WODCON XXI
INNOVATIONS IN DREDGING

DREDGING, DEWATERING, AND DISPOSAL OF MARINE SEDIMENTS FROM RESIDENTIAL CANALS IN ST. JOHN'S COUNTY, FL USING GEOTEXTILE TUBES

Chris Timpson
TenCate Geosynthetics

World Dredging Congress & Exhibition
Miami Hyatt Regency Hotel
June 13 – 17, 2016

TENCATE
materials that make a difference

Background

Source: www.dewatering-press.com

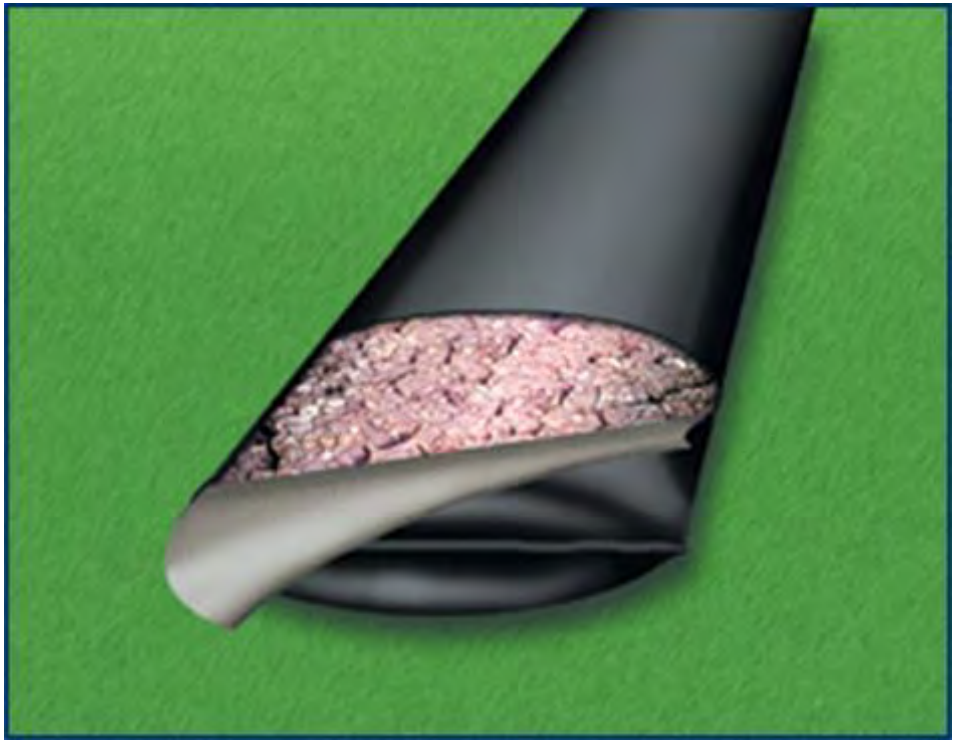
Background

Wastewater stream pumped into geotextile tube.
Dewatering capacity determined by tube circumference & length.

Background

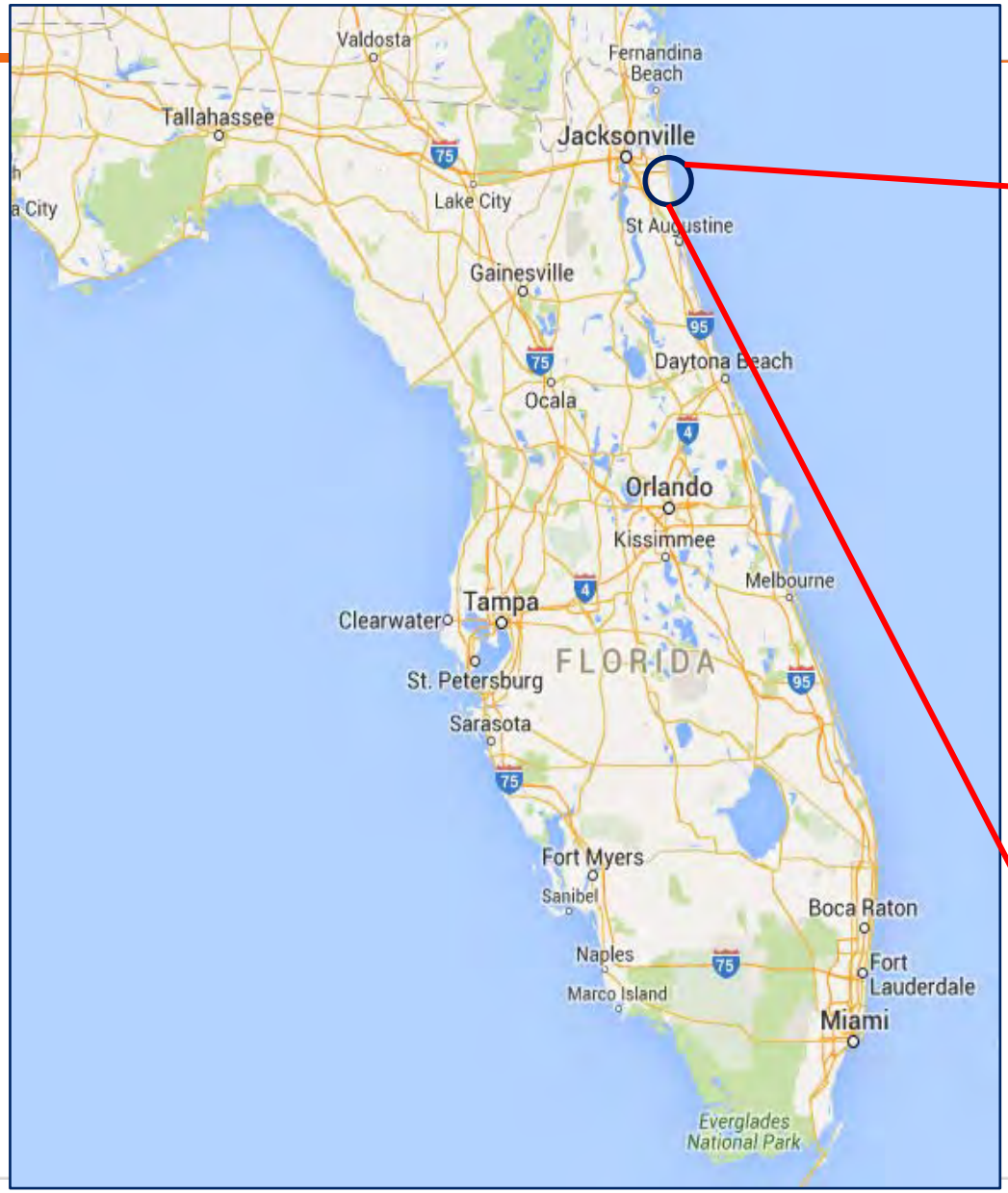
Wastewater residuals are captured, liquid escapes.
Filling & dewatering process is repeated.

Background

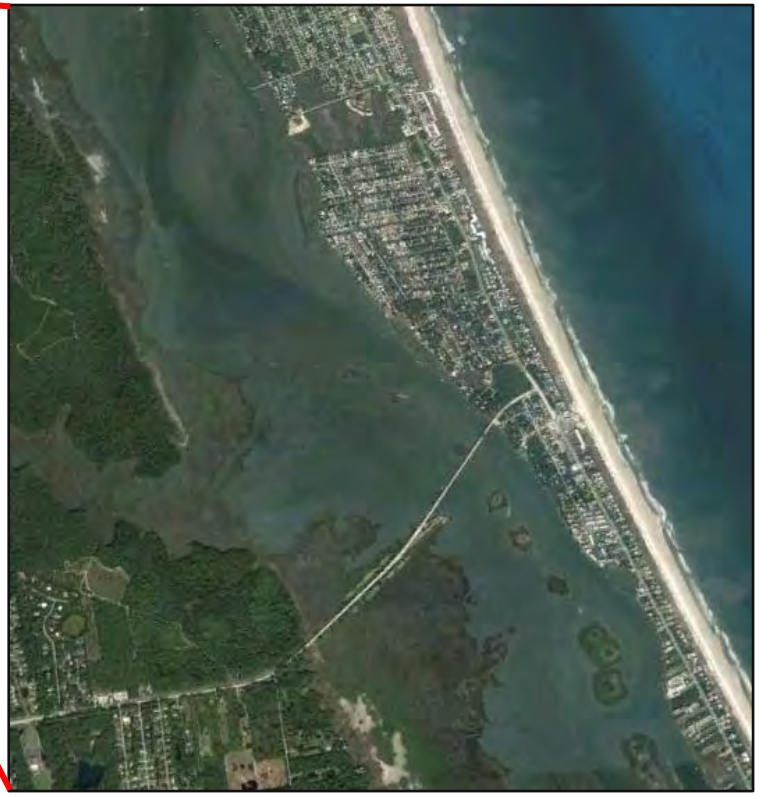


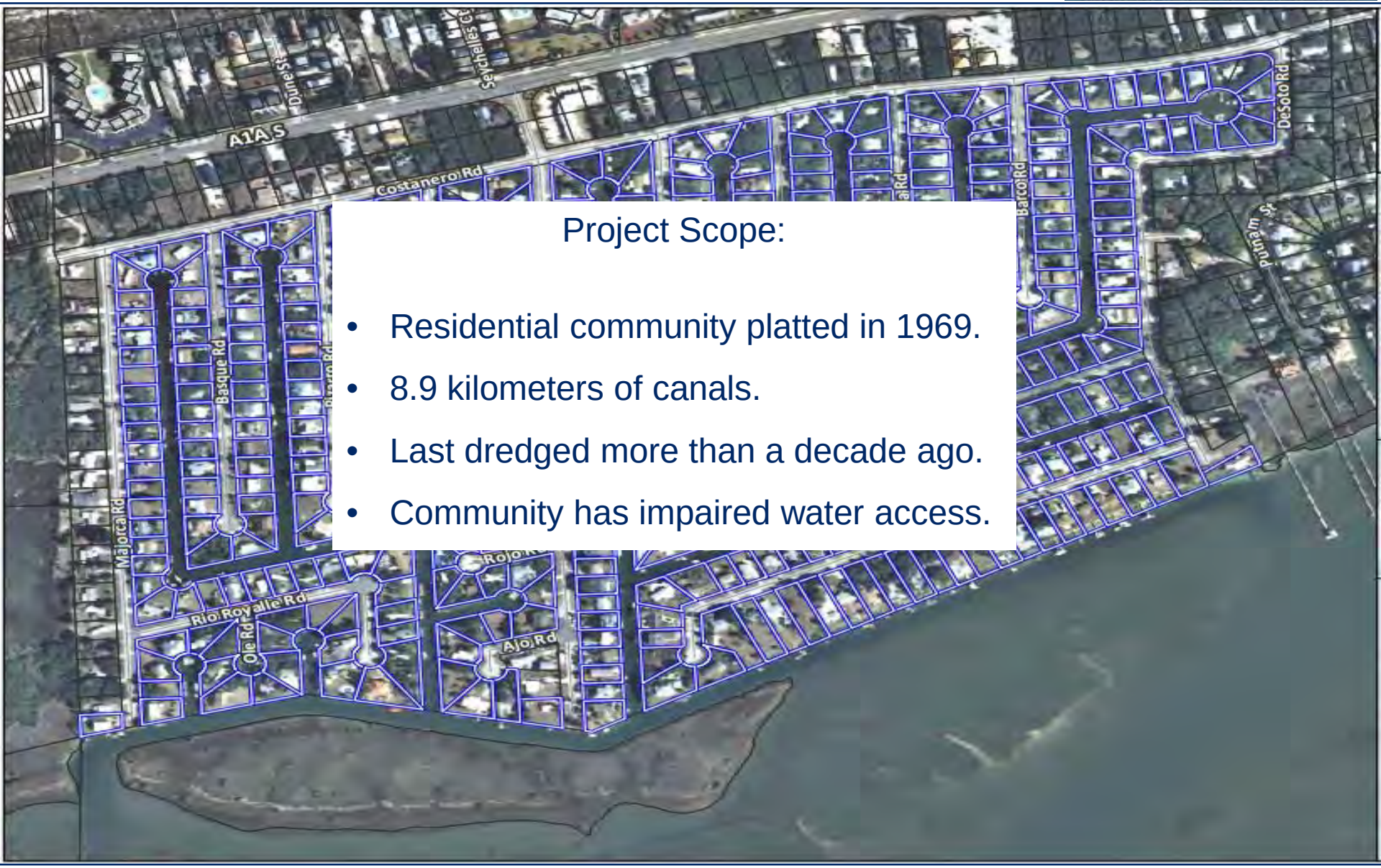
Wastewater residuals continue to consolidate over time.
After consolidation, residuals can be disposed.

Project Location



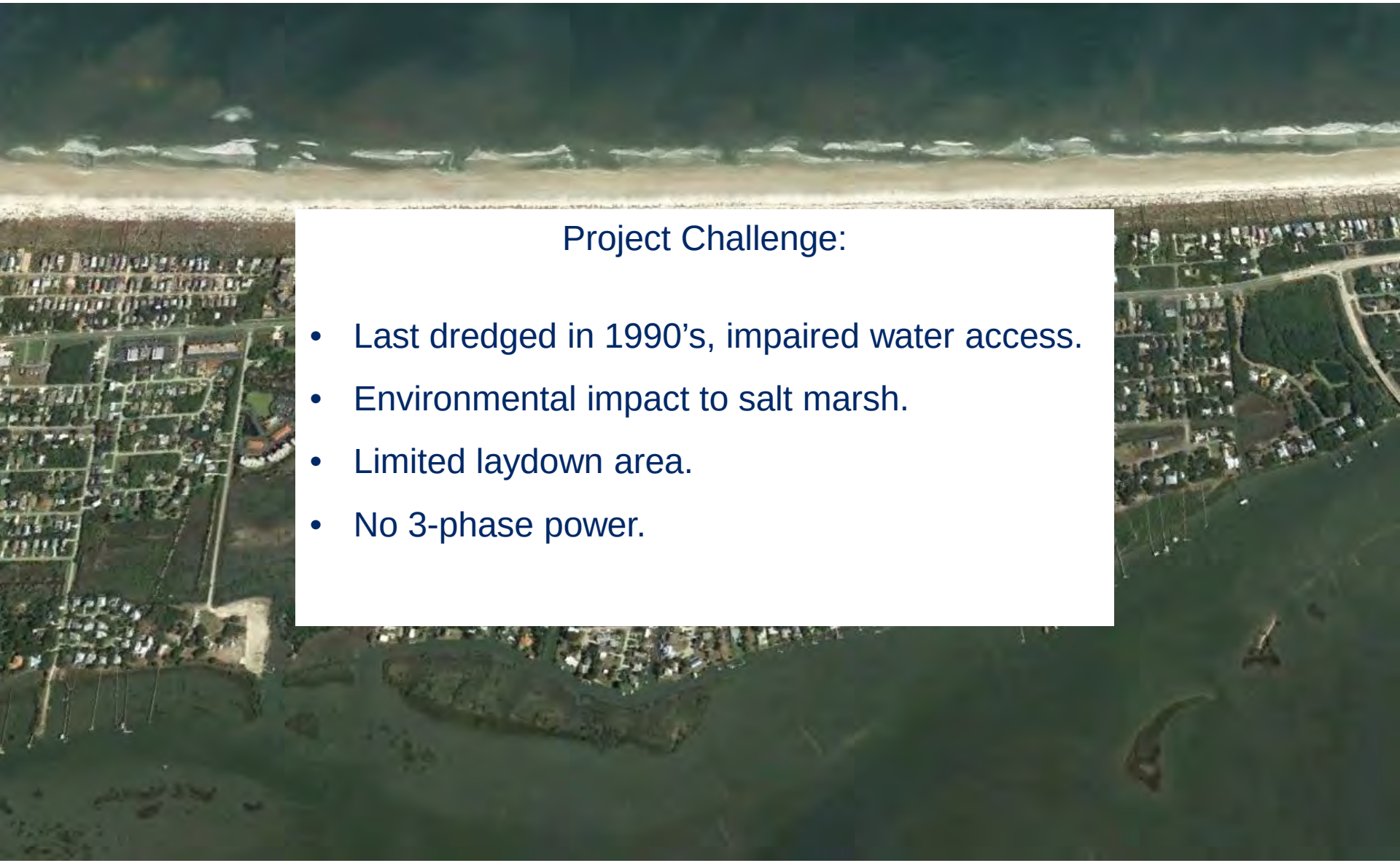
St. Augustine, FL





Project Scope:

- Residential community platted in 1969.
- 8.9 kilometers of canals.
- Last dredged more than a decade ago.
- Community has impaired water access.

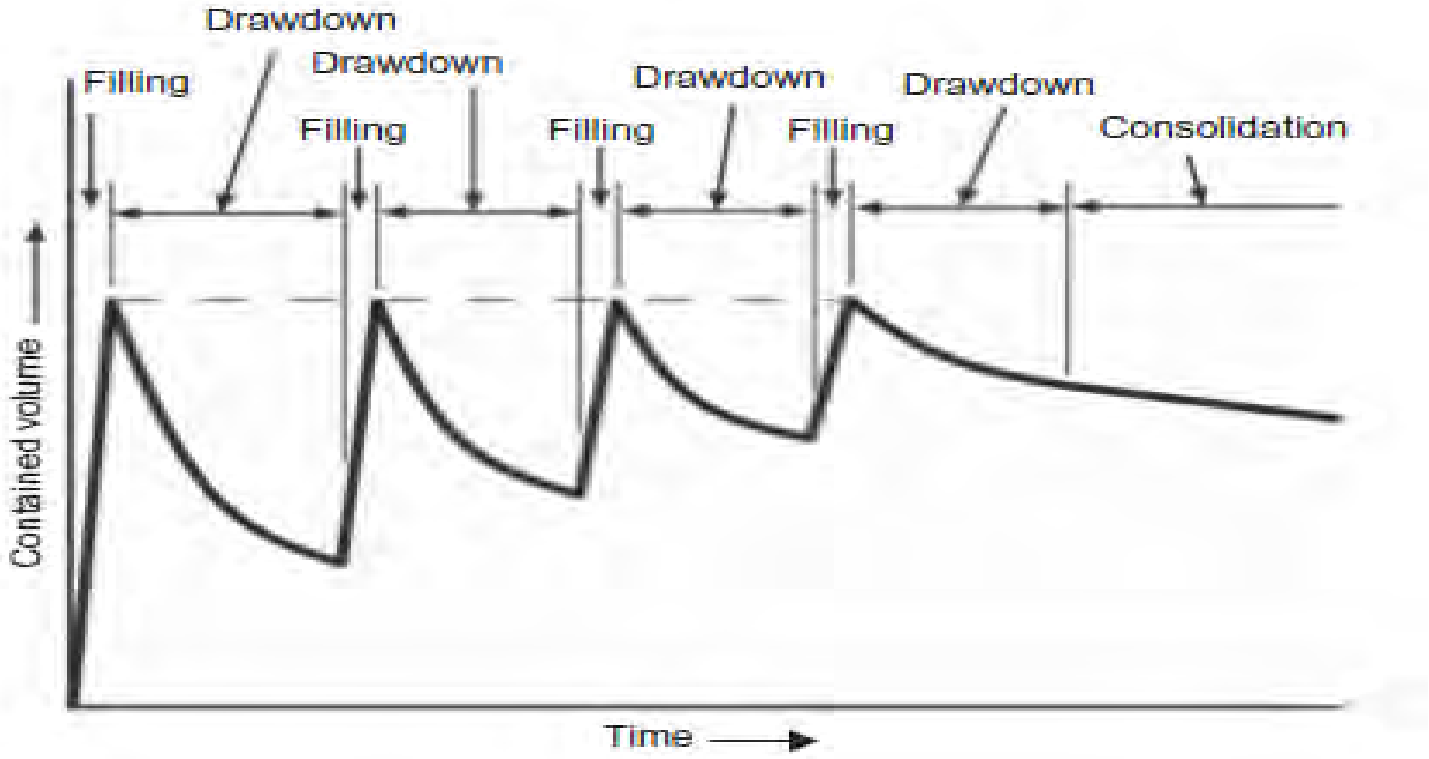


Project Challenge:

- Last dredged in 1990's, impaired water access.
- Environmental impact to salt marsh.
- Limited laydown area.
- No 3-phase power.

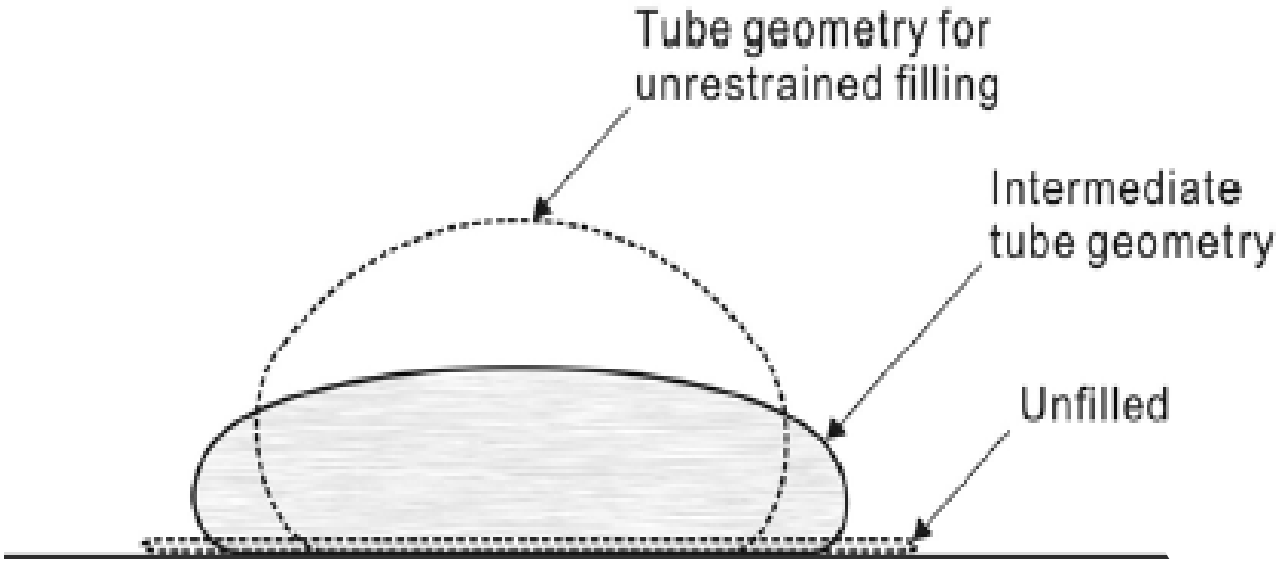
Proposed Solution

- Conduct feasibility study to demonstrate viability of dewatering with geotextile tubes.
- Utilize FL DEP approved polymers to meet discharge criteria of filtrate water into salt marsh.
- Temporary close Butler Park and repurpose to create a containment and dewatering cell.



Typical Geotextile Tube Dewatering Process

Yee, T.W., Lawson, C. Modeling the Geotextile Tube Dewatering Process. Geosynthetics International, 19, No. 5. pp. 339 – 353.



Typical Geotextile Tube Dewatering Process

Polymer Bench Testing

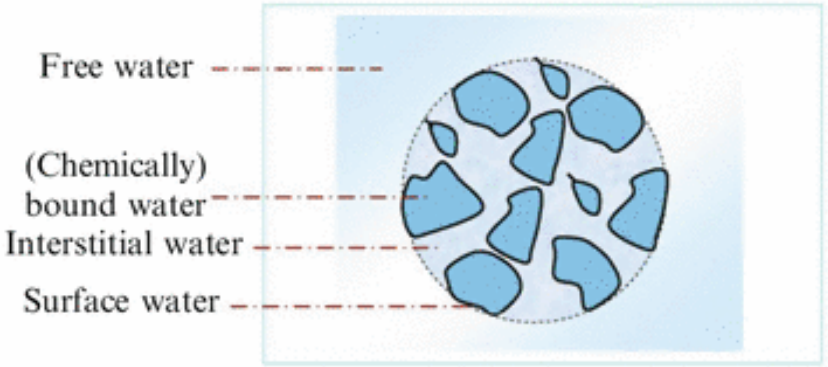
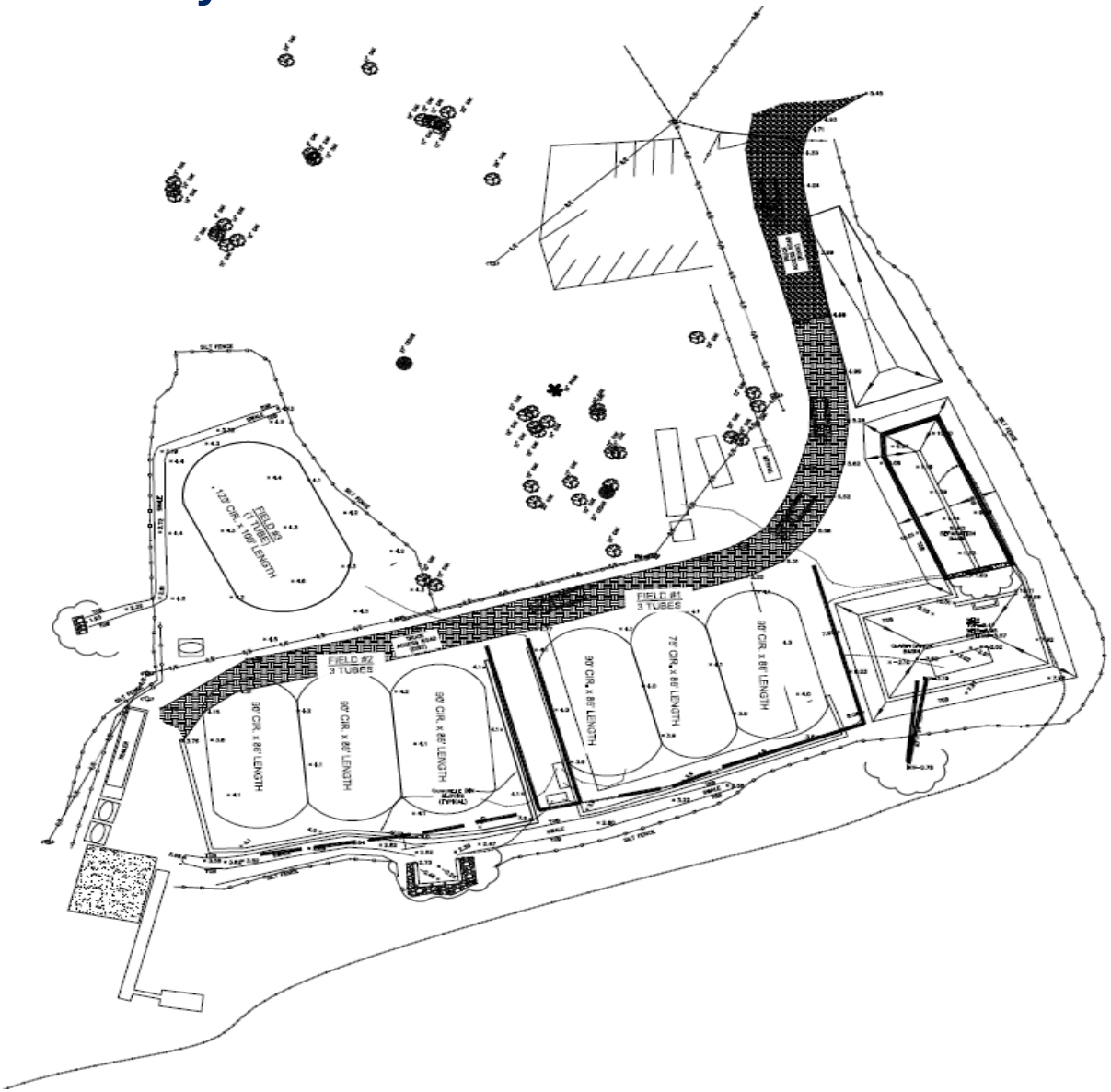


Fig 1 - Mahmoud, A., Olivier, J., Vaxelaire, J., Hoadley, A. (2012). Advances in Mechanical Dewatering of Wastewater Sludge Treatment. pp. 253 – 303.

Polymer Bench Testing

Proposed Dewatering Cell

Proposed Tube Layout



TENCATE Geotube

Geotube® Estimator

English Units Input - Known Volume

Version 15.0

Christopher Timpson 01/12/15

Project Name:	Treasure Beach
Location:	St. Augustine, FL
Contact:	Gator Dredging
Date:	4/2/2014
Type of Material:	Marine Sediments

Input		Units
Volume	100,000	Cubic Yards
Specific Gravity	1.60	
% Solids in Place	15.0%	
% Solids During Pumping	10.0%	
Target dewatered % Solids	30%	
% Coarse grain & sand*	1.0%	

* % Coarse grain & sand is removed from the calculation for volume reduction due to dewatering and added back in at the end in required Geotube® volume.

Production:

Pumping Rate (GPM)	1,000
Hours per Day	10.0
% Efficiency	75%

Material type:

Silts and/or Organics

Percent of Maximum Filled Capacity

80%

Output		Units
Total Volume Pumped	30,901,987	Gallons
Wet Volume per day	450,000	Gallons
Wet Volume per day	2,227.7	CY
Total Bone Dry Tons	13,389.1	Tons
Estimated Pumping Days	68.7	Days
Estimated Dewatered Volume	47,549.7	CY
Estimated Dewatered Weight	44,630.5	Tons

Estimated Geotube® Quantity:

Circumference x Pumping Height	Feet	
90' X 8.5'	5,151	Selectable

For MDS Applications:

Legal Hauling Capacity	0	Tons

Estimated MDS Geotube® Units:

MDS Dimension	*Each*
22.5' X 22'	#DIV/0!

Geotube® Simulator Cross Section

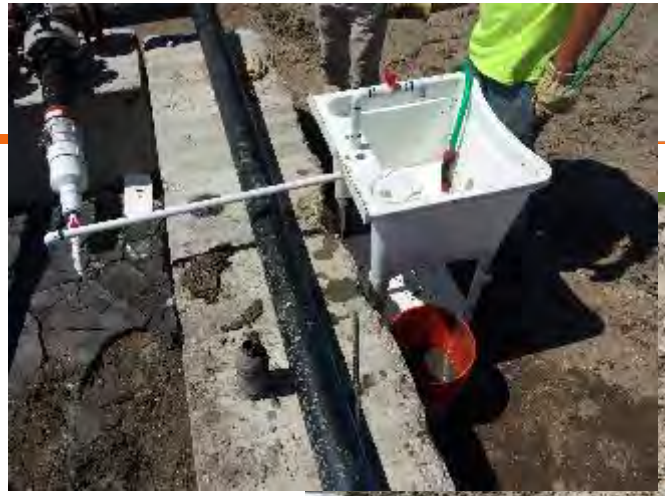
4/2/14	Project:	Treasure Beach

Units:	English		Circumferential Tensile Force (T) =	132.53	lb/in.
Water Level:	Fully Emerged		Geotube® Base Contact Width (B) =	36.58	ft
			Geotube® Filled Width (W) =	41.00	ft
Geotube® Height (H) =	8.5	ft	Geotube® Cross Section Area (A) =	311.56	sq ft
Geotube® Circumference (C) =	90	ft	Geotube® Volume Per Unit of Length (V) =	11.54	cu yd/ft
Relative Density of Fill Material =	1.4	sg	FS of Circumferential Failure =	3.4	FS
Geotube® Fabric Type:	GT500		Axial Direction FS (AFS) =	3.4	FS
Geotube® Fabric Type:	Rigid Mechanical		FS of Fill Port Failure =	3.4	FS

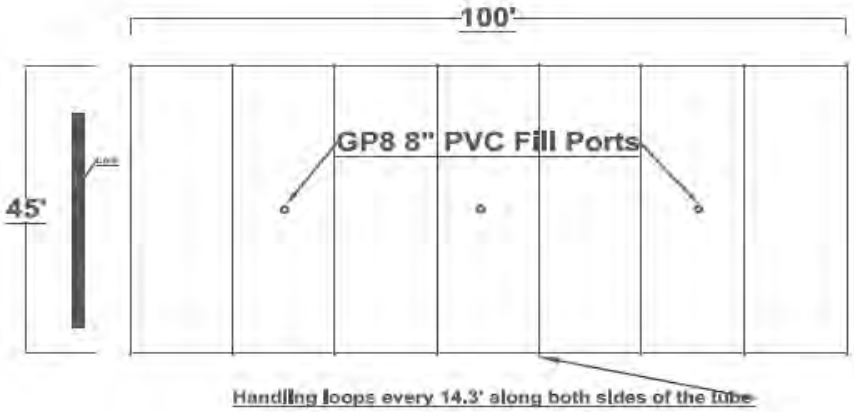

Riverside Blvd
Treasure Beach, FL
Gravity-Separation Basins
Cell #1
Cell #2
Cell #3

Sequence of Dredging


SNF FLOQUIP
29P-SPT-83



GT500/GP8/TS/90/ML



Customer Approval :

X _____
Approved By:

By signing this fabrication plan, the client acknowledges their acceptance of its accuracy. All other references to fabrication instructions shall be superseded and considered no longer valid.

Construction Instructions

Fabric Type :	GT500		Special Instructions :
Circumference :	90'		
Length :	100'		
Port Type :	GP8		
Total Panel Qty:	7		
End Type :	Tapered		
Pump Height:	8.5'		
Core Type:	Steel		
Roll-up Width :	12'		

Standards & Tolerances:

The following shall be considered the standard format and tolerances of Geotube® containers and Scour Aprons:

- Thread utilized shall be at a minimum of 9,000 denier for both needles and loopers.
- Seam will be sewn with a Union Special 8000 series double needle sewing machine utilizing a 401 "body" stitch.
- Sewn seam will contain between 3.5 and 6 stitches per inch.
- Primary Seam type utilized shall be as follows:
- Geotube® Containers & Scour Aprons - " Butterfly "
- Cross-seaming (splicing) may be utilized in the fabrication of Scour Aprons only !
- Allowable tolerances in measurement will be as follows !
- Circumference and width of Geotube ® containers and Scour Aprons ... 1.5 feet
- Length of Geotube ® containers and Scour Aprons ...2 feet
- Width and length of Geotube ® containers ....6 inches
- Strap spacing along sides of Geotube ® containers ... 2 feet
- Port spacing of Geotube ® containers, transverse seams ....8 feet
- Port spacing of Geotube ® containers, longitudinal seams ... 2 feet

TENCATE Geotube®
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Tel: 706 865-2226 Fax: 706 865-1400
www.tencate.com

DATE: 05/06/2014
SCALE: As Shown
DRAWN BY: Adamson
DRAWING NO.: 05062014001


XCMG
XE210C
XCMG


DEERE
CASE

Summary

- Project completed in 8 months.
- Over 76,500 m^3 removed from 8.9 kilometers of canals.
- Approximately 1,524 meters of geotextile tubes.
- After completion, Butler Park was restored and reopened for recreational use.
- Dredging improvements provided efficient canal and channel access for residents.

Questions / Comments:

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