit issued
- 2014 – Saddle Area Closure
- July 2015 – Phase 1 Piggyback Construction Begins

Phase 1 Piggyback Scope

- 20,000 CY Subgrade Excavation
- Subgrade Gas Relief / Breakout Collection Layer
- 250,000 CY Structural Fill
- 26 acres Composite Liner and Leachate Collection Systems
- Open Cell Stormwater Diversion System
- Wind Uplift Ballast

Contract Bidding and Award

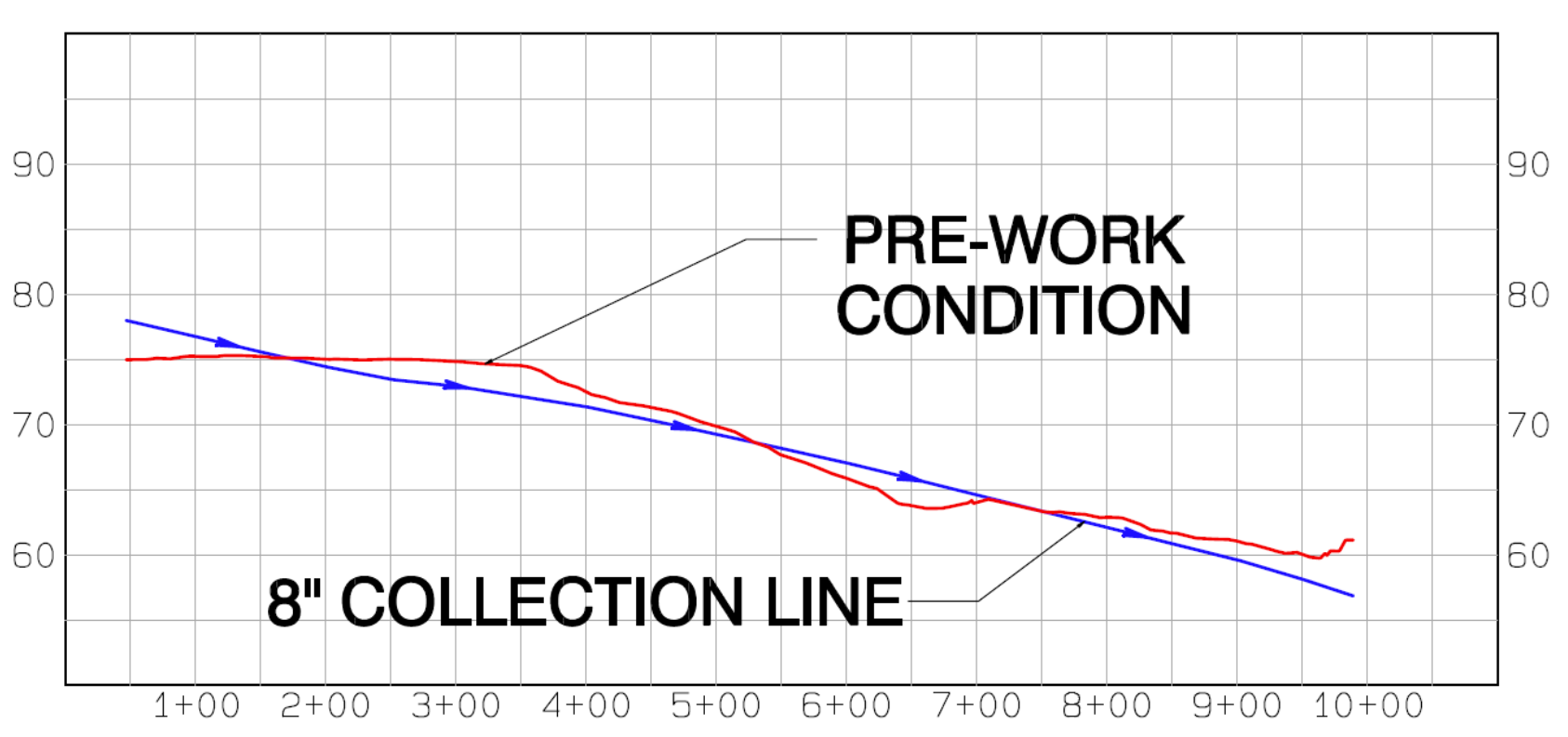
- Unit price bid – Owner pays for the actual amount of work completed
- Competitive bids received from four general contractors
- Low Bid: $9,245,181
- High Bid: $9,838,079
- Contract awarded to Southeast Environmental Contracting, Inc. of Hahira, Georgia

Subgrade Excavation

Subgrade Excavation

- Excavation known to contain buried waste
- Why move it in the first place?

Subgrade Excavation

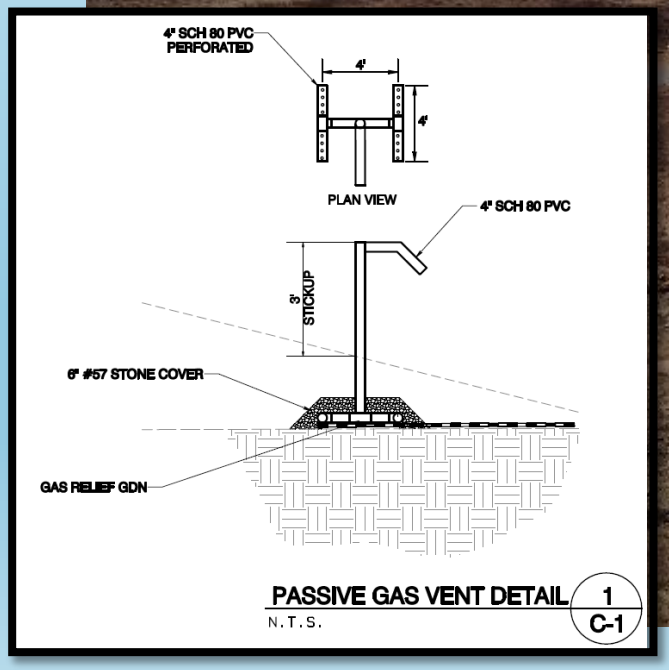


Subgrade Gas Relief System

- Nature of waste buried in the East Hill required consideration of a passive gas relief layer.
- Intermittent breakouts on the East Hill
- Recent closure of the northern and eastern faces of the East Hill indicate that a system of Geocomposite Drainage Net (GDN) and passive vents would be effective.

Subgrade Gas Relief System

Subgrade Gas Relief System



Structural Fill

- Previous construction on the East Hill indicated that settlement up to 30-inches could be experienced.
  - How is structural fill quantified for budgeting purposes prior to bidding?
  - How is structural fill quantified for payment by Contractor?

Structural Fill

- Quantity Estimate
  - Site experience included settlement data from previous construction projects.
  - Extrapolation of settlement data to estimate pre-work conditions for volume takeoff for budget quantity.

Structural Fill

- Quantity Verification
  - Contract measures Structural Fill in-place for payment
  - Contractor required to submit work plan to monitor settlement
    - Settlement plates
    - Gas Relief GDN

Structural Fill

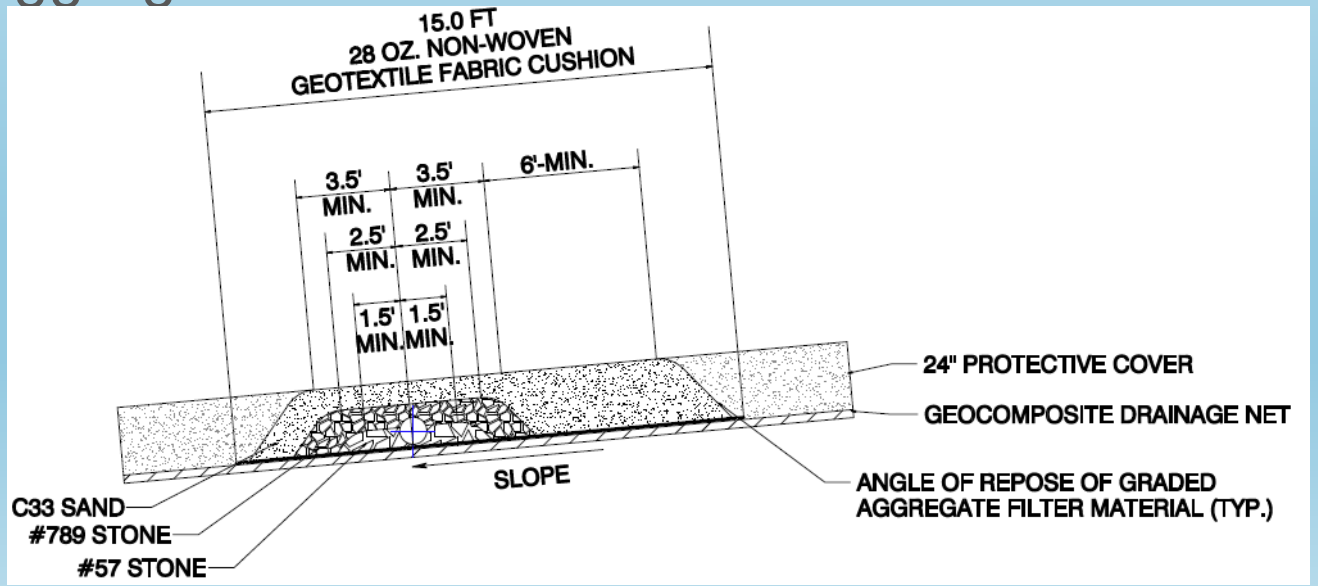
- Volume calculation performed by Contractor's surveyor and verified by the Engineer
  - Surface-to-surface comparison → Settled Pre-Work DTM vs. Constructed Subgrade DTM
  - More settlement points = better settled Pre-Work surfac

Composite Liner System

- 24” Min. Compacted Soil verified prior to deployment of Geosynthetic Clay Liner
- Geosynthetics supplied by Agru America, Inc. of Georgetown, South Carolina
  - GCL – Agru Geoclay WN36
  - FML – Agru Microspike 60-mil textured HDPE liner
  - GDN – Agru 6-200-6 Double-Side Geocomposite

Leachate Collection System

- Double Sided GDN
- 24” Protective Cover
- 8” Perforated HDPE collection lines with graded aggregate filter
- 10” Perforated HDPE header line with graded aggregate filter



Leachate Collection System

- Two leachate collection sumps w/ pumps

Stormwater Diversion System

- Stormwater diversion considered:
  1) Reduce leachate treatment costs during open-cell condition
  2) Protect installed materials from erosion

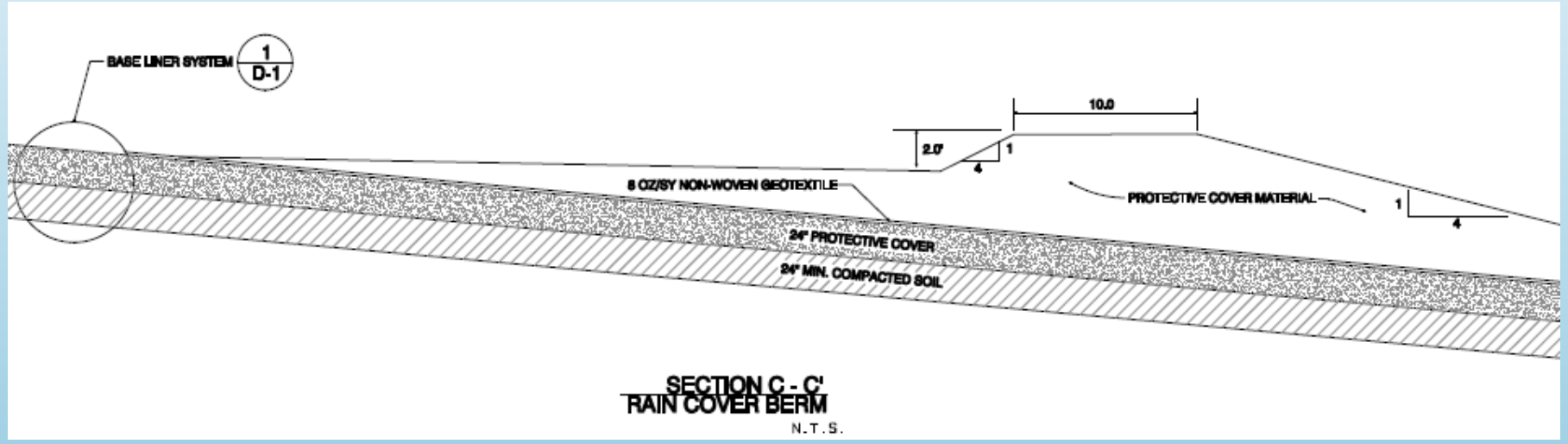
- System consists of:
  1) Operational diversion berms
  2) 12-mil scrim-reinforced LLDPE liner

Stormwater Diversion System

Stormwater Diversion System

- System consists of:
  1) Operational diversion berms

Stormwater Diversion System



Stormwater Diversion System

- System consists of:
  2) 12-mil scrim-reinforced LLDPE rain cover

Wind Uplift Ballast

- Typical temporary rain cover ballast consists of sandbags or tires placed at regular intervals.
- Based upon design wind speed, spacing of ballast is less than

Photo credit: Hallaton Environmental Linings

Wind Uplift Ballast

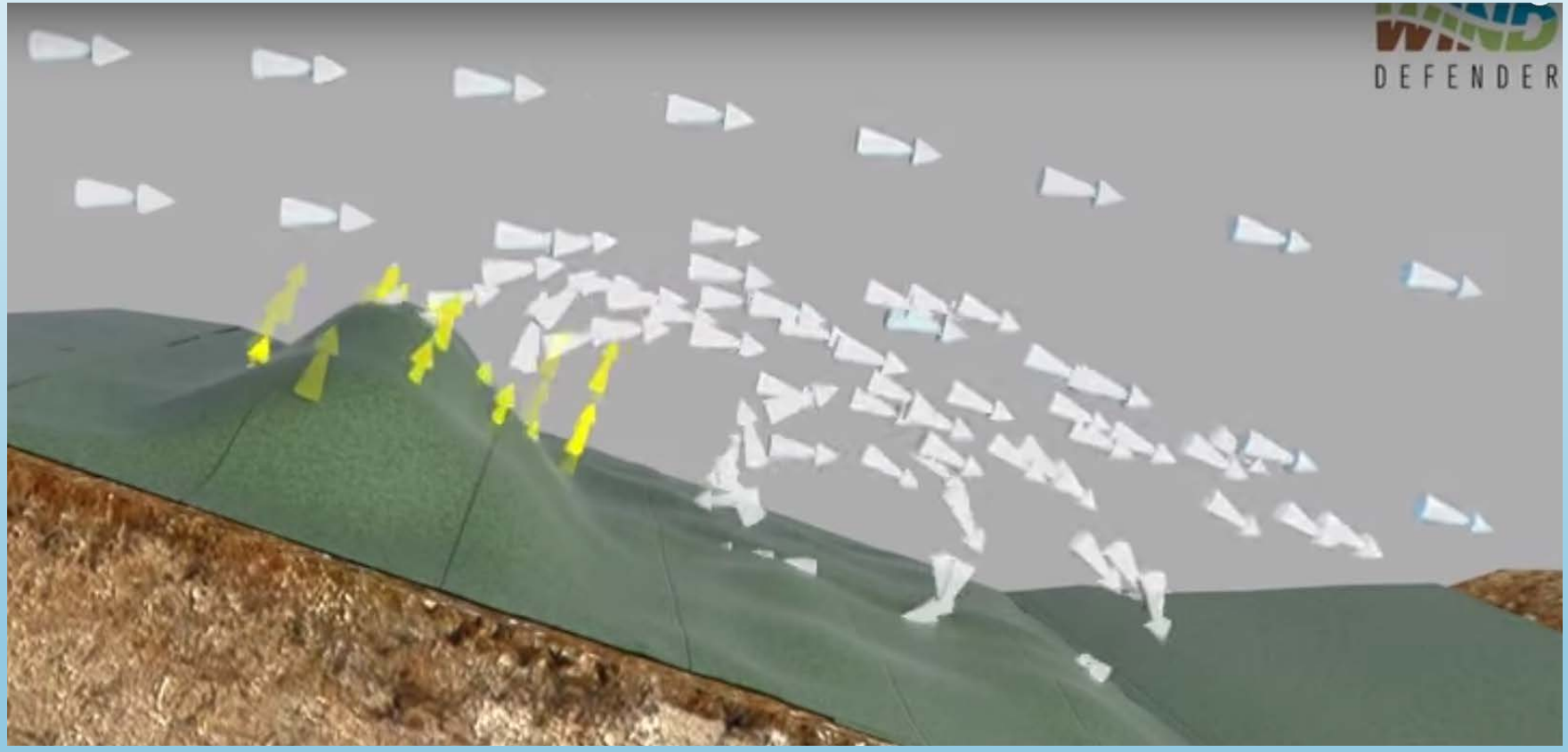
- Seagulls do not provide adequate ballast

Wind Uplift Ballast

- Selected ballast system is a combination of:
  - Wind Defender HD reinforced geotextile windscreen
  - Platipus Ground Anchors
- Benefits of the selected system include:
  - Protect rain cover from wind damage
  - Protect rain cover from UV degradation
  - Minimal number of anchor points
    - Ease of installation by contractor and landfill operator

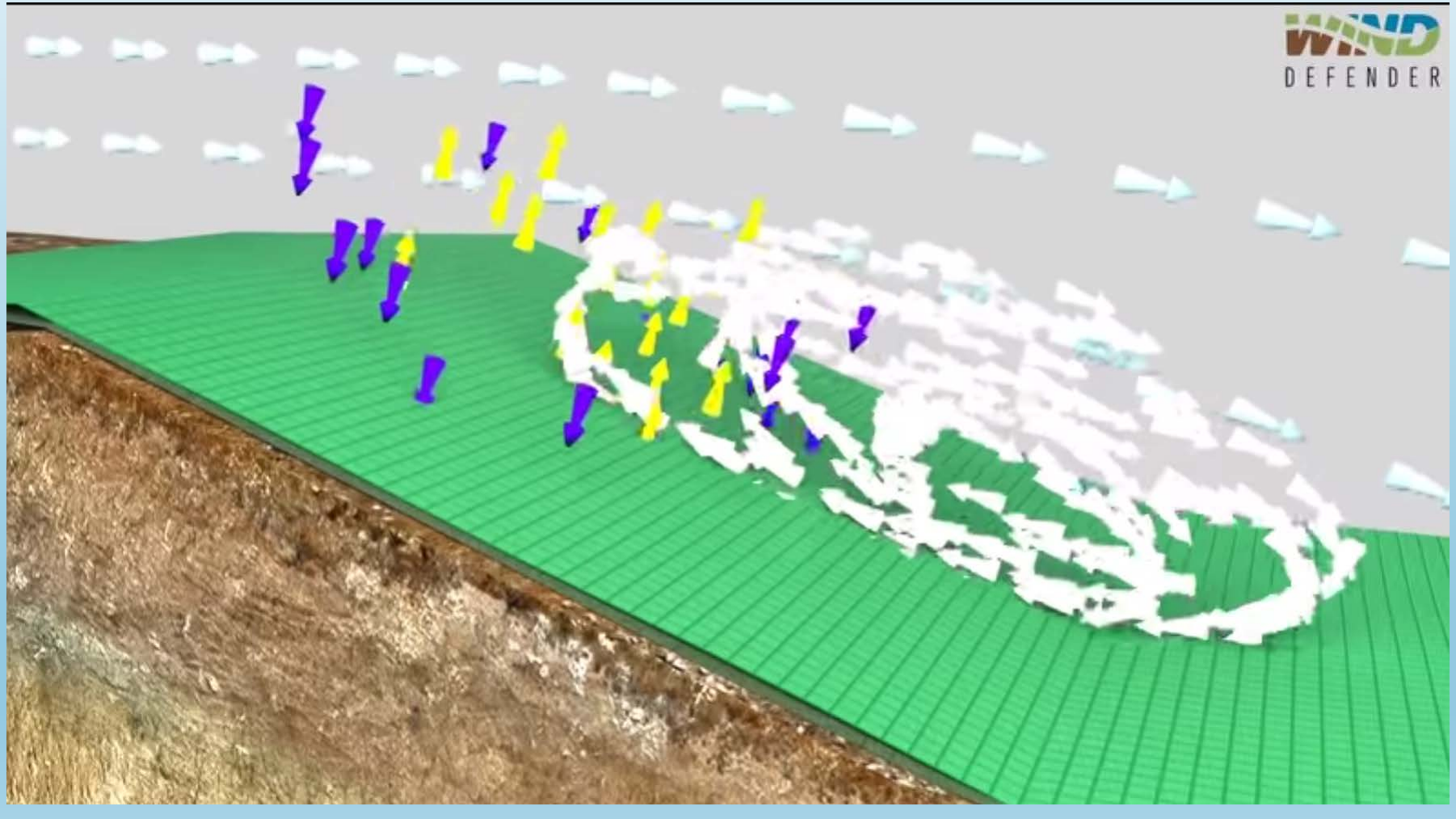
Wind Uplift Ballast

- Wind Defender HD



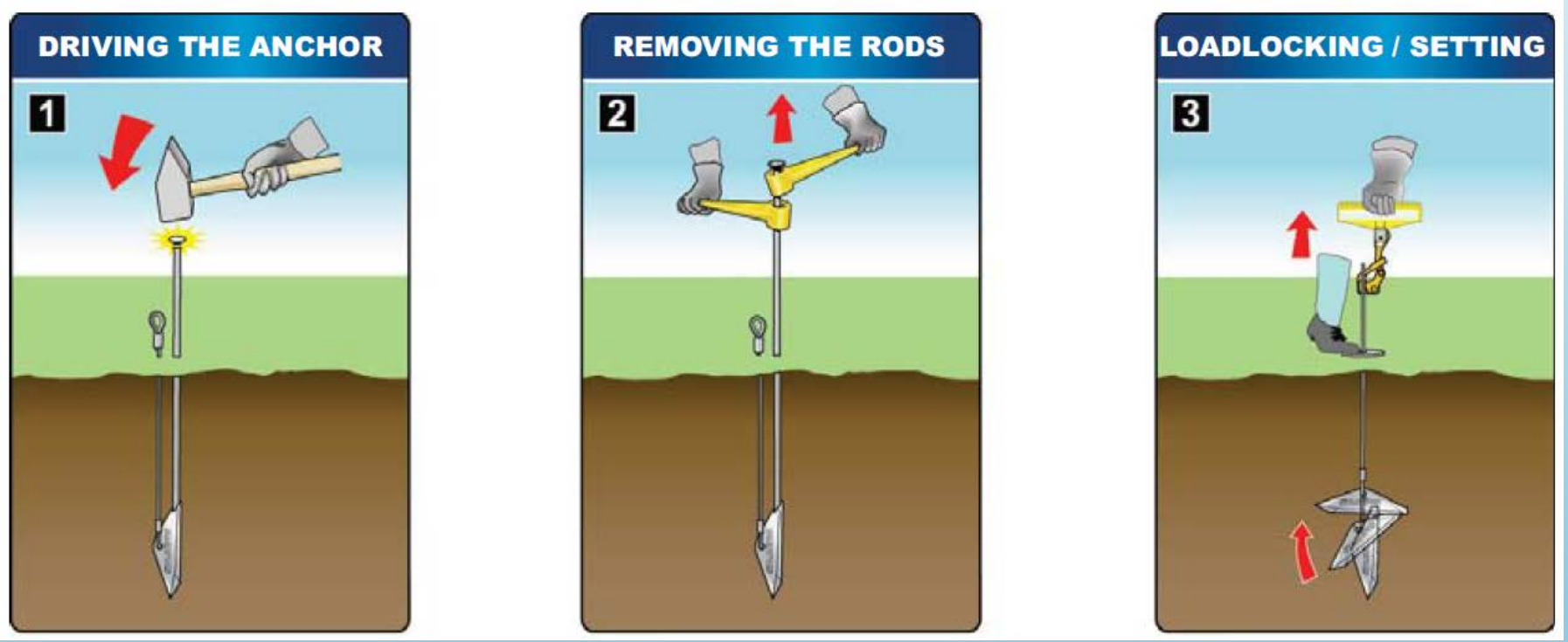
Wind Uplift Ballast

- Wind Defender HD



Wind Uplift Ballast

- Platipus Zip Anchors

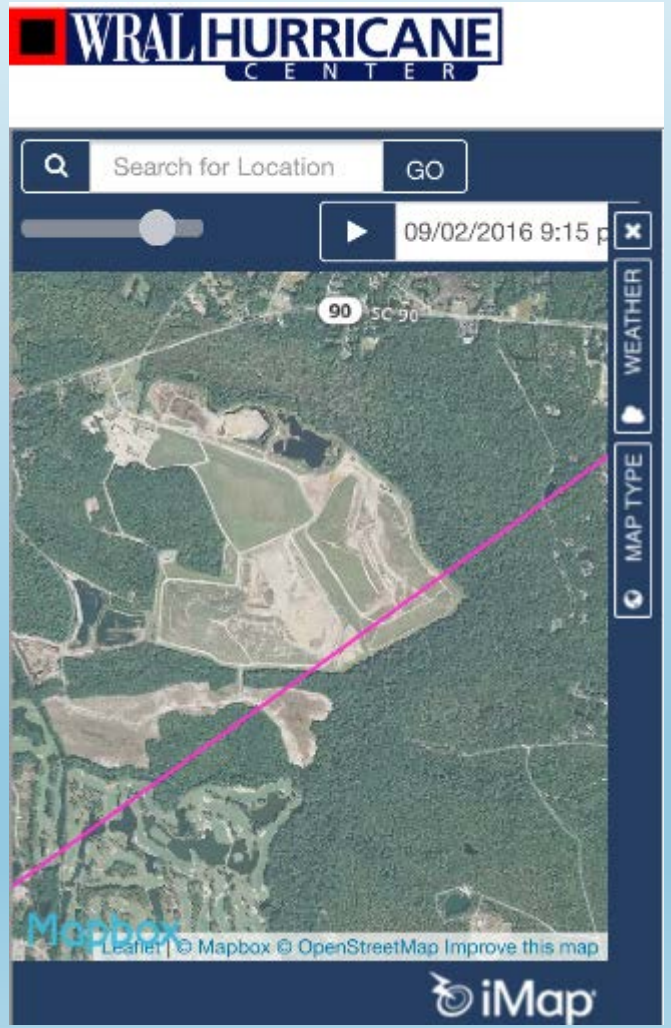


Wind Uplift Ballast

Wind Uplift Ballast

Construction Summary

- Final Contract Price $8,810,707
  - Budget underrun of $556,863
- Original Contract Time – 395 Calendar Days
  - 141 Calendar Days Extension for Reason of Adverse Weather
    - Unnamed Storm, 16” 10/2015
    - Tropical Storm Hermine
    - Hurricane Matthew
- Only change orders were owner-requested.



Acknowledgements

- Horry County Solid Waste Athority
- DHEC Solid Waste Permitting Staff

Questions?