BISCAYNE BAY WATERSHED MANAGEMENT ADVISORY BOARD

April 20th, 2022

MIAMI-DADE COUNTY

Biscayne Bay Watershed Management Advisory Board

Board Package

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MIAMI-DADE COUNTY

AGENDA

BISCAYNE BAY WATERSHED MANAGEMENT
ADVISORY BOARD (BBWMAB) MEETING
April 20th, 2022 - 9:00am – 12:00pm
LOCATION – Stephen P. Clark Government Center, Commission Chambers, 2nd Floor
111 NW First Street, Miami, FL 33128

1. **Roll Call**

2. **Approval of Agenda –** ***Actionable Item***

3. **Approval of Minutes for February 18th, 2022 –** ***Actionable Item***

4. **Reasonable Opportunity to be Heard**

5. **Update on Reasonable Assurance Plan**
   BBWMAB Chair, Commissioner Danielle Cohen Higgins

6. **Florida Department of Environmental Protection Grants and Projects Q&A**
   Pamela Sweeney, Senior Water Scientist, RER-DERM

7. **Update MS4 Stormwater Permit Renewal** *(Requested by Dave Doebler)*
   Mallika Muthiah, Senior Professional Engineer RER

8. **Stormwater Innovation Pilot Project**
   Liza Herrera, P.E., Department of Transportation & Public Works (DTPW)

9. **Innovation Presentations –** *(Requested by Brett Bibeau and Commissioner Rachel Streitfeld)*
   a. Scavenger Vessel 2000
   b. Clean Waterways - Foam Fractionation for Environmental Restoration

10. **Discussion of Future Agenda Items**
    BBWMAB Chair, Commissioner Danielle Cohen Higgins

11. **Adjournment**
    BBWMAB Chair, Commissioner Danielle Cohen Higgins

MEMORANDUM

Agenda Item No. 11(A)(23)

TO:	Honorable Chairman Jose "Pepe" Diaz and Members, Board of County Commissioners	**DATE:**	March 1, 2022
FROM:	Geri Bonzon-Keenan County Attorney	**SUBJECT:**	Resolution directing the County Mayor to expeditiously develop a proposed Reasonable Assurance Plan pursuant to state procedures and guidelines for such a plan; and urging the Secretary of the Department of Environmental Protection (FDEP) to expeditiously approve such Reasonable Assurance Plan, through the adoption of a final order, after the County submits such plan to FDEP for approval

The accompanying resolution was prepared and placed on the agenda at the request of Prime Sponsor Commissioner Danielle Cohen Higgins.

Geri Bonzon-Keenan
County Attorney

GBK/uw

MEMORANDUM
(Revised)

TO: Honorable Chairman Jose "Pepe" Diaz
and Members, Board of County Commissioners

DATE: March 1, 2022

FROM: Geri Bonzon-Keenan
County Attorney

SUBJECT: Agenda Item No. 11(A)(23)

Please note any items checked.

_____	**"3-Day Rule" for committees applicable if raised**
_____	**6 weeks required between first reading and public hearing**
_____	**4 weeks notification to municipal officials required prior to public hearing**
_____	**Decreases revenues or increases expenditures without balancing budget**
_____	**Budget required**
_____	**Statement of fiscal impact required**
_____	**Statement of social equity required**
_____	**Ordinance creating a new board requires detailed County Mayor's report for public hearing**
✓	**No committee review**
_____	**Applicable legislation requires more than a majority vote (i.e., 2/3's present ____, 2/3 membership ____, 3/5's ____, unanimous ____, CDMP 7 vote requirement per 2-116.1(3)(h) or (4)(c) ____, CDMP 2/3 vote requirement per 2-116.1(3)(h) or (4)(c) ____, or CDMP 9 vote requirement per 2-116.1(4)(c)(2) ____) to approve**
_____	**Current information regarding funding source, index code and available balance, and available capacity (if debt is contemplated) required**

Approved _____ Mayor
Veto _____
Override _____

Agenda Item No. 11(A)(23)
3-1-22

RESOLUTION NO. _____

RESOLUTION DIRECTING THE COUNTY MAYOR OR COUNTY MAYOR'S DESIGNEE TO EXPEDITIOUSLY DEVELOP A PROPOSED REASONABLE ASSURANCE PLAN PURSUANT TO STATE PROCEDURES AND GUIDELINES FOR SUCH A PLAN; AND URGING THE SECRETARY OF THE DEPARTMENT OF ENVIRONMENTAL PROTECTION (FDEP) TO EXPEDITIOUSLY APPROVE SUCH REASONABLE ASSURANCE PLAN, THROUGH THE ADOPTION OF A FINAL ORDER, AFTER THE COUNTY SUBMITS SUCH PLAN TO FDEP FOR APPROVAL

WHEREAS, Miami-Dade County is home to Biscayne Bay, a waterbody of local, regional, national, and international importance that is home to two state aquatic preserves, a state critical wildlife area, and a national park; and

WHEREAS, the County has been working on multiple fronts to help protect and restore Biscayne Bay, and such work related to Biscayne Bay has consistently been a priority for this Board; and

WHEREAS, the Florida Department of Environmental Protection (FDEP) implements certain requirements of the federal Clean Water Act for the U.S. Environmental Protection Agency (EPA) and various state statutes and rules, such as the Impaired Waters Rule, all with respect to water quality, and has identified impairments to Biscayne Bay waterbody segments including existing Total Maximum Daily Load determinations; and

WHEREAS, pursuant to section 403.0673(1), Florida Statutes, in order to be eligible for certain state grant monies related to wastewater, the project must be located within an area covered by a basin management action plan (BMAP), an alternative restoration plan adopted by final order, or a rural area of opportunity under section 288.0656 which will individually or collectively reduce excess nutrient pollution; and

WHEREAS, currently, no part of Miami-Dade County is covered by a BMAP, an alternative restoration plan adopted by final order, or a rural area of opportunity under section 288.0656; and

WHEREAS, FDEP has stated that Miami-Dade County can pursue and develop a particular type of alternative restoration plan, as referenced in section 403.0673(1), Florida Statutes, which is referred to as a Reasonable Assurance Plan, or "RAP," and which would require approval by FDEP and EPA, and ultimately, adoption by the Secretary of FDEP through a final order; and

WHEREAS, one of the purposes of a Reasonable Assurance Plan is to provide reasonable assurance, pursuant to section 62-303.600 of the Florida Administrative Code, to FDEP that the particular water segment will attain certain surface water quality goals; and

WHEREAS, developing and seeking Secretarial approval of a Reasonable Assurance Plan, pursuant to state procedures and guidelines, would not preclude the County from undertaking other County efforts to protect Biscayne Bay and may complement the County's other goals and ongoing efforts with respect to Biscayne Bay; and

WHEREAS, according to FDEP, there are currently five approved Reasonable Assurance Plans from other areas of Florida, in Lake Seminole; the Florida Keys; Shell, Prairie, and Joshua Creeks; Tampa Bay Estuary; and Mosquito Lagoon; and

WHEREAS, FDEP has generously provided guidance and assistance to Miami-Dade County to help the County develop a Reasonable Assurance Plan that would be approvable by the Secretary of FDEP; and

WHEREAS, after a Reasonable Assurance Plan has been adopted by the Secretary of FDEP through a final order, the areas covered by the Reasonable Assurance Plan may be eligible for significant state wastewater grant funding pursuant to section 403.0673, Florida Statutes; and

WHEREAS, if the County were to receive such wastewater grant funding, it is anticipated that this funding would enable important wastewater infrastructure projects to be undertaken in Miami-Dade County, with resulting benefits to both the environment and the economy; and

WHEREAS, as such, this Board therefore wishes to direct the County Mayor or County Mayor's designee to expeditiously develop a proposed Reasonable Assurance Plan pursuant to state procedures and guidelines, bring such Reasonable Assurance Plan to this Board for approval as soon as possible, and once approved, to submit such Reasonable Assurance Plan to FDEP for approval by the Secretary of FDEP; and

WHEREAS, in addition, this Board wishes to urge the Secretary of FDEP to approve the County's Reasonable Assurance Plan expeditiously, through the adoption of a final order, after such Reasonable Assurance Plan has been submitted to FDEP for approval,

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF MIAMI-DADE COUNTY, FLORIDA, that this Board:

Section 1. Directs the County Mayor or County Mayor's designee to expeditiously develop a proposed Reasonable Assurance Plan pursuant to state procedures and guidelines, bring such Reasonable Assurance Plan to this Board for approval as soon as possible, and once approved, to submit such Reasonable Assurance Plan to the Florida Department of Environmental Protection for approval by the Secretary of the Florida Department of Environmental Protection.

Section 2. Urges the Secretary of the Florida Department of Environmental Protection to approve Miami-Dade County's Reasonable Assurance Plan expeditiously, through the adoption of a final order, after such Reasonable Assurance Plan has been submitted to the Florida Department of Environmental Protection for approval.

Section 3. Directs the Clerk of the Board to transmit a certified copy of this resolution to the Governor, the Senate President, the House Speaker, the Chair and Members of the Miami-Dade State Legislative Delegation, and the Secretary of the Florida Department of Environmental Protection.

Section 4. Directs the County's state lobbyists to advocate for the action set forth in section 2 above, and authorizes and directs the Office of Intergovernmental Affairs to amend the 2022 State Legislative Package to include this item and to include this item in the 2023 State Legislative Package when it is presented to the Board.

The Prime Sponsor of the foregoing resolution is Commissioner Danielle Cohen Higgins. It was offered by Commissioner , who moved its adoption. The motion was seconded by Commissioner and upon being put to a vote, the vote was as follows:

Jose "Pepe" Diaz, Chairman
Oliver G. Gilbert, III, Vice-Chairman

Sen. René García	Keon Hardemon
Sally A. Heyman	Danielle Cohen Higgins
Eileen Higgins	Joe A. Martinez
Kionne L. McGhee	Jean Monestime
Raquel A. Regalado	Rebeca Sosa
Sen. Javier D. Souto	

The Chairperson thereupon declared this resolution duly passed and adopted this 1st day of March, 2022. This resolution shall become effective upon the earlier of (1) 10 days after the date of its adoption unless vetoed by the County Mayor, and if vetoed, shall become effective only upon an override by this Board, or (2) approval by the County Mayor of this resolution and the filing of this approval with the Clerk of the Board.

MIAMI-DADE COUNTY, FLORIDA
BY ITS BOARD OF
COUNTY COMMISSIONERS

HARVEY RUVIN, CLERK

By:_____
Deputy Clerk

Approved by County Attorney as
to form and legal sufficiency.

Abbie Schwaderer-Raurell

FL DEP Coral Reef Protection Grant / Water Quality Improvement Grant

Phase 1: FY 2021 -2023 - $10M + $10 MDC match*

Phase 2: FY 2022- 2024 - $12.9M + MDC match*

Project Name	Project Goals	Department Lead	Funding Allocation: Phase 1 ($10M)	Location / Number (NOTE: MDC Resilience and DERM are Creating an Interactive Map)	*Proposed* Funding Allocation: Phase 2 ($12.9M)	Type of Project Related to Nutrient Loads**
Water Quality Characterization	Identify, reduce or eliminate sources of water quality pollution in north Biscayne Bay watersheds - Miami River (C-6) - Little River (C-7) - Biscayne Canal (C-8)	MDC RER-DERM Partners: City of Miami	$2,150,000	Minimum 30 sites in C-6 Minimum 15 sites in C-7 Minimum 5 sites in C-8	$2,250,000	Investigative
Septic to Sewer Conversion	Prioritize conversion of parcels most vulnerable to failure	MDC WASD	$4,400,000	Largely within Little River Adaptation Action Area	$6,690,463	Restorative
Innovative Technology	Install Smart Covers and Smart Rain Gauges to analyze, predict, and prevent Sanitary Sewer Overflows (SSOs)	MDC RER-DERM	$1,150,000	150 smart covers across priority basins in coastal areas	$2,000,000	Preventative
Stormwater Treatment	Design and implement engineering strategies including innovative Green Infrastructure and Low Impact Development	MDC RER-DERM & DTPW	$1,300,000	**#1:** NW 111 St - NW 107 St and NW 21 Ct & NW 17 Av (*Technology: StormBasin Filter & EcoVault Unit*) **#2:** NW 96 St - NW 93 Ter and NW 17 Av – NW 14 Av (*Technology: Hydro DryScreen, AbTech Ultra Urban Filter, SOP Stormwater Filter w/ QR Codes*) **#3:** NW 85 St – NW 82 St and NW 5 Av – N. Miami Av (*Technology: Contech JellyFish, SOP Stormwater Filter Basket, AbTech Filter Cage and Line Skimmer*)	$2,000,000	Restorative
Biological Restoration to Enhance Water Quality	- #1: Develop a Living Shoreline guidance document - #2: Create a sponge nurseries that lead to increased filtration of Bay waters and reduction of nutrients and bacteria	MDC RER-DERM Partners: -FL Sea Grant -DEP BBAP -Nature Conservancy	$500,000	**#1:** N/A **#2:** Venetian Basin, within pilings just south of Julia Tuttle Causeway	$0	Restorative
Education & Outreach Connect2Protect	Education efforts in Little River Adaptation Action Area for Connect2Protect – septic to sewer conversions	MDC WASD	$500,000	Largely within Little River Adaptation Action Area	TBD	Preventative

*MDC match for both phases is comprised mostly of wastewater and stormwater projects; **Nutrient load reductions for each project / project type to be determined, in concert w/ DEP

FL DEP Resilient Florida Grant

State-Funded Projects – All County Projects

If you would like to review supplemental documentation for a specific project, please email request to: chiefbayofficer@miamidade.gov

	MDC Dept.	Project Name – All Miami-Dade County Projects – State Funded	Funding recommended by FDEP
1	RER-DERM	Lake Belmar new stormwater pump station infrastructure system	$3,200,000
2	RER-DERM	Biscayne Shores 3 stormwater pump stations infrastructure retrofit and improvements	$1,300,000
3	RER-DERM	Roadway infrastructure improvements including building resilience by elevating roads to 2060 requirements with future sea level rise, and associated drainage improvements: SW 157 Ave from SW 42 Street to SW 8th Street	$10,000,000
		Stormwater Projects Total:	**$14,500,000**
4	RER-DERM	Miami-Dade County Environmentally Endangered Lands Program Acquisition and Restoration Project	$4,000,000
5	RER-DERM	EEL Acquisition Project - Wink Eye Slough (152 acres)	$350,000
6	RER-DERM	Buffering Lands Acquisition - Peters Wetlands (62 acres)	$325,000
7	RER-DERM	Restoration Project - Goulds canal project	$900,000
		Land Acquisition and Restoration Projects Total:	**$5,575,000**
8	Solid Waste	Design plan to improve stormwater management for South Dade Landfill	$750,000
9	ISD	Critical Equipment Flood Resiliency for County Integrated Command and Communication Center	$6,000,000
10	ISD	Resilient Shoreline Stabilization at Kristi House Children's Center	$450,000
11	ISD	Flood Mitigation Measures for Critical County-wide Data Processing and Communications Center	$300,000
12	Libraries	Main Library Resiliency Grant	$760,000
13	Libraries	Miami Beach Regional Library Resiliency Grant	$400,000
14	Fire Rescue	Installation and Elevation of Generators at Multiple Fire Stations	$392,500
15	PHCD	PHCD's Ingram Terrace Apartment Affordable Housing Resilience Project	$575,275
16	PHCD	Miami-Dade Public housing resiliency improvements in Little River Adaptation Action Area	$15,000,000
		Total	**$44,702,275**

FL DEP Resilient Florida Grant

Federally-Funded Projects – All County Projects

If you would like to review supplemental documentation for a specific project, please email request to: chiefbayofficer@miamidade.gov

	MDC Dept.	Project Name – All Miami-Dade County Projects – Federally Funded	Funding
1	WASD	Increasing the Resiliency of Drinking Water Infrastructure to Flooding and Storms	$15,187,500
2	WASD	Schenley Park Septic to Sewer Conversion	$27,500,000
		WASD Projects Total	**$42,687,500**
3	RER-DERM	Secondary canal improvements in the Little River Basin to raise canal bank elevations to enhance storage, improve canal conveyance and outfalls to meet 2060 requirements with future sea level rise - Phase I	$7,000,000
4	RER-DERM	Secondary canal improvements in the Little River Basin to raise canal bank elevations to enhance storage, improve canal conveyance and outfalls to meet 2060 requirements with future sea level rise - Phase II	$5,200,000
5	RER-DERM	Roadway infrastructure improvements including building resilience by elevating roads to 2060 requirements with future sea level rise, and associated drainage improvements: NW 159th Street from NE 6th Ave to W Dixie HWY	$7,500,000
		RER-DERM Stormwater Projects Total	**$19,700,00**
6	RER-DERM	Buffering Lands Acquisition - Cutler Pit and Adjacent Wetlands (538 acres)	$300,000
		RER-DERM Land Acquisition Projects Total	**$300,000**
7	PROS	Haulover Park Western Shoreline Sea Level Rise and Flood Mitigation Project	$670,140
8	PROS	Black Point Park and Marina Sea Level Rise and Flood Mitigation Shoreline Stabilization Project	$765,000
9	PROS	Flooding and erosion control in the Lowland areas of Fairchild Tropical Botanic Garden	$12,500,000
		PROS Projects Total	**$700,000**
10	ISD	County Government Center (Stephen P. Clark Center) Stormwater Drainage Improvements	$400,000
11	ISD	North Dade Chiller Plant - Critical Infrastructure Hardening	$300,000
		ISD Projects Total	**$300,000**
12	Cultural Affairs	Flood Resiliency for North Side of Vizcaya Museum and Gardens	$260,615
13	Fire Rescue	Deployable Flood Barriers for Multiple Fire Stations	$340,000
		County Projects Total:	$77,923,255

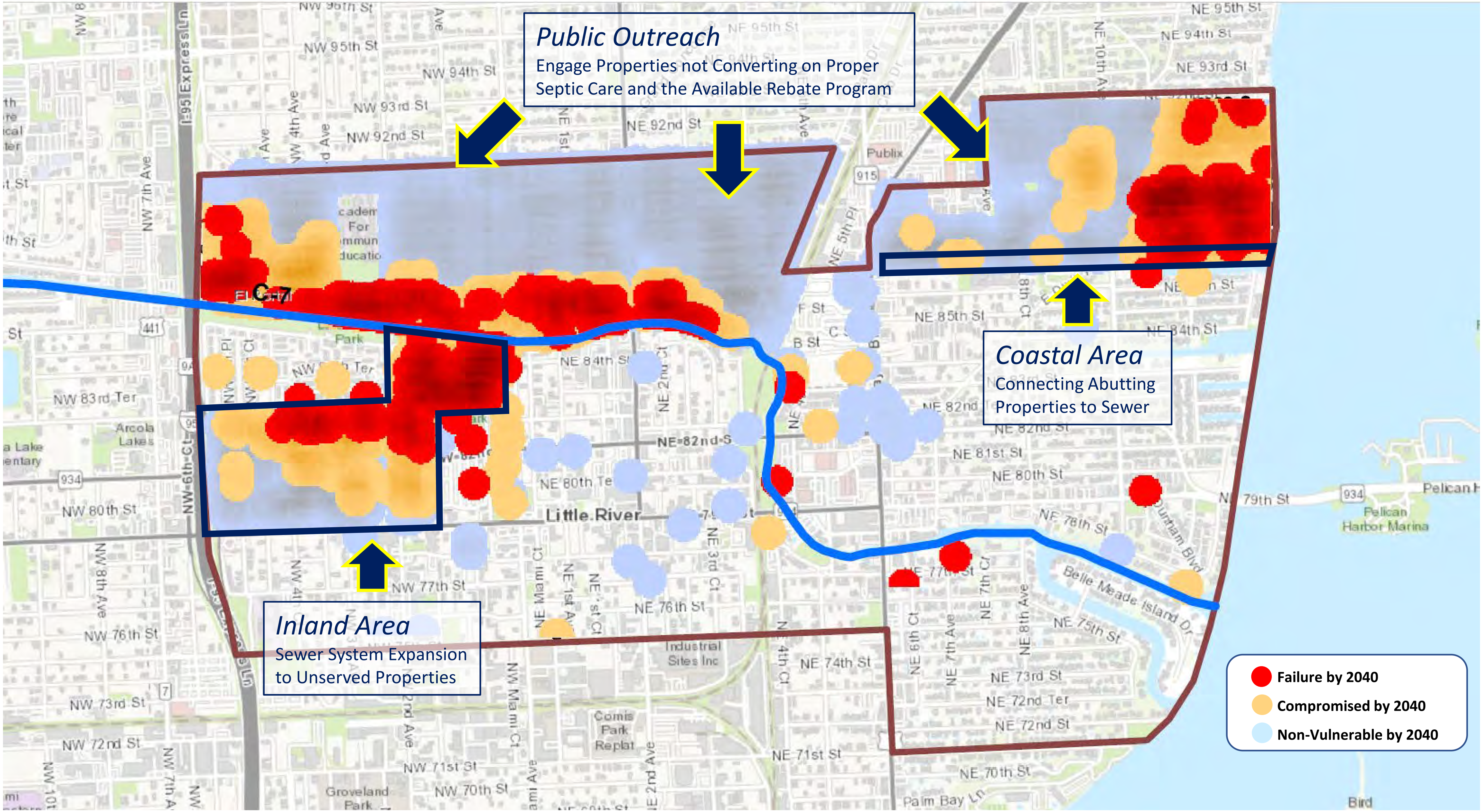
FL DEP Resilient Florida Grant

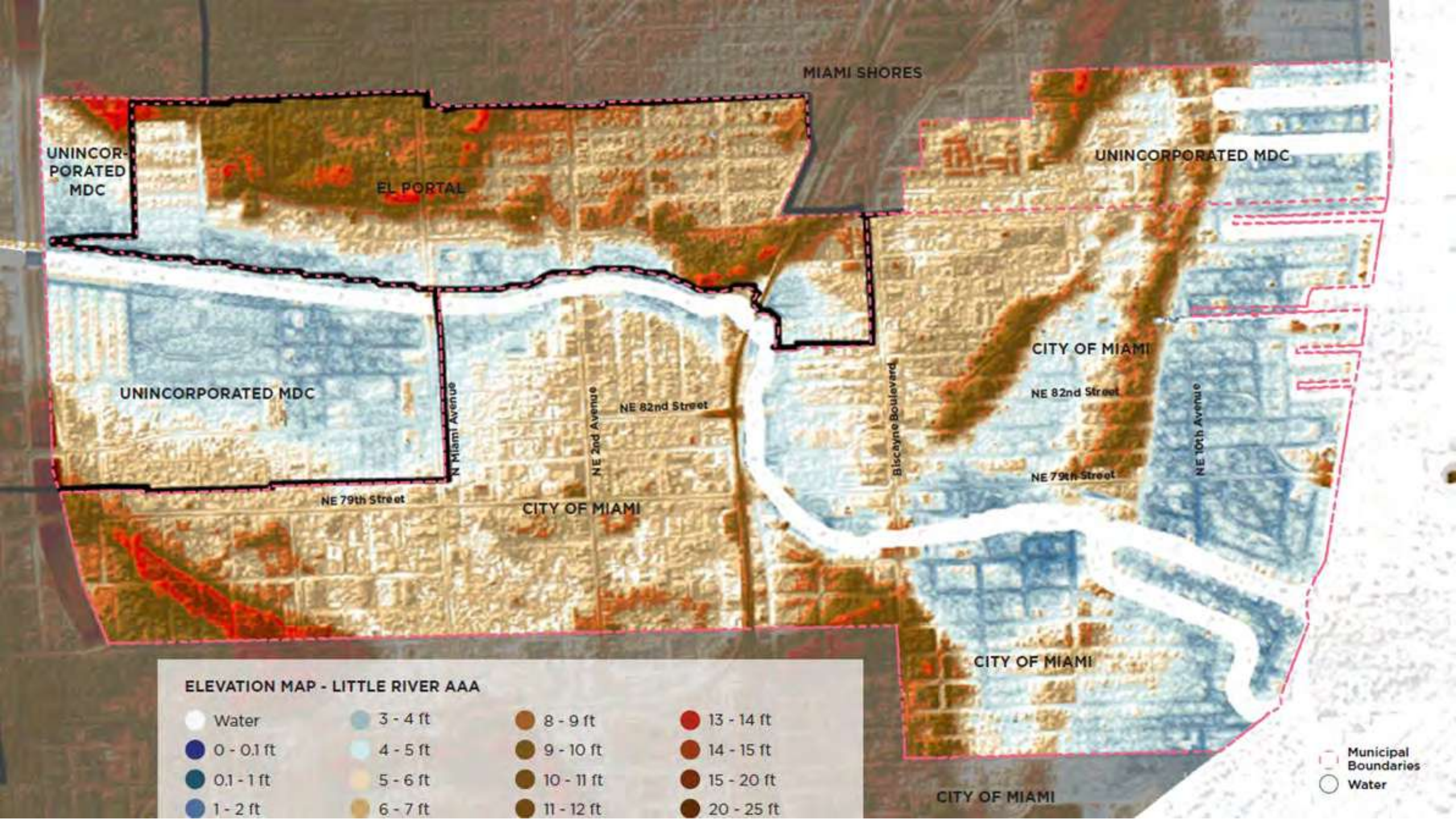
Details- State-Funded and Federally-Funded Projects – RER-DERM

If you would like to review supplemental documentation for a specific project, please email request to: chiefbayofficer@miamidade.gov

	MDC Dept.	Project Name – State Funded	State Funding	MDC Match	Timeline
1	RER-DERM	Lake Belmar new stormwater pump station infrastructure system	$3,200,000	$3,200,000	10/1/22 – 6/30/24
2	RER-DERM	Biscayne Shores 3 stormwater pump stations infrastructure retrofit and improvements	$1,300,000	$1,300,000	10/1/22 – 6/30/24
3	RER-DERM	Roadway infrastructure improvements including building resilience by elevating roads to 2060 requirements with future sea level rise, and associated drainage improvements: SW 157 Ave from SW 42 Street to SW 8th Street (DTPW)	$10,000,000	$10,000,000	1/10/23 – 12/31/26
		Stormwater Projects Total:	**$14,500,000**		
4	RER-DERM	Miami-Dade County Environmentally Endangered Lands Program Acquisition and Restoration Project	$4,000,000	$4,000,000	10/30/21- 12/1/22
5	RER-DERM	EEL Acquisition Project - Wink Eye Slough (152 acres)	$350,000	$350,000	7/1/22 – 12/1/22
6	RER-DERM	Buffering Lands Acquisition - Peters Wetlands (62 acres)	$325,000	$325,000	12/30/21 – 6/1/22
7	RER-DERM	Restoration Project - Goulds Canal	$900,000	$900,000	7/1/22 – 12/1/22
		Land Acquisition and Restoration Projects Total:	**$5,575,000**		
		State Funded RER-DERM Total	***$20,075,000***		

	MDC Dept.	Project Name – All Miami-Dade County Projects – Federally Funded	Federal Funding	MDC Match	Timeline
1	RER-DERM	Secondary canal improvements in the Little River Basin to raise canal bank elevations to enhance storage, improve canal conveyance and outfalls to meet 2060 requirements with future sea level rise - Phase I	$7,000,000	$7,000,000	10/1/22 – 9/30/25
2	RER-DERM	Secondary canal improvements in the Little River Basin to raise canal bank elevations to enhance storage, improve canal conveyance and outfalls to meet 2060 requirements with future sea level rise - Phase II	$5,200,000	$5,200,000	10/1/22 – 9/30/25
3	RER-DERM	Roadway infrastructure improvements including building resilience by elevating roads to 2060 requirements with future sea level rise, and associated drainage improvements: NW 159th Street from NE 6th Ave to W Dixie HWY (DTPW)	$7,500,000	$7,500,000	8/1/23 – 6/30/26
		RER-DERM Stormwater Projects Total:	**$19,700,00**		
4	RER-DERM	Buffering Lands Acquisition - Cutler Pit and Adjacent Wetlands (538 acres)	$300,000		
		RER-DERM Land Acquisition Projects Total:	**$300,000**		
		Federally Funded RER-DERM Total	***$20,000,000***		


Public Outreach
Engage Properties not Converting on Proper Septic Care and the Available Rebate Program
Coastal Area
Connecting Abutting Properties to Sewer
Inland Area
Sewer System Expansion to Unserved Properties
Failure by 2040
Compromised by 2040
Non-Vulnerable by 2040
C-7
Little River


MIAMI SHORES
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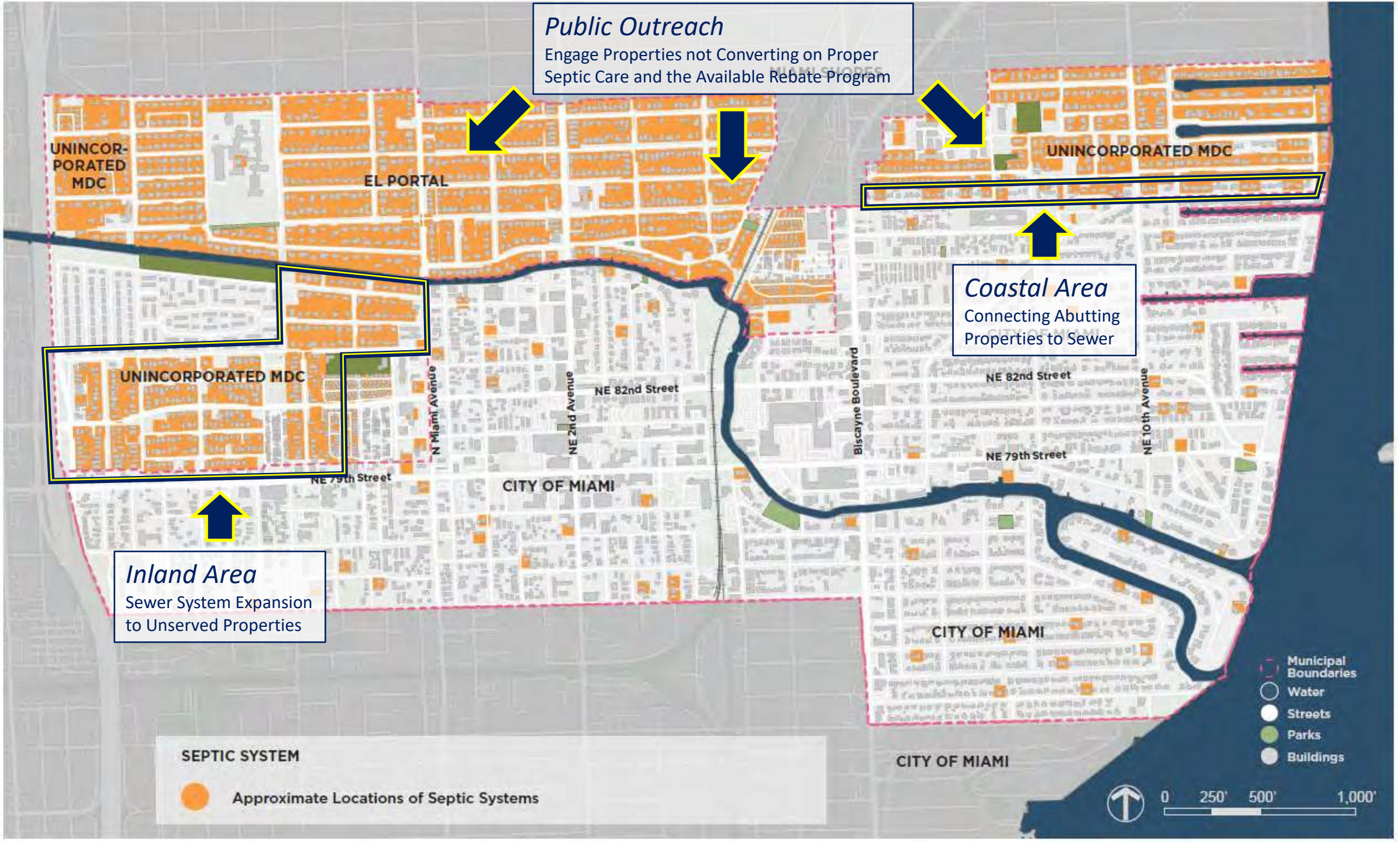
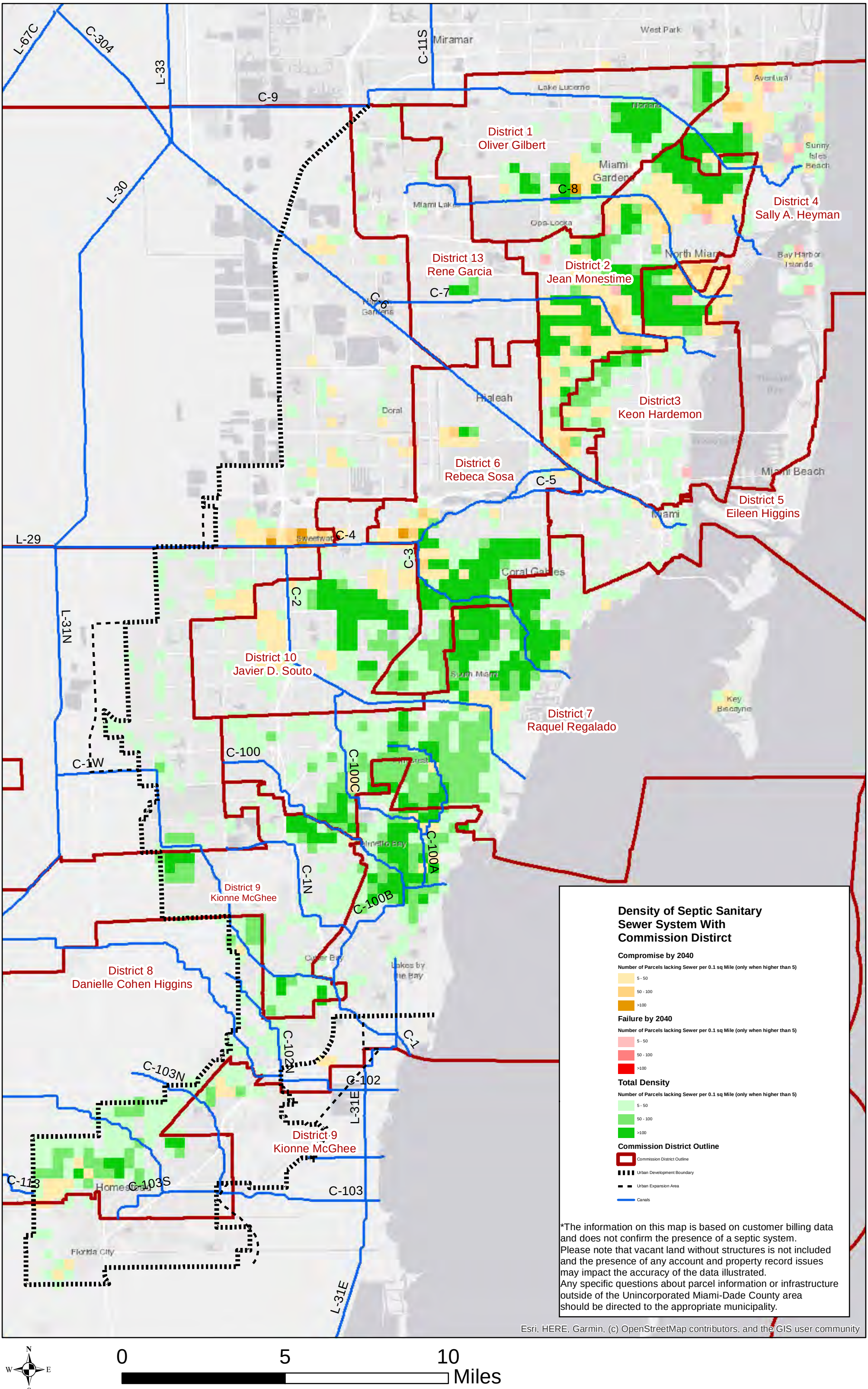
UNINCORPORATED MDC
N Miami Avenue
NE 2nd Avenue
NE 82nd Street
NE 79th Street
CITY OF MIAMI
Biscayne Boulevard
CITY OF MIAMI
NE 82nd Street
NE 79th Street
NE 10th Avenue
CITY OF MIAMI
CITY OF MIAMI
ELEVATION MAP - LITTLE RIVER AAA
Water
0 - 0.1 ft
0.1 - 1 ft
1 - 2 ft
3 - 4 ft
4 - 5 ft
5 - 6 ft
6 - 7 ft
8 - 9 ft
9 - 10 ft
10 - 11 ft
11 - 12 ft
13 - 14 ft
14 - 15 ft
15 - 20 ft
20 - 25 ft
Municipal Boundaries
Water


Public Outreach
Engage Properties not Converting on Proper Septic Care and the Available Rebate Program
UNINCOR-PORATED MDC
EL PORTAL
UNINCORPORATED MDC
UNINCORPORATED MDC
Coastal Area
Connecting Abutting Properties to Sewer
N Miami Avenue
NE 2nd Avenue
NE 82nd Street
NE 79th Street
CITY OF MIAMI
Biscayne Boulevard
NE 82nd Street
NE 10th Avenue
NE 79th Street
Inland Area
Sewer System Expansion to Unserved Properties
CITY OF MIAMI
CITY OF MIAMI
Municipal Boundaries
Water
Streets
Parks
Buildings
SEPTIC SYSTEM
Approximate Locations of Septic Systems
0
250'
500'
1,000'


L-67C
C-304
L-33
C-11S
Miramar
West Park
C-9
Lake Lucerne
Aventura
District 1
Oliver Gilbert
Miami Gardens
Sunny Isles Beach
C-8
L-30
Miami Lakes
Opa-Locka
District 4
Sally A. Heyman
North Miami
Bay Harbor Islands
District 13
Rene Garcia
District 2
Jean Monestime
C-7
C-6
Hialeah
Doral
District3
Keon Hardemon
District 6
Rebeca Sosa
C-5
Miami Beach
Miami
District 5
Eileen Higgins
L-29
C-4
C-3
C-2
Coral Gables
L-31N
District 10
Javier D. Souto
South Miami
Key Biscayne
District 7
Raquel Regalado
C-100
C-1W
C-100C
C-100A
C-1N
C-100B
District 9
Kionne McGhee
Cutler Bay
Lakes by the Bay
District 8
Danielle Cohen Higgins
C-102N
C-1
C-103N
C-102
L-31E
District 9
Kionne McGhee
C-113
C-103S
Homestead
C-103
Florida City
L-31E
Density of Septic Sanitary Sewer System With Commission Distirct
Compromise by 2040
Number of Parcels lacking Sewer per 0.1 sq Mile (only when higher than 5)
5 - 50
50 - 100
>100
Failure by 2040
Number of Parcels lacking Sewer per 0.1 sq Mile (only when higher than 5)
5 - 50
50 - 100
>100
Total Density
Number of Parcels lacking Sewer per 0.1 sq Mile (only when higher than 5)
5 - 50
50 - 100
>100
Commission District Outline
Commission District Outline
Urban Development Boundary
Urban Expansion Area
Canals
*The information on this map is based on customer billing data and does not confirm the presence of a septic system.
Please note that vacant land without structures is not included and the presence of any account and property record issues may impact the accuracy of the data illustrated.
Any specific questions about parcel information or infrastructure outside of the Unincorporated Miami-Dade County area should be directed to the appropriate municipality.
Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
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Miles

CONNECT 2 PROTECT

CONNECTING TO SEWER PROTECTS YOUR PROPERTY, HEALTH, AND BISCAYNE BAY!

Miami-Dade County's **Connect 2 Protect** is a multi-year, countywide program that provides sanitary sewer service to residents with septic systems. Approximately 9,000 septic systems are considered vulnerable, compromised, or failing under current groundwater conditions. As sea-level rise increases, this number will grow to approximately 13,500 by 2040. Compromised and failing septic systems can cause negative impacts on private properties, pose public health risks, and have long-lasting detrimental effects on our natural resources including Biscayne Bay.

INFRASTRUCTURE PROJECTS UNDERWAY

Little River Adaptation Area

This $19 million project will connect approximately 370 homes in the Little River area, a low-lying neighborhood prone to flooding with a history of reported septic tank failures during heavy rain and high tide events.

Commercial Corridor Connection Program

This $126 million program is funded by the Building Better Communities General Obligation Bond (GOB) , which is dedicated to converting more than 1,000 commercial septic systems to County sewer service in the following five commercial corridors: Green Technology Corridor along NW 37 Avenue, NW 7 Avenue, NW 27 Avenue, NW 22 Avenue and NW 79 Street.

Ojus Urban Area District Project

Property owners in this area have collectively voted to create a Special Benefit Area to provide sewer service in a NW Miami-Dade County neighborhood between Biscayne Blvd and the Oleta River. Within the Special Benefit Area, property owners will be assessed over a 30-year period for the cost of the sewer expansion.

Public Laterals installations for properties with available sewer infrastructure

There are approximately 12,000 properties with septic tanks where sewer infrastructure is available for tying in. Under this program, lateral pipes will be installed from the street to the property line to help property owners who are required to connect to the available sanitary sewer system. The sewer laterals represent at least half of the cost to connect. The map below illustrates the low, medium, and high priority areas based on the density of vulnerable septic systems.

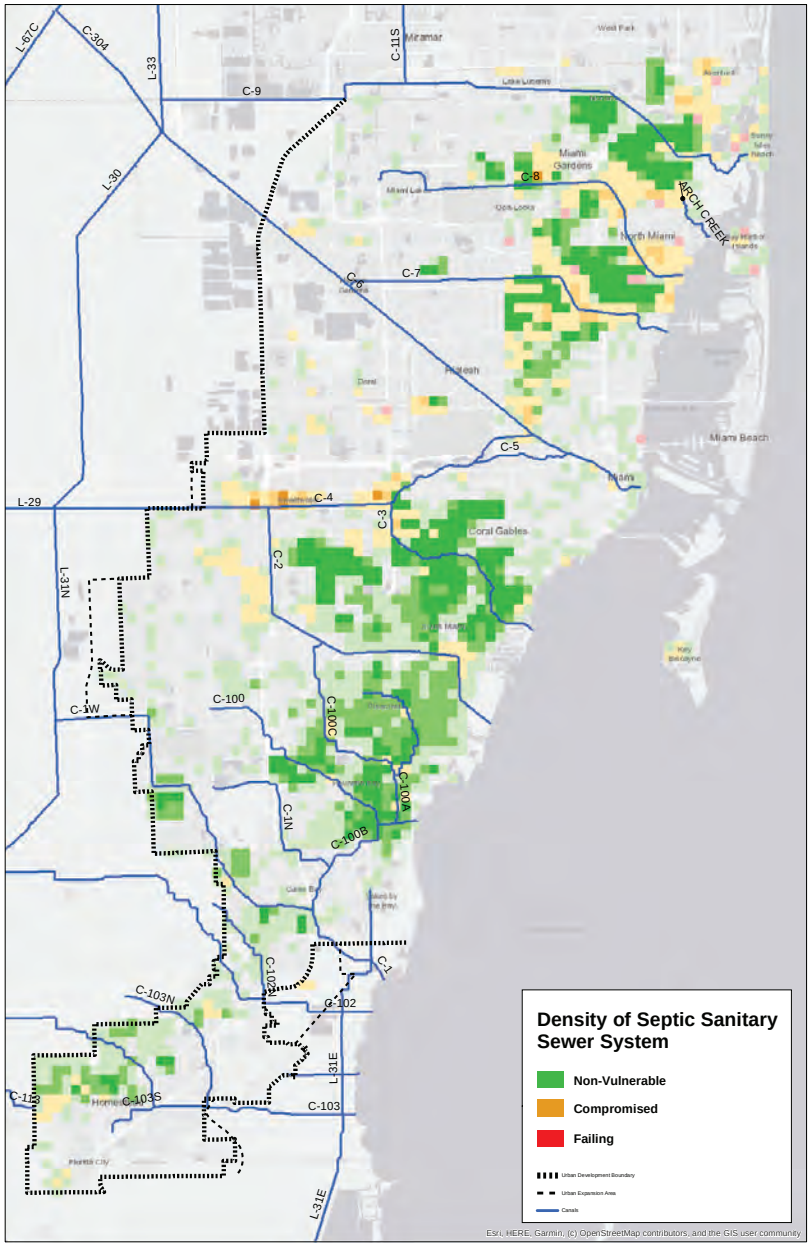
TIMELINE FOR PROJECTS UNDERWAY

FUTURE PHASES

Expansion of the sewer system to unserved areas

Fully addressing this issue and expanding infrastructure will take time and significant investment. Expanding sewer infrastructure to unserved areas costs $40,000 - $50,000 per property.

The Department is actively seeking new funding sources and mechanisms to expand the sanitary sewer system, starting with systems that are most likely to malfunction due to groundwater conditions and those that would have the greatest public health and environmental impact if they were to fail.



HOW CAN YOU HELP?

Check to Protect

Please properly maintain your septic system. It will add years to its service life, keep problems at bay and save you money.

For tips and to find a permitted service professional, visit the Department of Regulatory and Economic Resources' Septic System Care page at:

CHECK 2 PROTECT

Properly Functioning Septic Systems Save You Money and Protect Your Property, Health and Our Environment

MIAMI-DADE COUNTY

For more information go to **www.miamidade.gov/connect2protect**

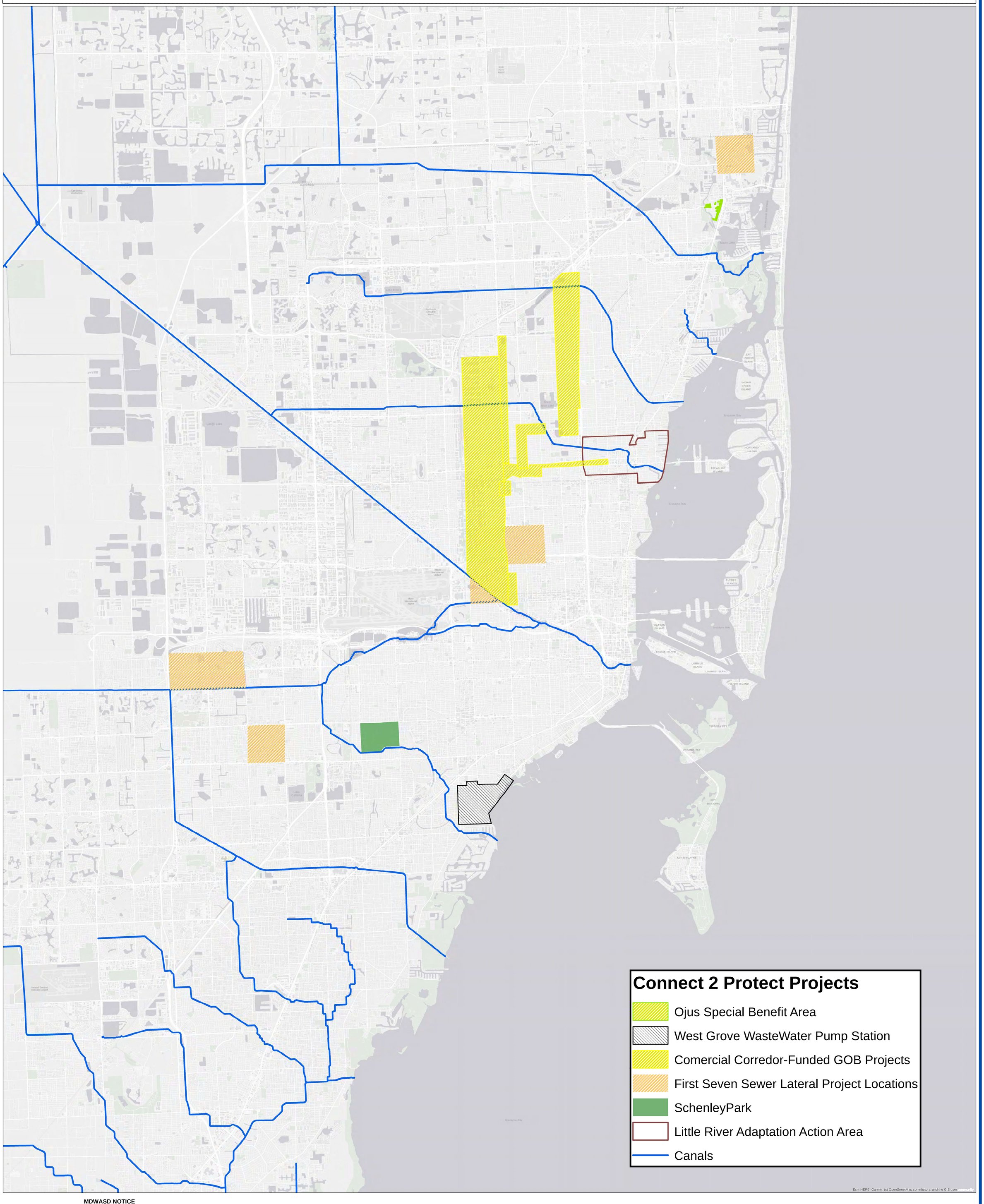
Connect with us by taking the C2P Survey!

Protect your home
from damage, reduce maintenance, and get more use from your yard

Protect your health
from exposure to overflows and flood water

Protect our natural resources,
including our drinking water and Biscayne Bay

MIAMI - DADE WATER AND SEWER DEPARTMENT
Planned and Funded Connect 2 Protect Projects



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MIS/GIS Modified 04-13-22

Permittee: Miami-Dade County MS4 NPDES Permit

Mallika Muthiah, P.E.
Senior Professional Engineer
NPDES Program
Water Management
Division of Environmental Resources Management (DERM)

Presentation to BBWMAB

4/20/22

Outline

- It is all connected!
- Types of MS4 Permits
- NPDES MS4 Permit Program
- Miami-Dade County and 32 Co-Permittees
- Construction Activities
- Departments Involved & NPDES Activities
- Permit Renewal
- Cycle 5 NPDES Permit
- Surface Water Quality Monitoring
- Total Maximum Daily Load (TMDL)
- Estuarine Regions & Nutrient Parameters
- Public Outreach
- Special Water Quality Monitoring

It is all connected!

Only Rain Down the Storm Drain!

Stormwater Runoff May End Up

In Aquifer, Canals, Creeks, Rivers, or Lakes

MS4s

Municipal Separate Storm Sewer System (MS4) is a system of conveyances:

- Roads, streets, catch basins, curbs, gutters, ditches, constructed channels, or storm drains
- Owned / operated by entity with jurisdiction over management and discharge of stormwater
  - State, city, town, county, special district, etc.
- Discharges to waters of the state

Types of MS4 Permits

- Phase I MS4 Permit – For medium and large MS4s
- Phase II MS4 Permit - Two-Step Generic Permit
  - Florida City, Sweetwater, and FIU
- MSGP - Multi-Sector Generic Permit
  - Airports, Port of Miami, Air Reserve Base, Landfills, etc.
  - Industrial facilities regulated through MSGP Permits
  - For 11 categories of industrial activities, further divided into 29 sectors.
- CGP - Construction Generic Permit
  - Required for discharges from construction activities
  - Disturb one or more acres of land

NPDES MS4 Permit Program

- It is a Federal Program Delegated to the States
- National Pollutant Discharge Elimination System
- NPDES Permit – Is Known as Phase I MS4 Permit
- Permit is Issued by the State of Florida Department of Environmental Protection (FDEP)
- **FDEP is the Regulator**
- **Miami Dade County is not the Regulator**
- **Miami-Dade County (MDC) is the Permittee**
- MDC needs Legal Authority through Local Rules / Code Provisions to Enforce NPDES Permit Requirements

NPDES MS4 Permit Program

- NPDES Permit is issued to Miami-Dade County & 32 Co-Permittees
- Co-Permittees
  - Municipalities (except for City of Miami & Hialeah),
  - FDOT District VI
  - MDX, and
  - Florida Turnpike Enterprise
- City of Miami and Hialeah have their own permit
- Each Co-Permittee submits their NPDES Annual Report directly to FDEP
- Each permittee is responsible for the performance of their permit requirements
- All Co-Permittees answer to FDEP directly

STATE OF FLORIDA
MUNICIPAL SEPARATE STORM SEWER SYSTEM PERMIT

ACILITY NAME: Miami-Dade County MS4

ERMIT NUMBER: FLS000003-004 — MAJOR Facility

SSUANCE DATE: December 29, 2017

XPIRATION DATE: December 28, 2022

ERMITTEES:

Aventura, City of
19200 West Country Club Drive
Aventura, FL 33180

Bay Harbor Islands, Town of
9665 Bay Harbor Terrace
Bay Harbor Islands, FL 33154

Cutler Bay, Town of
10720 Caribbean Blvd, Suite 105
Cutler Bay, FL 33189

El Portal, Village of
500 NE 87th Street
El Portal, FL 33138

Florida Department of Transportation
Florida's Turnpike Enterprise
P.O. Box 9828
Ft. Lauderdale, FL 33310

Hialeah Gardens, City of
10001 NW 87th Avenue
Hialeah Gardens, FL 33018

Indian Creek Village
9080 Bay Drive
Indian Creek Village, FL 33154

Medley, Town of
7777 NW 72nd Avenue
Medley, FL 33166

Bal Harbour, Village of
655 Ninety Sixth Street
Bal Harbour Village, FL 33154

Coral Gables, City of
2800 SW 72nd Avenue
Miami, FL 33155

Doral, City of
8300 NW 53rd Street, Suite 100
Doral, FL 33166

Florida Department of Transportatio
District Six
1000 NW 111th Avenue
Miami, FL 33172

Golden Beach, Town of
One Golden Beach Drive
Golden Beach, FL 33160

Homestead, City of
551 SE 8th Street
Homestead, FL 33030

Key Biscayne, Village of
88 West McIntyre Street
Key Biscayne, FL 33149

Miami Beach, City of
1700 Convention Center Drive, 4th F
Miami Beach, FL 33139

Miami-Dade County
701 NW 1st Court
Miami, FL 33130

Miami Lakes, Town of
6601 Main Street
Miami Lakes, FL 33014

Miami Springs, City of
201 Westward Drive
Miami Springs, FL 33166

North Bay Village, City of
1666 Kennedy Causeway, Suite 700
North Bay Village, FL 33141

North Miami Beach, City of
17050 NE 19th Avenue
North Miami Beach, FL 33162

Palmetto Bay, Village of
8950 SW 152nd Street
Palmetto Bay, FL 33157

South Miami, City of
4795 SW 75th Avenue
Miami, FL 33155

Surfside, Town of
9293 Harding Avenue
Surfside, FL 33154

West Miami, City of
901 SW 62nd Avenue
West Miami, FL 33144

Miami Gardens, City of
18605 NW 27th Avenue
Miami Gardens, FL 33056

Miami Shores, Village of
10050 NE 2nd Avenue
Miami Shores, FL 33138

Miami-Dade Expressway Authority
3790 NW 21st Street
Miami, FL 33142

North Miami, City of
776 NE 125th Street
North Miami, FL 33161

Opa-Locka, City of
12950 North Le Jeune Road
Opa-Locka, FL 33054

Pinecrest, Village of
10800 Red Road
Pinecrest, FL 33156

Sunny Isles Beach, City of
18070 Collins Avenue
Sunny Isles Beach, FL 33160

Virginia Gardens, Village of
6498 NW 38th Terrace
Virginia Gardens, FL 33166

This permit is issued pursuant to Section 403.0885, Florida Statutes (F.S.), and rules promulgated thereunder. The Department of Environmental Protection (Department, DEP) implements the stormwater element of the federal National Pollutant Discharge Elimination System (NPDES). The stormwater element of the federal NPDES program is mandated by Section 402(p) of the Clean Water Act (CWA), which is set out in the federal statutes at 33 U.S.C. Section 1342(p) and implemented through federal regulations including 40 Code of Federal Regulations (CFR) 122.26.

Authorized by Section 403.0885, F.S., the Department's federally approved NPDES Stormwater Program is set out in various provisions within Chapters 62-4, 62-620, 62-621 and 62-624 of the Florida Administrative Code (F.A.C.). Chapter 62-624, F.A.C., specifically addresses Municipal Separate Storm Sewer Systems (MS4s).

Construction Activities

- Control the contribution of pollutants to the MS4 by stormwater discharges associated with construction sites
- Require the use and maintenance of appropriate structural and non-structural erosion, sedimentation, and waste controls.
- Prevent and reduce the discharge of pollutants to the MS4 from construction activities
- Confirmation that CGP coverage, for applicable sites, has been obtained prior to commencement of any land grading, excavation, or clearing

Departments and Entities Involved

In MDC, NPDES activities are primarily performed by:

- Department of Regulatory and Economic Resources (RER)
- Department of Transportation and Public Works (DTPW)
- Water and Sewer Department (WASD)
- Department of Solid Waste Management (DSWM)
- Parks, Recreation, and Open Spaces Department (PROS)
- Florida Yards and Neighborhood (FYN)

NPDES Requirements (key)

Activities include:

- Inspections and maintenance of the Stormwater System and the Secondary Canal System
- Flood control Projects
- Street sweeping
- Inspections of industrial facilities
- Investigation of complaints
- Spill Prevention, Remediation, and Clean-up
- Permitting, and Inspections of Construction Activities
- Sedimentation & Erosion Control training
- Outreach Activities
- Surface Water Quality Monitoring

Reapplication

- MDC's NPDES Permit expires December 28, 2022
- A Letter that states the Year 4 Annual Report is for reapplication
- Letter submitted along with the Cycle 4 Year 4 NPDES Annual Report, which is due June 30, 2022
- Permit Issuance by FDEP depends on the compliance aspects of the NPDES Co-Permittees

Issues Affecting Issuance of Cycle 5 MS4 Permit

- Timely submission of Year 4 Annual Reports and required attachments
- Outstanding Enforcement Issues
- Compliance Assistance Offers and Warning Letters must be closed
- Consent Orders must be signed and issued prior to permit issuance

Cycle 5 Permit Changes (some)

- Requirements relocated and/or expanded
- Content revised for consistency with EPA interpretation of Clean Water Act requirements
- Clarified program requirements – plan review, inspection, SOPs, training, etc. Expanded staff to be trained
- Some of the added requirements to:
  - Map non-major outfalls
  - Evaluate catch basins inspection and maintenance schedule
  - Include parks and public use areas to litter control program
  - Report incidents of spills and corrective action
  - Prioritize Reasonable Assurance Plan in lieu of TMDL waterbodies

Surface Water Quality Monitoring

- 107 active monitoring stations in Miami-Dade County
  - 66 stations are along the inland canals
  - 41 stations are in the Bay Region
- Miami-Dade County has entered into a Joint Interlocal Agreement with Co-Permittees
- The County conducts county-wide surface water quality monitoring and the cost is shared among the Co-Permittees
- MDC prepares annual surface water quality monitoring report and shares the report with the Co-Permittees

Proposed Additional Monitoring Stations

- Miami-Dade County is planning on expanding the NPDES monitoring network
- Adding few additional monitoring stations in the Canal System and some in the Bay.
- The Monitoring Plan will be updated and submitted to FDEP for approval. It will be shared with the NPDES Co-Permittees

List of Surface Water Quality Monitoring Parameters

Parameters	Monitoring Frequency
Total Ammonia*	Monthly
Dissolved Oxygen*	Monthly
Nitrate + Nitrite	Monthly
Total Kjeldahl Nitrogen	Monthly or Bimonthly
Total Nitrogen**	Calculated
Total Phosphorus**	Monthly
Chlorophyll-A**	Monthly
Total Suspended Solids	Quarterly
Copper, Zinc, Lead, Cadmium, Dissolved* (mg/L)	Annually (Freshwater sites) or Once every five years (Estuarine Regions)
Biochemical Oxygen Demand	Quarterly
Specific Conductivity (Salinity)*	Monthly
Escherichia Coli*	Monthly or Bimonthly
Enterococci*	Monthly or Bimonthly

* Parameters with established State or County Criterion

** Estuary-Specific Numeric Criterion

Nutrient Parameter

- There are no set FDEP criteria for nutrients such as TP, TN, and Chlorophyll-A for the inland canal system.
- For canal system, assessment must be based on monitoring data collected and trend analysis
- However, Bay Regions have State established numeric nutrient criteria based on Annual Geometric Mean for TP, TN, and Chlorophyll-A

Table 8. Results of evaluation of Estuarine Regions in Biscayne Bay, as per 62-303.353. Exceedances of the criterion are typed in red.

NUMERIC NUTRIENT CRITERIA (NNC) of BISCAYNE BAY 2016-2020

NNC Standard: The Annual Geometric Mean (AGM) shall not exceed the criterion more than once in any three-year period (62-302.532 (1) (h) FAC)

AGM for Total Phosphorus Concentrations (mg/l)

Nutrient WBID	3226H1	3226H2	3226H3	3226H5	3226H6	6001C	6001D	6001E	6001F	6001G	6001H	6002	6003
Criterion	0.012	0.012	0.01	0.012	0.01	0.008	0.007	0.008	0.007	0.007	0.006	0.007	0.007
2017	0.008	0.006	0.005	0.006	0.006	0.002	0.003	0.003	0.003	0.002	0.002	0.002	0.004
2018	0.009	0.008	0.005	0.008	0.009	0.003	0.005	0.003	0.004	0.003	0.003	0.003	0.004
2019	0.008	0.008	0.005	0.009	0.009	0.004	0.005	0.004	0.004	0.004	0.005	0.004	0.004
2020	0.009	0.007	0.003	0.007	0.007	0.002	0.003	0.003	0.003	0.002	0.002	0.002	0.002
2021	0.008	0.006	0.004	0.007	0.007	0.003	0.003	0.003	0.003	0.002	0.003	0.004	0.003

AGM for Total Nitrogen Concentrations (mg/l)

Nutrient WBID	3226H1	3226H2	3226H3	3226H5	3226H6	6001C	6001D	6001E	6001F	6001G	6001H	6002	6003
Criterion	0.3	0.3	0.29	0.3	0.29	0.33	0.31	0.28	0.48	0.35	0.24	0.58	0.58
2017	0.461	0.32	0.306	0.34	0.413	0.388	0.42	0.33	0.55	0.432	0.262	0.688	0.579
2018	0.302	0.243	0.256	0.303	0.324	0.307	0.383	0.353	0.476	0.335	0.197	0.599	0.541
2019	0.353	0.252	0.189	0.273	0.265	0.294	0.296	0.238	0.476	0.281	0.14	0.673	0.547
2020	0.523	0.317	0.243	0.331	0.306	0.354	0.43	0.292	0.594	0.374	0.168	0.698	0.625
2021	0.308	0.271	0.286	0.353	0.349	0.404	0.38	0.309	0.566	0.363	0.255	0.68	0.554

AGM for Chlorophyll (µg/l)

Nutrient WBID	3226H1	3226H2	3226H3	3226H5	3226H6	6001C	6001D	6001E	6001F	6001G	6001H	6002	6003
Criterion	1.7	1.7	1.1	1.7	1.1	0.5	0.5	0.7	0.4	0.2	0.2	0.4	0.4
2017	3.786	2.186	1.131	2.533	2.046	0.615	0.88	0.965	0.493	0.468	0.341	0.584	1.058
2018	3.422	1.84	1.38	1.396	1.738	0.526	0.659	0.712	0.387	0.426	0.245	0.537	0.97
2019	3.486	1.696	0.636	1.421	1.323	0.52	0.642	0.627	0.401	0.315	0.358	0.486	0.708
2020	5.327	3.027	1.033	2.152	1.625	0.562	0.87	0.763	0.465	0.342	0.479	0.527	0.709
2021	4.151	1.747	0.741	1.228	1.355	0.425	0.495	0.501	0.271	0.317	0.332	0.23	0.552

These are data for TP TN, and Chlorophyll-A for the Bay Region from surface water quality monitoring report

First row is state criteria

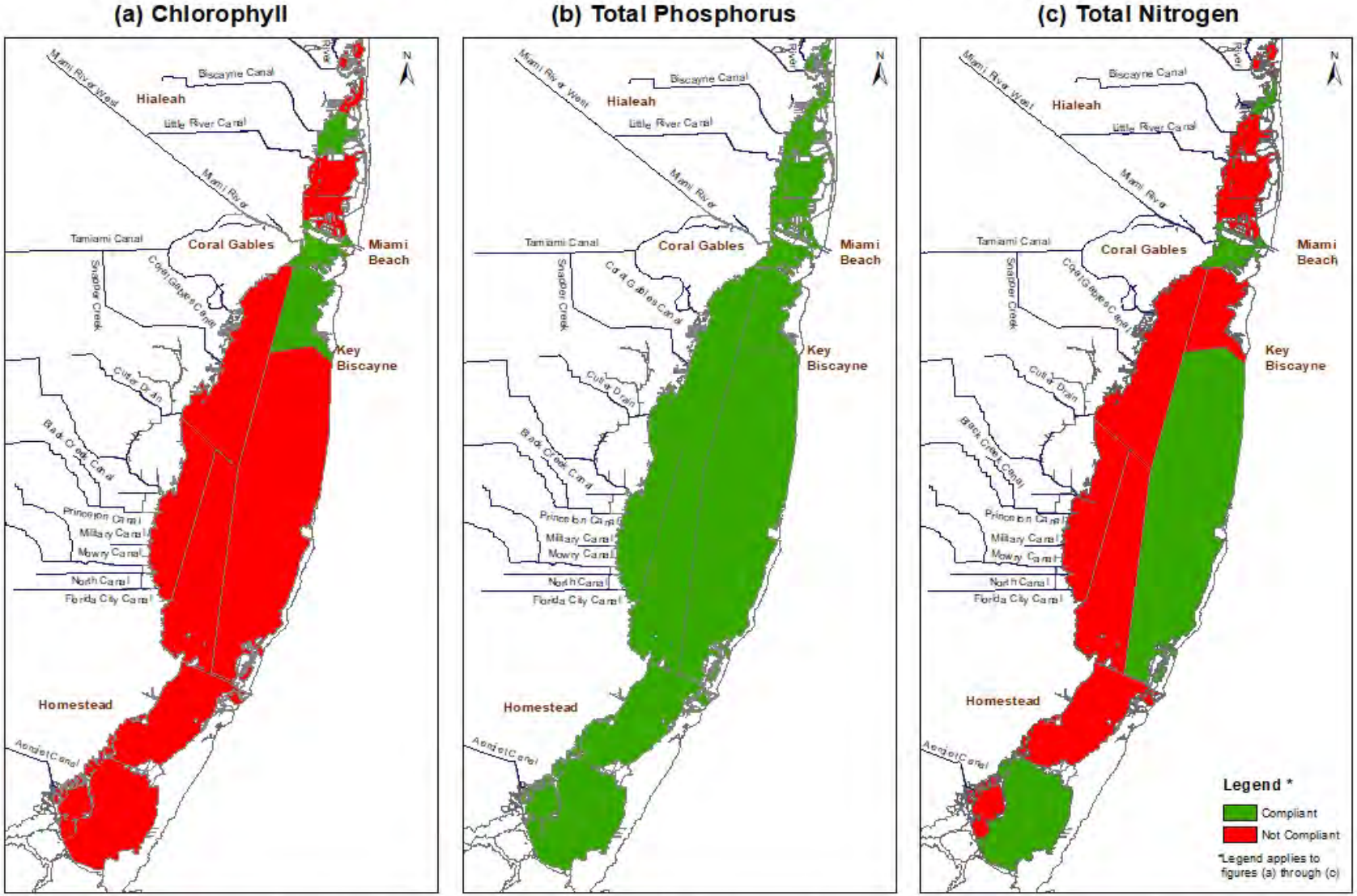
Subsequent rows are Data for 2017 to 2021

AGM for Total Nitrogen Concentrations (mg/l)													
Nutrient WBID	3226H1	3226H2	3226H3	3226H5	3226H6	6001C	6001D	6001E	6001F	6001G	6001H	6002	6003
Criterion	0.3	0.3	0.29	0.3	0.29	0.33	0.31	0.28	0.48	0.35	0.24	0.58	0.58
2017	0.461	0.32	0.306	0.34	0.413	0.388	0.42	0.33	0.55	0.432	0.262	0.688	0.579
2018	0.302	0.243	0.256	0.303	0.324	0.307	0.383	0.353	0.476	0.335	0.197	0.599	0.541
2019	0.353	0.252	0.189	0.273	0.265	0.294	0.296	0.238	0.476	0.281	0.14	0.673	0.547
2020	0.523	0.317	0.243	0.331	0.306	0.354	0.43	0.292	0.594	0.374	0.168	0.698	0.625
2021	0.308	0.271	0.286	0.353	0.349	0.404	0.38	0.309	0.566	0.363	0.255	0.68	0.554

AGM for Chlorophyll (µg/l)													
Nutrient WBID	3226H1	3226H2	3226H3	3226H5	3226H6	6001C	6001D	6001E	6001F	6001G	6001H	6002	6003
Criterion	1.7	1.7	1.1	1.7	1.1	0.5	0.5	0.7	0.4	0.2	0.2	0.4	0.4
2017	3.786	2.186	1.131	2.533	2.046	0.615	0.88	0.965	0.493	0.468	0.341	0.584	1.058
2018	3.422	1.84	1.38	1.396	1.738	0.526	0.659	0.712	0.387	0.426	0.245	0.537	0.97
2019	3.486	1.696	0.636	1.421	1.323	0.52	0.642	0.627	0.401	0.315	0.358	0.486	0.708
2020	5.327	3.027	1.033	2.152	1.625	0.562	0.87	0.763	0.465	0.342	0.479	0.527	0.709
2021	4.151	1.747	0.741	1.228	1.355	0.425	0.495	0.501	0.271	0.317	0.332	0.23	0.552

- No more than one exceedance in any 3-year period Rule
- Nine (9) Bay regions non-compliant with the Total Nitrogen standard
- Ten (10) regions non-compliant with Chlorophyll-A standard

Numeric Nutrient Assessment for Regions of Biscayne Bay 2022



Compliance = Annual Geometric Mean (AGM) does not exceed criteria more than once in a consecutive three (3) year period.

- Better understanding of sources of pollutants
- Better understanding of groundwater loading
- Enhancing operations and communications to optimize volume, timing and distribution of freshwater into the Bay
- Enhance environmental awareness + responsibility

Involvement of multiple Stakeholders

Do Synergies Exist?

Other information available at:

Miami-Dade County Department of Regulatory & Economic Resources

- Flood Complaints
  - Water Management Division
  - (305) 372-6529
  - swu@miamidade.gov
- To report illegal connections, dumping of any liquid or materials into storm drains or water bodies:
  - Environmental Complaint Desk at 305-372-6955 or
  - environmentalcomplaints@miamidade.gov

Miami-Dade County - NPDES Monitoring Plan

TMDL Prioritization Report

For Water Body Identification WBID 3287
Little River Canal

Miami-Dade County
Regulatory & Economic Resources Department
MS4 Permit No. FLS000003-004

March 26, 2018

A. SAMPLE COLLECTION & ANALYSIS

B. MONITORING PARAMETERS

Miami-Dade County TMDL Prioritization
For Cycle 4 MS4 Permit No. FLS000003-004

Introduction

e Total Maximum Daily Loads (TMDL) Prioritization Plan is prepared pursuant to Part VIII.B.2.a of the ami-Dade County and Co-Permittees National Pollutant Discharge Elimination System (NPDES) nicipal Separate Storm Sewer System (MS4) Permit No. FLS000003-004 issued December 29, 2017. ami-Dade County will prioritize WBID (Waterbody Identification) 3287 along the Little River Canal to nply with the TMDL requirements of MS4 Cycle 4 permit. However, it should be noted that the Li e er Canal is under the jurisdiction of, and maintained by, the South Florida Water Mana ment trict (SFWMD).

The items explained below include the priority criteria used for the analysis of th state of Florida Department of Environmental Protection (FDEP) adopted TMDL WBIDs and the ra g of the WBIDs.

2. Adopted TMDLs

There are 33 FDEP identified WBIDs within Miami-Dade County bo dary. Some of those WBIDs were identified by the FDEP as impaired for fecal coliform and some ers for nutrient pollutants. However, all existing FDEP adopted TMDLs for Miami-Dade Count for the parameter Fecal Coliform, and those four WBIDs are shown below in Table 1.

Table 1: FDEP adopted TMDLs applicable to Miami-Dade County MS4 discharges

Waterbody Name(s)	Waterbody Identification Number (WBID)	TMDL Parameter	F.A.C. Rule No.
C-7 Little River Canal	3287	Fecal Coliform	62-304.725
C-6 Miami River (Upper)	3288	Fecal Coliform	62-304.725
C-6 Miami River (Lower)	3288B	Fecal Coliform	62-304.725
Wagner Creek	3288A	Fecal Coliform	62-304.725

3. Prioritization Criteria

Miami-Dade County previously prioritized the Wagner Creek/Seybold Canal WBID 3288A to comply with the Cycle 3 MS4 permit requirements. Miami-Dade County will continue to implement restoration measures in WBID 3288A, therefore, WBID 3288A will not be included in the current TMDL prioritization evaluation. Only the Little River WBID 3287, and the Miami River WBIDs 3288 and 3288B, will be considered in the MS4 Cycle 4 TMDL evaluation, ranking, and prioritization.

Page 3 of 8

WATER QUALITY LOS ASSESSMENT

7

WATER QUALITY LOS ASSESSMENT

Miami-Dade County
MS4 Monitoring Assessment Plan

MS4 Permit No. FLS000003-004
Part V – Monitoring Requirements
Subpart B – Assessment Program

December 27, 2018

Miami-Dade County
MS4 Permit No. FLS000003-004
Part V – Monitoring Requirements
Subpart B – Assessment Program

1. ASSESSMENT PROGRAM OBJECTIVE

The purpose of this assessment program is for Miami-Dade County (MDC) to evaluate the overall effectiveness of the surface water quality monitoring program in reducing stormwater pollutant loadings from its Municipal Separate Storm Sewer System (MS4) to receiving water bodies, which is required under MS4 Permit No. FLS000003-004. The requirements to develop and submit an assessment program to the Florida Department of Environmental Protection Agency (FDEP) for review and approval, within twelve months of permit issuance, are specified under PART V. B.1 and B.2 of Permit No. FLS000003-004.

2. ASSESSMENT PROGRAM COMPONENTS

The purpose of the assessment program is to provide information for MDC to determine the overall effectiveness of the SWMP in reducing stormwater pollutant loadings from the MS4.

The following elements shall be used to develop the assessment program:

A. Water Quality Monitoring Plan – The water quality monitoring plan intended to identify local sources where urban stormwater may be adversely affecting surface water bodies.
B. Pollutant Loading Estimates
C. Evaluation and Response Plan – The response plan is a description of how the data from A. and/or B. above will be used to:
   1) Evaluate trends in water quality with reference to pollutants of concern; and
   2) Identify portions of the MS4 which can be targeted for load reduction /corrective action.

3. WATER QUALITY SAMPLING ACTIVITIES

Miami-Dade County lies within the Biscayne Bay Coastal Basin and the Southeast Everglades Basin. There are eighty-six (86) current monitoring stations located in the fresh water canals and in the estuarine areas within Biscayne Bay (Bay) and its other tributaries. The stations located in the internal fresh water canals are dispersed across several hydraulic basins. The estuarine stations within the Bay are located at the mouths of the canals where they discharge into the Bay, and within the Bay itself. Water quality trends for parameters of interest will be developed and/or examined to establish if a relationship exists between the MS4 Stormwater Management Plan and quality of receiving waters.

Optimizations within the program have occurred over time; sampling locations have been discontinued in some areas and added in others. However, since the State of Florida's methods for determining impaired waters (Chapter 62-303, F.A.C.) recommends 7.5 years of data to have sufficient data density for robust analyses, data from all sites within a WBID—discontinued and current—will be utilized for assessments.


Questions?

DIRECTIVE

On April 20, 2021, the Board of County Commissioners (Board) adopted Resolution No. R-361-21 directing the County Mayor or County Mayor's designee to:

- Install additional stormwater treatment technologies, and research projects
- Expand upon existing collaboration and coordination with municipalities within Miami-Dade County (County) with respect to stormwater-related projects that municipalities may have already implemented
- Determine which of those projects could be successfully implemented by the County
- Recommend to the Board three (3) specific stormwater pilot projects to be prioritized, including details of how such projects could be implemented, estimated costs, and proposed funding.

COOLABORATION WITH MUNICIPALITIES

The County researched the application of existing stormwater technologies used by other municipalities and found some not to be as effective in reducing dissolved nutrients (Total Phosphorous and Total Nitrogen) and bacteria from stormwater.

Municipalities Contacted:

- **City of Miami Beach and Miami Dade County - Vortex Structures** effective for intercepting large trash and debris; capturing hydrocarbons; performs well with sediments; however, not suitable for reducing dissolved pollutant discharges including Total Nitrogen, Total Phosphorous, and Bacteria.
- **City of Miami - SOP Technologies filters** effective for capturing debris and sediments**.** Require increase street sweeping for removal of the captured debris.
- **City of Coral Gables - Smart Sponge -** effective for intercepting hydrocarbons (oils) floating on water. and trash and debris are only captured after it reaches the water body.
- **Village of Key Biscayne - Smart Sponge -** effective for intercepting hydrocarbons (oils) floating on water. and trash and debris are only captured after it reaches the water body.
- **City of Cutler Bay –** Currently is not using any stormwater technologies

SELECTION OF PILOT PROJECTS

Required Participation of several Miami Dade County Departments (RER-DERM and DTPW), local agencies, and private companies.

Location criteria baselines:

- Based on results from previous completed water quality assessments, namely in the Little River sub-basin, and in support of recommendations from the Biscayne Bay Task Force
- Based on the report Water Quality Assessment Report (Revision 2) Little River dated February 15, 2021, which provides test data information related to Total Nitrogen, Total Phosphorous, and Bacteria levels throughout the Little River Canal
- These pre-installation assessments will be used to monitor and document the operational performance of each nutrient removal technology installed during storm events, monitor, and document the level of effort required for maintenance, and determine the amount of nutrients and bacteria removed by each type of technology
- Based on balancing the effectiveness of improving stormwater quality while maintaining the flood quantity level of service
- Representing areas being highly affected by nutrient pollution and provide environmental benefits for the Little River Basin
- Locating typical stormwater systems serving on public right-of-way and may serve as models for future projects

All pilot projects discharge to the Little River Canal (C-7).

MIAMI-DADE COUNTY

TECHNOLOGY SELECTION PROCESS

Several vendors were contacted to obtain information of Stormwater Technologies for Removal of Total Nitrogen, Total Phosphorous and Bacteria.

- Provided to vendors the Northern North Bay (NNB) and the Southern North Bay (SNB) and bacteria criterion values. The NNB and the SNB are the areas where the Little River Canal discharges to Biscayne Bay
- Criterion values were provided by RER-DERM
- The selection of technologies were based on the following criteria: effectiveness, durability, maintenance, and cost
- A matrix was prepared to evaluate each technology based on criteria. (1-poor and 5-best)
- Eight vendors (8) were selected
- Vendors that did not provide technologies that meet pilot project criteria were not selected

	Contech (JellyFish)	Ferguson (StormBasin Inlet Filters)	Ferguson (Helix Filter)	SOP Technologies (Stormwater Curb Inlet Filters)	SOP Technologies (Stormwater Filter Baskets)	Hydro International (DownStream Defender)	Hydro International (Hydro Dryscreen)	Abtech (Smart Sponge)
Cost	4	3	5	5	3	3	3	3
Effectivenes	5	5	5	3	3	2	3	3
Maintenance	4	2	3	2	2	5	4	3
Durability	4	3	4	4	3	4	4	4
Total Score	17	13	17	14	11	14	14	13
Location	3	1	1	2,3	2,3	Installed at various locations in the County	2	1,2,3

PILOT PROJECT 1

Pilot Project 1 is located in a residential area on NW 107 St from NW 19 Ave to NW 18 Ave.

- Two (2) existing outfalls to Little River Canal (C-7)
- Will install 20 StormBasin catch basin inserts with filters prior to Outfall 1
- Will install EcoVault unit with filter prior to Outfall 2
- Estimated Project Cost $260,000

Project Status

- Design Phase: 100% complete
- Permitting Phase: 100% complete
- Procurement: Ongoing
- Construction and Testing: Scheduled for Summer 2022

Description	Quantity
EcoVault 5' x 10' (Ecosense International Inc)	1
StormBasin Plus with Protected Bypass (Various sizes) (Ferguson)	20
EcoVault 5' x 10' Replacement Filter (Ecosense International Inc)	4
StormBasin Plus with Protected Bypass (Various sizes) Replacement Filter (Ferguson)	40

MIAMI-DADE COUNTY

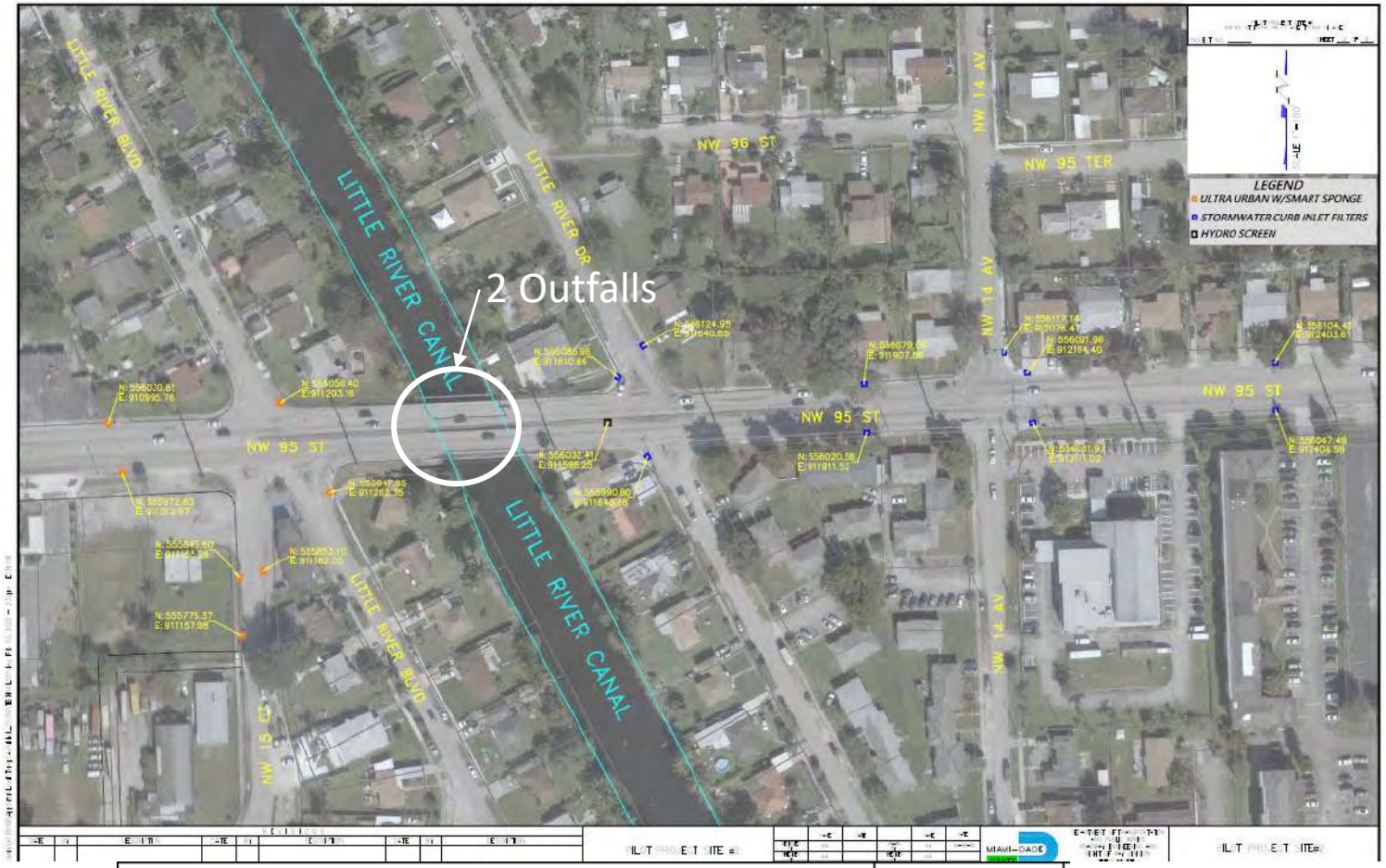
PILOT PROJECT 2

Pilot Project 2 is located on an arterial roadway, NW 95 St from NW 13 Avenue to NW 17 Ave.

- Two (2) existing outfalls to Little River Canal (C-7)
- Will install ten (10) SOP Inlet Screens and a Hydro Dryscreen unit prior to Outfall 1
- Will install seven (7) SmartSponge Filters Insert prior to Outfall 2
- Estimated Project Cost $254,000

Project Status

- Design Phase: 100% complete
- Permitting Phase: 100% complete
- Procurement: Ongoing
- Construction and Testing: Scheduled for Summer 2022



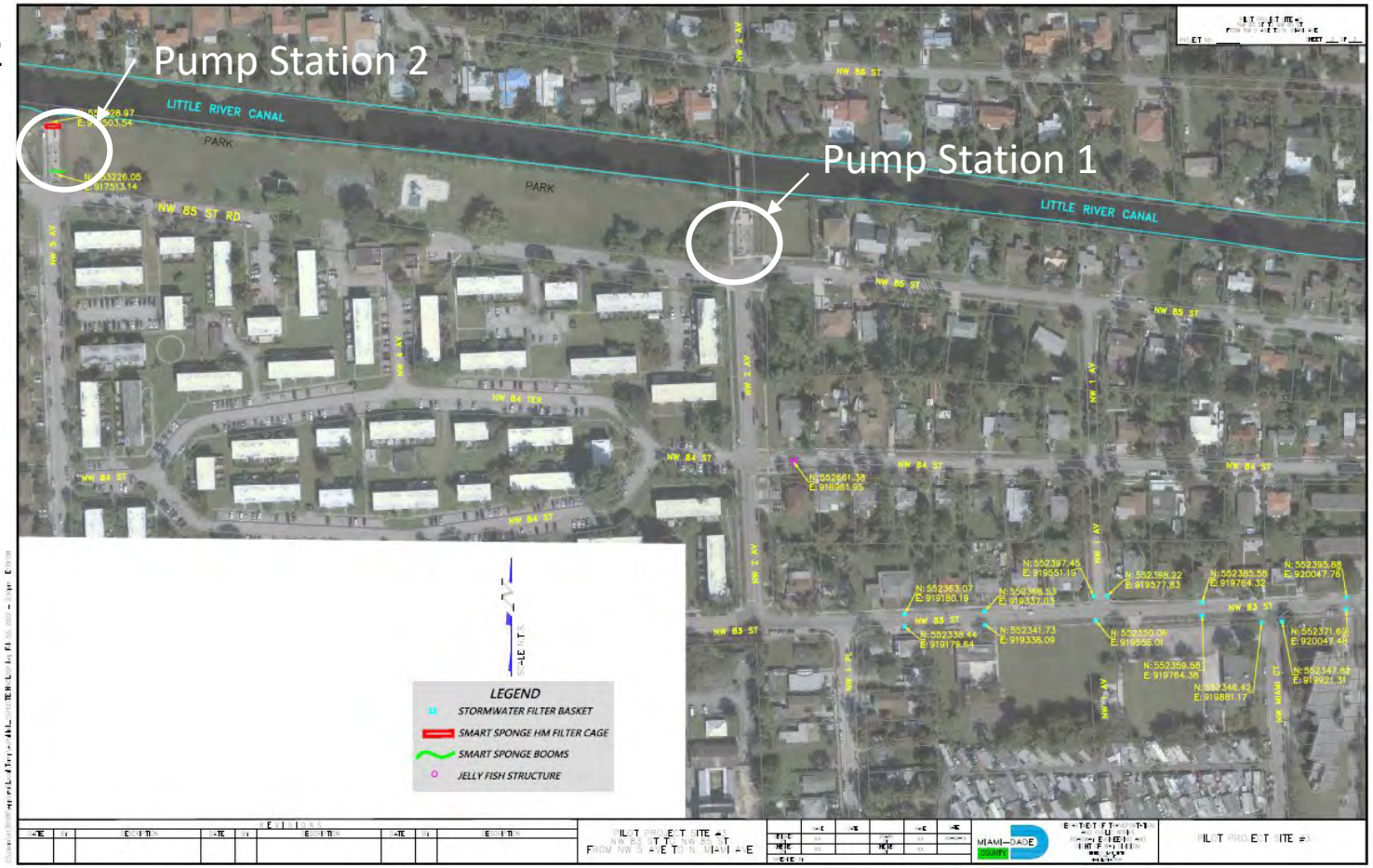
4X8 Hydro Dryscreen (HYDRO INTERNATIONAL)	1
Stormwater Curb Inlet Screens (SOP TECHNOLOGIES)	10
SmartSponge Filter Inserts UUF DI3216H, W/2 SPK 161603 HM	3
SmartSponge Filter Inserts UUF DI3216N, W/2 SPK 161603 HM	1
SmartSponge Filter Inserts UUF DI1414H, W/1 SPK 141403 HM	3
Smart Pak - Smart Sponge HM (Replacement) (ABTECH)	22

MIAMI-DADE COUNTY

PILOT PROJECT 3

Pilot Project 3 is in a residential neighborhood, NW 2 Ave to NW Miami Ct from NW 83 St to NW 84 St.

- Two (2) existing outfalls to Little River Canal (C-7)
- Will install ten (10) SOP Filter Baskets and a Jellyfish unit prior to Pump Station 1
- Will install Filter Cage prior to Pump Station 2
- Estimated Project Cost $293,000



Project Status

- Design Phase: 100% complete
- Permitting Phase: 100% complete
- Procurement: Ongoing
- Construction and Testing: Scheduled for Summer 2022

JELLYFISH FILTER STRUCTURE (8' X 8') BY CONTECH	1
FILTER ASSEMBLY STAINLESS STEEL CAGE BY ABTECH INDUSTRIES	1
6" Diameter SMART SPONGE BOOM BY ABTECH by 5' long (Line Skimmer) BY ABTECH INDUSTRIES	4
SOP TECHNOLOGIES PATENTED STORMWATER FILTER BASKETS	13
Smart Sponge Plus 18" X 1' X 1'(Replacement) (BY ABTECH INDUSTRIES)	20
Smart Sponge HM 18" X 1' X 1' (Replacment) (BY ABTECH INDUSTRIES)	20

MIAMI-DADE COUNTY

TECHNOLOGIES SELECTED

SOP - Inlet Screens and Filter Baskets

- To be installed on existing infrastructure to prevent sources of nutrients (leaves and vegetation) and street litter from entering stormwater systems
- The filter baskets are placed under existing storm grates
- Designed for maximum water flow
- Have Quick Response (QR) codes and web app to provide community engagement (share photos and their observations of storm drain filters & inlets) and learn about Miami-Dade County's efforts to protect Biscayne Bay
- Other cities using them include the City of Miami, City of South Miami, and City of Aventura since 2019.

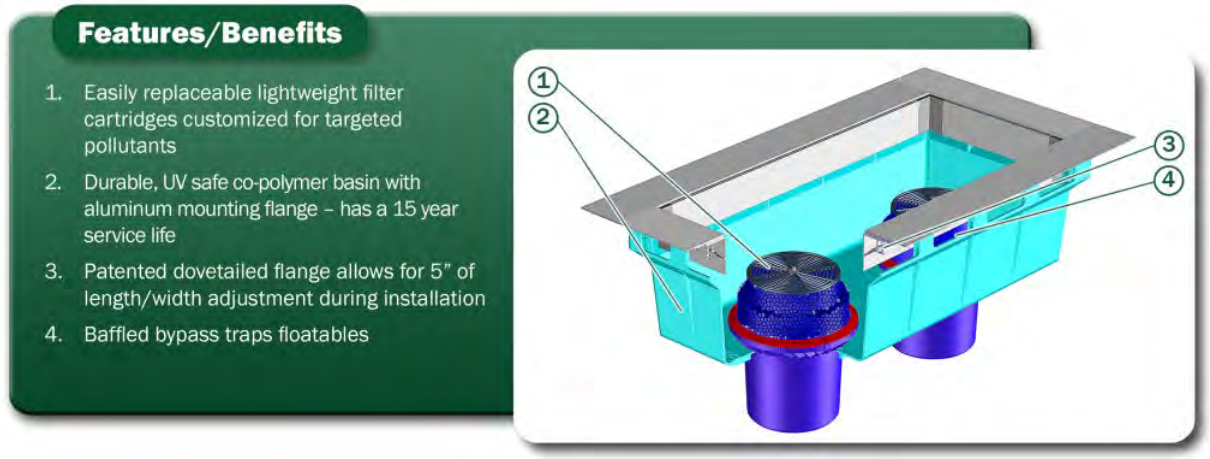
Maintenance

- Require a more frequent street cleaning schedule to keep grates free of debris

TECHNOLOGIES SELECTED

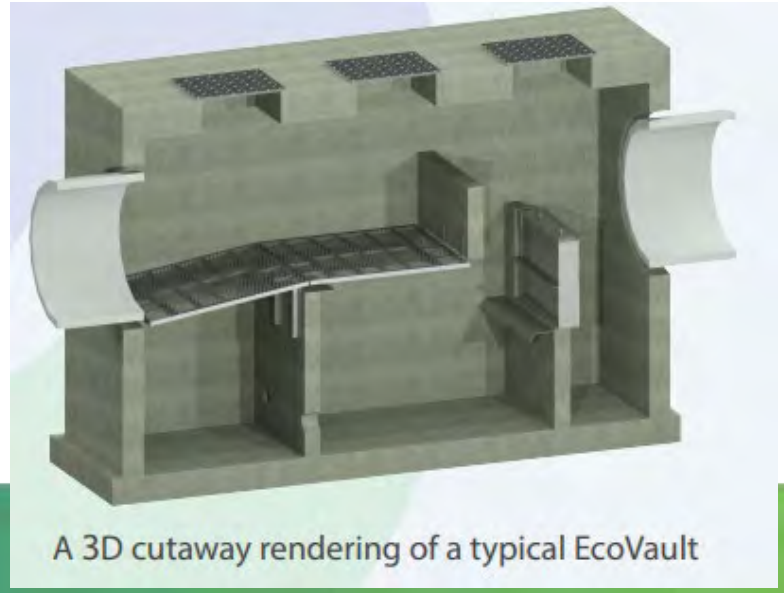
Fabco/Ferguson-StormBasin

- Cartridge filtration system with specific media (bacteria and nutrients)
- Cartridge is twist and lock which makes replacement simple
- Trash is removed by vactor truck



EcoSence International -EcoVault Unit

- Provides separation, screening and filtration
- Removes grass clipping, leaves, litter, sediments, heavy metals, nitrogen, phosphorus, oil and grease
- Quarterly inspections recommended
- Filters should be replaced annually

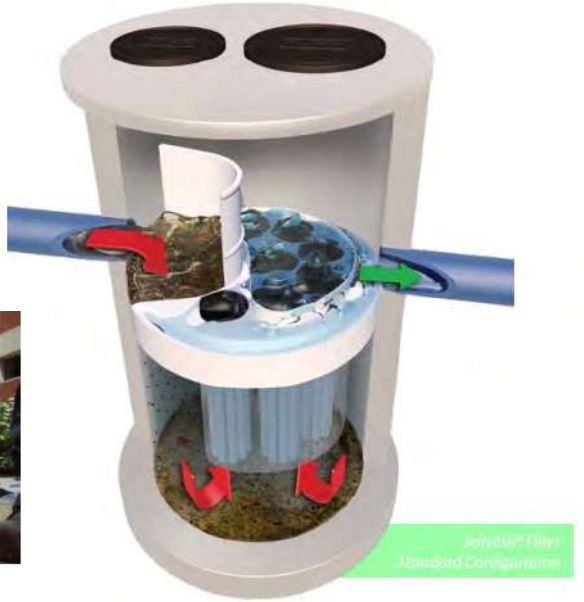

A 3D cutaway rendering of a typical EcoVault

MIAMI-DADE COUNTY

TECHNOLOGIES SELECTED

Contech-Jellyfish

- Filters provide removal of fine sand and silt-sized particles, and particulate-bound pollutants such as nitrogen, phosphorus, metals, and hydrocarbons
- Provides high flow bypass
- Filters are reusable after rinsing
- Filter replacement every 2-5 year



Hydro International-Hydro Dryscreen

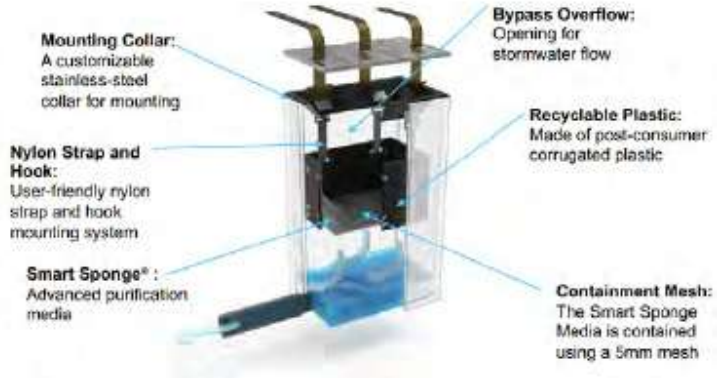
- Captures sediment, trash and suspended solids
- These structures work under low conditions, such as relatively flat drainage profiles, and high groundwater.

TECHNOLOGIES SELECTED

Abtech - SmartSponge Filters Insert

- Removes hydrocarbons, trash debris and sediments
- SmartSponge Filters Insert remove dissolved target contaminant
- Require annual inspection and maintenance

Applicable Technology	Targeted Contaminant
Smart Sponge	Hydrocarbons
Smart Sponge HM	Heavy Metals, Phosphorus, and Hydrocarbons
Smart Sponge Plus	Bacteria
Smart Sponge AC	Heavy Metals, phosphorus, and souluable/insoluable Hydrocarbons
Smart Sponge BC	Heavy Metals, Phosphorus, and Hydro-carbons

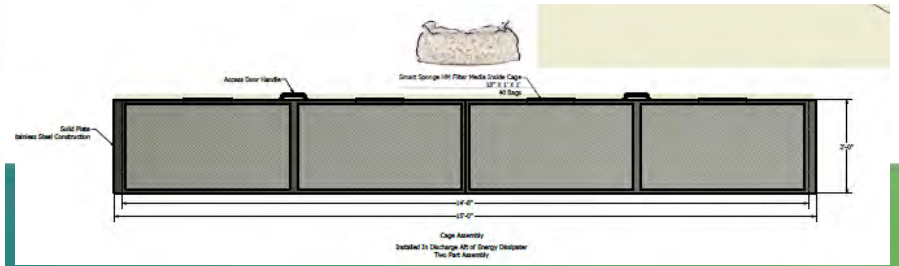


Abtech - SmartSponge Line Skimmers

- Absorb sheen hydrocarbons – will be used inside the pump station wet well

Abtech - Filter Cage

- Designed in collaboration with DTPW for a stormwater pump station



Smart Sponge® Media

Smart Sponge	Smart Sponge Plus	Smart Sponge HM	Smart Sponge AC	Smart Sponge Char
Hydrocarbons	Bacteria	Dissolved Heavy Metals and Phosphates	Dissolved Hydrocarbons and Organics	Nutrients Metals and Emerging Contaminants

All Smart Sponge media variants are hydrophilic, oleophilic, and are non-leaching. Utilized in Ab Tech's product offerings, all media variants will remove TSS, TPH's, motor oils and grease. Purification capabilities of specific contaminants depends on the media variant, product and design features. Contact Ab Tech Industries to determine the best solution.

MIAMI-DADE COUNTY

RECOMMENDATIONS

The duration for the pilot projects should be one and a half years including design, permitting, implementation, maintenance cycle(s) and post-installation water quality assessment to evaluate the effectiveness and technology performance.

Duration will provide ample time for data collection, testing and evaluation of selected technologies.

Funding sources that could be used for implementation of pilot projects are grants and capital funds, such as stormwater utility.

RESULTS

Results of the implementation of the pilot project will provide:

Information on the effectiveness of implemented technologies for removing nutrients from the stormwater drainage system discharging to the Little River Canal (C-7) and other Biscayne Bay tributaries.

Increase the understanding of which solutions work best and under which scenarios.

Assist with the evaluation of the cost-benefit analysis of implementing different stormwater nutrient removal technologies for stormwater drainage systems discharging into waterbodies of Miami-Dade County.

Assist to establish and refine policies that will encourage private developers to implement new technologies in private projects to further mitigate impacts to the health of Biscayne Bay.

LESSONS LEARNED

Most technologies for removal of **dissolved nutrients and bacteria** are based on a filtration system that utilizes FILTERS

Filters can be targeted for removal of specific chemicals (TN, TP, hydrocarbons) and bacteria. Impaired waterbodies should be prioritized.

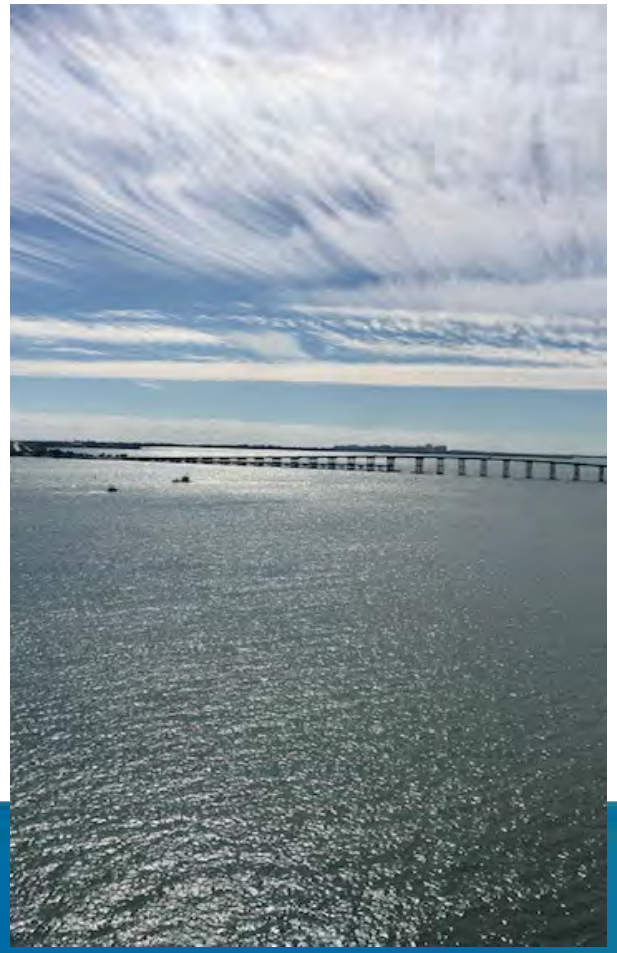
Technologies, such as drain screens and baskets, are dependent on maintenance (street sweeping frequency, drain cleaning).

Price of technologies vary from $1000 per unit to $50,000 per unit or more, depending on treatment flow.

The best approach is a **"train"** approach, in which you have several layers of treatment:

- First layer-swales, screens on structures, increased maintenance (regular sweeping, drain cleaning)
- Second layer- French drains, baffles, pollution control structures before outfalls (provide water quality)
- Third layer- units with **Filters** for dissolved targeted substances and bacteria (requires increase maintenance)

QUESTIONS?




Water Management Technologies, Inc. Presents:
THE SCAVENGER VESSELS
DECONTAMINATION VESSEL
Your Solution to
CLEAN WATER
A Revolutionary Approach to Water Regeneration
www.scavengervessel.com

Restoring Health and Clarity to **Waterways**

The contamination of our waterways by biological and chemical waste, floating debris and runoff is a growing concern worldwide. As a result of human activity, raw sewage, large amounts of nutrients like nitrogen, phosphorus and hydrocarbons are introduced into the water. These, in turn, allow harmful bacteria like E.coli, viruses, algae and insects to breed.

The Scavenger Vessel™ is the **most effective** pollution control and water maintenance vessel available in the world today. It was designed by U.S. based Water Management Technologies™ to clean and rejuvenate waterways **"In Situ"** such as lakes, rivers, harbors, and industrial waste water in order to promote healthy and safe environments.

The Scavenger Vessel™ with its Patented OxyPlus™ decontamination system improves water quality by reducing and eliminating bacteria and viruses, raising D.O. (Dissolved Oxygen) levels, controlling algae growth, improving water clarity and eliminating odors. A multi-purpose vessel, the Scavenger Vessel™ not only decontaminates and re-oxygenates water; its unique design also allows it to collect floating debris simultaneously, creating safe, healthy and more attractive public waterways.

The Scavenger Vessel's OxyPlus™

Decontamination system has the following **BENEFITS:**

IMPAIRED WATERS

- High bacteria levels
- Low Dissolved Oxygen Levels
- Elevated BOD or COD levels
- Unbalanced nutrients
- High algae count

BIOLOGICAL

- Kills bacteria, parasites and microbes
- Destroys fecal coliforms
- Neutralizes viruses
- Raises DO levels in water
- Improves water quality overall

CHEMICAL

- Reduces BOD and COD
- Oxidizes some pesticides, insecticides, herbicides and fungicides that are washed into the watershed

AREAS OF IMPACT

- Waterways / Canals
- Rivers
- Lakes
- Ports
- Harbors
- Agricultural reservoirs

PHYSICAL

- Improves water clarity by reducing turbidity and removing color
- Eliminates odors caused by sulfur, nitrogen, and organic materials
- Controls algae growth by removing algae food sources
- Eliminate the plume of nutrients left by surface debris removal

OUR CUSTOMERS

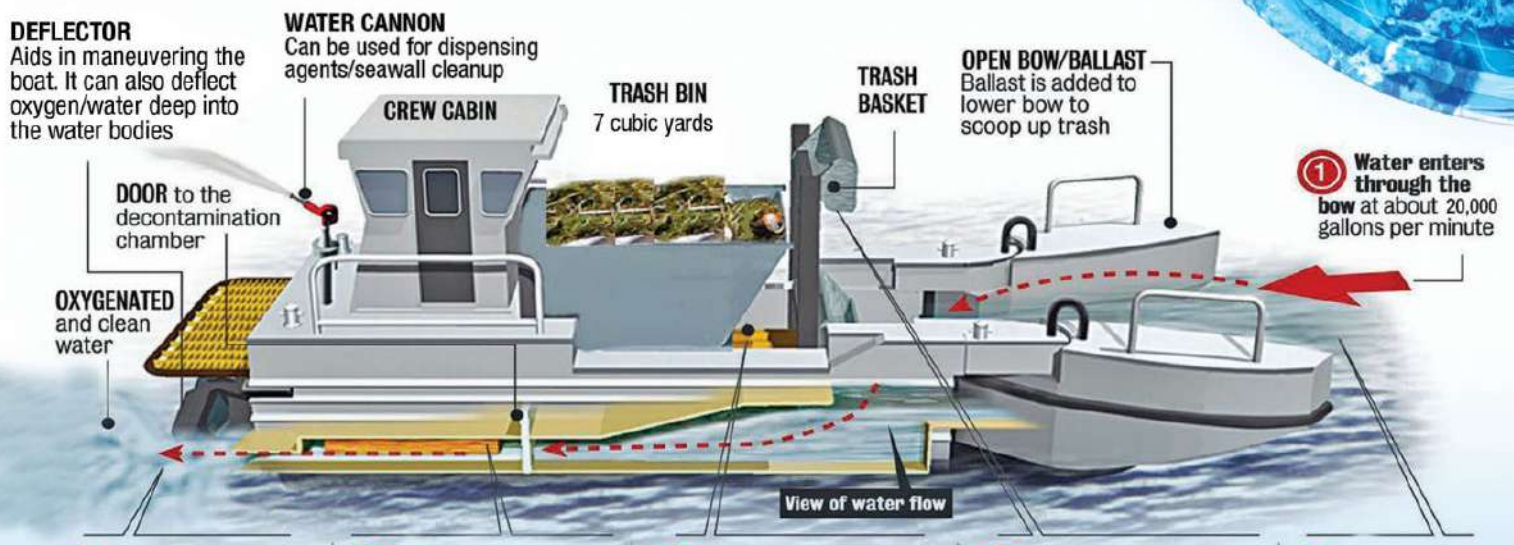
- Government agencies
- Municipalities
- Private Industries
- Environmental Restoration entities
- Agriculture

How It Works

The key to the Scavenger Vessel is the advanced Patented OxyPlus™ water decontamination system that treats and revitalizes waterways by aerating the water with a combination of ozone and oxygen. In full operation mode, the vessel scoops up floating debris, destroys bacteria, and injects life-supporting oxygen in the water. This process restores the overall health in the water. The Scavenger Vessel in operation mode can decontaminate at a rate of up to 20,000 gallons of water per minute and inject up to 600,000 liters of oxygen per hour.

CLEANING THE WATER

How the Scavenger Vessel's onboard OxyPlus™ water treatment system works:



SOURCE: Water Management Technologies;

GRAPHIC/LYNN OCCHIUZZO

Proven Technology

OxyPlus™ Water Decontamination System

At the heart of the Scavenger Vessel is the OxyPlus™ advanced water decontamination system. When oxygen is injected into polluted water, the enrichment contributes directly to reducing contaminants suspended in the water. With the addition of ozone to the aeration process a very powerful yet environmentally safe disinfection occurs in the body of water being treated by the Scavenger Vessel™.

Ozone has been applied with great success in municipal sewer treatment processes worldwide because of its ability to disinfect water without leaving the harmful by-products left by chlorine. In fact, ozone has been found to be more than 100 times more powerful than chlorine in destroying E.coli bacteria.

As water enters through the bow of the vessel, the OxyPlus™ generates ozone and oxygen and injects it into the water. The ozone's life expectancy varies between a few seconds and a few minutes. The ozone then converts into oxygen. This process supports Chemical Oxygen Demand (COD), breaks down substances so that they become digestible to bacteria, and supports the aerobic oxidation of toxic nitrogen compounds.

By altering the surface charge, ozone enables suspended particles to coagulate and be easily removed. In addition to algae and improving water clarity, ozone effectively oxidizes some pesticides and some algae therefore improving water clarity. Lastly, it increases the dissolved oxygen content in the water, which has a rejuvenating effect. The Scavenger Vessel's decontamination rate is 1.2 million gallons of water per hour with an hourly oxygen injection rate of up to 600,000 liters. This increases the dissolved oxygen levels in the water, and reduces the number of toxins in the water.

Nova Southeastern University's Oceanographic Center says: "The Scavenger vessel's OxyPlus™ technology can significantly improve water quality. A single pass through the vessel's systems can **reduce up to 98% of bacteria** and coliform in the water, and reduce algae counts by half".

RIVER WATER

Before and after water samples treated with our OxyPlus™ System.

Debris **Collector**

The Scavenger Vessel features a retractable stainless steel trash basket, which is mounted on the front of the vessel. It picks up debris floating on the surface of the water, up to a depth of 2.5 ft. The basket's design, which resembles a comb or grate, is engineered to virtually eliminate any water turbulence during the suction operation. The weight capacity of this basket is approximately 2,500 lbs. The basket is emptied into a containment bin by means of a hydraulic system, which is operated from the main cabin. Continuous debris collection is ensured by a secondary grill that is automatically activated to keep debris from entering the channel while the basket is being emptied into the bin.

The containment bin has a capacity of 7 cubic yards and can effectively be emptied due to its bottom double folding doors activated by a lever.

PICKING UP THE TRASH

As trash and water are funneled into the bow, a basket catches the debris and empties it into a large on-board containment bin.

WATER IS FUNNELED INTO THE BOW

Vacuum water flow up to 20,000 gpm. Vacuum effect. The vessel does not have to run after debris.

Effective Maneuverability

The Scavenger Vessel can make a 360-degree turn, in place, with the bow open and in recuperation mode. This maneuver can be done without interrupting the decontamination process, using the special rear deflector that is attached to the stern of the vessel. The Scavenger Vessel never has to interrupt its recovery systems.

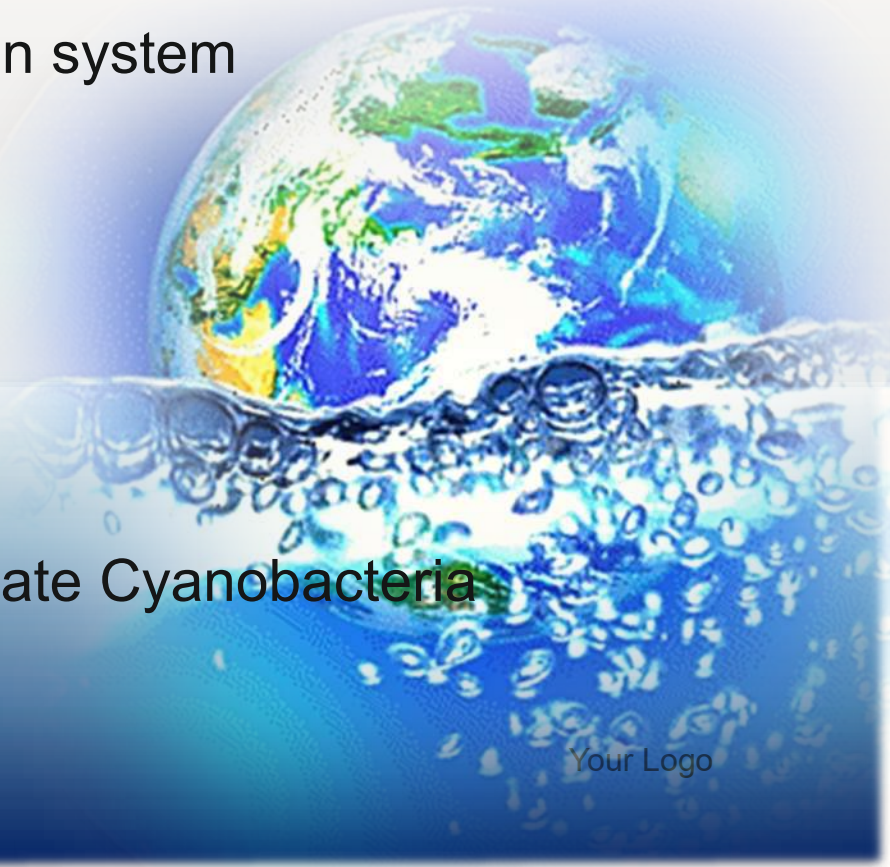
Transport

The Scavenger Vessel can be easily transported anywhere in the world.

WHO WE ARE

WMT
Water Management Technologies

- An Innovative Water Management Company
- Family owned Florida Corporation for over 20 years
- Patented Oxy-Plus decontamination system
- Manufactures Environmental Tools
- Proudly built in the USA
- Proven track record
- Sole source product in the world
- Under contract with DEP to remediate Cyanobacteria



Your solution to
Clean Water

Your Logo

City of Miami and Miami-Dade County Accomplishments From 06/05/2020 To 05/28/2021

1. AMOUNT OF DEBRIS REMOVED FROM 06/05/2020 TO 05/28/2021 = 8642 CUBIC FEET
   320 Cubic Yards = an approximate of 199 US Tons of trash
2. AMOUNT OF WATER DECONTAMINATED AT A RATE OF 10,000 GALLONS PER MINUTE
   1.060 Billion Gallons of water treated
3. AMOUNT OF OXYGEN INJECTED AT A RATE OF 150,000 LITERS PER HOUR.
   284 Million liters of oxygen
4. 2372.5 NAUTICAL MILES TRAVELED
5. 366 DONATED HOURS TOTALLING $73,200 FROM Water Management Technologies
6. WE PICKED UP MANY NAVIGATIONAL HAZARDS SUCH AS DOCK PLANKS,
   55 GALLON OIL DRUMS, DOCK BOARDS, LARGE TIRES

Oxy-Plus™ BENEFITS

Biological

- Destroys fecal coliform
- Destroys Cyanobacteria
- Kills Bacteria
- Neutralizes viruses Including but not limited to Covid-19 (SARS Corona virus)
- Balances Phosphates and Nitrates

Physical

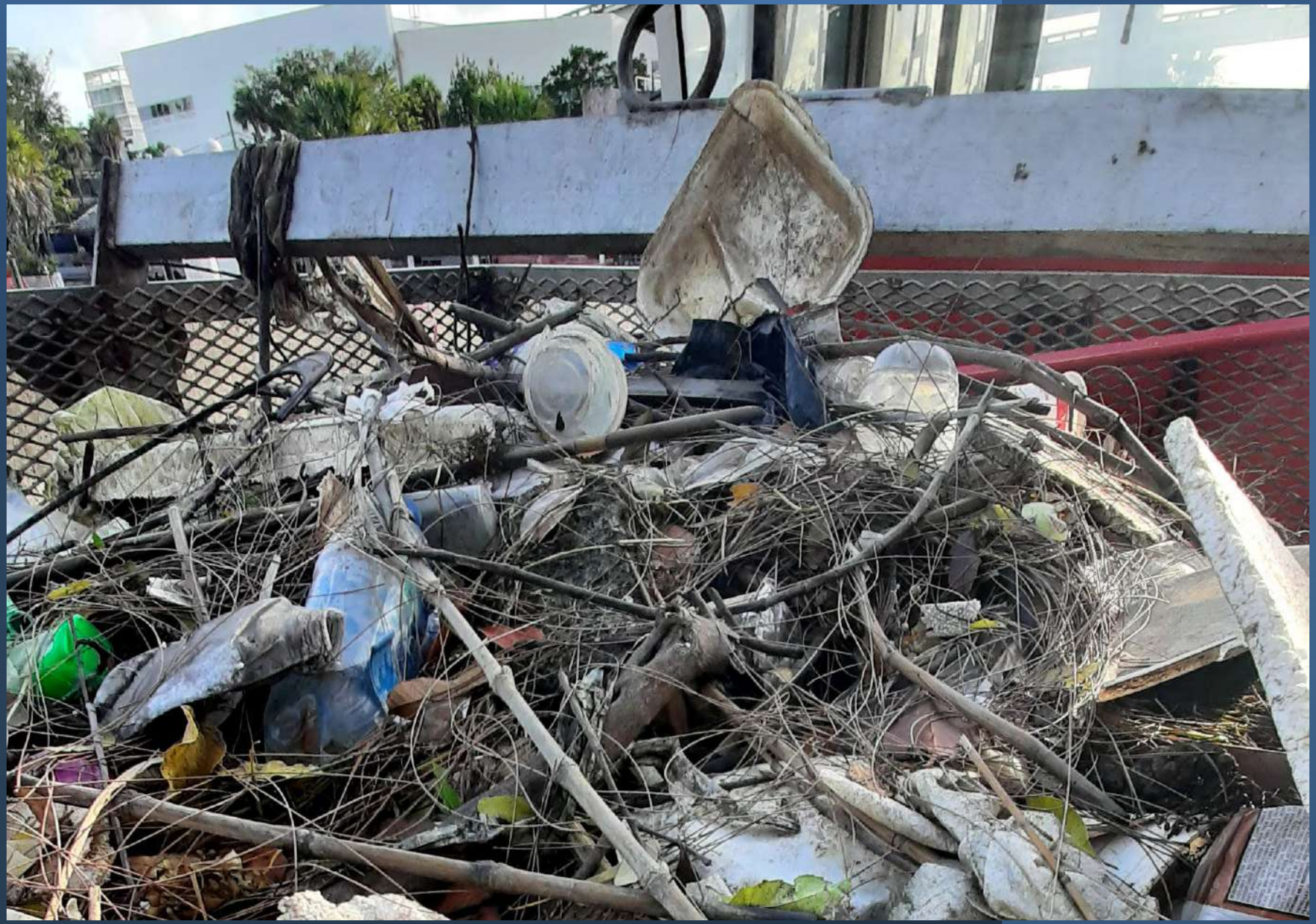
- Remove surface debris
- Reduces Turbidity
- Improves water quality
- Eliminates odors
- Destroys and Controls algae growth
- Remove Hazardous algae cakes

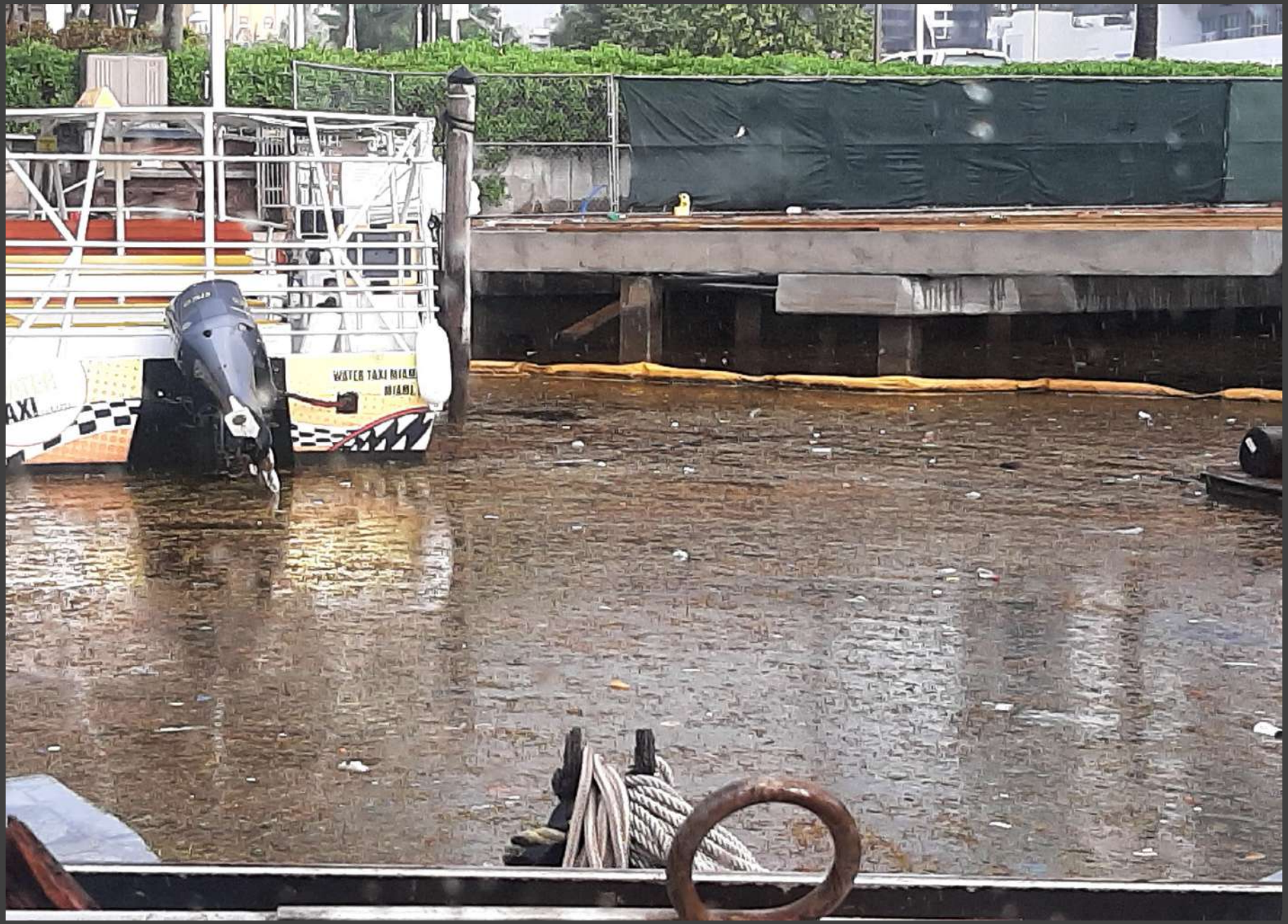
Chemical

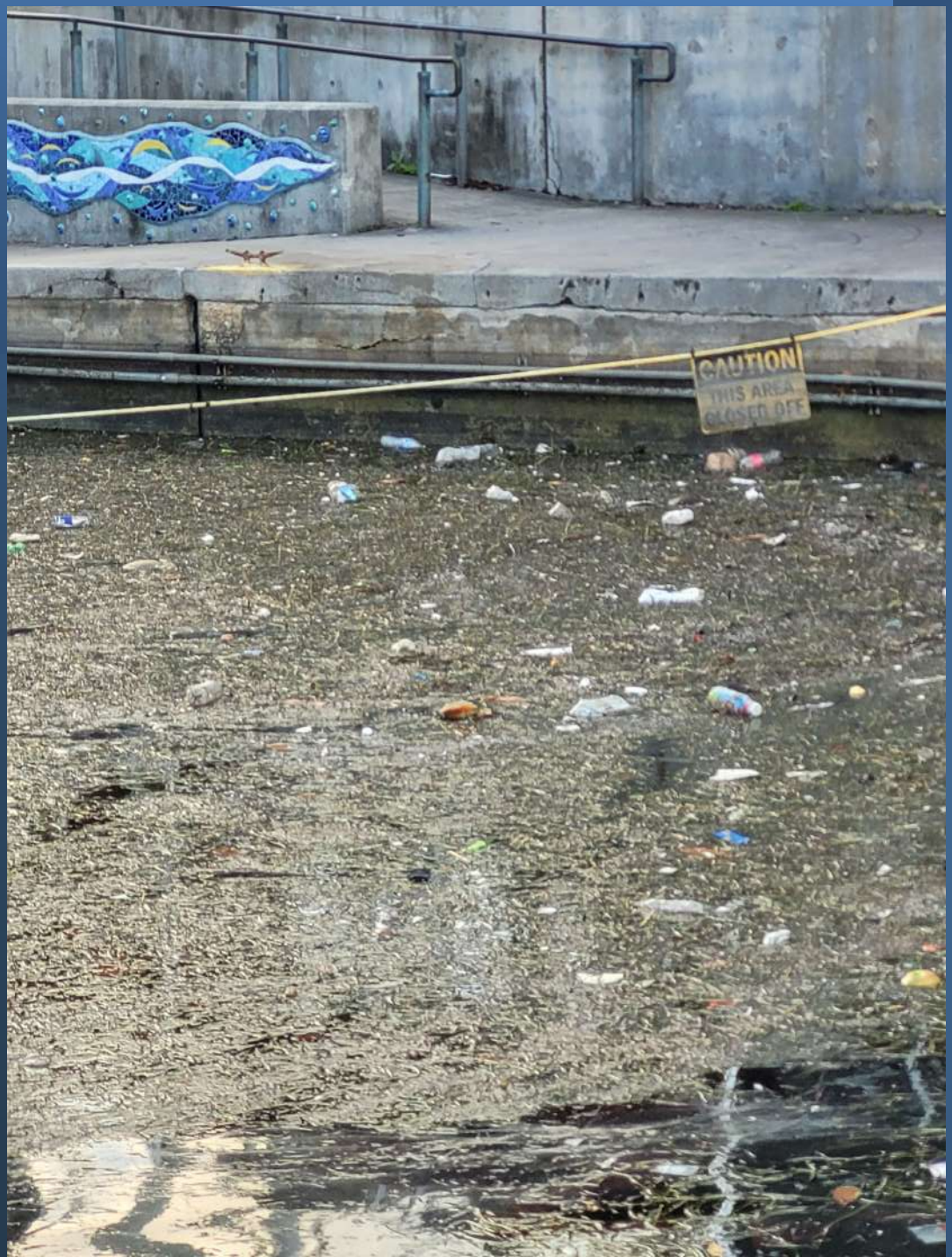
- Increases DO
- Removes some pesticides, herbicides, and fungicides that are washed into the watershed

Your solution to
Clean Water


DECONTAMINATION VESSEL



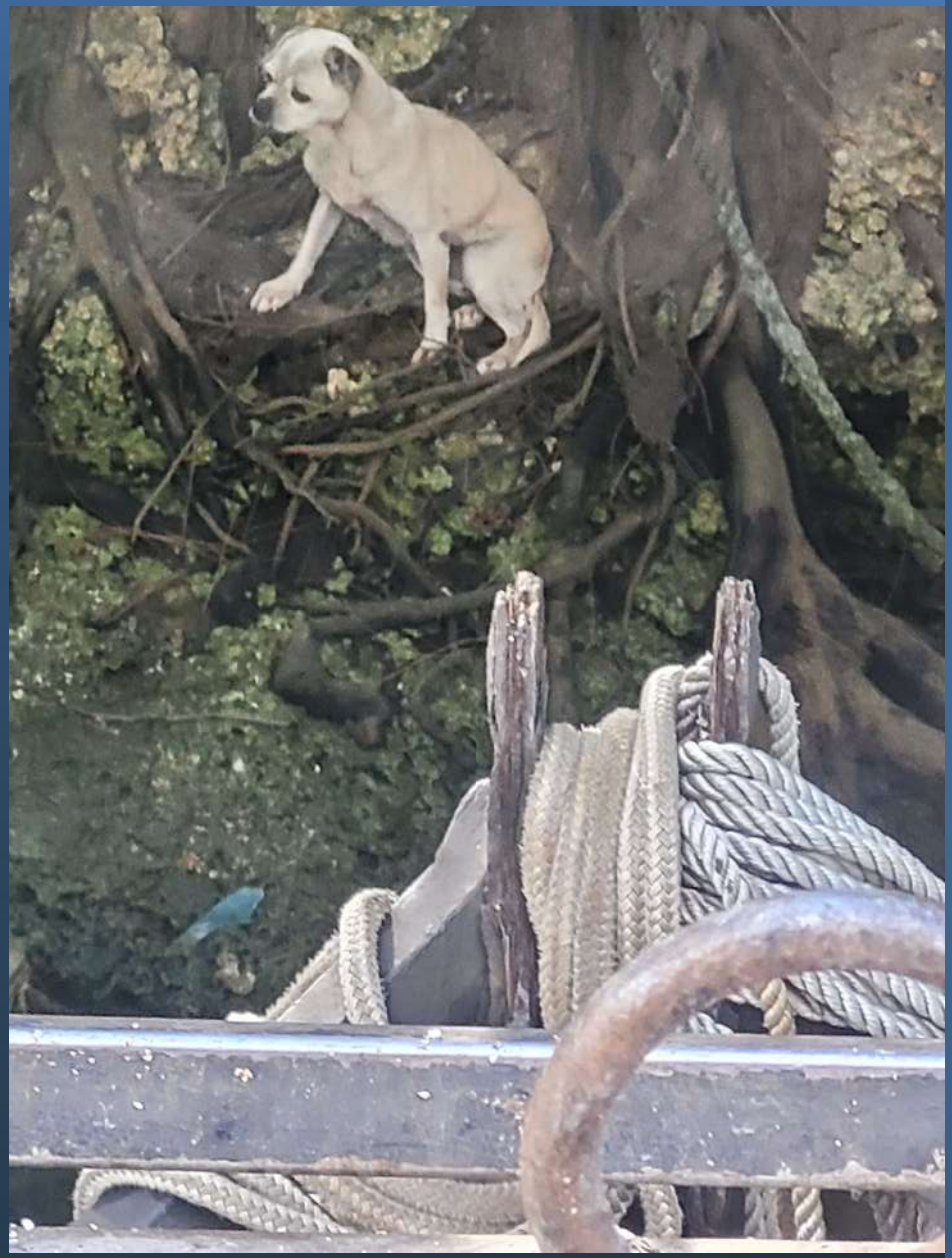

WATER TAXI


CAUTION

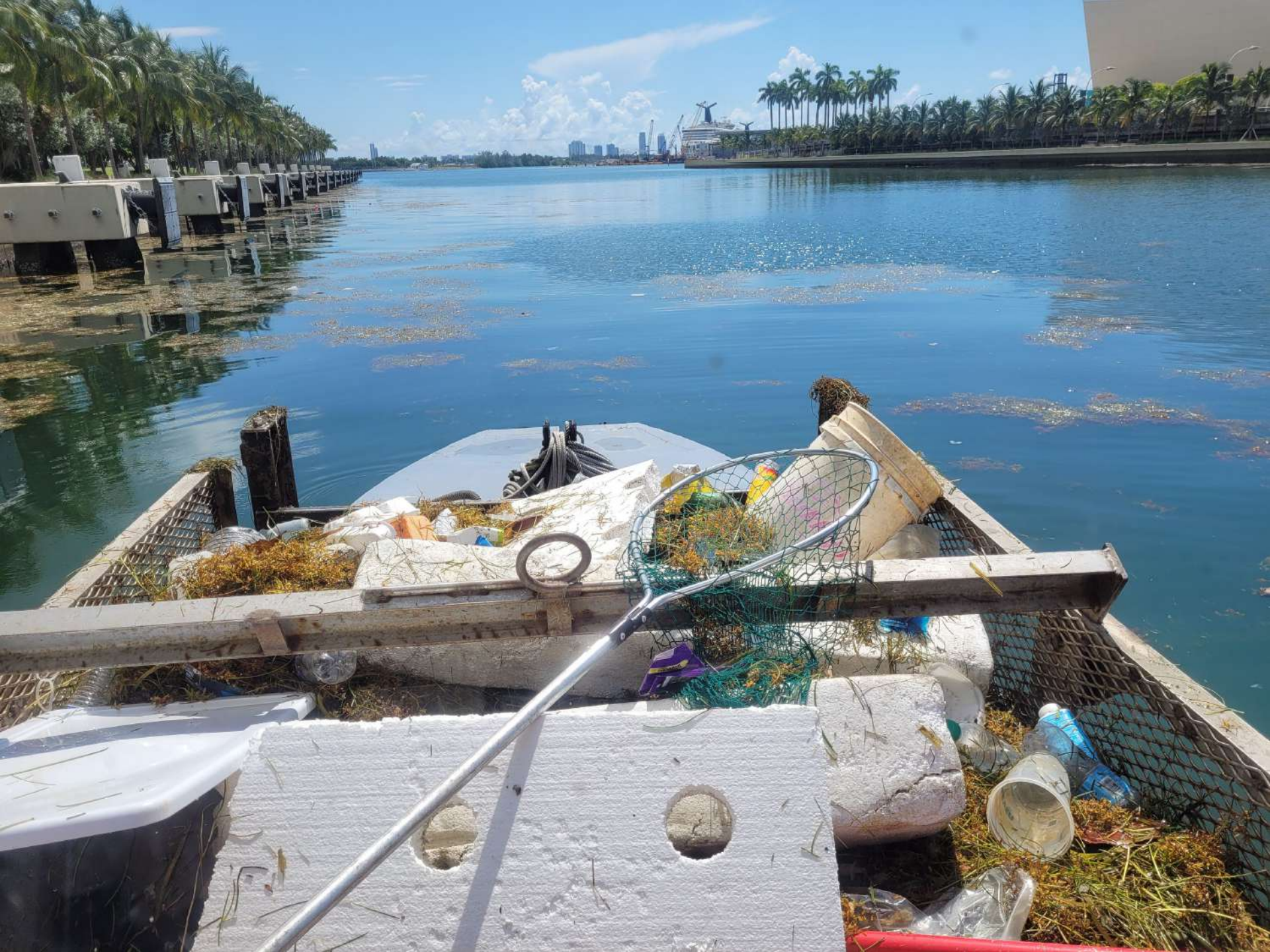

MIAMI BEACH
NO DOCKING


BAY RIDE TOURS


NAVD 88
SFWMD
+1.56 TO NGVD29
2
1
0




BOAT LIF

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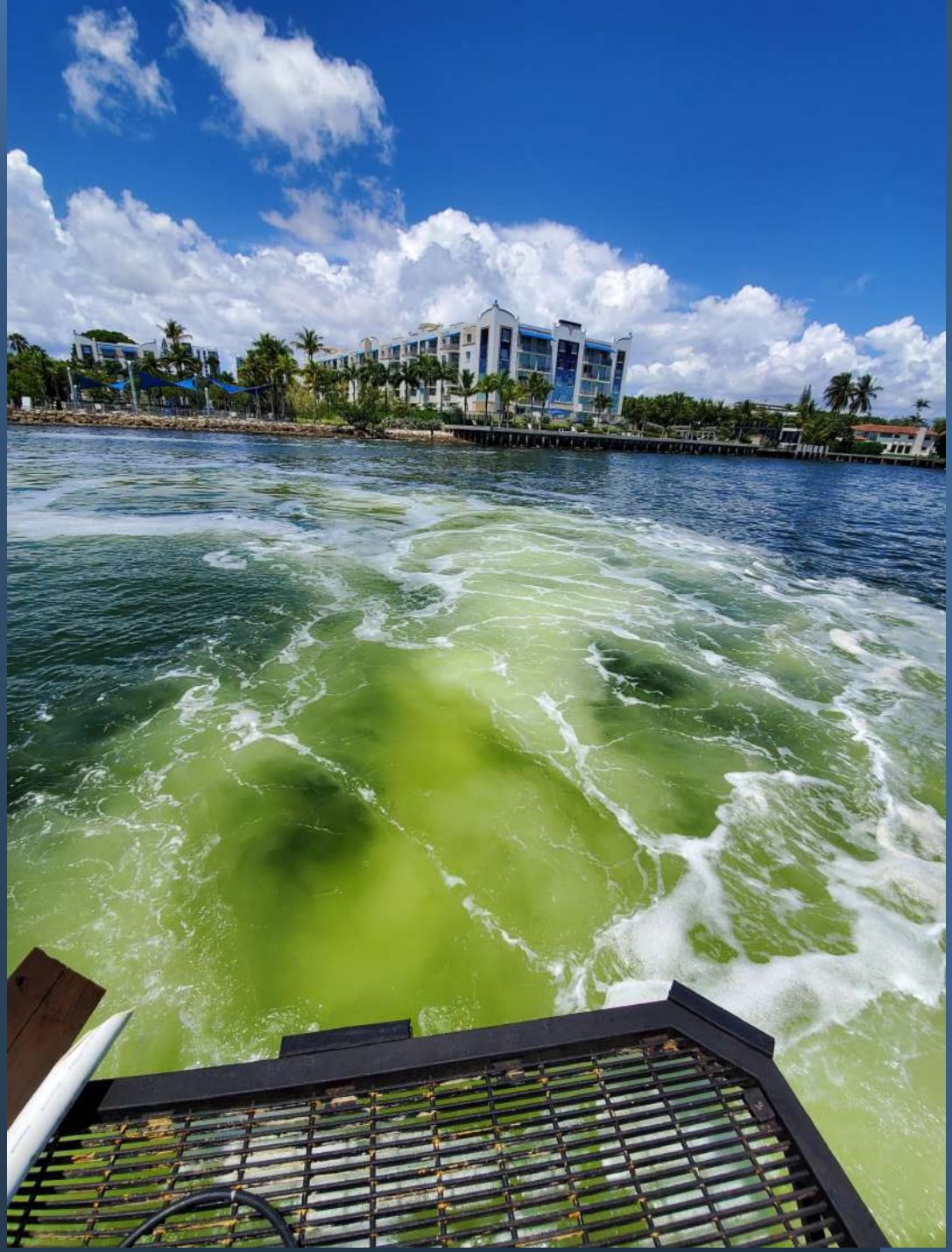



SIMRAD

Clean Waterways

Foam Fractionation for Environmental Restoration

Continued Water Pollution in South Florida

Excess Nitrogen, phosphorus, coliform bacteria and other pollutants in our inland and near shore water bodies are causing ecosystem disasters

- Simply running turnover devices such as bubblers fuels bacteria (often toxic) to digest organic molecules down to basic nitrogen and phosphorus promoting algae waves (often toxic) perpetuating the problems

Currently manatee deaths associated with seagrass depletion as well as the loss of coral and all economic and ecologic benefits associated with coral reefs are directly correlated with cascading effects of excess nitrogen and phosphorus in the environment

Coliform bacteria correlate with pollution

Highly recommended to not expose humans to higher than 70 mpn

Federal Dept. of Health

- High greater than 70 MPN
- Low 0-35 MPN
- Medium 36-70 MPN

Site (South Florida)	Total	E.coli	Enterococcus
Rick Case Canal	>2419.6	66.3	107.1
Pop travers park	501.2	554.6	39.3
Volunteer park	>2419.6	59.8	15.5
Plantation preserve	>2419.6	290.9	190.4
royal Palm Office Park	436	13.5	6.1
Fig tree park	>2419.6	816	
Jacaranda park	157	26	
Himmarshee Canal SE 8th Avenue	>4839	154	1297
15th street canal	>4839	1841	1226
Nurmi Drive	78	355	615
Himmarshee Canal SE (near New River)	3457	>4839	2827
Hollywood Northlake	8704	20	40
Hollywood Southlake	2024	20	270
Lake Ida	>2419.6	>2419.6	>2419.6

Chemical pollutants Himmarshee Canal

- Pesticides
- Medicines
- Petroleum products

parameter	result	units
Acetaminophen	0.008	ug/l
Carbamazepine	0.0011	ug/l
Enterococci(mammal fecal)	64	#/100ml
Fluoride (tap water)	0.26	mg/L
Primidone(seizure med)	0.004	ug/l
Triclopyr (herbicide)	0.004	ug/l
2,4-D (pesticide)	0.047	µg/L

A man with a plan:

Ongoing acute environmental concerns prompted John Loos, multi generational South Florida native concerned about the ocean for both future generations and his own children, to assemble a team of experts to drive a clean-up plan using technology

Dr. Charles Gregory, Chief Science Officer: Aquatic veterinarian, Aquaculturist, and Marine Biologist. Founder of non profit Reef Institute: marine biology education, research, and restoration

Miles Forman, President: Businessman, Entrepreneur, Developer, Philanthropist

John Loos, VP: Marina Owner Operator, World Traveled Waterman, Commissioner Broward County housing authority.

Dr. Katherine Koenig Esquire, IP and Research: Environmental Engineer and patent attorney.

Shane Lafreniere, Operations: Founder 247 Aquariums, large aquarium and aquaculture consultant, and Filtration Designer.

Richard Back, Director of Product: Founder of Afishionado and famous aquarium technology expert

Mike Lambrechts, CFO: VP, Coastal Conservation Association Florida. President, CCA Broward Chapter.. Focused in oyster restoration research and artificial reef deployment. Financial advisor.

John M. Milledge Esq., Director of Government Relations:: AV rated attorney with 35 years of experience on large successful public/private projects.

Bubbles Attract Pollution

Injecting bubbles into a water column causes non-polar particles to accumulate on those bubbles and aggregate at the surface making a foam that can overflow and be mechanically separated from water.

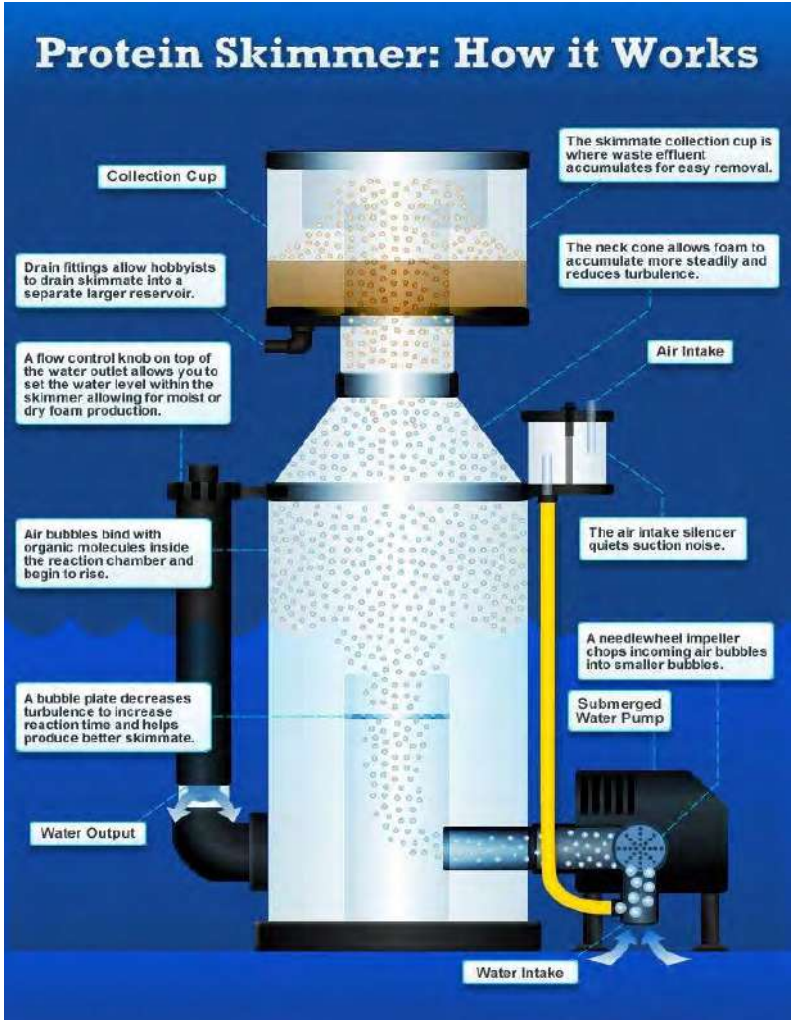
Foam Fractionation: Using bubbles to mechanically separate oils, bacteria, and chemicals from water.

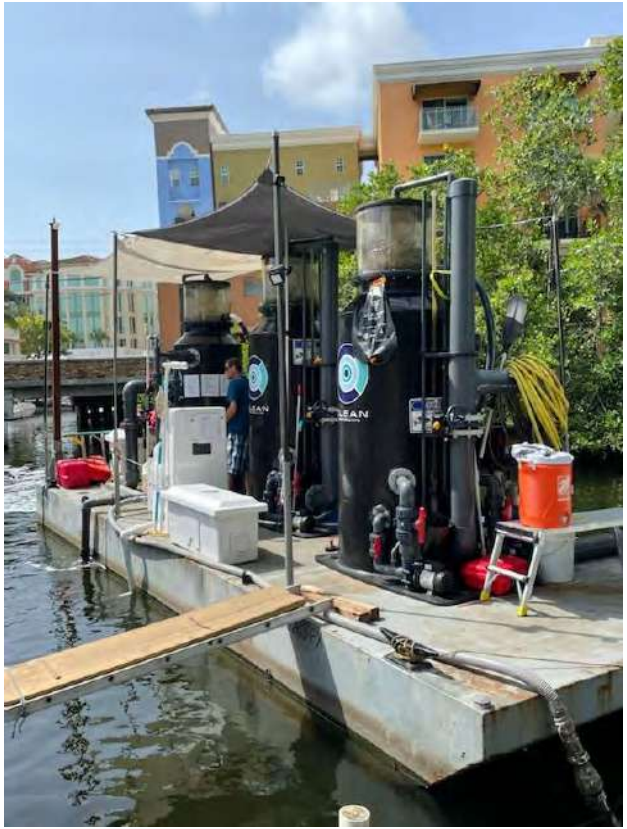
Protein Skimmer: A machine which uses foam fractionation to clean water.

Currently designed only for aquariums and aquaculture

How Protein Skimmers Work

- **Protein skimming** is a form of filtration which mechanically separates most organic molecules from water using billions of tiny bubbles.
- Oils, proteins, and simple molecules such as the basic ammonia (the simplest form of protein waste) accumulate on these bubbles as they rise in a water tower chamber and eventually pile up, overflow, and are separated from water.
- Bacterial and some microalgae are also removed





Pilot Skimmer Barge on the Himmarshee Canal Fort Lauderdale

Combining water purification, oxygen and flow

- Cleaning the water using foam fractionation shows clear evidence of the difference between the skimmer platform and the water outside.

- When isolated from environmental variables, protein skimming showed significant remediation in turbidity, nutrient load, and coliform counts.

Skimmers separate significant pollution through millions of bubbles overflowing into the top hoppers and consolidating as concentrated sludge separated from cleaned oxygenated water which is returned to the environment.

Skimmate removed by Johnson Environmental and disposed of to DEP standards

August 2nd, 2021, Unknown substance from storm drain

Obvious variables to water quality

Being on site on a mobile science platform, clean waterways staff is able to isolate and identify sources of pollution.

Skimmers Extracted Excess Nutrient and Pollution:

Fertilizer runoff, sewage spills, general human pollution:

Skimmate (concentrated skimmer waste removed from waterways):

Nitrogen concentrated > 55x from ambient water (already heavily polluted)

Phosphorus concentrated > 120x from ambient water (already heavily concentrated)

Coliform bacteria concentrated > 1000x from canal water

Additionally removes and concentrates decomposing algae, heavy metals, and a variety of chemicals

Result:

- Cleaner water
- Clearer water
- Highly oxygenated water

Pilot Canal Results

With our machines running full time, the canal is now regularly passing the environmental coliform contamination tests that are conducted by the third party water testing non-profit, Miami Waterkeepers

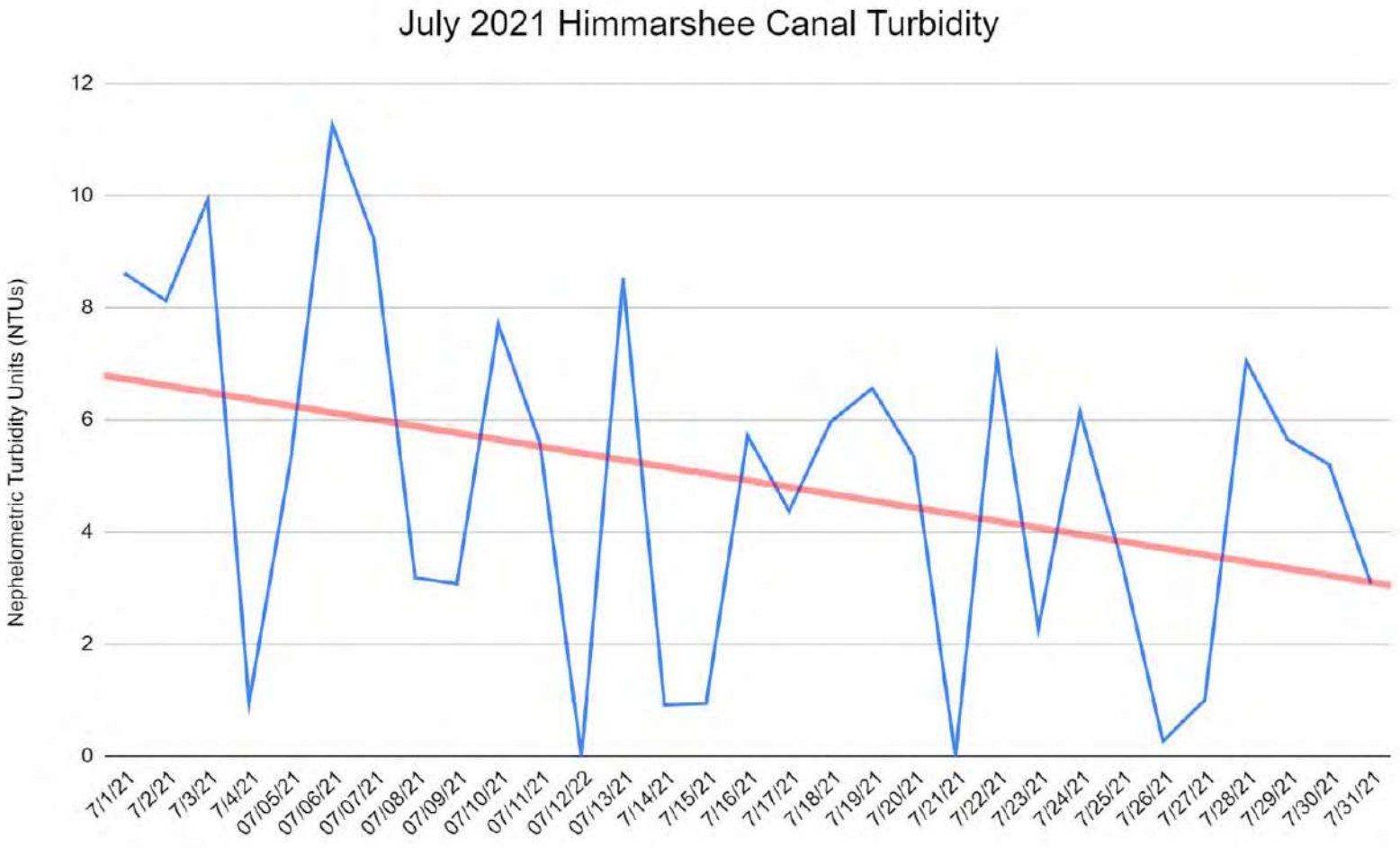
January-June

- Green 3 times in 6 months
- Avg. 760 mpn *Enterococcus sp.*

July-August during barge operations

- Green 4 times in 2 months
  - 4 times higher rate
- Avg. 538 mpn *Enterococcus sp.*

*sampled weekly at random tide


July 2021 Himmarshee Canal Turbidity
Nephelometric Turbidity Units (NTUs)
12
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4
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7/3/21
7/4/21
07/05/21
07/06/21
07/07/21
07/08/21
07/09/21
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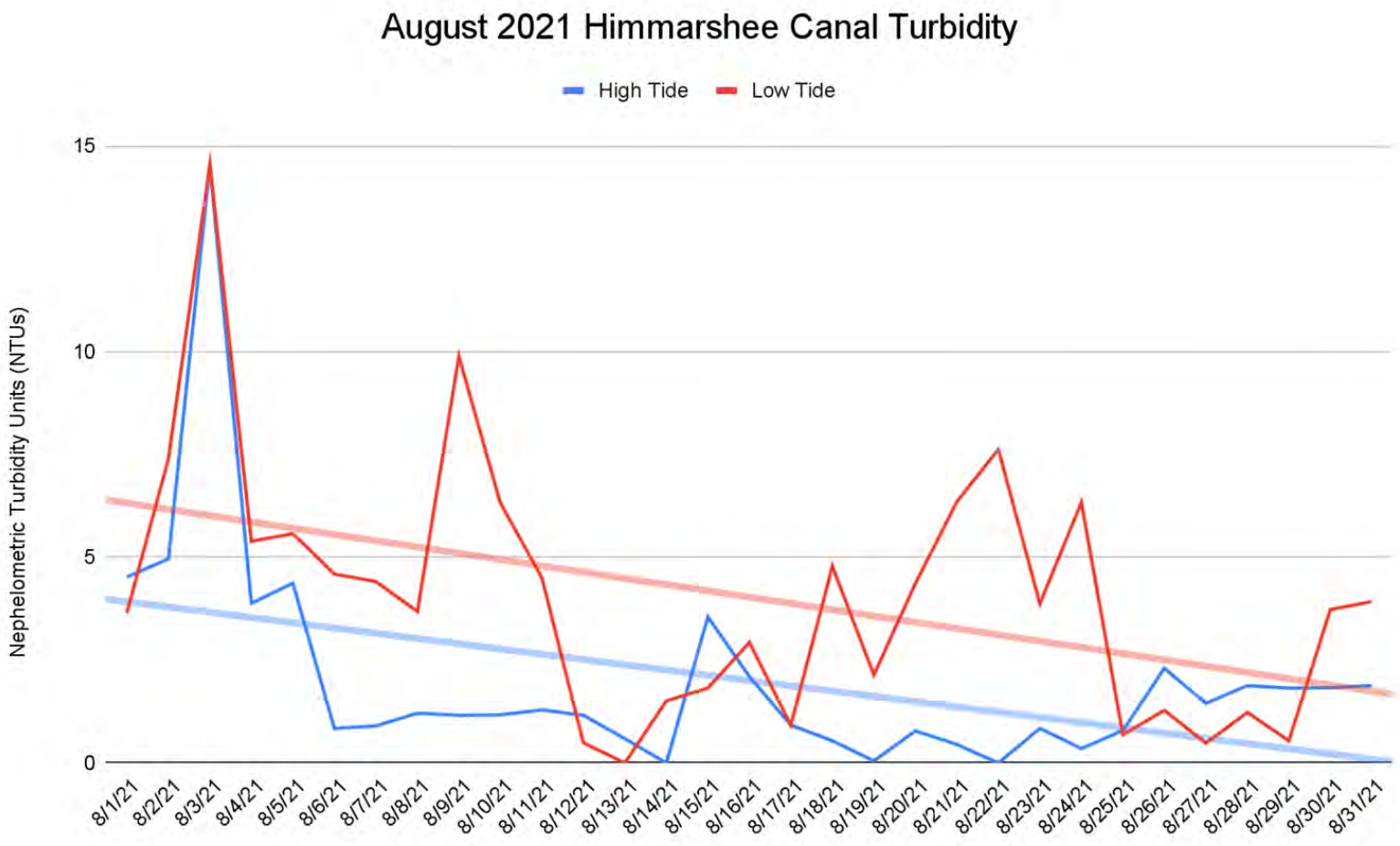
August 2021 Himmarshee Canal Turbidity
High Tide
Low Tide
Nephelometric Turbidity Units (NTUs)
15
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8/3/21
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8/6/21
8/7/21
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Clear Water

Foam fractionation removes suspended unnatural bacteria and algae, excess nutrients, chemicals, and organic particulates.

This decreases turbidity and increases water clarity allowing base levels of marine biology to undergo photosynthesis and subsequent levels of the food chain to find food visually.

Lowered turbidity and oxygenation from foam fractionation encourages ecosystem recovery.

Additional Benefits

Increase in Biodiversity

- Decreasing turbidity and increasing clarity

Solid waste removal

- garbage manually removed from environment by on site operators

Oxygenation and flow

- Surface films eliminated
- cyanobacteria substrate layer eradicated around barge
- aggregations of fish around operations and downstream with flow
- settlement of invertebrates and plants on nearby

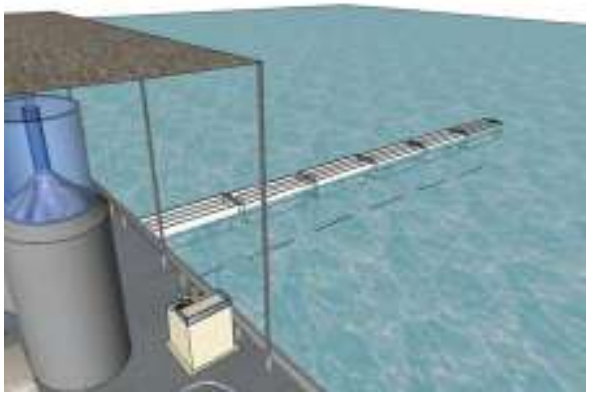
Applications:
“Fire Trucks vs. Garbage Trucks”

- Interception of pollutants at bottlenecks before entering waterways (pump stations, canal locks, drainage outfalls)
- Removal of pollutants during acute environmental disasters (sewage spills, oil spills, sinking boats)
- Mitigation of construction turbidity and environmental impacts of dredging/coastal development
- Oxygenation and mitigation of stagnation in closed/semi-closed waterways
- Ongoing remediation to increase water quality and chemistry for environmental restoration

Additional Options Currently Being Piloted

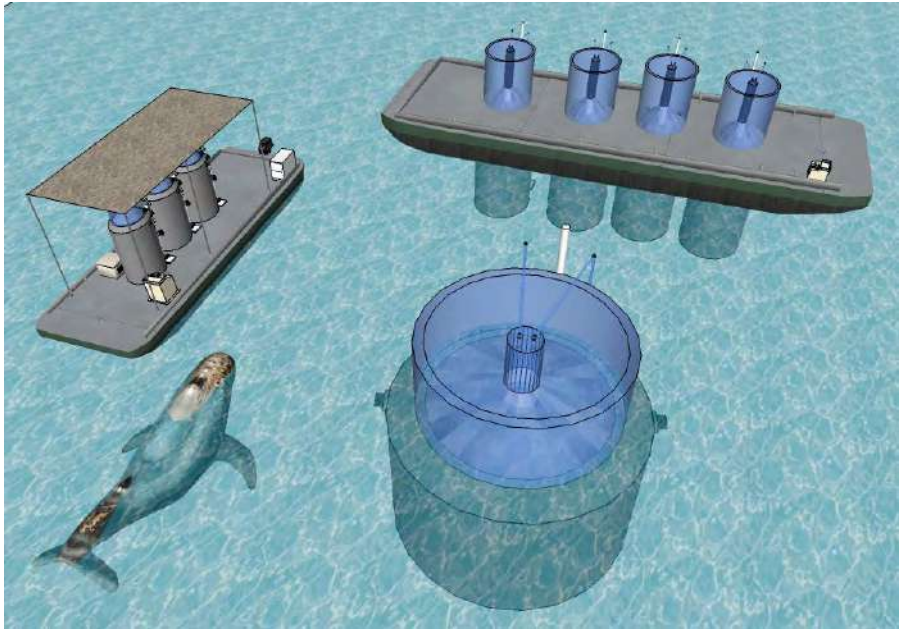
Trailer platform for inland waterways. Skimmers modified for fresh water chemistry or deployed at pump stations, drainage outflows, or canals choke points

For extended volume and reach, a skimmer “blockade” uses floating modules with downward extensions creating a wall of bubbles to remove excess nutrient (through foam fractionation), mitigate turbidity, and even deflect and contain solid pollution.



Scaling for Impact and Economics

- Industrial Sized Protein Skimmers on barge or trailer (Current service)
- Modified barge with only skimmer hopper above waterline (in production)
- Giant stand alone submerged skimmer with hopper above water



Current barge (left) with next generation modified in water barge and free floating versions optimized for scale and efficiency (30ft humpback whale for comparison)

Supplemental Funding

Significant grant and funding opportunities through both State and Federal appropriations for both environmental remediation and research of technology for restoration

Big Picture

- Clean waterways works to address the challenges of implementing and optimizing foam fractionation to open waterways.
- Technology that has only been used in closed systems as in public aquariums or aquaculture operations is now being adapted, applied, and scaled to the natural waterways and the ocean.
- Stopping ocean pollution is intercepting the problem at it’s bottleneck then addressing the source. Protecting the Beaches, intracoastal waterways, seagrass beds, kelp forests, reefs, open oceans, etc. means realistically mitigating pollution.

Currently no technology can filter dissolved pollutants more safely or effectively.

Upcoming Events

BBWMAB Meeting Dates:

- June 10th – Save the Date

Events:

- April 23rd: 40th Annual Baynanza: Baynanza (miamidade.gov)
- April 23rd: Baynanza After Party & Protect Biscayne Bay Pop-Up Event: Baynanza After Party & Protect Biscayne Bay Pop-Up Event Tickets, Sat, Apr 23, 2022 at 2:00 PM | Eventbrite
- May 25th: Biscayne Bay Marine Health Summit: Biscayne Bay Marine Health Coalition (BBMHC) (biscaynebayfl.com)