

ADOPTION OF SMART STORMWATER PONDS IN FLORIDA

2021 Florida Stormwater Association Winter Conference
December 1 - 3, 2021

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Addressing Stormwater Challenges



Resilience & Innovation Real-Time Control Systems

Impacts from climate change will have variable effects on the form and frequency of extreme events across the nation. To withstand these effects, stormwater infrastructure should be implemented with a context-sensitive approach, namely a localized understanding of flood risk in combination with an awareness of land-use practices and regulatory expectations. This approach should inform the types, designs, locations, and long-term sustainability of stormwater systems. Resilience for stormwater infrastructure should increasingly reflect a mix of optimized green, gray, and natural infrastructure, land planning and urban growth, updated asset management, and, in water-scarce areas, the productive reuse of stormwater.

Current innovations include the use of real-time control systems that leverage complex modeling, cloud computing, data storage, and predictive analysis. Large datasets can be used to optimize the capacity of stormwater conveyance, storage and treatment systems, investments in O&M activities, and other costs. The affordability of sensors has also improved, expanding the potential for system implementation of real time data and control.

Finally, some areas employ a regional approach to stormwater management through volume and nutrient trading within watersheds. This can economically incentivize stormwater innovation.



OptiCumulus
Continuous Monitoring



OptiNimbus
Continuous Monitoring
and Adaptive Control



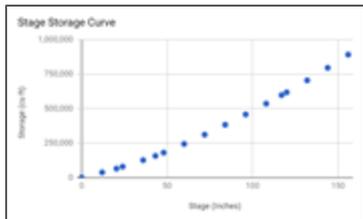
Opti Platform

 Beaver Creek
Trunk Lines

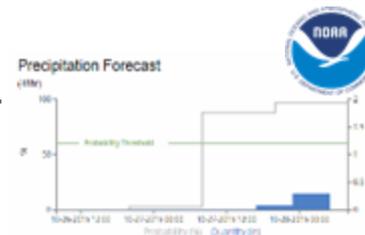
 Beaver Creek
Sewershed



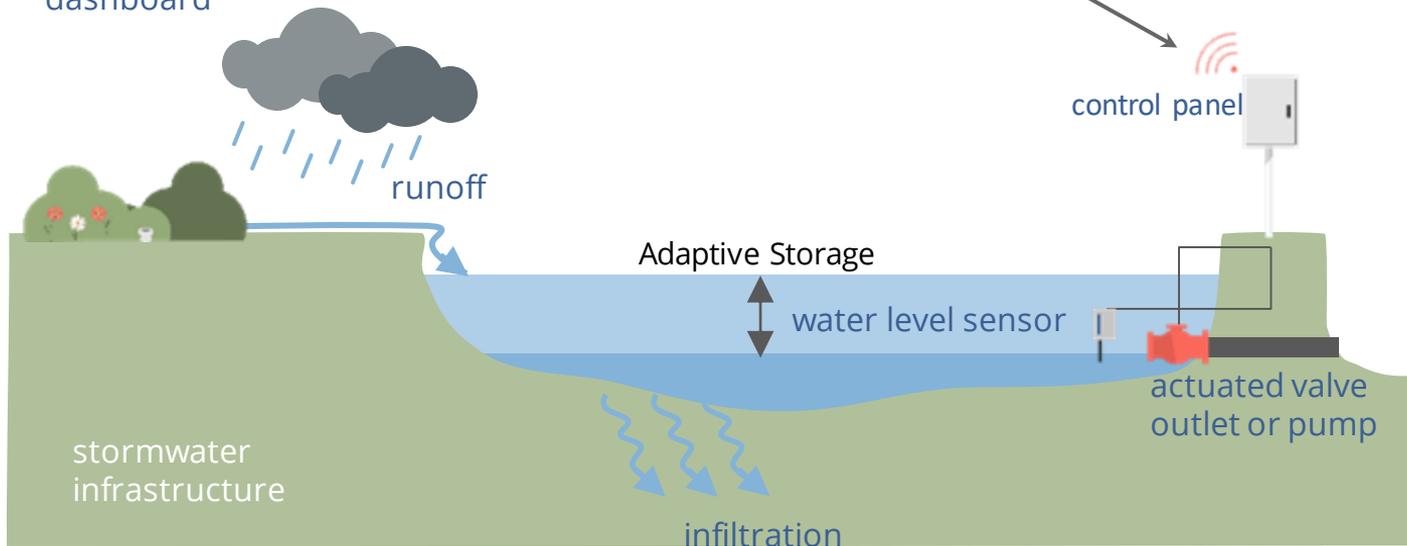
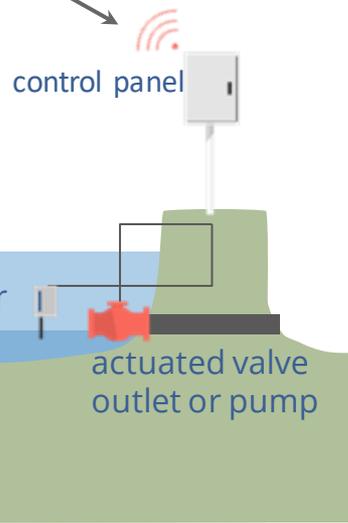
Continuous Monitoring and Adaptive Control



web-based dashboard



Real-Time Inputs → Model → Output

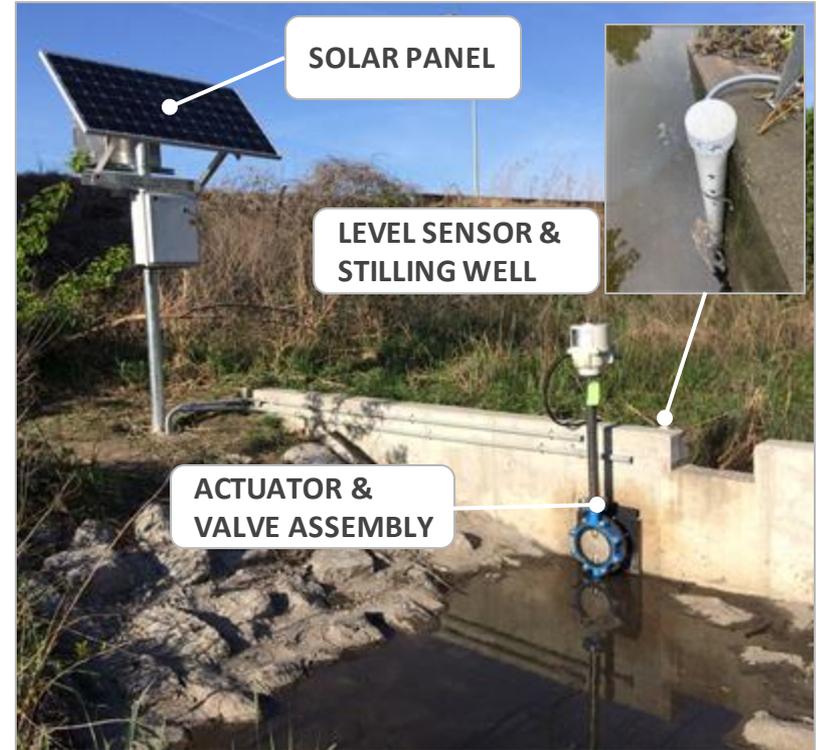
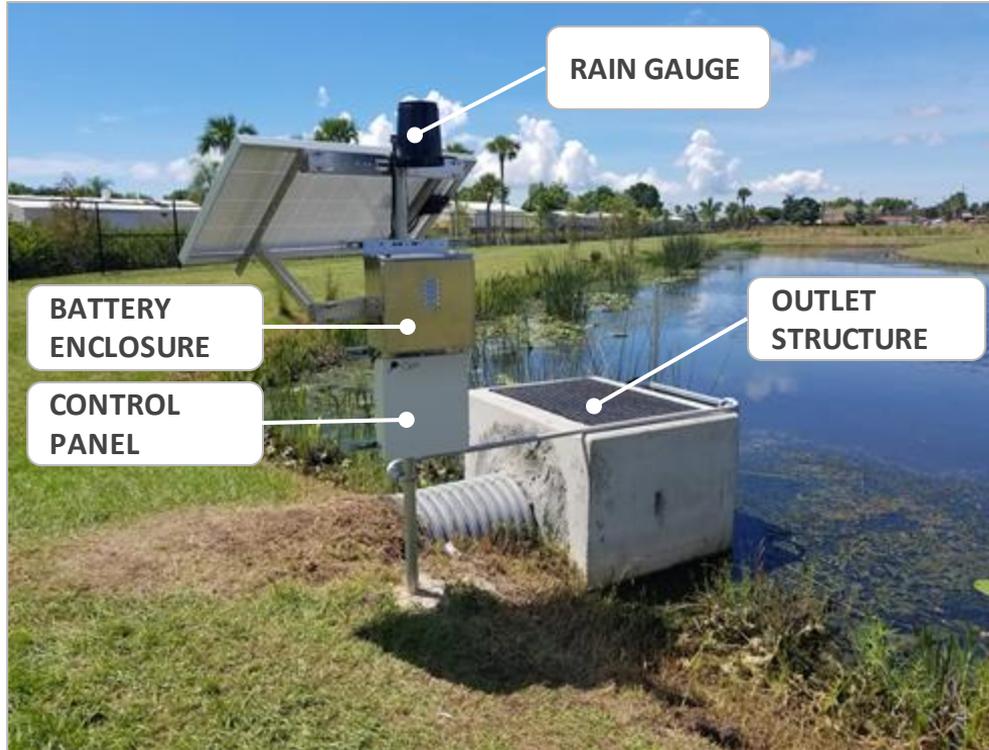


Product Configuration

Example Parameters

- Watershed Area
- Impervious Area
- Valve Diameter
- Overflow Invert
- Peak Discharge
- Retention Period
- PoP Threshold

Field Equipment



Data-Driven Behavior

MANUAL
OVERRIDE

CURRENT
CONDITIONS

FORECAST
VIEW

ONLINE
STATUS



MANAGED
STORAGE

CUMULATIVE
RAIN GAUGE

VALVE
POSITION

Albany, NY



Economic

+90% Savings

Compared to passive construction



Resilient

89% Flow Capture

Average annual wet weather performance

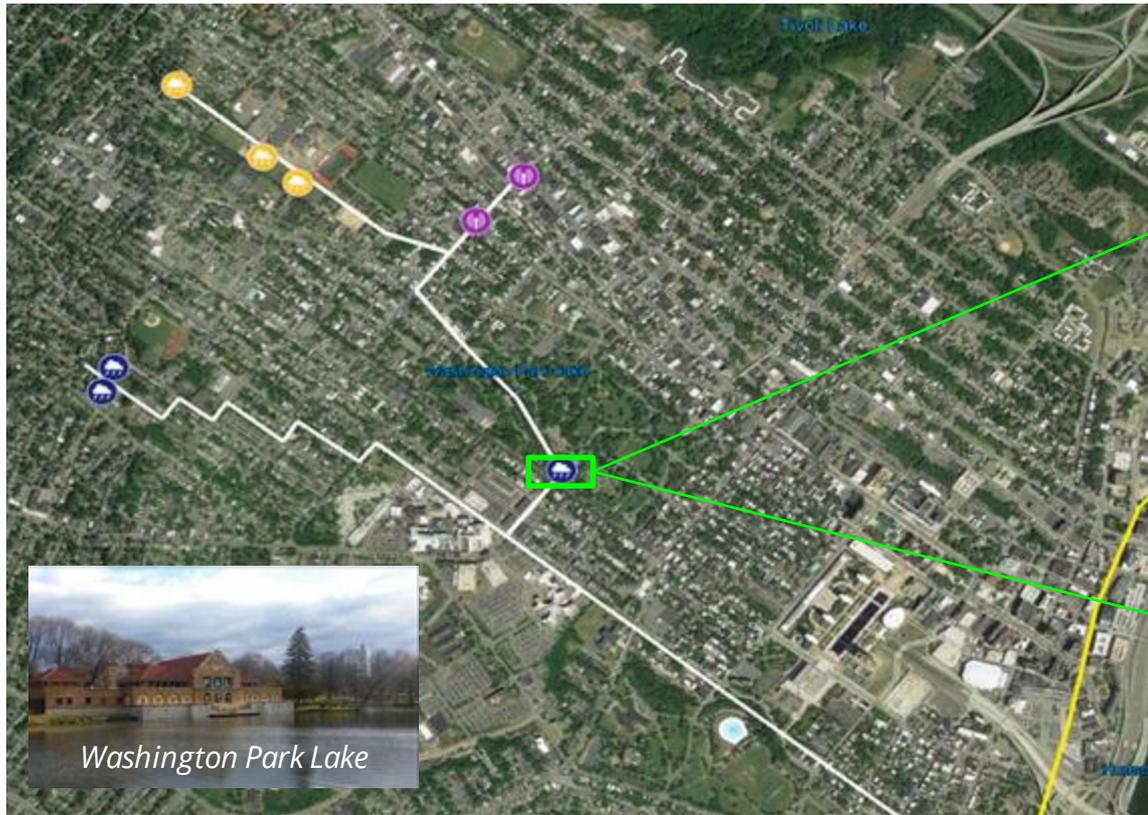


Peace of Mind

Improved Customer Service

Public safety and real-time reporting

Washington Park Lake: Existing Storage

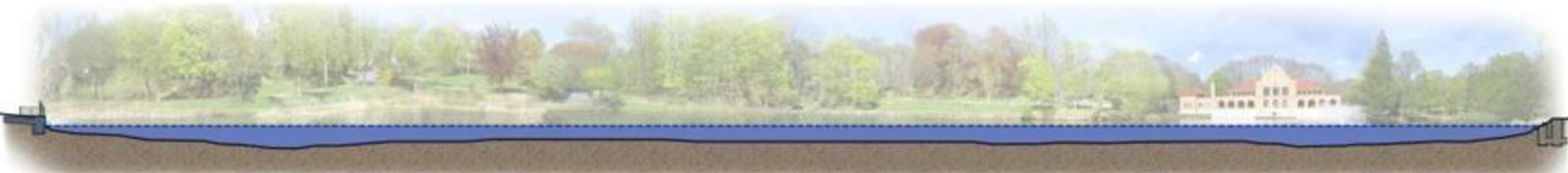


Washington Park Lake Enhancement

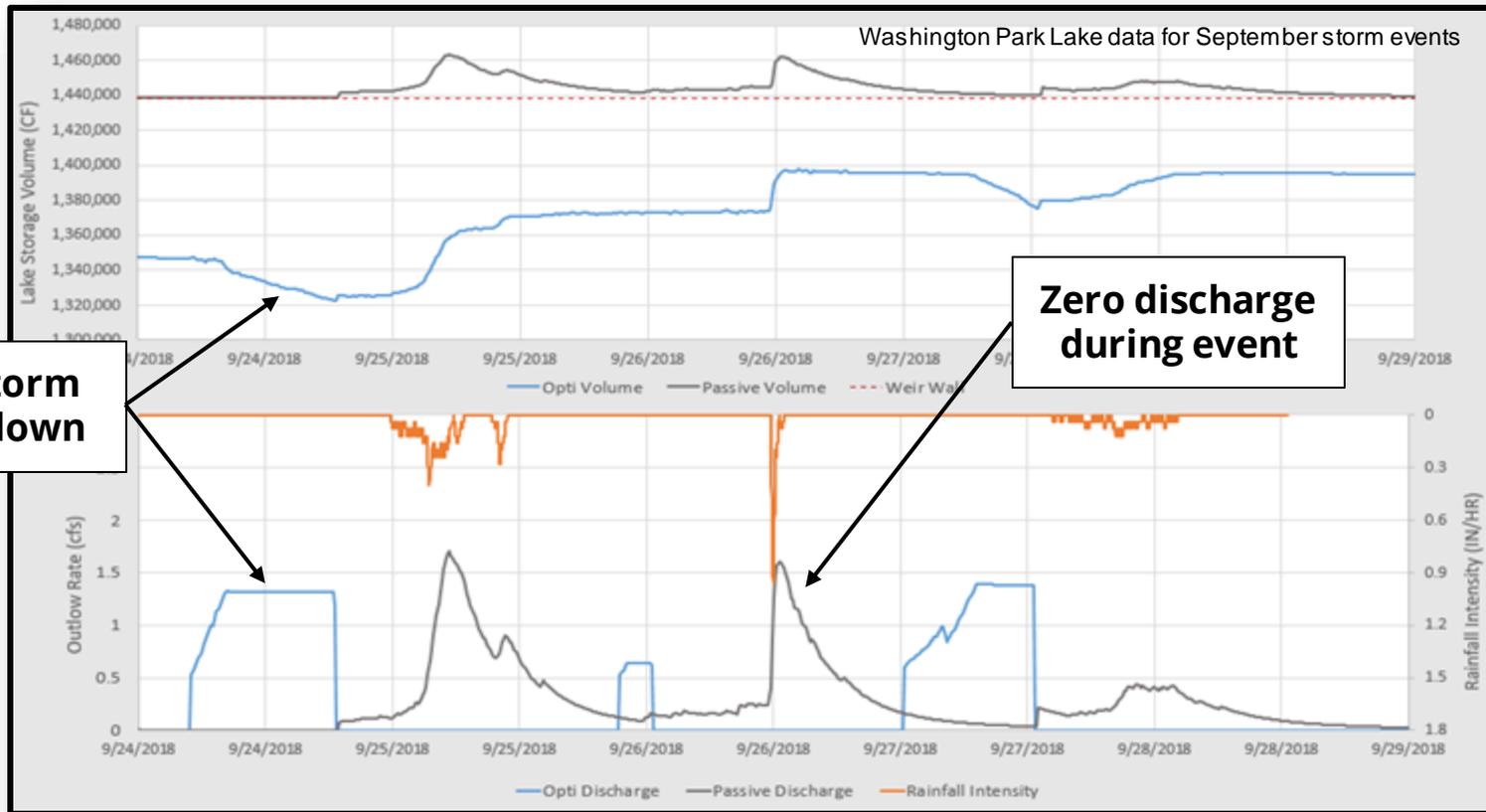


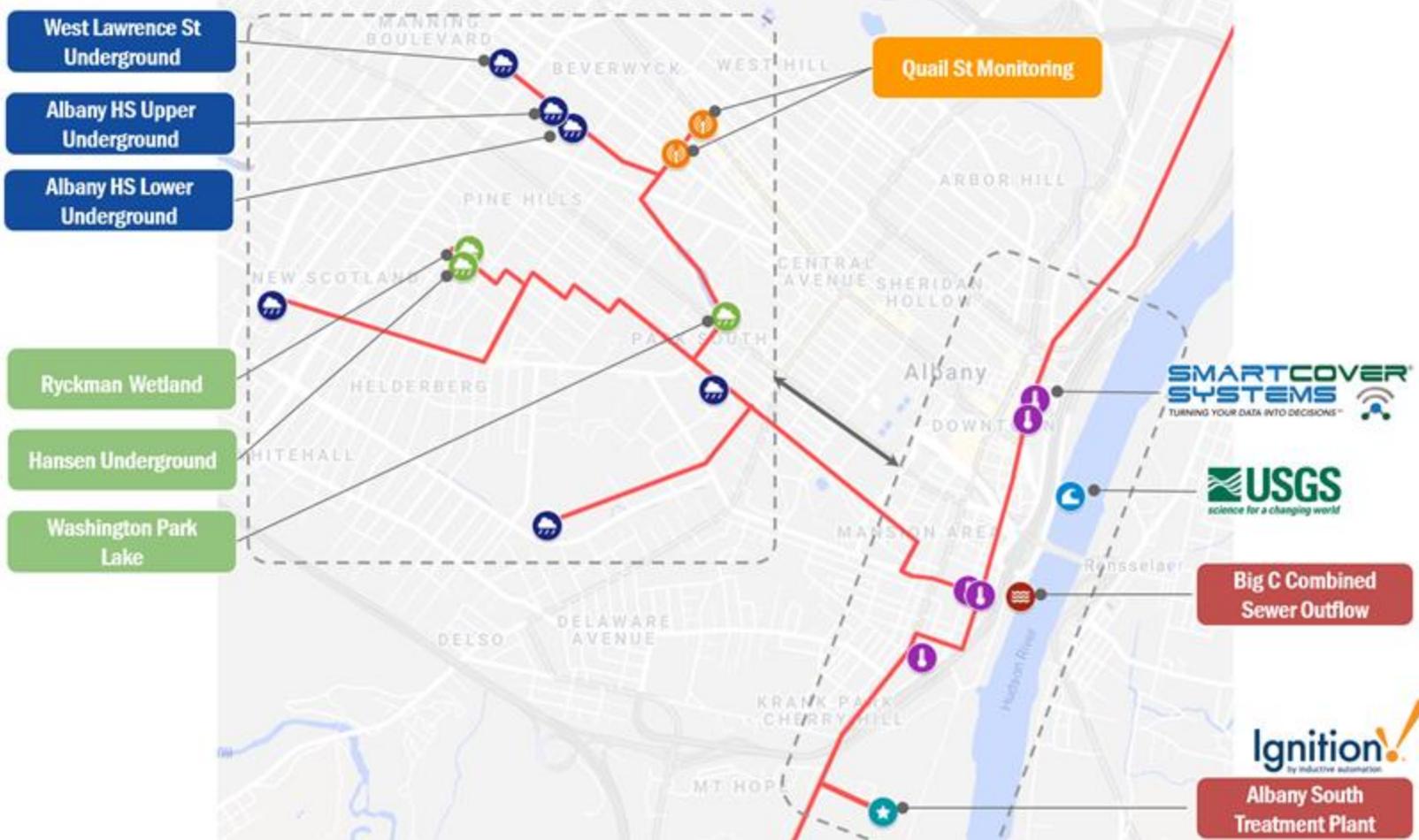
Quick Stats

- Online since 2017
- 102.6 Acres of drainage
- 9,000,000 Gallons of active storage
- **89% Annual wet weather capture**



Optimized Behavior

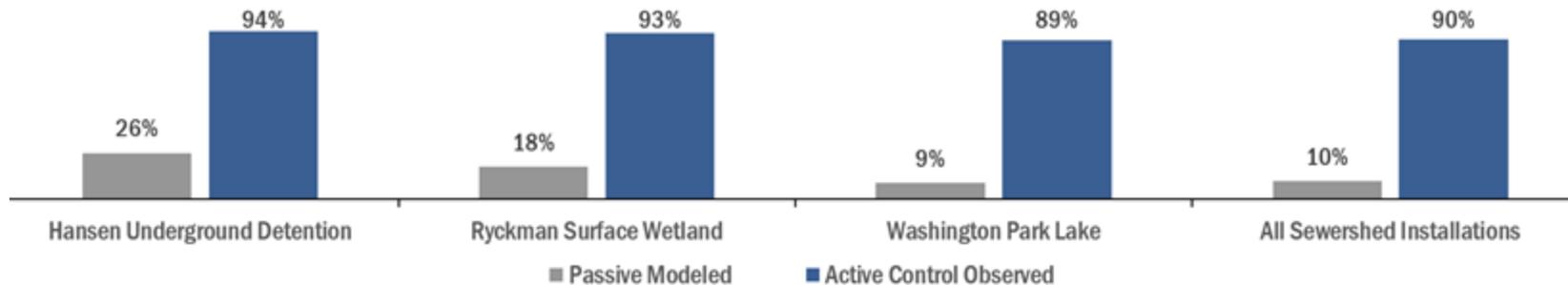




Community Benefits



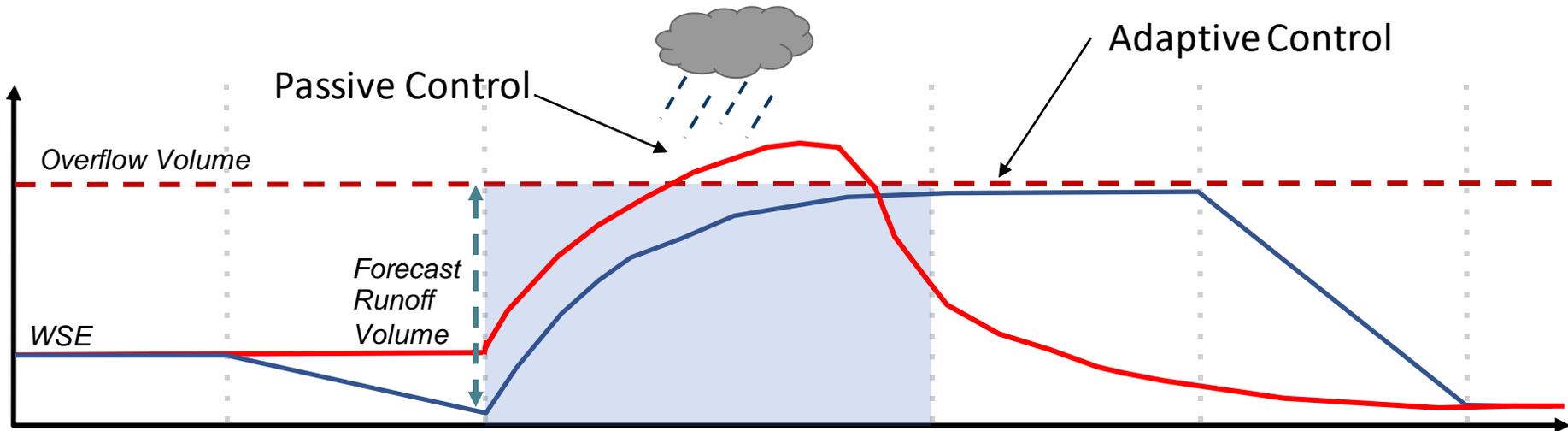
Wet Weather Flow Volume Reduction





Improving Water Quality in Florida

Optimized Storm-Based Control



Dry Weather
Volume at Pre-Storm State

Forecast Period
Pre-Event Drawdown if Necessary to Fully Capture Storm

Wet Weather
Minimum Discharge During Storm Events

Post-Event Retention
Hold Water to Settle Nutrients and Reduce Outflow

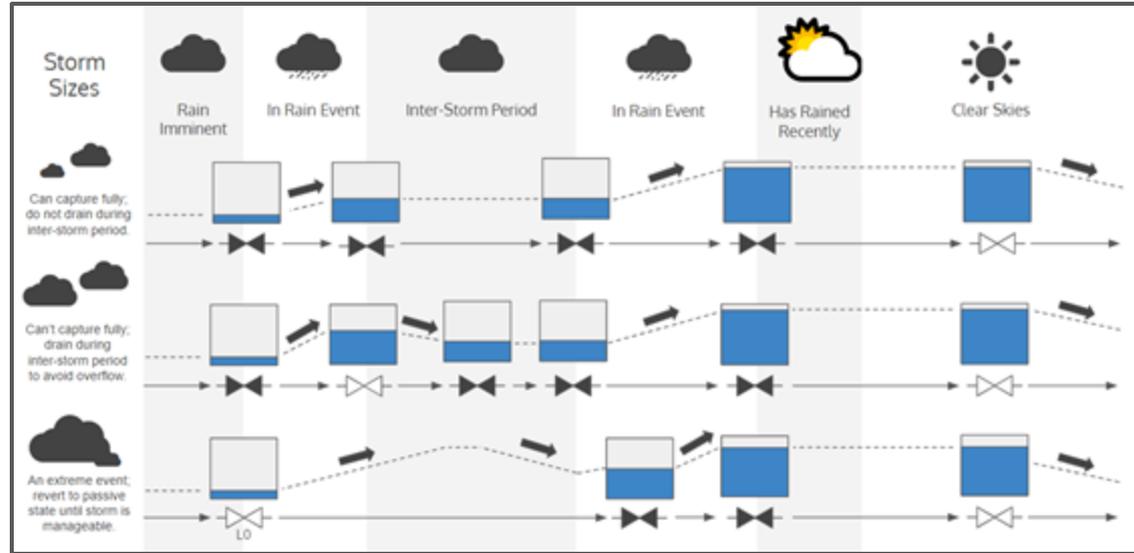
Post-Retention Drawdown
Controlled Release

Control Decisions are Continuously Updated

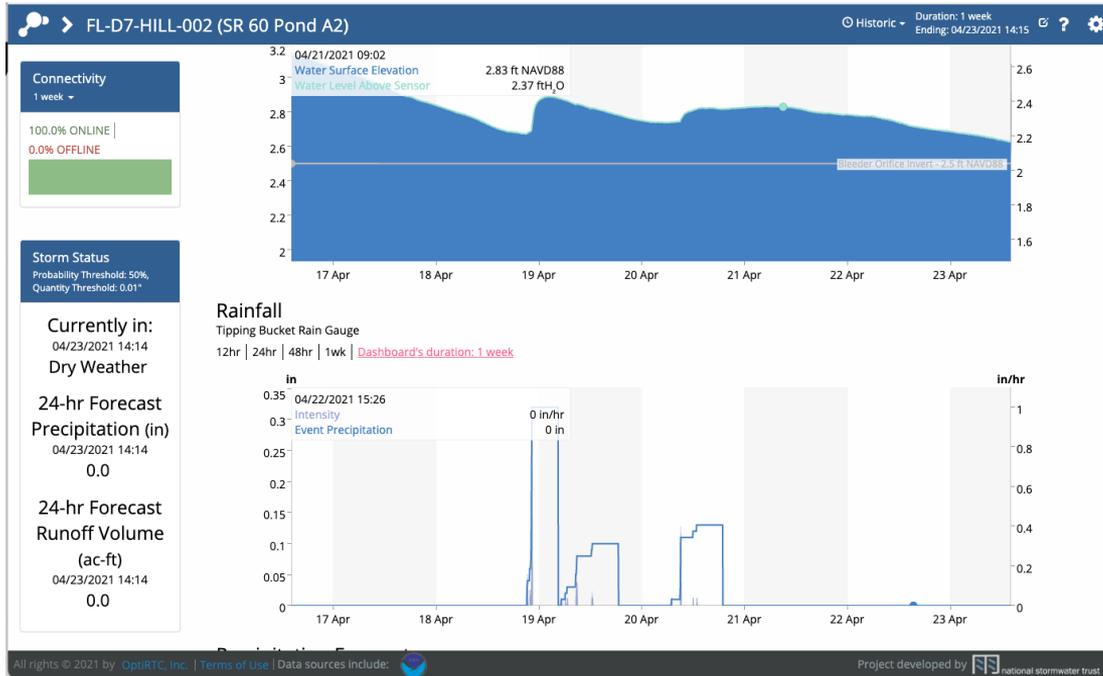
In a 24-hour period, there are...

- 96 weather forecasts
- 4,416 monitored input data points
- **1,440 control decisions**

... for one facility



Dashboard

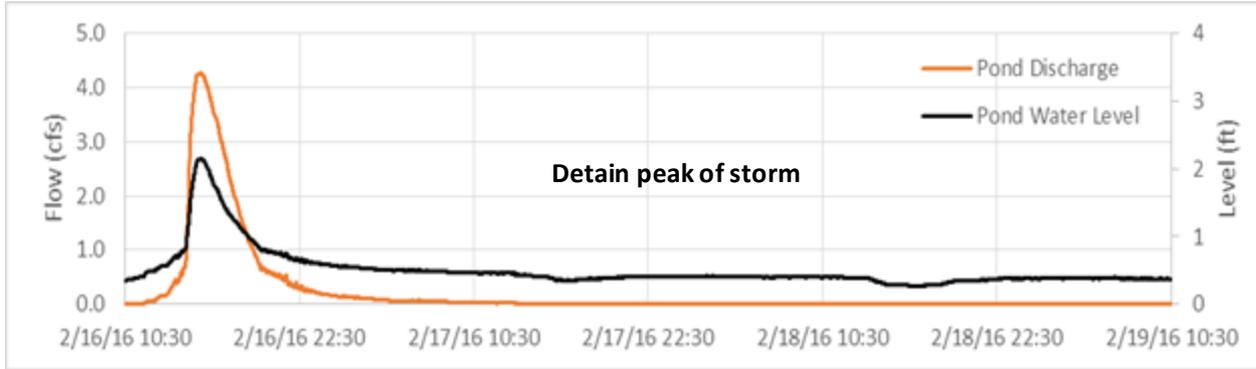


CMAC Benefits

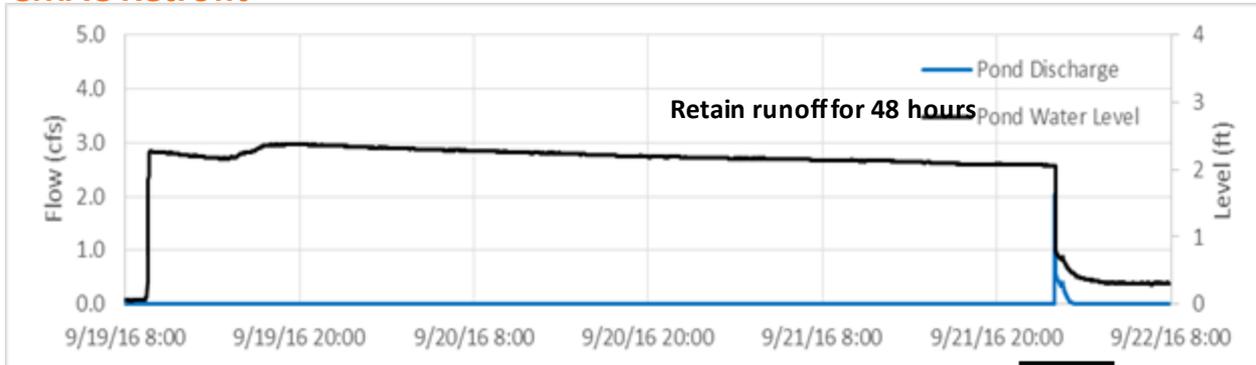
- Continuous Monitoring
- Improved Water Quality
- Verification of treatment
- Flood risk mitigation
- 24/7 Inspections

Dry Pond – 1-inch Rainfall Event

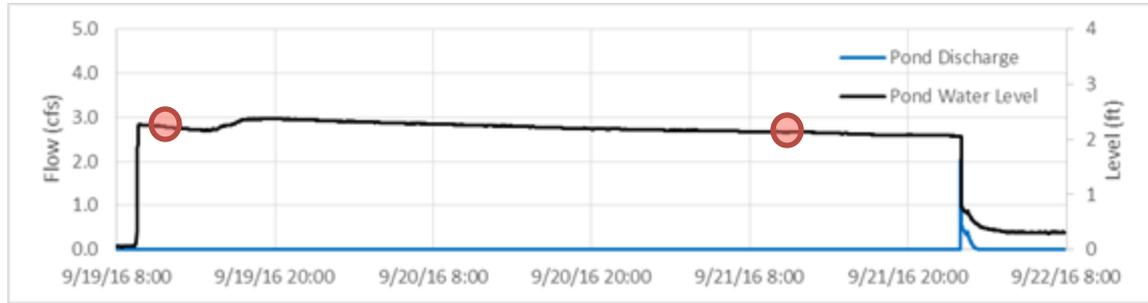
No Outflow Control



CMAC Retrofit



Dry Pond – September 19, 2016 Rainfall Event



9/19/2016 9:35AM

9/21/2016 10:04AM



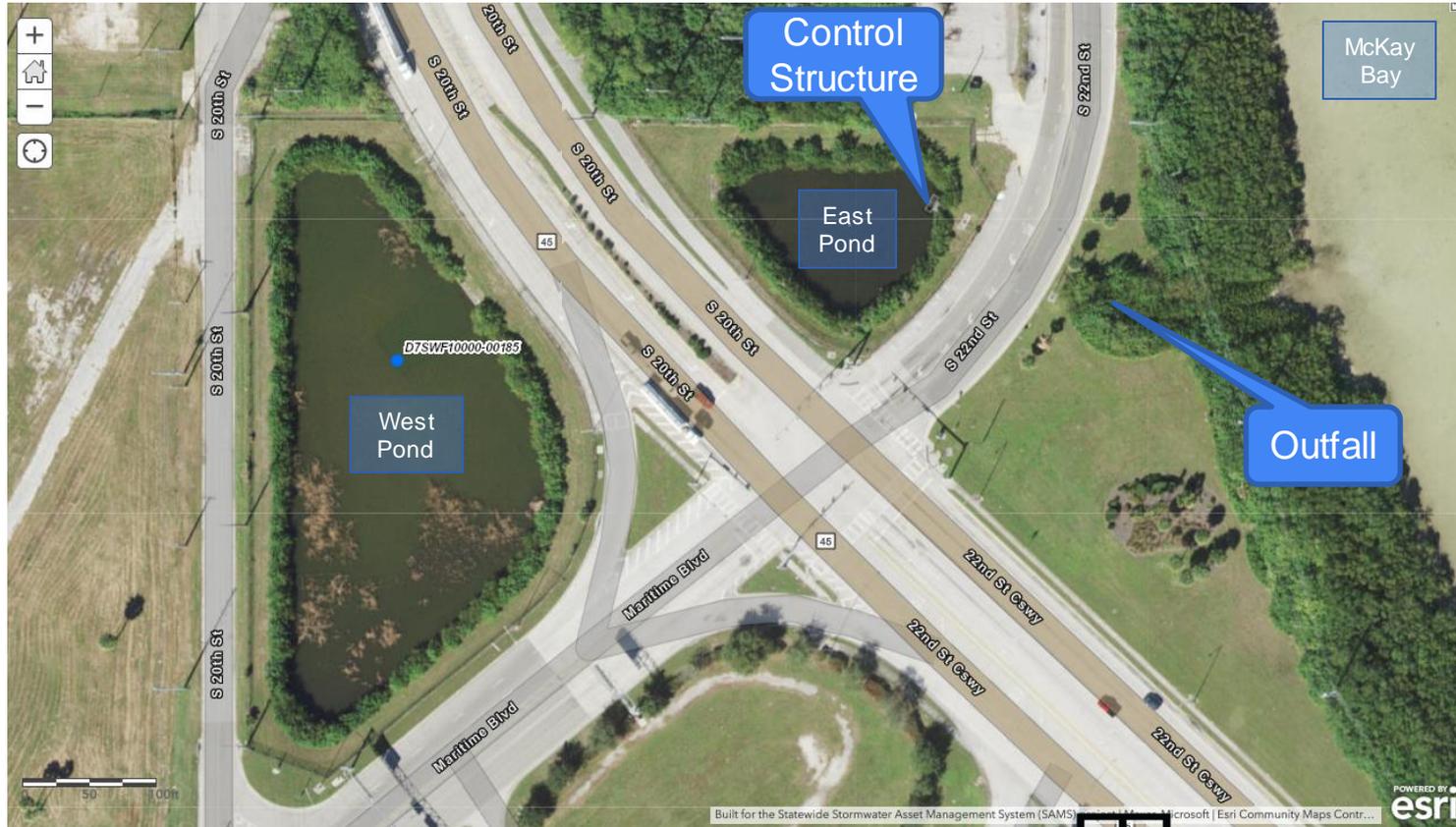
Case Study – SR 45 Pond 1



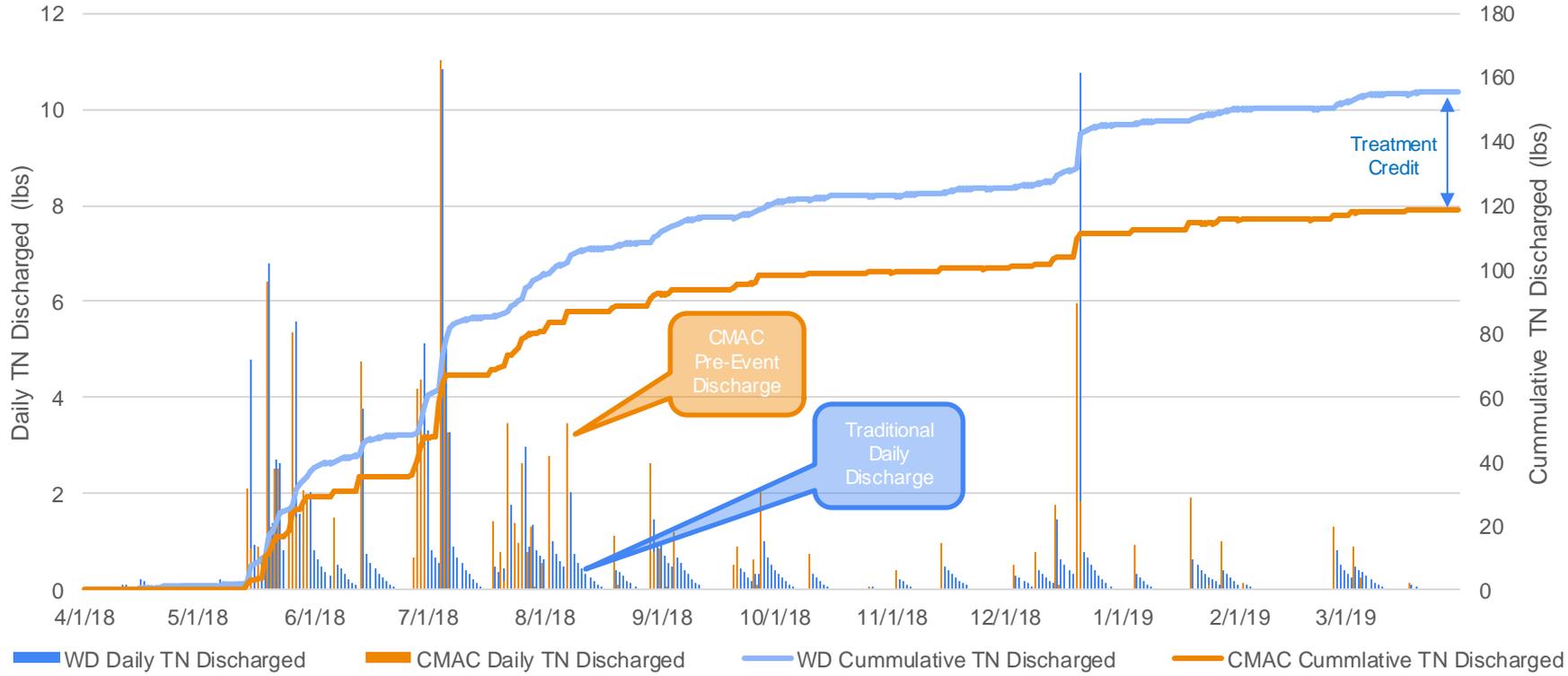
Case Study – SR 45 Pond 1



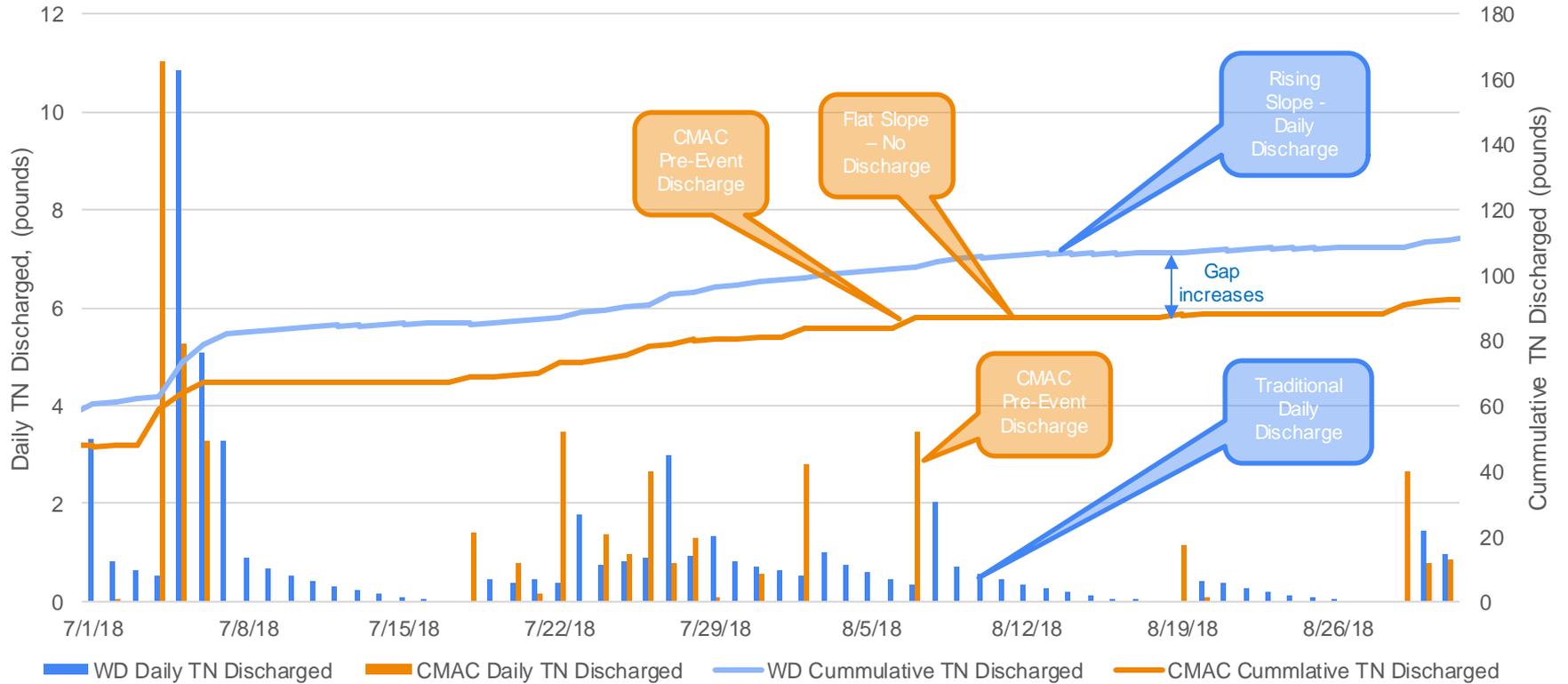
Case Study – SR 45 Pond 1



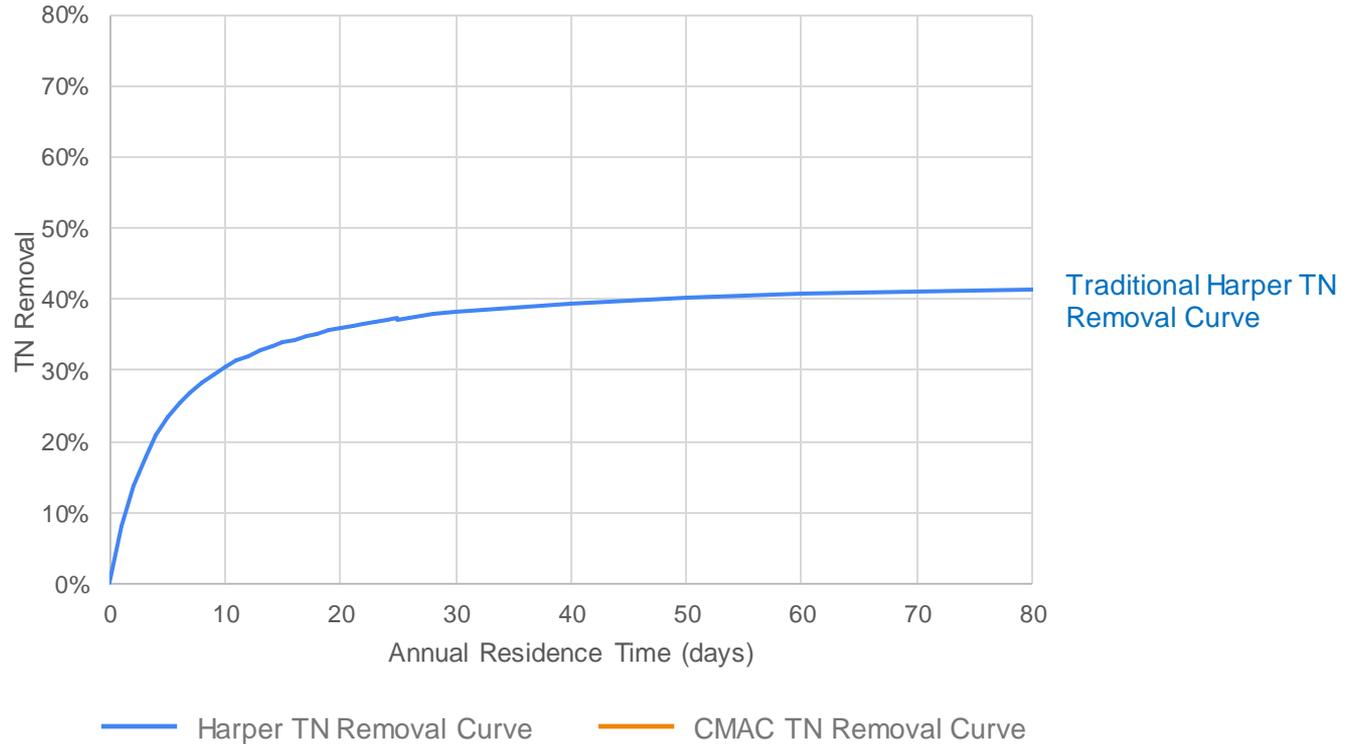
TN Discharged Comparison



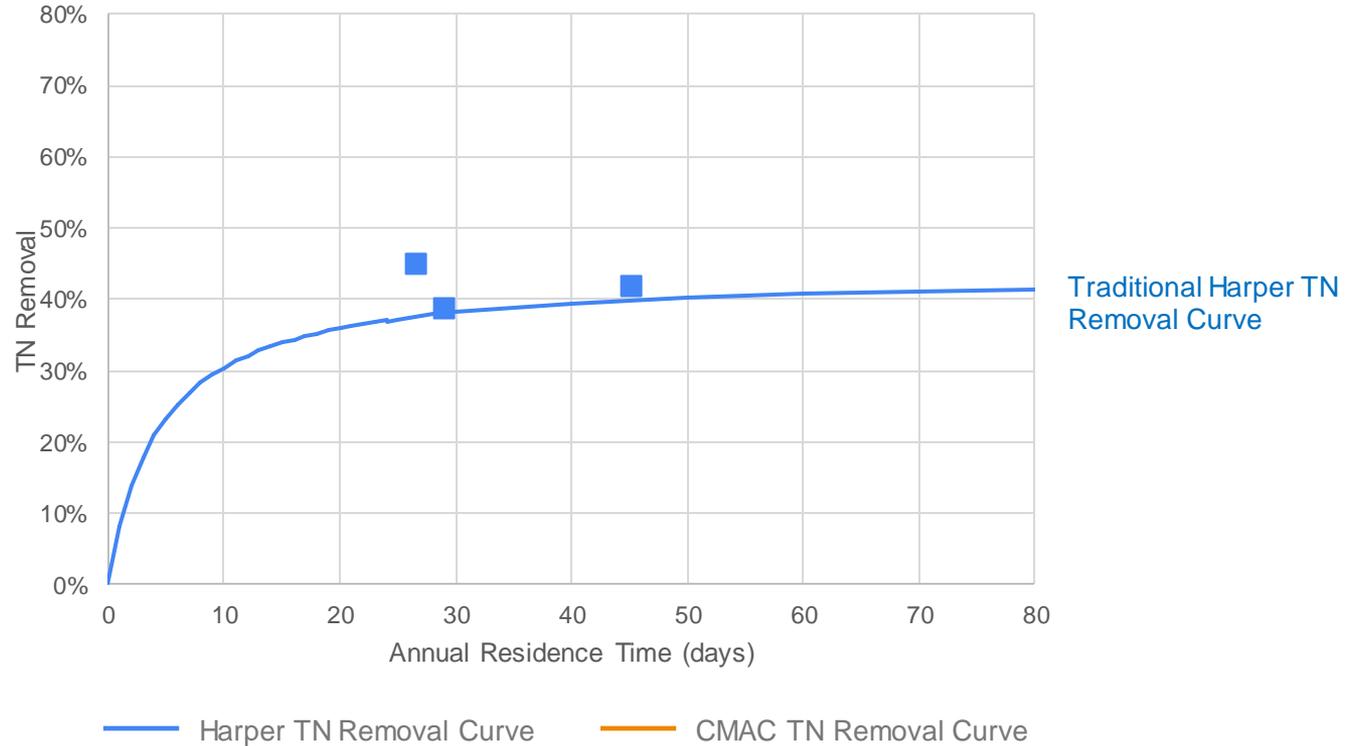
TN Discharged Comparison - July & August



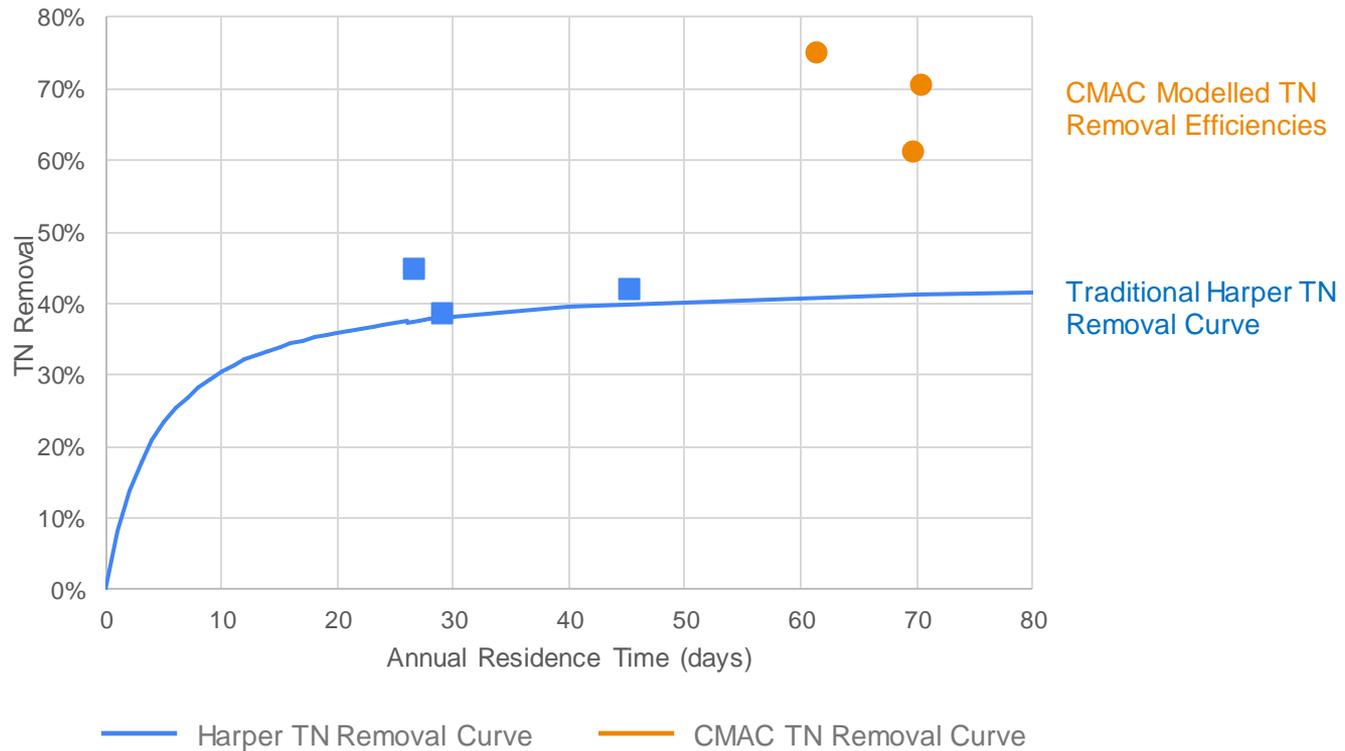
How does CMAC affect TN Removal?



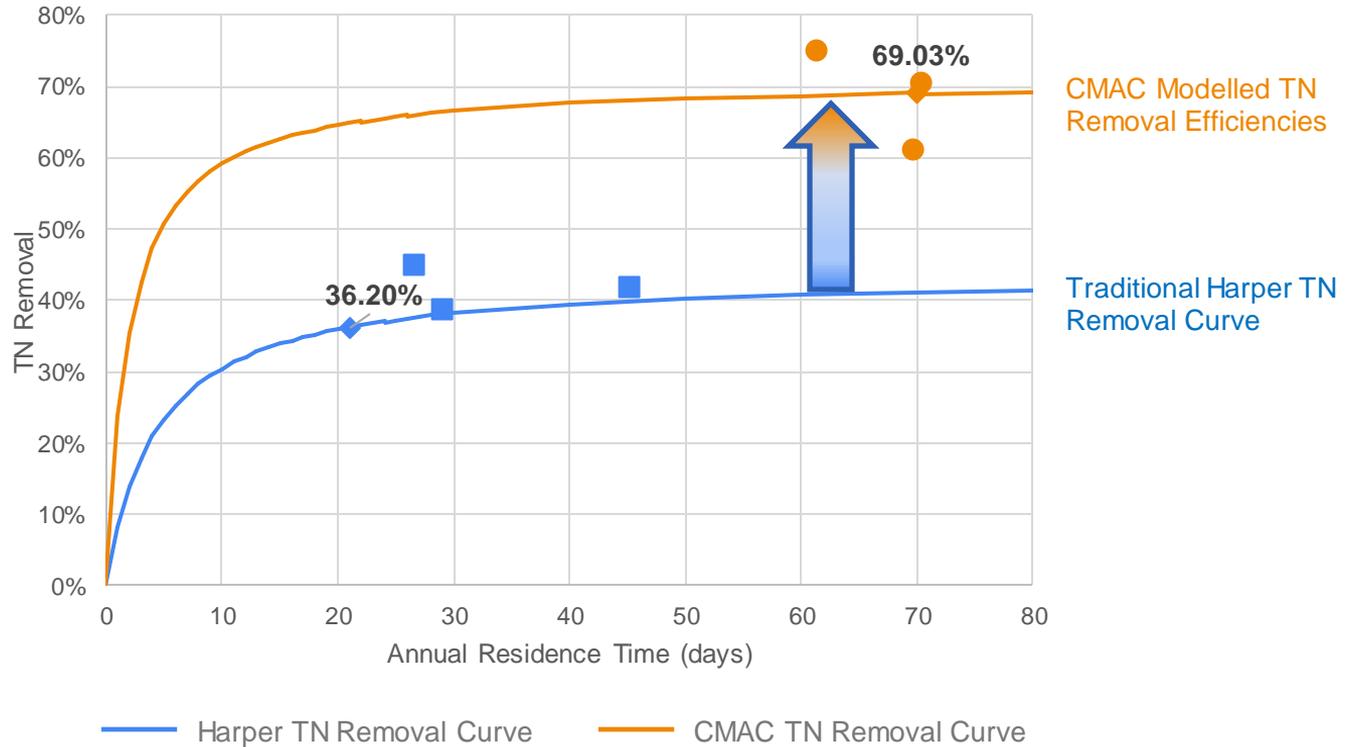
How does CMAC affect TN Removal?



How does CMAC affect TN Removal?



How does CMAC affect TN Removal?



Return on Investment



March 24, 2021

Kevin J. Thibault, P.E.
Secretary
Florida Department of Transportation
605 Suwannee Street
Tallahassee, FL 32399-0450

Dear Secretary Thibault,

Port Tampa Bay recently decided to purchase offsite stormwater treatment capacity for its planned Eastport Development by executing a contract with National Stormwater Trust, Inc. (NST) for \$1.75 million. This decision saved approximately \$2.63 million compared to conventional stormwater treatment costs.

I understand the stormwater treatment for the Eastport Development is being provided in nearby ponds leased to NST by the Florida Department of Transportation (FDOT), allowing the Port to utilize valuable Port property for its highest and best use. I also understand that the FDOT ponds are being improved by NST at its own cost with "smart pond" technology, providing resiliency and water quality benefits to the Tampa Bay region.

I want to personally thank you for supporting innovation within your agency and the resulting stormwater partnership with NST. In doing so, your agency is directly benefitting the environment, our Port expansion efforts and having a positive economic impact on the State of Florida.

Best Regards,

A. Paul Anderson
President and CEO

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Increased Pond Efficiency

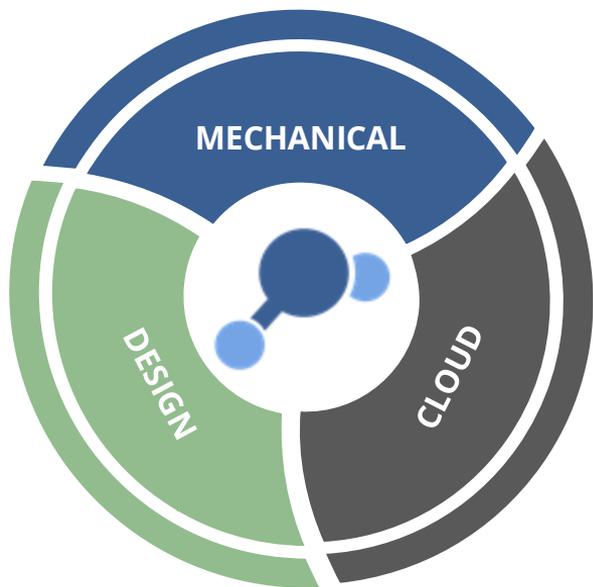
Nitrogen Removal Increase:	44%
Flood Attenuation Volume:	84%
Increased Pond Area:	0%

Port Savings

Treatment Volume:	\$2.63M
OPEX Savings:	\$14,000/yr
Increased Property Utilization:	✓



Designing Redundancy and Security



Cloud-Based:

- Alarms
- Remote Manual Control
- Internationally Certified Data Centers
- Product Release Cycles
- 3rd Party Security Audit

Mechanical:

- Battery Backups
- Local Fail-Safe Logic
- Onsite Manual Control

Civil Design:

- Passive Overflow
- Downstream Condition Assessment

Design & Permitting Approach



THANK YOU

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