

# MATRIX**NEW**WORLD

Enabling Progress

## **Coastal Marsh Restoration/Living Shoreline *Pilot Projects in the Mid-Atlantic Region***

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Delaware Estuary Science & Environmental Summit 2015  
January 25-28, 2015  
Cape May, NJ

# Topics

- Living Shoreline / Coastal Restoration
- Innovative Approach - EKO® Bag Concept
- Past Projects
- Mid-Atlantic Pilot Projects
- Global Applications
- Questions / Discussion



# Living Shoreline

- Shoreline management practice – an integrated and natural approach
- Addresses the loss of vegetated shorelines, beaches, and habitat in the littoral zone
- Provides protection, restoration or enhancement of the habitats for living resources
- Entails strategic placement of plants, stone, sand, or other structural and organic materials

# Living Shoreline Types

1. **Natural** – natural vegetation, SAV, fill & biodegradable organic materials
2. **Hybrid** – natural + low-profile rock structures (Ex. segmented sills, stone containment & living breakwaters) seeded with native shellfish.
3. **Structural** – revetments, breakwaters & groins

# Innovative Restoration Approach

- Utilizes EKO® Bag Concept for
  - creation of marshes
  - restoration or enhancement of wetlands and habitats
  - stabilization of eroding shoreline
- Jump-starts growth and survivability by counteracting
  - Moderate wave action
  - rapid erosion
  - wind damage
- Minimal annual maintenance required



# EKO Bag® Concept

- A biodegradable, self-contained package of native plants, custom mixed soil with composted humus amendments
- Supports, feeds and stabilizes native vegetation
- Bags produced by Restore the Earth Foundation (REF), Ithaca, NY
- 501(c)3 Organization



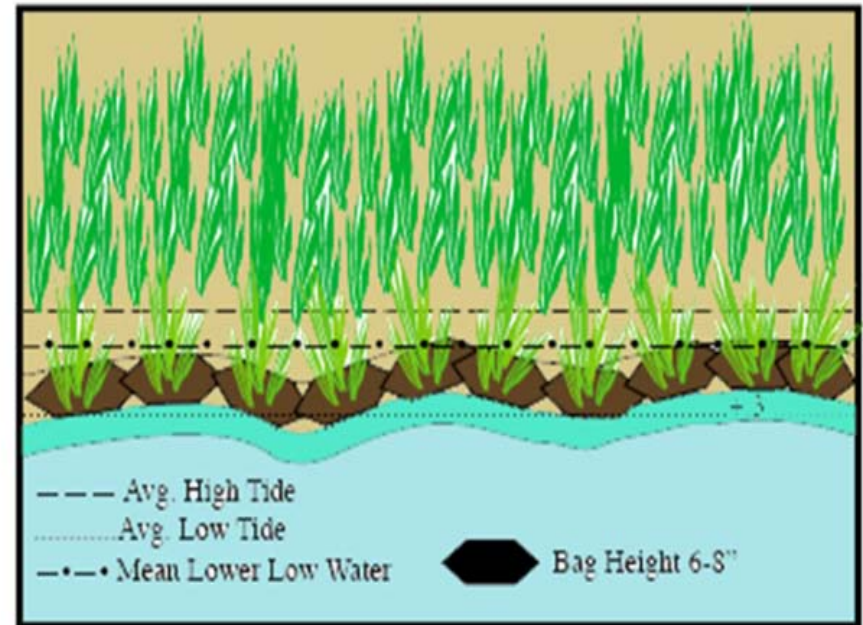


# EKO Bag<sup>®</sup> Concept

- Bay-Saver Bag<sup>™</sup> (BSB)
- Gulf Saver<sup>®</sup> Bag
- Dune Saver<sup>®</sup> Bag

## BSB<sup>™</sup> Specs:

Material:	Untreated all natural burlap
Size:	14" X 26" (flat)
Weight:	20 lbs-22 lbs
Plugs per Bag:	Three (3) 1-year old seedling plugs



# Past Projects

## Demonstration Projects

- Pass A Loutre, Venice, Plaquemines Parish, LA
- Eastpoint, County, FL (Panhandle)



# Pass A Loutre WMA Demonstration Site



- Remote location
- Variable tidal range
- High wave energy
- Substantial discharge rates on-site

# Demonstration Area: North Pass PAL WMA



Demonstration project successfully implemented in Dec. 2010 at Pass A Loutre WMA

**Site 1**: Approximately 887 m<sup>2</sup> area planted with *S. alterniflora*

**Site 2**: Approximately 807 m<sup>2</sup> planted with *S. alterniflora*



# Gulf Saver Bag® Deployment

## Site 1

- 12/2010
  - 200 bags in 2-3 bag clusters in checkerboard grid (3 m spacing)
  - 200 bags in linear array
- 03/2011
  - 50 bags in linear array



## Site 2

- 04/2011
  - 700 bags deployed in 2-3 bag clusters and linear arrays



# North Pass PAL WMA: Demonstration Project - Site 1



12/2010: 2 weeks post  
deployment

09/2011: 9 months post  
deployment



# North Pass PAL WMA: Demonstration Project - Site 2



04/2011: 2 weeks post  
deployment

09/2011: 5 month post-  
deployment





# North Pass PAL WMA: Performance Monitoring



- Linear transects through control and planting areas
- Permanent 1 m<sup>2</sup> sampling points
- Average canopy height, % canopy cover
- Above/below ground biomass collected in 2012 season

# Demonstration Project- North Pass PAL WMA Marsh Creation

- **Results**

- 90% total cover of native vegetation within one year
- 8 m of lateral growth in 17 months
- Creation of wildlife habitat including rookeries
- Erosion protection

- **Project Benefits**

- Re-vegetation of project area 5 times faster than bare root planting
- Replicable and scalable
- Coast-Wide application
- Easily incorporated into existing projects



# PAL WMA Demonstration Project

## Results indicate that:

- Exceptionally rapid establishment of functional wetland (<2 yrs)
- Better storm resistance with less plant loss
- Minimum 16 DSAYs credits per acre planted
- Minimal annual maintenance required
- Successful proof of concept at Popcorn & Buttermilk (early project) Beaches-PAL WMA, Venice , LA

	8 Months	12 Months	16 Months
Vegetative Cover (%)	75 – 80	65 – 90	70 – 100
Average Canopy Height (cm)	70 – 85	75 - 110	90 - 150



*Gulf Saver bags at 4 months*

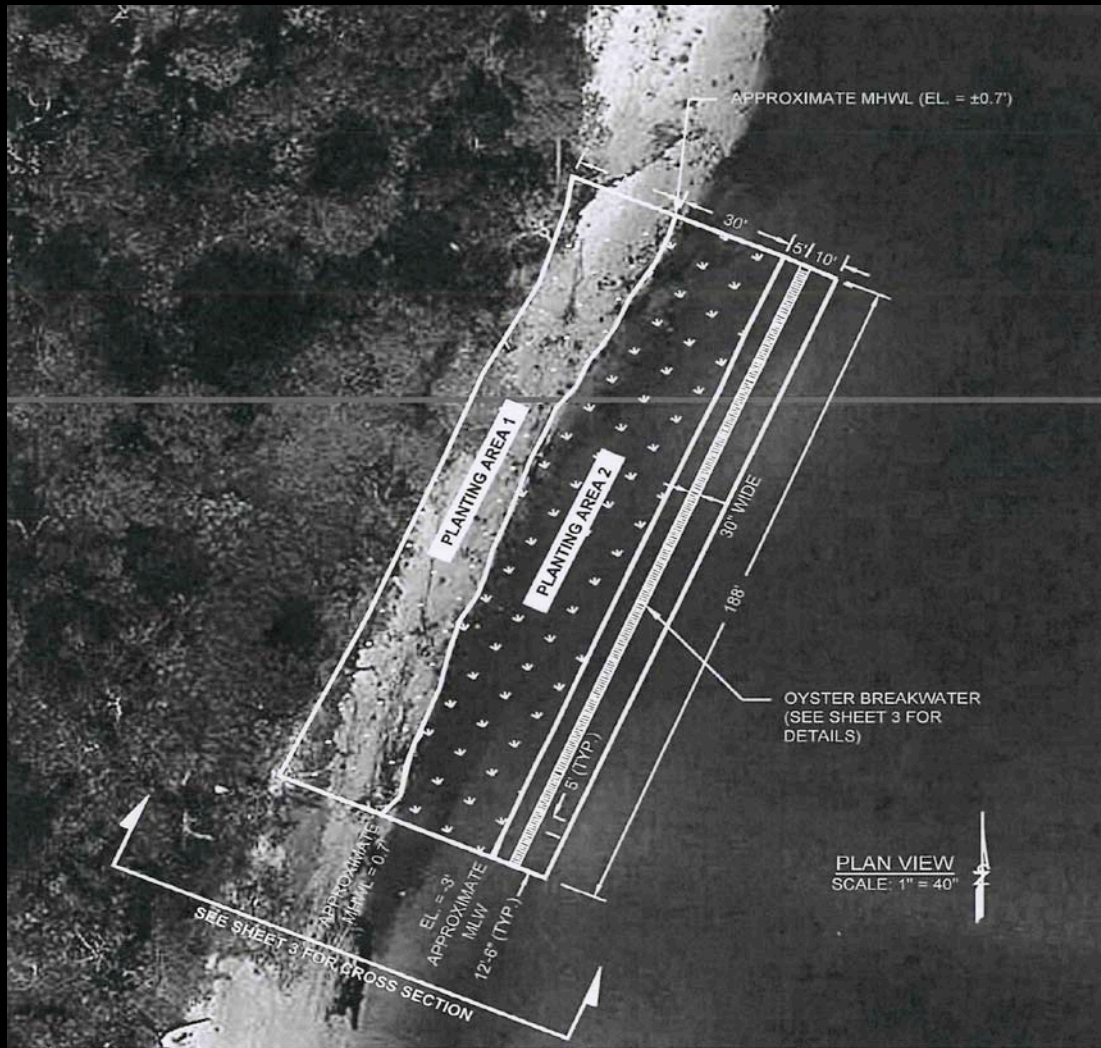


*Gulf Saver bags at 7 months*



*Gulf Saver bags at 9 months*

# Living Shoreline: Eastpoint, Florida



- Eastpoint, Florida (Panhandle)
- Site experiences very high wave energy
- Utilized Gulf Saver® bags



# Living Shoreline: Eastpoint, Florida

March 7, 2013 - Initial At-Grade Planting



# Living Shoreline: Eastpoint, Florida

March 26, 2013 - Initial plants washed away after a strong storm event





# Living Shoreline: Eastpoint, Florida

April 26, 2013 – After 2<sup>nd</sup> Planting  
(buried bags)



# Living Shoreline: Eastpoint, Florida

Monitoring in August 3, 2013 – Plants growth and stability in <4 months





# Living Shoreline: Eastpoint, Florida



September  
2014

(after 17  
months of  
planting)



# Pilot Living Shoreline / Coastal Restoration Projects in the Mid-Atlantic Region

- Chesapeake Bay Environmental Center (CBEC), Grasonville, MD
- Cattus Island County Park, Toms River, NJ

# Objectives

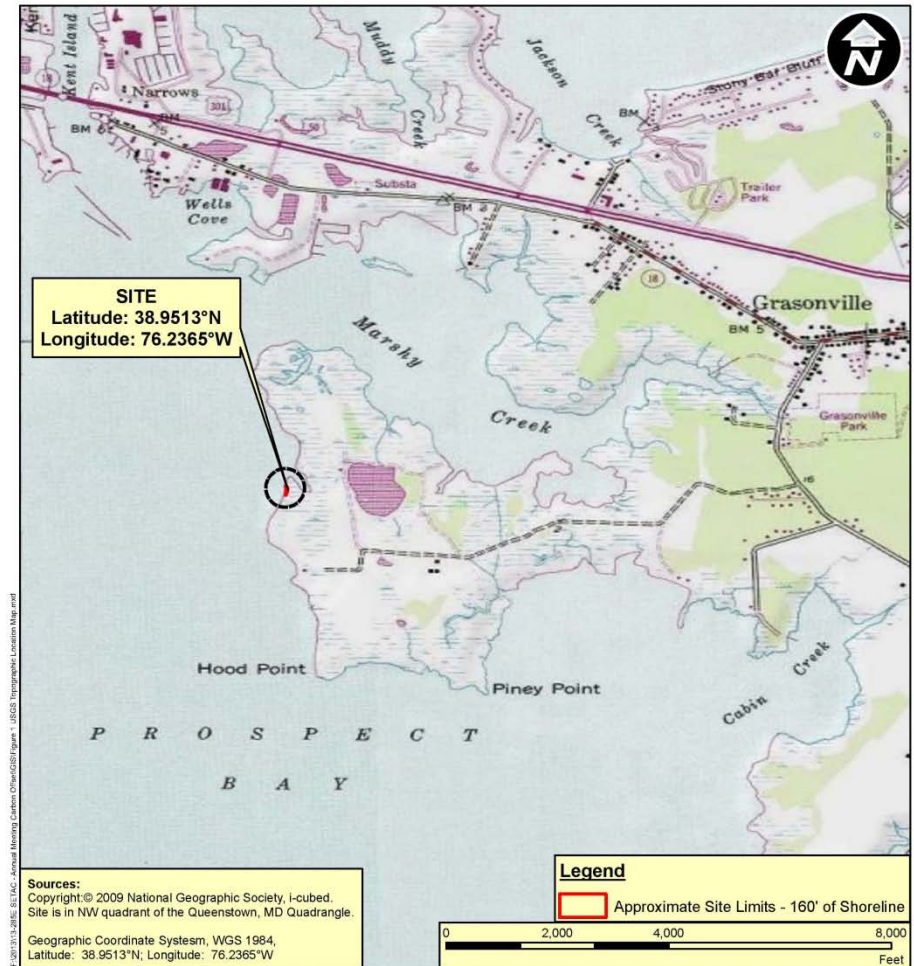
- Re-establishing vegetation across the pilot areas
- Reducing shoreline erosion
- Promoting sediment accretion
- Restoring valuable wildlife habitat
- Determine if this technology can be successfully adapted to local conditions within the mid-Atlantic region

# CBEC Project

- Coastal wetlands restoration & carbon offset project for the North America Society of Environmental Toxicology and Chemistry (SETAC) 2013 Annual Meeting
- The Team
  - Matrix
  - REF
  - CBEC
  - SETAC – Chesapeake-Potomac Regional Chapter (CPRC)
- A 2,000-SF area along approx. 150 LF of a eroding shoreline at the CBEC
- Utilizing BSB – similar EKO bag approach

# The Site

- CBEC, Grasonville, Queen Anne's County, MD
- Approx. 150 LF of shoreline restoration



## VICINITY MAP - QUEENSTOWN, MD USGS 7.5 MINUTES TOPOGRAPHIC QUADRANGLE

### MATRIXNEWORLD

Enabling Progress

Matrix New World Engineering, Inc.  
26 Columbia Turnpike  
Florham Park, New Jersey 07932  
Tel: 973-240-1800  
Fax: 973-240-1918  
WWW / CBE / DBE  
www.matrixnewworld.com

**SITE - P/O PROPERTY MAP-65, PARCELS-12 & 29**  
**CHESAPEAKE BAY ENVIRONMENTAL CENTER**  
**600 DISCOVERY LANE**  
**GRASONVILLE CDP**  
**QUEEN ANNE'S COUNTY, MARYLAND**

<b>SCALE:</b> 1:24,000 1 inch = 2,000 feet	<b>DATE:</b> DECEMBER 2013	<b>JOB NO.:</b> 13-285E	<b>DRAWN BY:</b> RS	<b>FIGURE NO.:</b> <b>1</b>
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# The Site

- Moderate to high wave energy environment



## AERIAL PHOTOGRAPH - SITE LOCATION

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Enabling Progress

Matrix New World Engineering, Inc.  
56 Columbia Turnpike  
Farming Park, New Jersey 07432  
Toll: 800-755-7555  
Fax: 973-243-1111  
www.matrixnewworld.com

SITE - P/O PROPERTY MAP-65, PARCEL S-12 & 29  
CHESAPEAKE BAY ENVIRONMENTAL CENTER  
600 DISCOVERY LANE  
GRASONVILLE CDP  
QUEEN ANNE'S COUNTY, MARYLAND

SCALE: 1:2,400 1 inch = 200 feet	DATE: DECEMBER 2013	JOB NO.: 13-285E	DRAWN BY: RS	FIGURE NO.: 2
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# The Approach

- Install a single row of end-to-end BSBs at the water's edge, and additional row of bags behind the first row at 2' spacing
- Planting in each bag, 3 seedlings of *Spartina alterniflora*
- Small test area for bare root plugs planting
- An alternative to traditional non-structural shoreline stabilization methods



MDE #13-G-1156  
 AI #: 97703  
 Plan Date: 2/14/14  
 Sheet 2 of 4

#### NOTES:

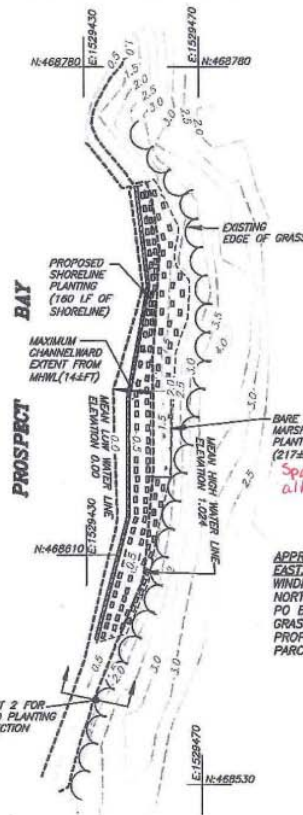
1. TIDAL RANGE IS 1.024 FEET.
2. SOUNDINGS IN FEET AND REFER TO MEAN LOW WATER.
3. APPROXIMATELY 170± BAY-SAVER BAGS WILL BE PLACED WITHIN THE PLANTING AREA. THIS WILL INTRODUCE APPROXIMATELY 6,200 CU. YDS. OF FILL CONTAINED IN TOTAL 170 BAY-SAVER BAGS. REFER TO PLANT SPEC TABLE AS SHOWN.
4. THE EXTENT OF RESTORATION AREAS DETERMINED DURING SEPTEMBER 9, 2013 FIELD PRE-APPLICATION MEETING WITH REPRESENTATIVES FROM MARYLAND DEPARTMENT OF ENVIRONMENT. TOTAL PROPOSED PLANTING AREA IS APPROXIMATELY 2,042± SF.
5. ALL EXISTING VEGETATION WILL BE LEFT UNDISTURBED.
6. ANY/ALL HAND EXCAVATED MATERIAL SHALL BE USED ON-SITE.
7. PLANT MATERIAL WILL BE PLANTED UNDER THE DIRECTION OF THE PROJECT WETLAND SCIENTIST TO APPROXIMATE THE COMPOSITION AND CONFIGURATION OF THE SURROUNDING SHORELINE/WETLANDS VEGETATION. PLANTING SHALL BE LIMITED TO THE PLANTING AREA AS SHOWN ON THE PLANTING PLAN.
8. THE CONTRACTOR AND/OR OWNER SHALL BE RESPONSIBLE FOR MAINTENANCE/MONITORING OF PLANTED/SEEDED MATERIAL FOR A PERIOD OF FIVE (5) GROWING SEASONS OR UNTIL SUCH TIME AS 85% COVER WITH NATIVE OR PLANTED SPECIES HAS BEEN ACHIEVED.
9. BAY-SAVER BAGS WILL BE TRANSPORTED USING WHEEL-BARROW AND MANUALLY BY VOLUNTEERS. USE OF HEAVY MACHINERY IS NOT PROPOSED FOR THE PROJECT.

BAY-SAVER BAG SPECS:	
MATERIAL:	UNTREATED ALL NATURAL BURLAP
SIZE:	14" X 26" (FLAT)
WEIGHT:	20 LBS-22 LBS
PLUGS PER BAG:	3 1-YEAR OLD NATIVE SEEDLING PLUGS

PROJECT SITE LOCATED IN:  
 MAP-65, PARCEL-12 & MAP-65, PARCEL-29

- LEGENDS**
- ☐ BAY-SAVER BAG
- ☒ MARSH PLANT SEEDING (SPARTINA ALTERNIFLORA)

APPLICATION BY:  
 WINDFOWL TRUST OF NORTH AMERICA, INC./CHESAPEAKE BAY ENVIRONMENT CENTER



APPROX. 3,500 FT.  
 EAST PROPERTY OF:  
 WINDFOWL TRUST OF  
 NORTH AMERICA, INC.  
 PO BOX 519  
 GRASONVILLE, MD 21638  
 PROPERTY MAP-58H  
 PARCEL-29



SHEET 1 OF 3 REVISED 02-14-14	SHEET 1 OF 3 REVISED 02-14-14	PROJECT TITLES SHORELINE RESTORATION AT CHESAPEAKE BAY ENVIRONMENTAL CENTER GRASONVILLE, QUEEN ANNES COUNTY, MARYLAND	BUILDING PROGRAM PROPOSED SHORELINE PLANTING PLAN VIEW	MATRIX NEW WORLD Building Program Matrix New World Engineering, Inc. 20 Columbia Turnpike P.O. Box 1000 York, PA 17403 Tel: 717-339-1900 Fax: 717-339-1910 www.matrixnewworld.com	JAMES D. GENS PROFESSIONAL LAND SURVEYOR MARYLAND LICENSE NO. 21527 02-14-14 DATE	DESIGNED BY JAVIER CHECKED BY JAVIER DESIGNED DATE 02-14-14 APPROVED BY JAVIER DATE 02-14-14	1 PER MDE COMMENTS (E-H-J-V) JS CHANGED MLW=0.00 ORIGIN DATE 12-19-13	REVISIONS	DATE	BY	APP'D



# Project Planting

- Project Planting on Sunday, April 27, 2014
- Volunteers: The Team + students from Towson University & Wye River Upper School



*Source: Paul Lundegard*



*Source: Paul Lundegard*



# Planting



Source: Paul Lundegard



Source: Paul Lundegard



# Post-Planting

After 2 months



Source: Rebecca Lazarus



Source: Rebecca Lazarus

# Cattus Island Project

- Cattus Island County Park
- Restore & stabilize section of eroded saltmarsh
- The Team
  - Matrix
  - REF
  - Ocean County Department of Parks and Recreation (OCDPR)
  - HDR, Inc.





# The Site

- A 0.1-acre area of eroded marsh restoration
- Located in a 500-acre County Park bordering Barnegat Bay, Toms River
- Valuable habitat - for an array of migrating shorebirds & waterfowl, and endangered species



# Project Planting

- Commemoration at the launching of the Fifth Barnegat Bay Blitz by NJDEP Commissioner Bob Martin on Friday, April 25, 2014





# Project Planting

- Volunteer planting event on Monday, April 28, 2014
- Volunteers: The Team + Ocean County Vocational Technical School (OCVTS) & MSU students + youth from neighboring townships



Source: Y. Qian





# Post-Planting

- Monitoring
- Installed goose-fence

September 26, 2014



# Project Benefits

- Better protection and faster growth
- Robust vegetation creating stable soil
- Demonstrates a new tool for use in the non-structural/hybrid shoreline stabilization method
- Minimal maintenance required during grow-in, thereby, saving on the cost of maintenance
- Living classroom for students – involvement in:
  - Planting
  - Routine monitoring to evaluate project success



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Thank you for your time.

Questions?

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