SOURCE TO STREAM 2025 Conference

Canada's Premier Stormwater and Erosion and Sediment Control Conference

Thank you to our sponsors!

EXECUTIVE SPONSORS

ADS – Our reason is water.

Aquafor Beech Limited

citygreen – Urban Landscape Solutions

CUPOLEX® – Engineering Solutions Inc.

ENVIROPOD™

NEXT STORM

Oldcastle Infrastructure – A CRH Company

PERMACON

Sustainable Technologies Evaluation Program

StormTrap – Modular Concrete Stormwater Management

terrafix geosynthetics inc.

MEDIA SPONSOR

Environmental Science & Engineering Magazine

HOSTS

Presented by:

Toronto and Region Conservation Authority

In association with:

Lake Simcoe Region conservation authority

Credit Valley Conservation – inspired by nature

Using Anionic Polymer Gels To Achieve Maximum Turbidity Reduction From Construction Projects

Eddie Snell
Source To Stream 2025

APPLIED POLYMER SYSTEMS, INC.

Presentation Outline

1. Introduction
2. Project Case Histories

3

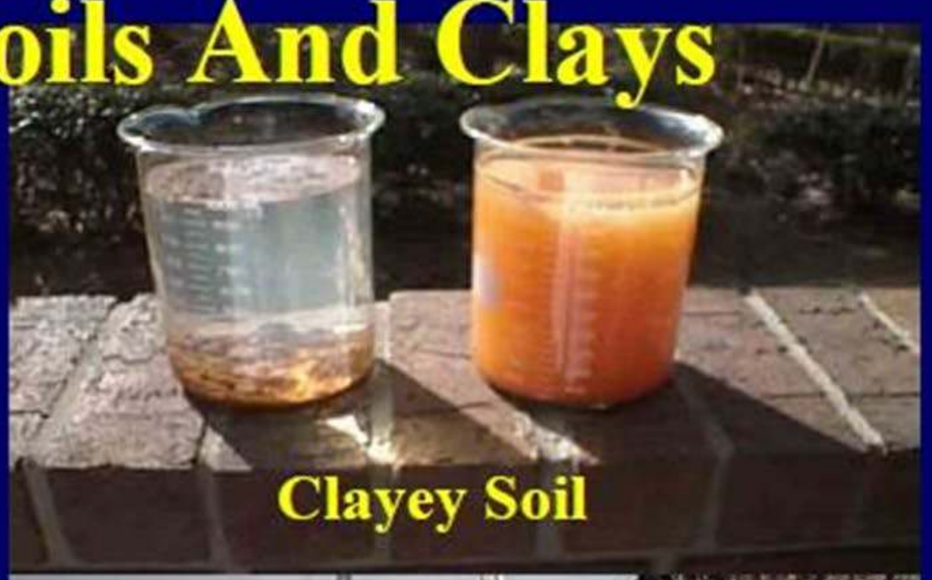
INTRODUCTION

PAM (Anionic polyacrylamide)

- Very low toxicity
- Allowed per 2022 USEPA CGP
- Lab test used to determine PAM blend
- Granular Silt Stop used for stabilization
- Floc Log form used in water treatment

Different Blended PAMs Are Used On Different Soils And Clays

Loamy Soil

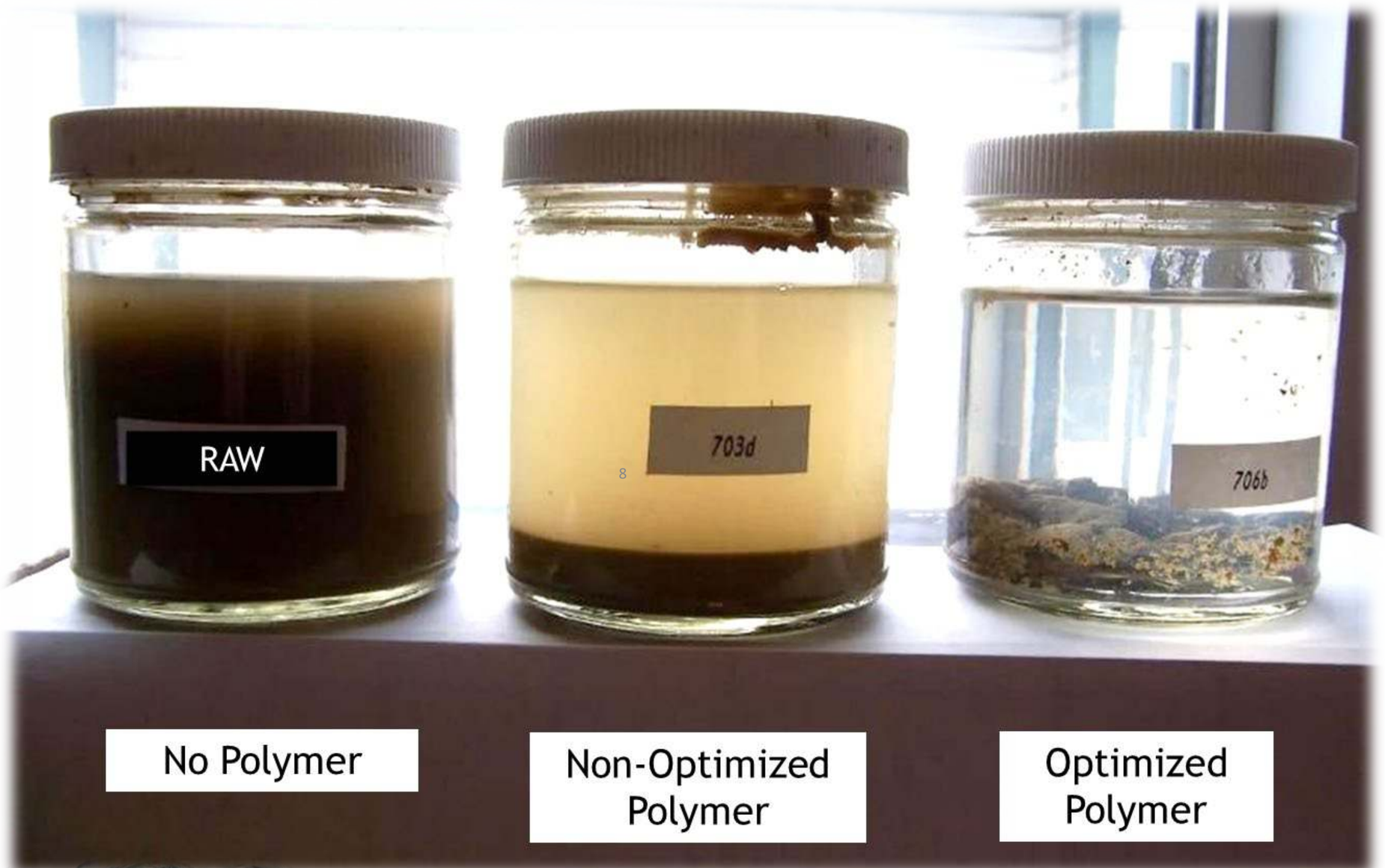

Clayey Soil

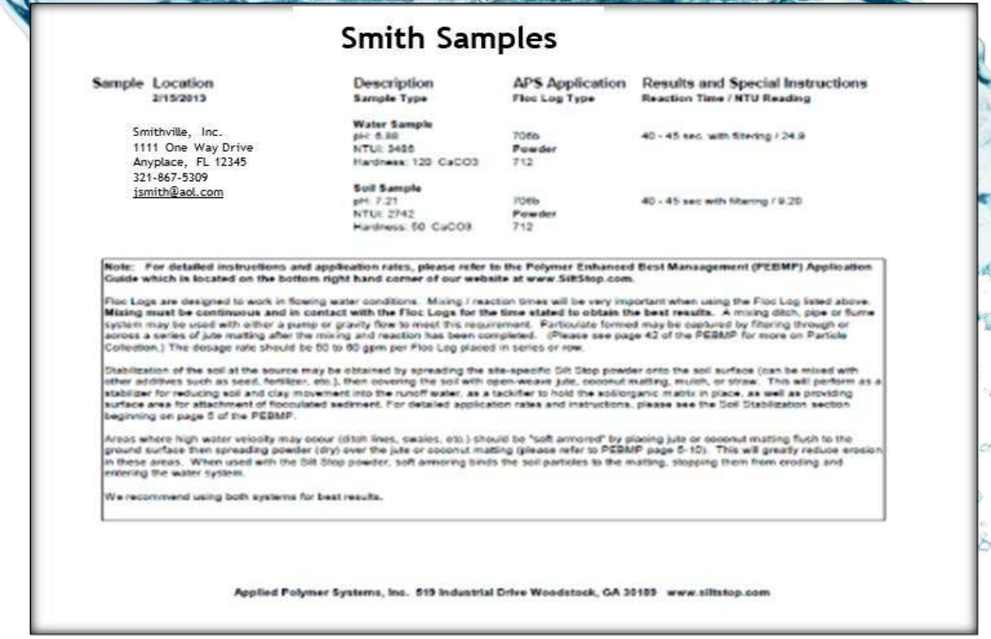

Phosphate Soil


Organic Dredge Soil

Generic PAMs are not lab tested to match soil.
This often results in poor performance

Polymer Matched To Soil/Water





Smith Samples

Sample Location 2/15/2013	Description Sample Type	APS Application Floc Log Type	Results and Special Instructions Reaction Time / NTU Reading
Smithville, Inc. 1111 One Way Drive Anyplace, FL 12345 321-867-5309 jsmith@aol.com	**Water Sample** pH: 8.88 NTU: 3488 Hardness: 120 CaCO3	706b **Powder** 712	40 - 45 sec. with filtering / 24.9
	Soil Sample pH: 7.21 NTU: 2742 Hardness: 60 CaCO3	706b **Powder** 712	40 - 45 sec with filtering / 9.20

Note: For detailed instructions and application rates, please refer to the Polymer Enhanced Best Management (PEBMP) Application Guide which is located on the bottom right hand corner of our website at www.SiltStop.com.

Floc Logs are designed to work in flowing water conditions. Mixing / reaction times will be very important when using the Floc Log listed above. **Mixing must be continuous and in contact with the Floc Logs for the time stated to obtain the best results.** A mixing ditch, pipe or flume system may be used with either a pump or gravity flow to meet this requirement. Particulate formed may be captured by filtering through or across a series of jute matting after the mixing and reaction has been completed. (Please see page 42 of the PEBMP for more on Particle Collection.) The dosage rate should be 60 to 90 gpm per Floc Log placed in series or row.

Stabilization of the soil at the source may be obtained by spreading the site-specific Silt Stop powder onto the soil surface (can be mixed with other additives such as seed, fertilizer, etc.), then covering the soil with open-weave jute, coconut matting, mulch, or straw. This will perform as a stabilizer for reducing soil and clay movement into the runoff water, as a tackifier to hold the soil/organic matrix in place, as well as providing surface area for attachment of flocculated sediment. For detailed application rates and instructions, please see the Soil Stabilization section beginning on page 5 of the PEBMP.

Areas where high water velocity may occur (ditch lines, swales, etc.) should be "soft armored" by placing jute or coconut matting flush to the ground surface then spreading powder (dry) over the jute or coconut matting (please refer to PEBMP page 5-10). This will greatly reduce erosion in these areas. When used with the Silt Stop powder, soft armoring binds the soil particles to the matting, stopping them from eroding and entering the water system.

We recommend using both systems for best results.

Applied Polymer Systems, Inc. 519 Industrial Drive Woodstock, GA 30189 www.siltstop.com

Written
Guidelines

Determine
PAM-Blend

9

REPORT FOR ACUTE TOXICITY TESTING OF
APPLIED POLYMER SYSTEMS, INC.
SILT STOP PRODUCTS

NORCROSS, GEORGIA

TEST PERIOD: OCTOBER 3-10, 2001

Prepared for:

APPLIED POLYMER SYSTEMS, INC.

Norcross, Georgia

October 2001

Toxicity Test
Results

PAM Types

- Emulsions
- Silt Stop Powders
- Floc Log

The 5 Fundamentals For Effective Flocculation

- 1. Formulation
- 2. Dosage
- 3. Reaction Time
- 4. Mixing
- 5. Floc Capture

Treatment Train Design Variables

- Volume of water
- Peak flows
- Storage capacity
- Terrain
- Available space

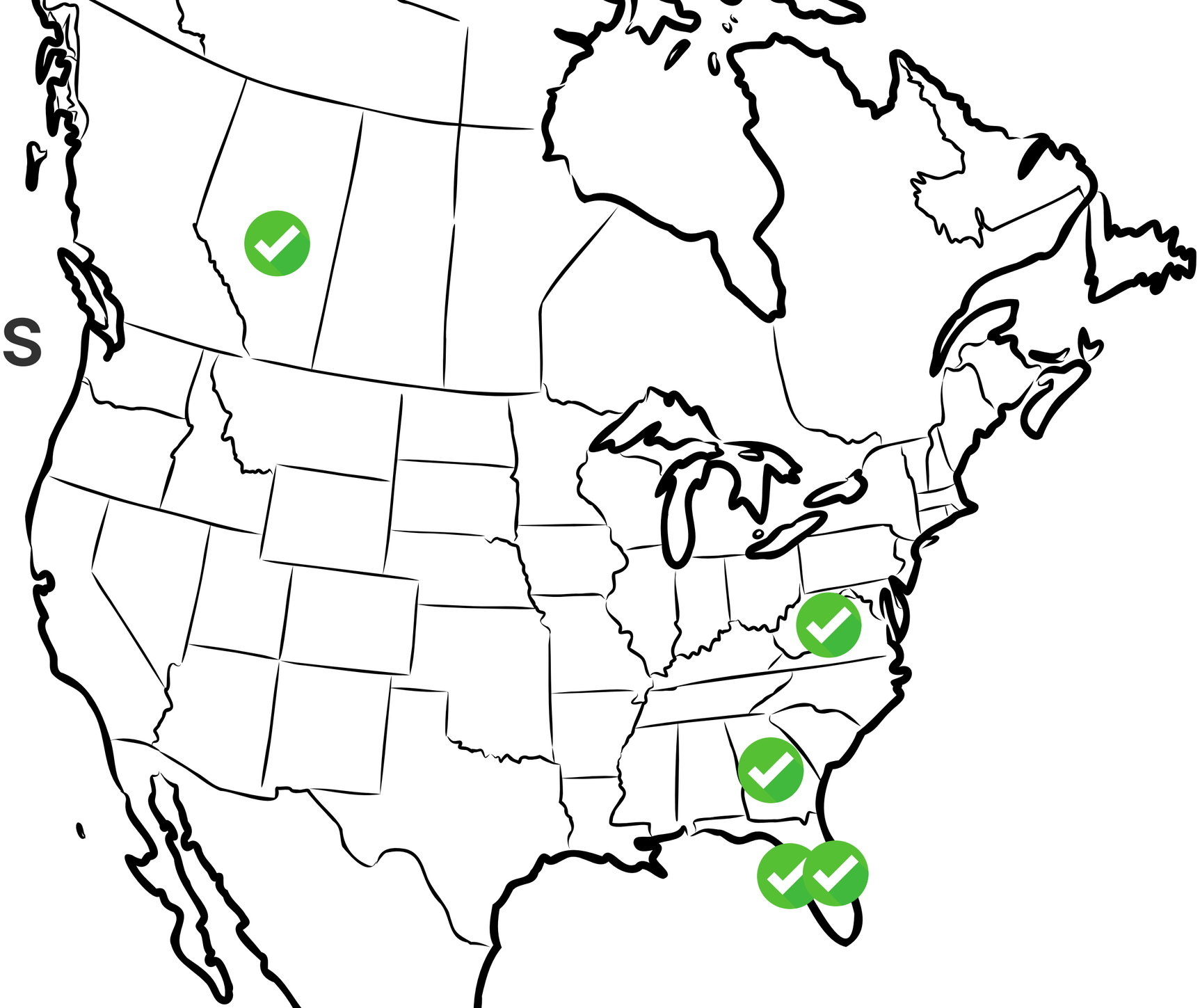
12

5 Projects Using Polymer Gel

Treatment Systems:

- Gwinnett, Georgia, USA
- Edmonton, Alberta, Canada
- West Virginia, USA
- Central Florida, USA (2)

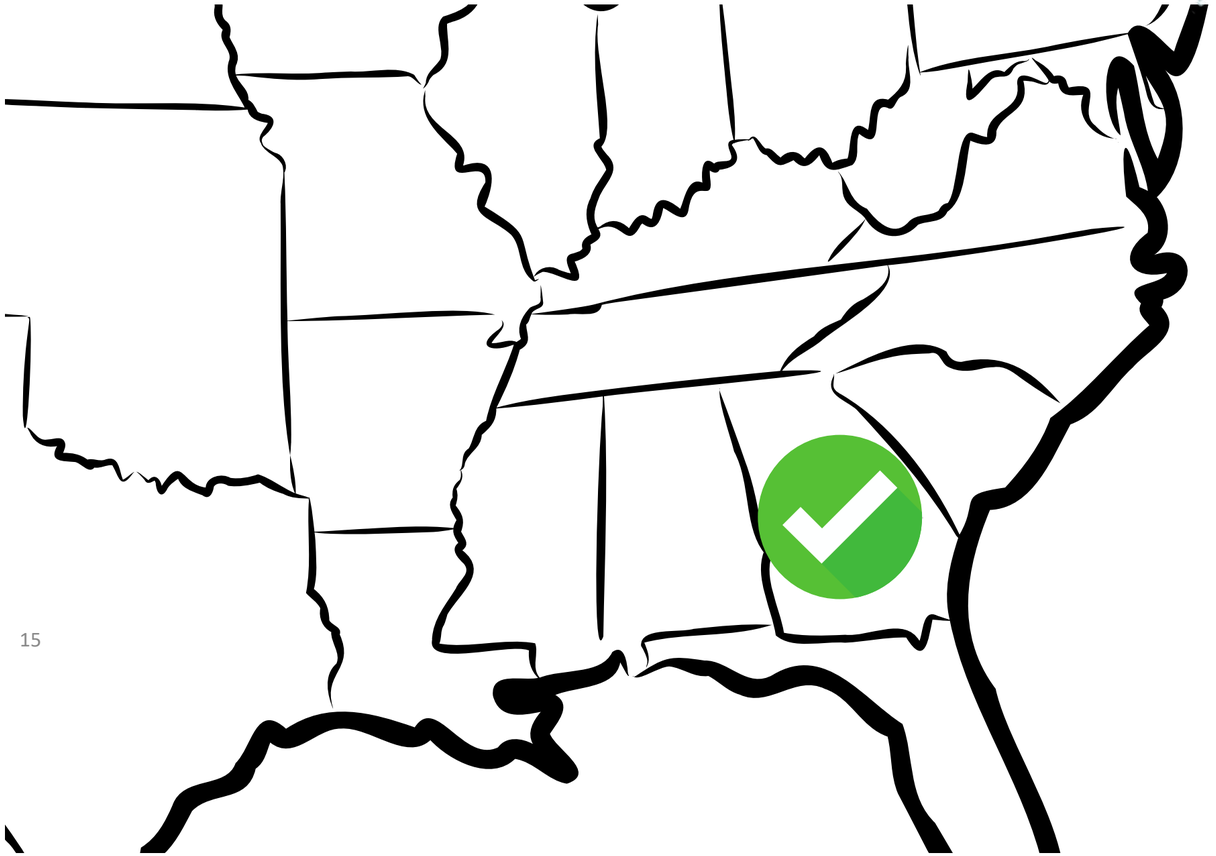
Project Examples



Project Examples

Gwinnett,
GA, USA

Tunnel construction length = 4,853 m (15,922 ft.)



15

Process water required treatment before discharge to trout stream.

Pollutants of concern:

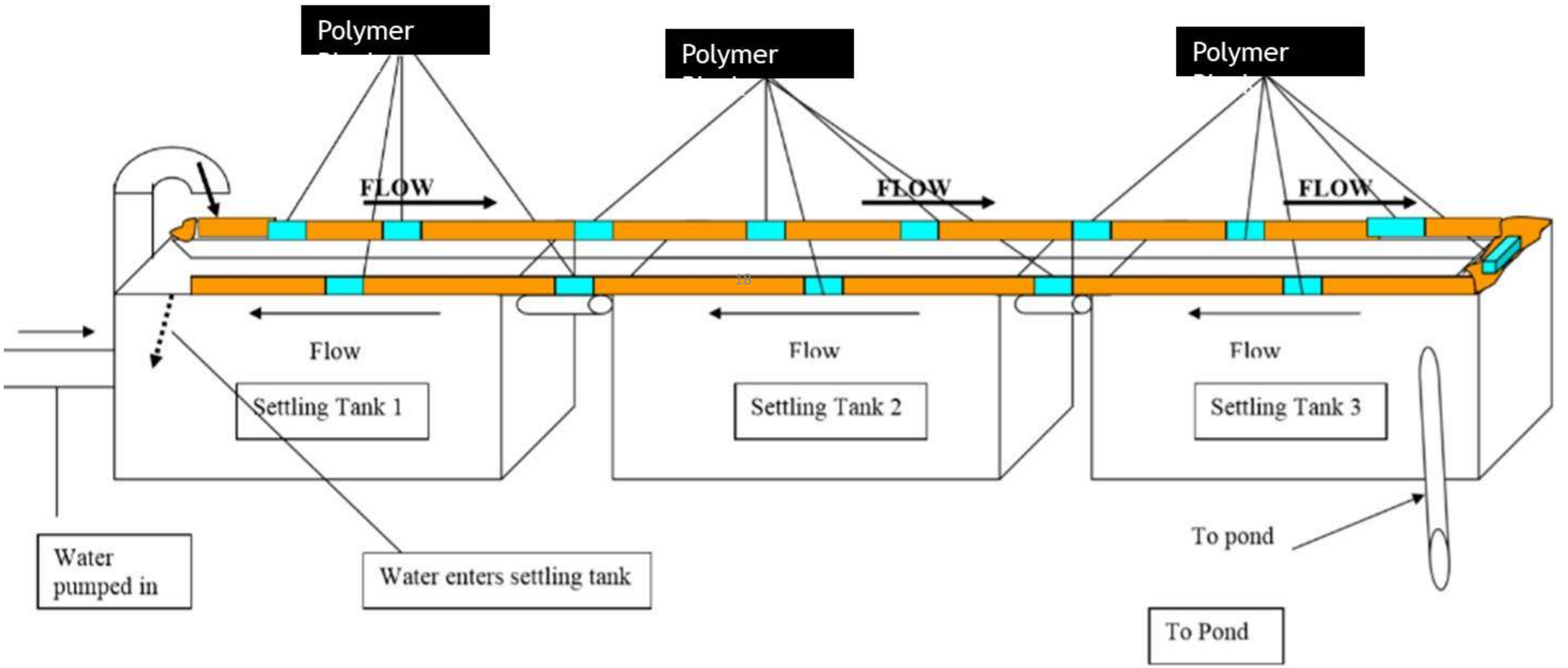
- Turbidity
- pH
- Treatment system footprint

17

Water Clarification Treatment Split Pipe
For use with baker tank

Applied Polymer Systems, Inc.™
519 Industrial Drive Woodstock, GA 30189
678-494-5998 Phone 678-494-5298 Fax info@siltstop.com

Example Only –
Modify design to fit site conditions



Mixing launder system using three tanks in series

20

A mixing launder is a split pipe that sits on top of the tanks and passes water over the polymer floc logs

Floc Logs were matched to dewatering discharge water and included a pH Log (between tanks 2-3) to lower it to match receiving waterbody

Tank one acts as a settling basin and captures large particulate

Tanks 2-3 use particle curtains to capture fine particulate

Tank 3 discharged to a pond where additional Floc Logs treated the final product water

Discharge water was monitored regularly to maintain turbidity reduction target goals.

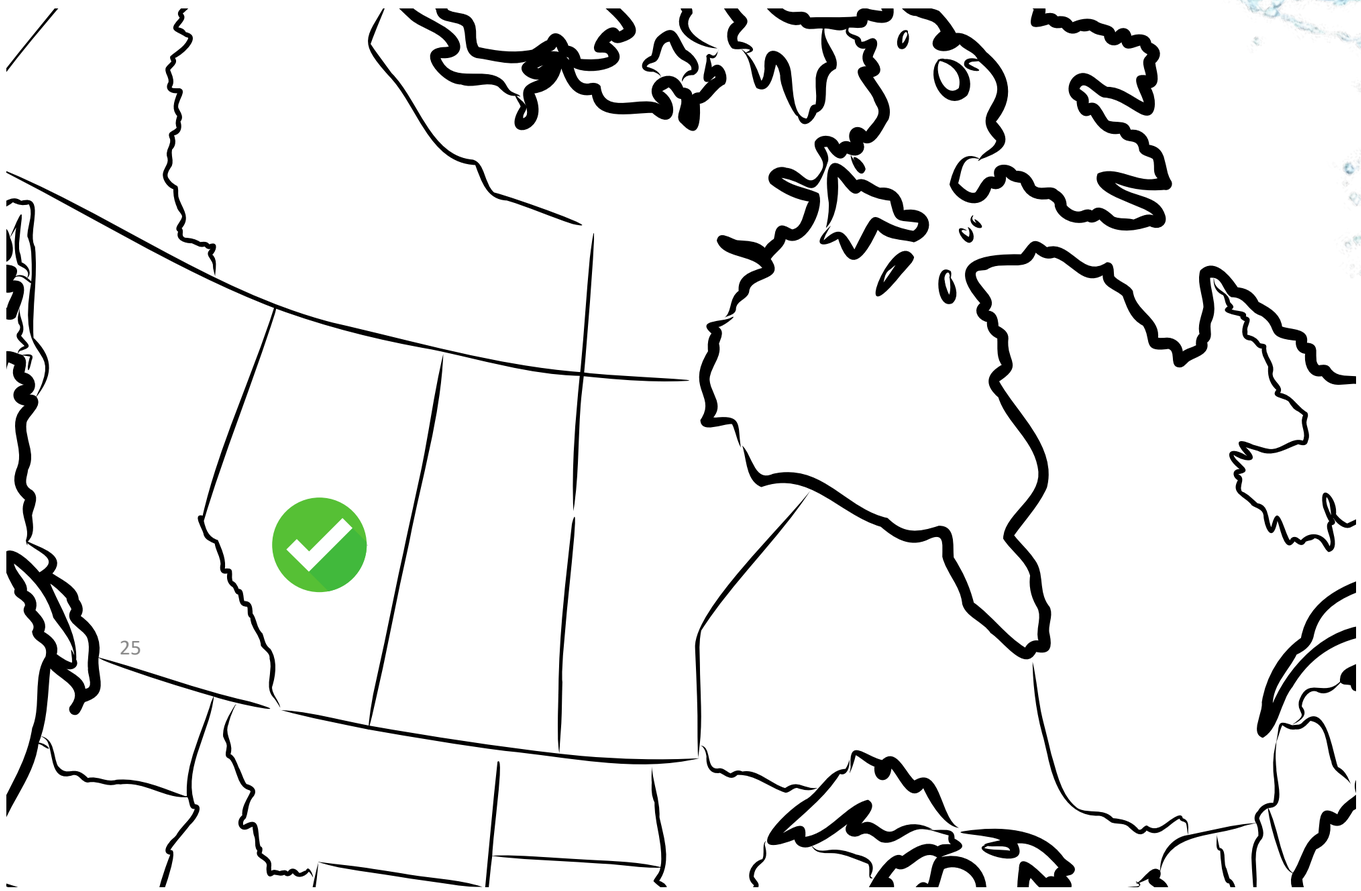
Turbidity Reduction (log scale)

Summary:

- Turbidity reduced to target goals
- pH issue adjusted in treatment system
- Small footprint of treatment system

Project Examples

Edmonton,
Alberta, Canada



Industrial stormwater runoff

Pollutants of Concern:

- Turbidity
- TSS
- Metals

Treatment Train Design:

- Capture metal bound particulate
- Fit within stream channel footprint
- No pumps or tanks for chemical dosing
- System must survive winter with minimal maintenance in spring
- Materials must be non-toxic to aquatic life

A passive treatment system selected:

- Soft armoring along stream channel
- Granular PAM applied to create particle capture system
- Duplex polymer block treatment of water column (703d#3 & 706b)
- Sandbags with Floc Logs at 3-meter (10 ft.) intervals for mixing

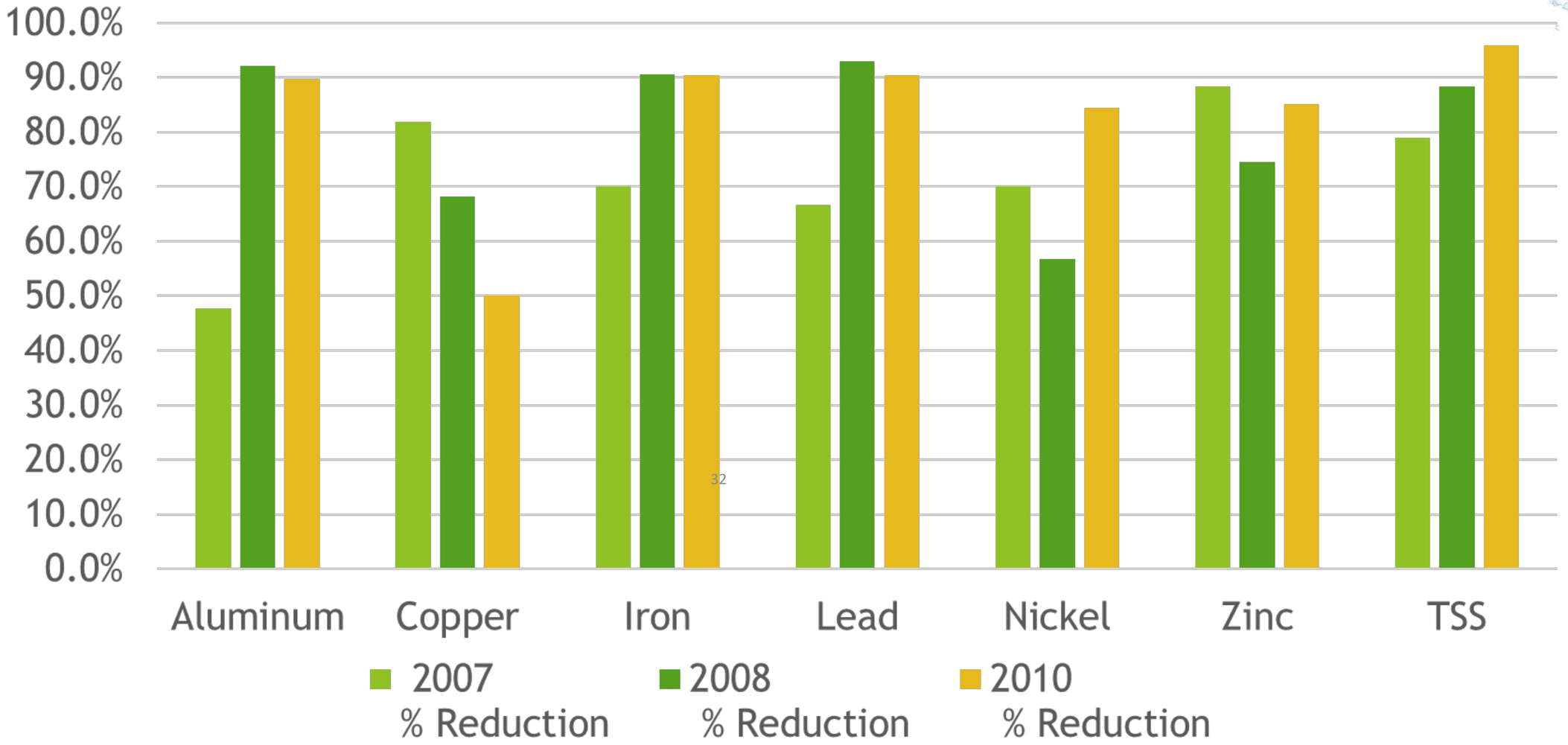
28

Soft armoring applied in stream channel and along embankment

Floc Logs installed in duplex at 3-m intervals

Particulate containing metals captured on jute. Clear water discharge downstream.

Metals Reduction by Year



Summary:

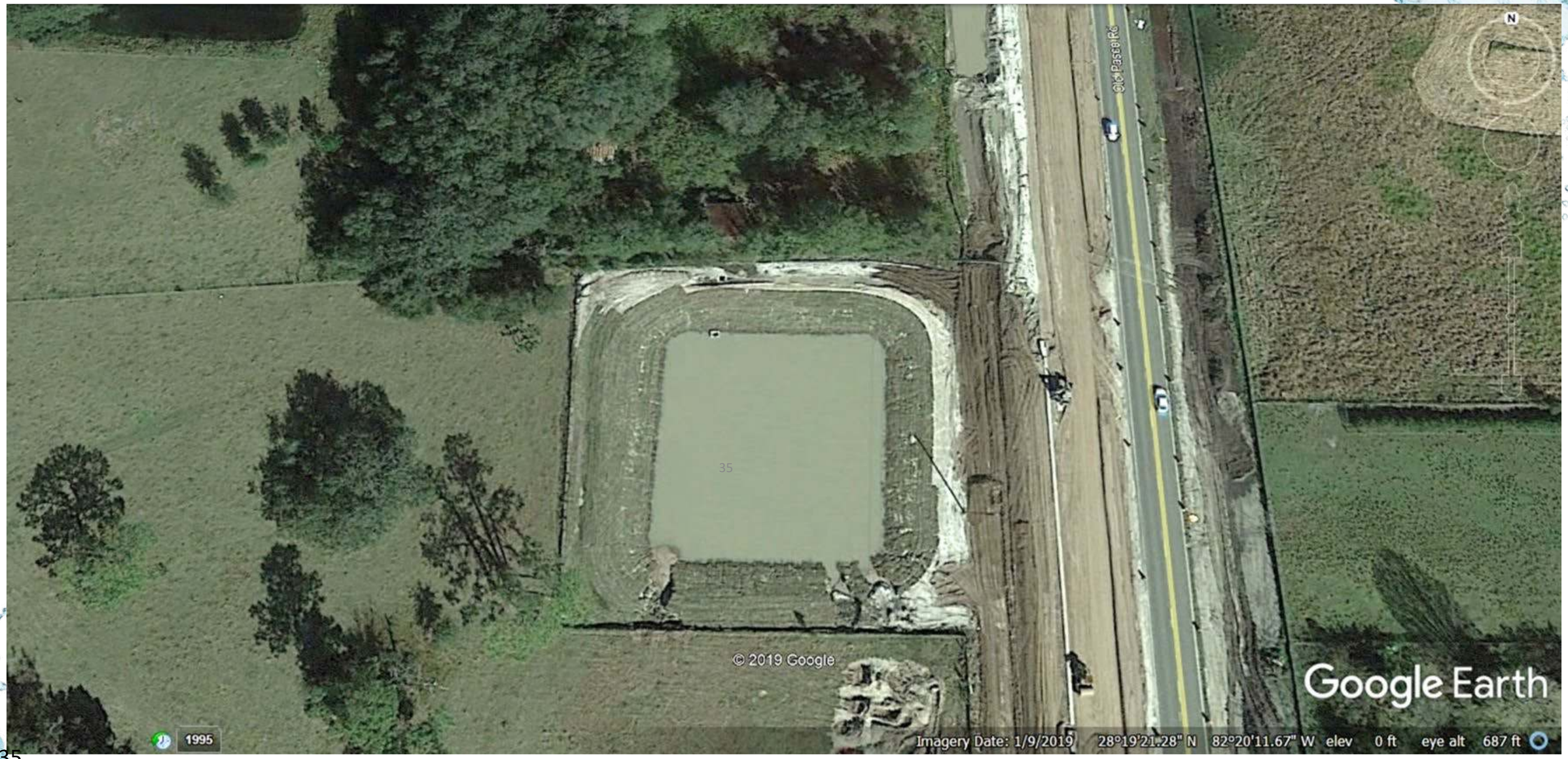
- Metals significantly reduced
- Passive treatment system fit in footprint
- PAMs performed well in cold weather and survived ice/snow
- Future design could harvest metal particulate from discharge

Project Examples

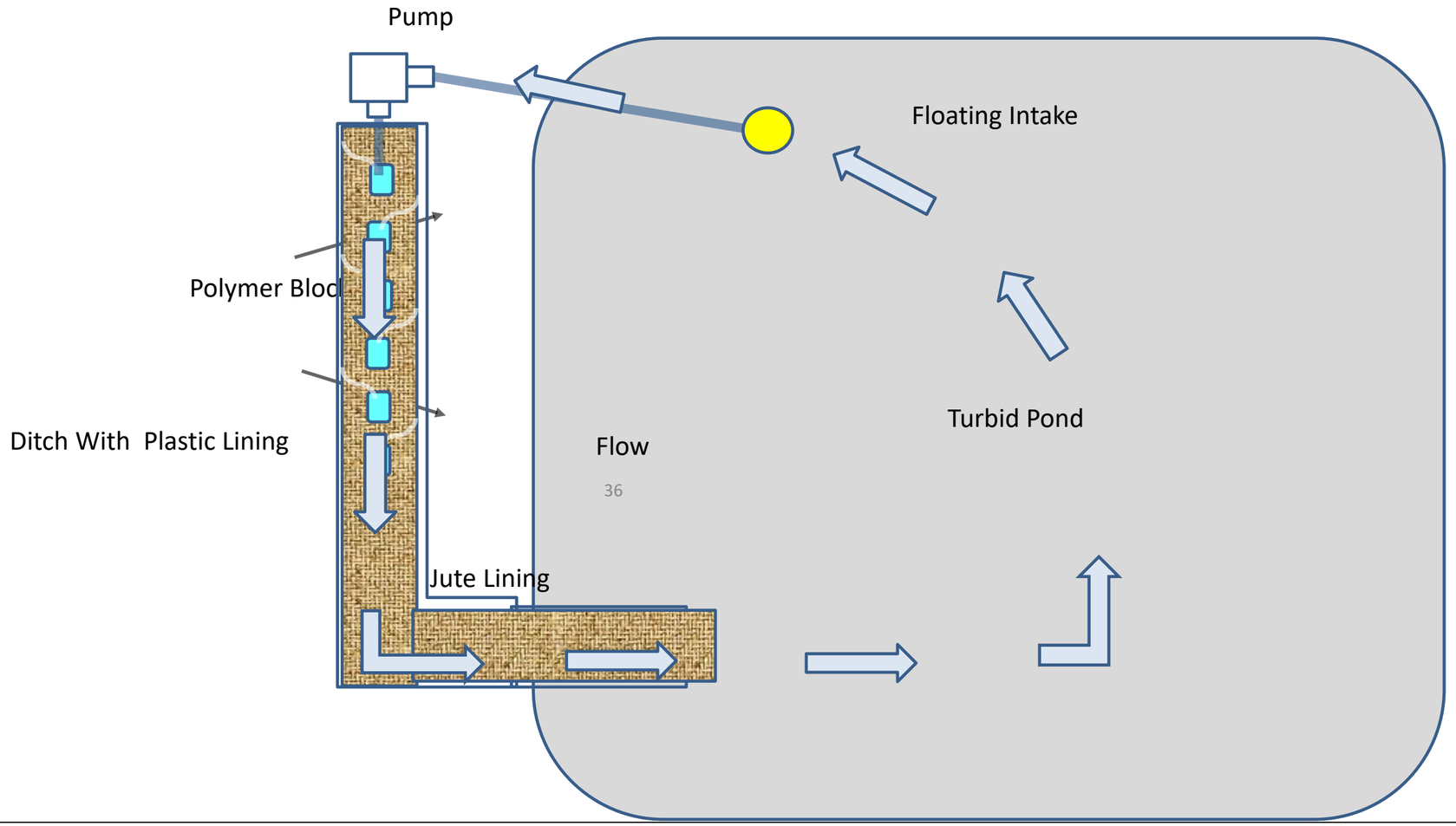
Roadway Project, San Antonio, FL, USA

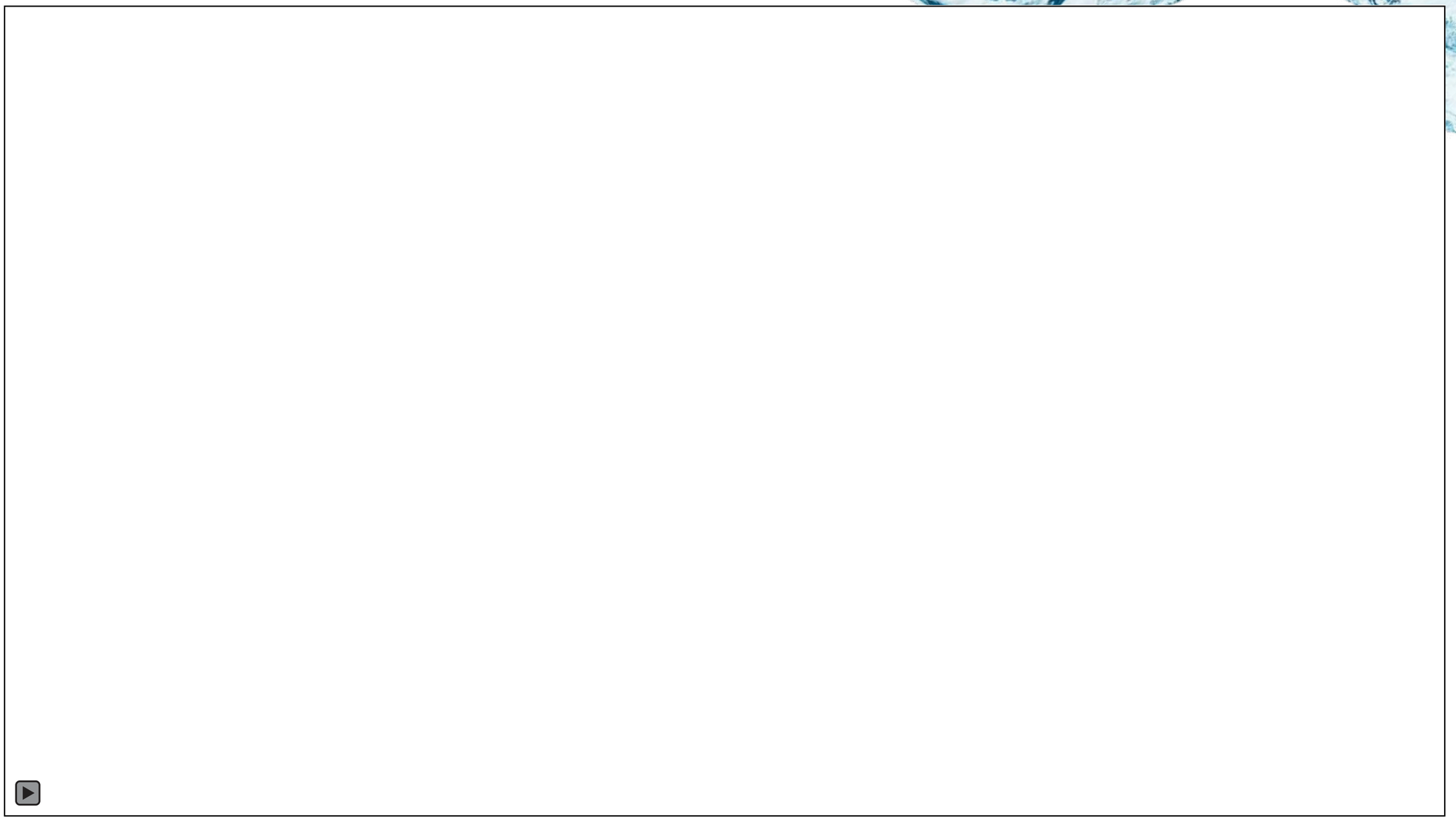
Road infrastructure project with turbid stormwater pond discharging to wetlands

Project Location



Recirculating PAM Treatment Ditch System





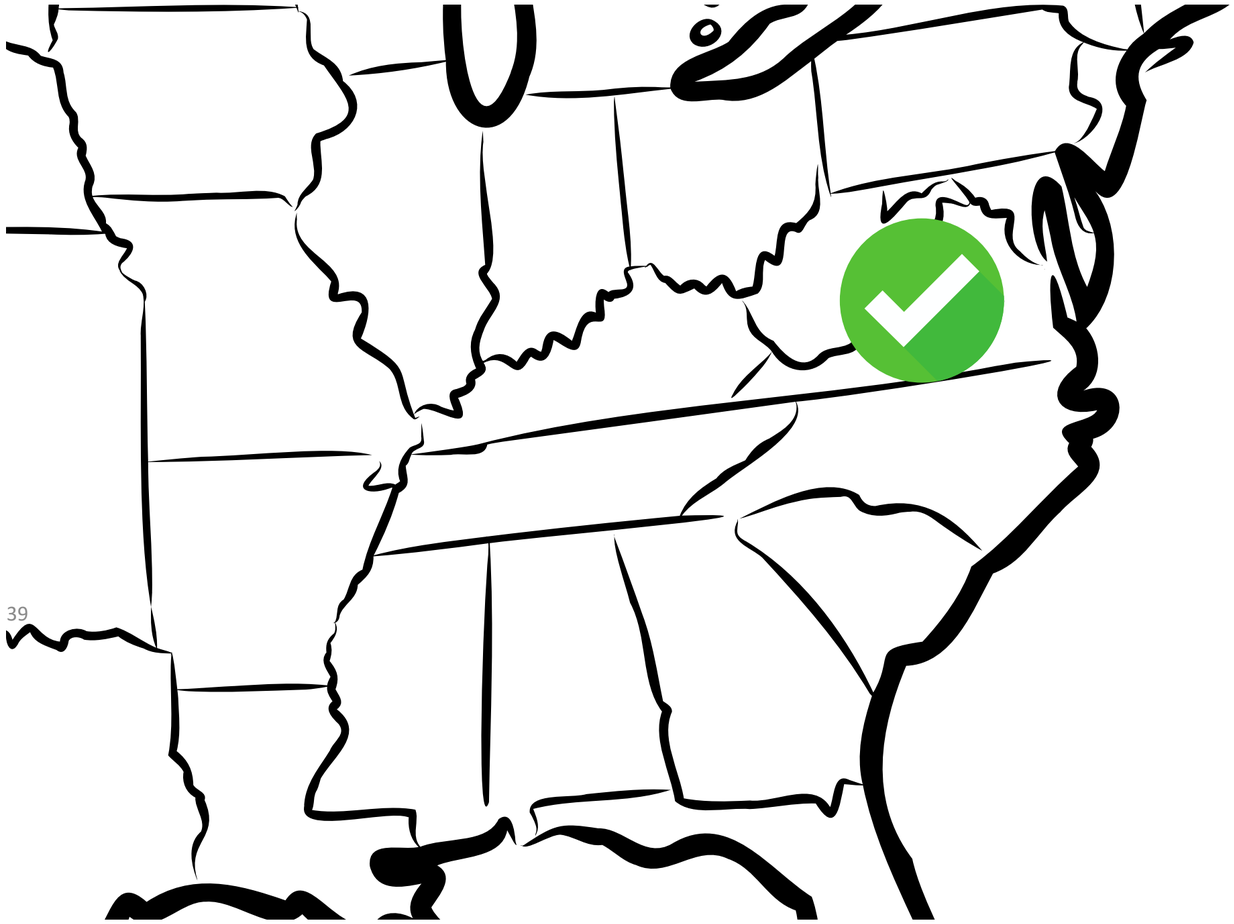
Performance:

- Pond size = 1 acre
- Volume = 2.6 million gallons
- 3-inch trash pump ran at 300 gpm for 6 days
- 2,592,000 gallons water treated
- Final receiving water = 8 NTUs, background = 3 NTUs
- 85-91% turbidity reduction

Project Examples

Pipeline Project, West Virginia, USA

Natural gas pipeline through heavily forested mountains



Pipeline cut through 300 + miles of pristine Appalachian forest ecosystems. Numerous threatened and endangered species. Very steep slopes with silty and clay soils. Standard sediment controls repeatedly failed.

40

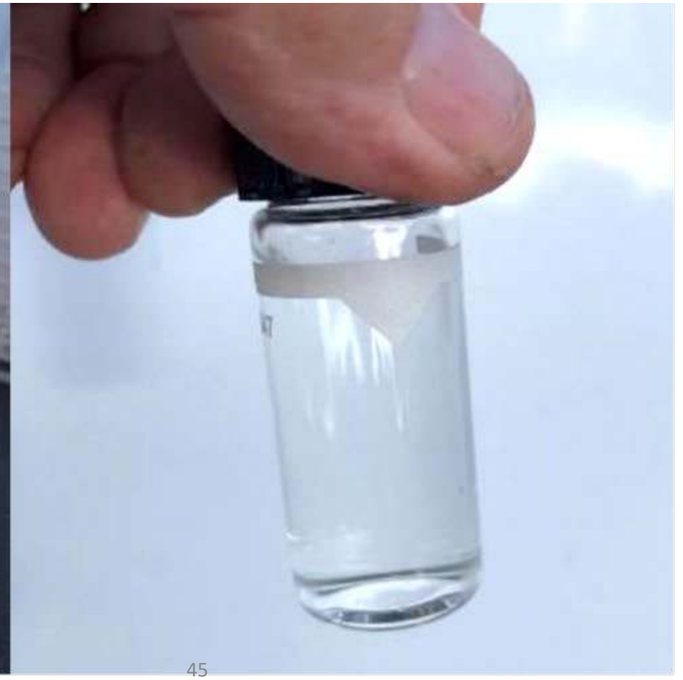
Steep Slopes!

- Turbid water discharge exceeded limits
- Standard BMPs and Dewatering bag did not reduce turbidity
- Numerous water quality violations by Federal/State agencies
- Protests by National/local environmental groups
- Federal government shutdown project

42

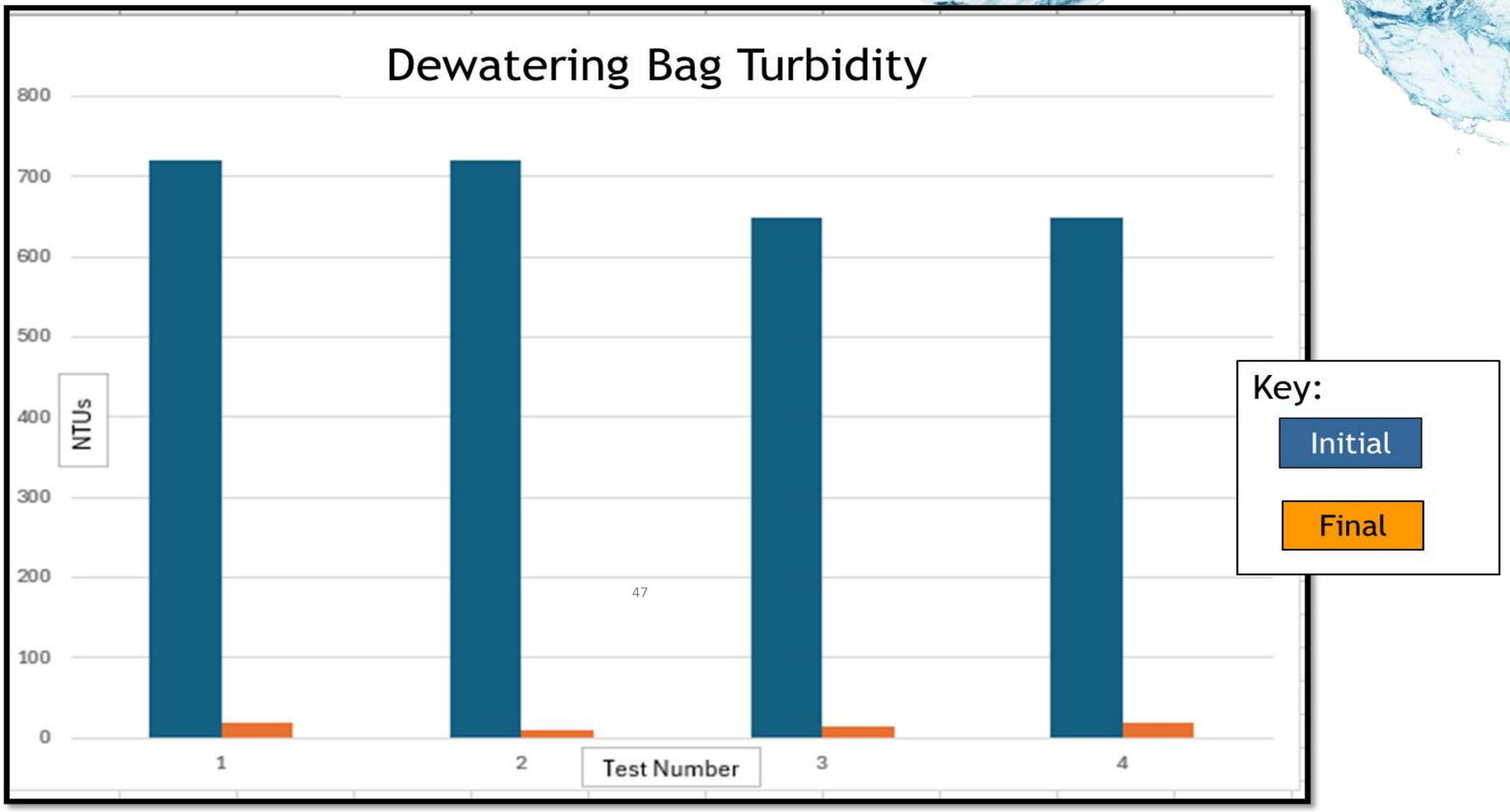
- Turbid water discharge exceeded limits
- Standard BMPs and Dewatering bag did not reduce turbidity
- Numerous water quality violations by Federal/State agencies
- Protests by National/local environmental groups
- Federal government shutdown project

Field Jar Testing



Best Jar Test Results, Measure Turbidity, Record


Permit requirement to use dewatering bag
(problem)


Dewatering Bag Turbidity
800
700
600
500
400
300
200
100
0
NTUs
1
2
3
4
Test Number
Key:
Initial
Final

47

Dewatering Bag Testing:

Test	Test 1 with polymer inside containment
Discharge	Clear discharge over jute/polymer
Test	Test 2 no polymer inside containment
Discharge	Clear discharge over jute/polymer

48

Dewatering Bag Within Containment

Mixing/Dosing With Floc Logs

Particle Capture On Jute Matting

200-300 Polymer Treatment Systems Constructed Along Pipeline Route

Polymer treated water discharge

54

Conclusions:

- Bags convert concentrated flow to sheet flow
- Polymers downstream of bag work
- No compliance issues/ No bag failures
- Water treatment team highly skilled in matching polymer blends
- Water treatment discharges were single digit NTUs
- Success!

Project Examples

Orlando, Florida, USA

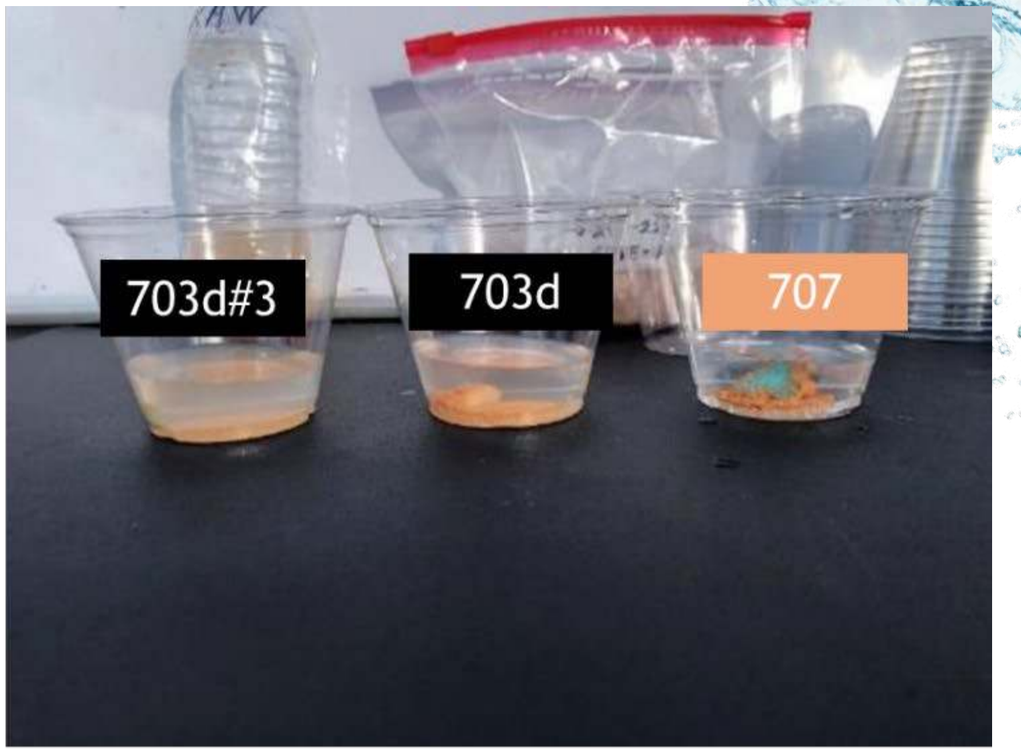
Three-phase apartment project with surrounding wetlands, intensely monitored


Grande Pines Apartments
Protected
Wetlands
4418 ft
Google Earth

Wellpoint System Usually Produces Clear Water Discharge. Site Groundwater Contained High Turbidity (82 NTUs).

Site Discharged To Existing Stormwater Ponds And Then To Sensitive Wetlands That Were Highly Protected And Monitored By Orange County EPD.

60



Needed to Create a Soil-Matched 707 TurboFloc Log

Custom Logs Installed Within TurboFloc System And Pumps Turned On To Start Dewatering Operation.


62


Initial Discharge 13 NTUs
LaMotte
12.7 NTU
2020we

Final Discharge 6 NTUs

Conclusions:

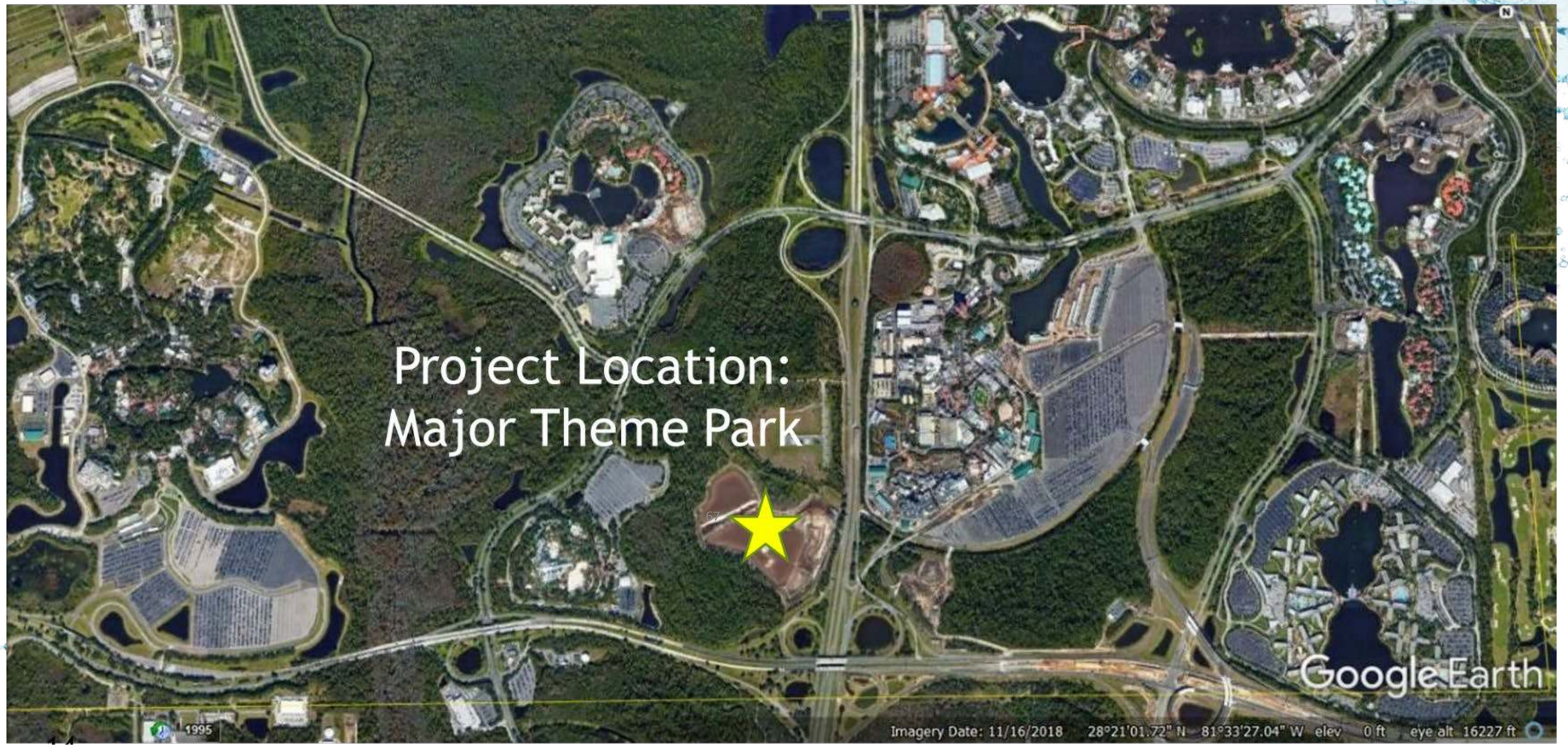
- Soil/Water Testing Determined Need For Customized TurboFloc Log
- TurboFloc PAM System Adequately Dosed Turbid Water
- Jute Particle Capture Added Another Layer Of Treatment
- Final Discharge 6 NTUs, 93% Reduction
- Wetlands Protected
- Client Happy

65

Project Examples

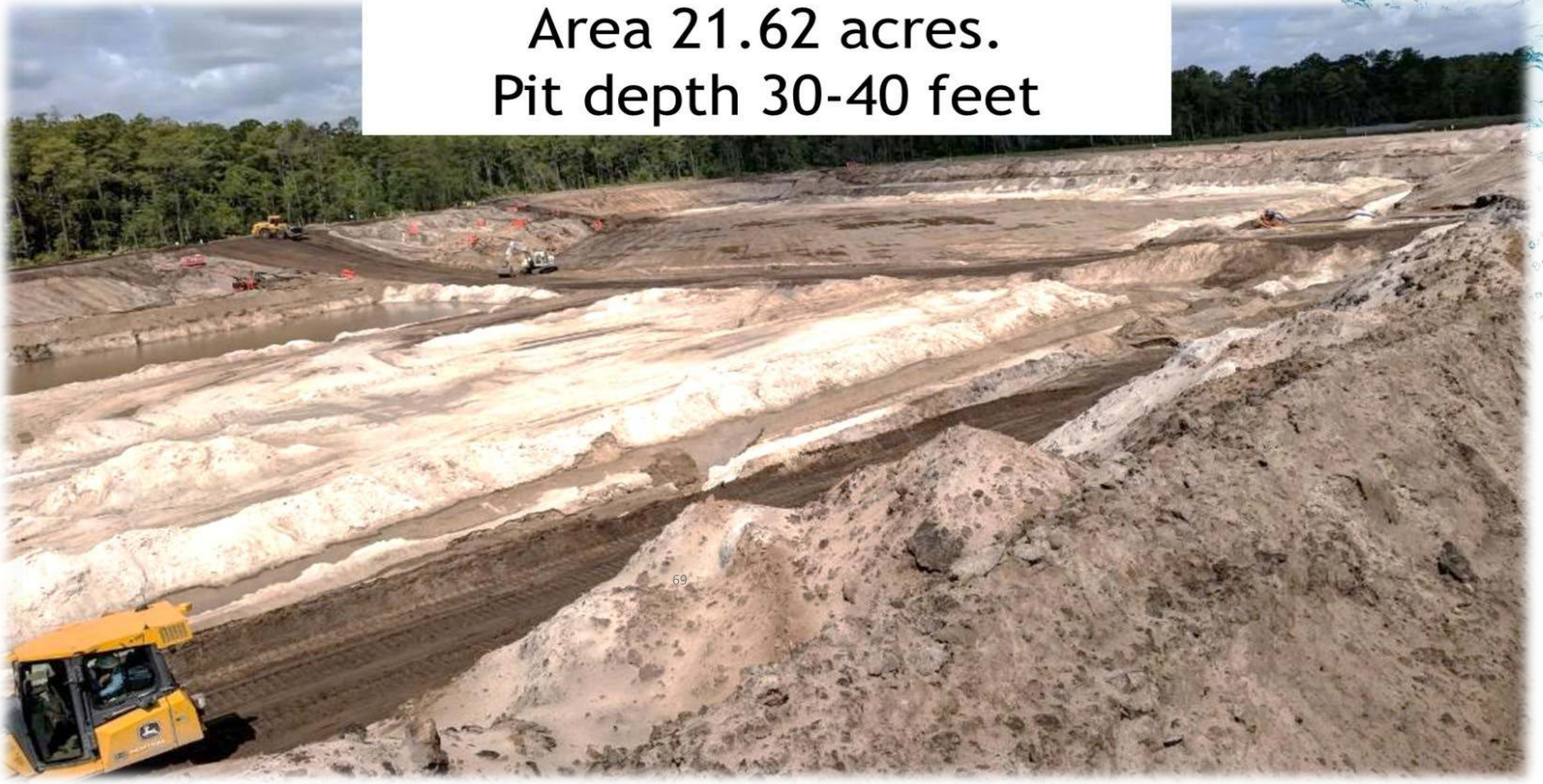
Orlando, Florida, USA

Excavation of fill material for new ride project with surrounding wetlands, intensely monitored


Project Location:
Major Theme Park
Google Earth
1995
Imagery Date: 11/16/2018 28°21'01.72" N 81°33'27.04" W elev 0 ft eye alt 16227 ft

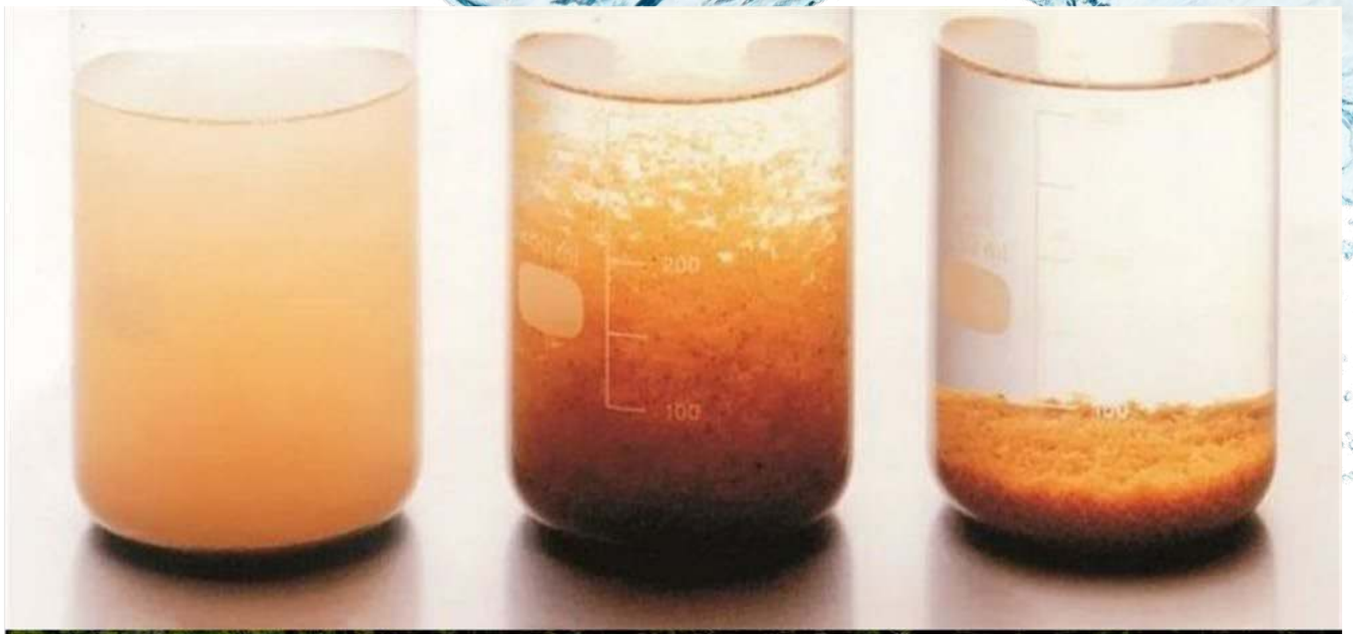

Sand Mine Pit For New Attraction
Google Earth
1995
Imagery Date: 11/16/2018 28°21'13.77" N 81°33'45.22" W elev 0 ft eye alt 2732 ft

Area 21.62 acres.
Pit depth 30-40 feet



Turbid water (300-400 NTUs)
Volume approximately 300 million gallons

ALUM TREATMENT PERFORMED ON POND



Hurricane Irma
Sep. 2017

72

12-inch rain event flooded the pit and shut down work

Turbid water (300-400 NTUs)

Volume approximately 300 million gallons

Pond Flooded. Containment Lost. Alum Ineffective Due To Loss Of Settling Area.

Polymer Mixing Inside Of Pipe

500-1,200 GPM Flow Rates per unit

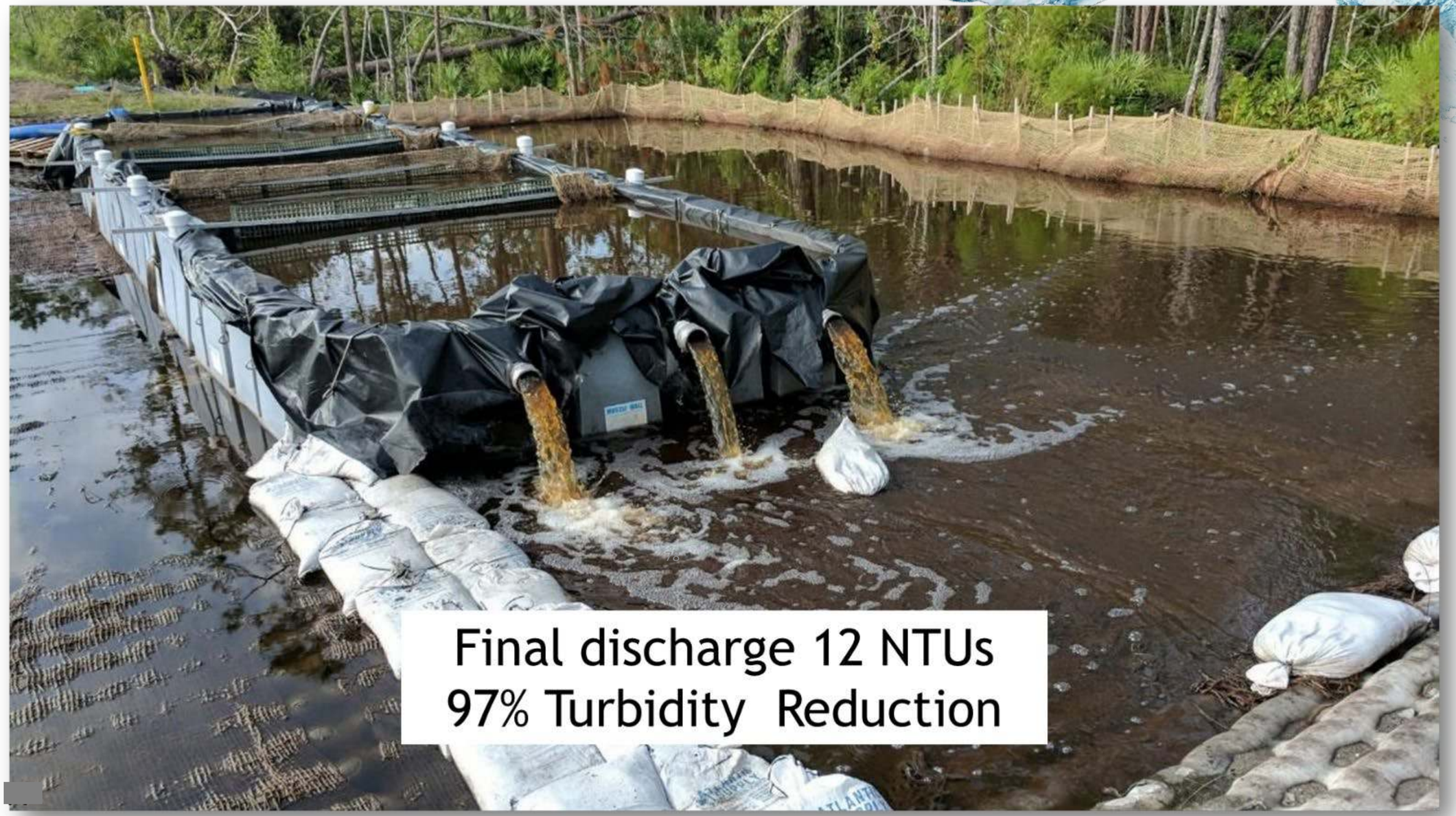
Pipe Mixing Systems

Advanced Treatment

Treatment systems were connected in a series for higher flow rates

Modular Particulate Capture System

Floc Pit Installation

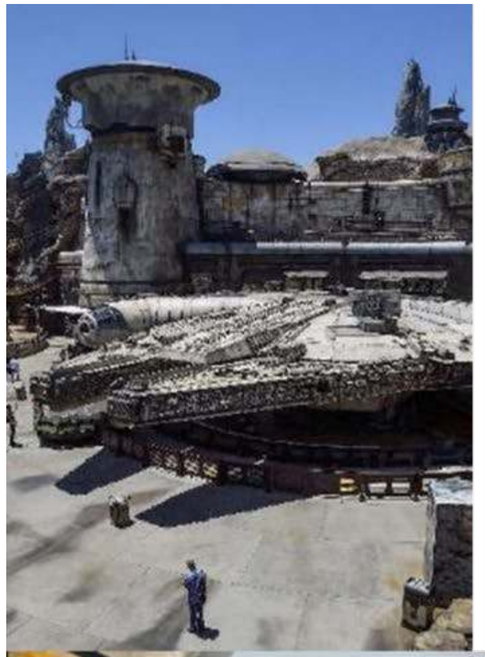

Final discharge 12 NTUs
97% Turbidity Reduction


10/2019
Magellan
Cypress Dr
World Dr
S Orange Blossom Trl
Pkwy
79
Finished pond
Google Earth
1995
Imagery Date: 10/10/2019 28°21'07.55" N 81°33'51.48" W elev 0 ft eye alt 4678 ft

DETAILS:

- 540,000 gph x 24 hours =12,960,000 gpd
- 12,960,000 x 180 days =2.3 billion gallons pumped
- Final discharge 12 NTUs (target limit 32 NTUs)
- 97% Turbidity Reduction

80



Highly successful project!

Anionic PAM Blends Summary:

- Versatile, adaptable, scalable, allowing construction in sensitive areas
- Applied directly to soil, static or flowing waters, and ponds
- Performance testing assures best results
- Training enhances success
- Toxicity testing protects aquatic[82] life
- Reduce metals, TSS, and turbidity in extreme and remote areas

EPA United States Environmental Protection Agency

All APS products meet or exceed the requirements of the EPA Construction General Permit for chemical treatment of stormwater from construction activities using anionic polyacrylamide (Effective 2022).

NSF/ANSI/CAN STANDARD 60

ANIONIC PAM SAFE FOR FISH

TOXICITY TESTED PER EPA STANDARDS

SITE SPECIFIC TAILORED FORMULAS

SILT STOP® 700 SERIES POWDERS

FLOC LOG® 700 SERIES LOGS

POND LOG® 800 SERIES LOGS

SILT CLEAR™

TURBOFLOC


OUR VISION IS CLEAR!
APPLIED POLYMER SYSTEMS
www.apsfloc.com
Phone: 678-494-5998
info@apsfloc.com
Eddie Snell
404-915-9165
eddie@apsfloc.com

SOURCE TO STREAM 2025 Conference

Canada's Premier Stormwater and Erosion and Sediment Control Conference

Thank you to our sponsors!

EXECUTIVE SPONSORS

ADS – Our reason is water.

Aquafor Beech Limited

citygreen – Urban Landscape Solutions

CUPOLEX® – Engineering Solutions Inc.

ENVIROPOD™

NEXT STORM

Oldcastle Infrastructure – A CRH Company

PERMACON

Sustainable Technologies Evaluation Program

StormTrap – Modular Concrete Stormwater Management

terrafix geosynthetics inc.

MEDIA SPONSOR

Environmental Science & Engineering Magazine

HOSTS

Presented by:

Toronto and Region Conservation Authority

In association with:

Lake Simcoe Region conservation authority

Credit Valley Conservation – inspired by nature