MARCO ISLAND CLEAN WATER INITIATIVE

A White Paper of Discussion Suggestions

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Purpose

This white paper offers a sequenced set of discussion suggestions for addressing water quality in Marco Island's canal system. It is written to help residents, City staff, and elected officials think through priorities using a clear, defensible, science based framework. The ideas here are presented as my personal views, offered for open debate and refinement. They are not recommendations from any committee or organization.

Organizing Principle

"Stop the Input, then Remove the Accumulation, then Sustain Aquatic Life While We Fix It."

This sequence organizes ideas by root cause first, then remediation, then ongoing management. It provides a defensible, science based rationale for prioritizing budget and staff attention. Each tier below builds on the one above it.

TIER 1. ROOT CAUSE, PART 1. HIGHEST PRIORITY, ADDRESS FIRST

1. Advanced Wastewater Treatment (AWT) and Higher Level Reuse Water

City Council has already retained Black & Veatch to study alternatives and costs for implementing higher levels of potable and sewage treatment to reduce nitrogen and phosphorus in reuse water. This is the foundational fix.

Reuse water distributed island wide for irrigation is the primary identified source of phosphorus and nitrogen entering the canal system. All other interventions are downstream mitigation until this source is addressed.

Status: Already moving at the City Council level with the Black & Veatch report underway. The appropriate civic role is to stay aligned with that work and maintain momentum.

TIER 2. ROOT CAUSE, PART 2. STOP THE NUTRIENT INPUT

1. Proactive Fertilizer Ordinance Enforcement

Marco Island already has a fertilizer ordinance. The gap is enforcement. Specific actions worth considering:

- Ensure all fertilizer vendors are registered with the City and adhering to controlled application rates.
- Conduct regular random testing of vendor fertilizer products for phosphorus and nitrogen content.
- Stop landscapers from blowing lawn debris into canals and canal drains, and fine violators.
- Fund dedicated Code Enforcement resources to patrol canals for violations.
- Stop City overspray of reuse water on Collier Boulevard medians.
- Consider a one year island wide ban on fertilizer application, or alternatively encourage all landowners to voluntarily reduce fertilizer application by at least 50 percent, with progressive reductions in future years.

This is a high impact, low cost category that is immediately actionable. No capital expenditure is required.

2. Florida Friendly Landscaping and Turf Reduction

Reduce fertilizer dependent turf island wide through ordinance reform and public encouragement. Specific ideas:

- Encourage Florida native ground covers that require little or no added fertilizer.
- Increase Florida Friendly plantings in City maintained medians.
- Coordinate with the Beautification Committee and Collier County on sustainable planting standards.
- Support and monitor ongoing landscape ordinance reform efforts.

This directly reinforces fertilizer enforcement. Fewer fertilizer dependent lawns mean less nutrient loading regardless of enforcement levels.

3. Stormwater Ordinance Reform, Close the Residential Exemption

City Council should consider amending or replacing the existing Stormwater Ordinance to require stormwater treatment for all new and substantially rehabilitated single family homes.

The current gap: residential construction on lots under one acre is exempted from MS4 stormwater regulations, while commercial and industrial construction is covered. This

exemption creates a significant unregulated pathway for nutrient laden runoff into the canal system.

TIER 3. REMEDIATION. ADDRESS WHAT HAS ALREADY ACCUMULATED

1. Sediment Removal and Canal Dredging

Decades of nutrient laden sediment on canal bottoms continues leaching phosphorus and nitrogen upward into the water column, even if all surface inputs are eliminated today. Dredging can be a useful complement to AWT.

A phased dredging plan is worth advocating for. Federal, state, and private grant opportunities should be pursued to reduce City cost. Targeted suction dredging, encapsulation, and microbe based sediment treatment are all options worth exploring.

2. Canal Bubblers, Aeration Demonstration Program

The current demonstration program is the correct approach: test before scaling. Aeration and bubblers address low dissolved oxygen, which is a symptom of nutrient loading rather than the underlying cause. They provide a valuable bridge measure that can sustain aquatic life while larger fixes proceed.

Demonstration results should be evaluated rigorously before committing to island wide expansion.

3. Deep Injection Wells

Investigate increased use of deep injection wells for excess reuse water supply during periods when demand is low, until reuse water quality is improved through AWT. This reduces the volume of nutrient laden reuse water distributed for irrigation.

4. A Project That Should Be Deprioritized: Tidal Leveling and Hydraulic Culvert Interconnect

In my view, the City should not pursue the Tidal Leveling and Hydraulic Culvert Interconnect project. A technical policy review finds it is not scientifically viable, financially justifiable, or capable of reducing nutrient concentrations in Marco Island's canal system. The tidal leveling and hydraulic culvert interconnect proposals are variants of the same concept and share the same fatal flaws.

Key technical findings:

- Marco Island's canal system holds over 3.16 billion gallons. Actual tidal exchange is only 1 to 3 percent per tide, far below what is required to meaningfully displace nutrient rich water.
- Achieving even a 50 percent nutrient concentration reduction would require replacing more than 1.5 billion gallons per day, over 25 times the realistic tidal exchange capacity.
- Nutrient loading is continuous from reclaimed irrigation water, stormwater, and sediment release. Dilution through tidal exchange cannot keep pace with ongoing inputs.
- Nearshore Gulf waters periodically contain moderate nutrient levels and harmful algal species. Increased tidal exchange may import problems rather than reduce them.
- The infrastructure required, including reconstruction of canal entrances, tidal gates or high capacity pumps, and extensive dredging, would likely cost hundreds of millions of dollars while delivering marginal or no measurable water quality benefit.
- Artificial currents can damage seawalls, disturb sediments, and create unintended ecological impacts.

The project would merely shift pollution offshore rather than reduce it. Resources should be directed to proven, source focused strategies: AWT, fertilizer enforcement, aeration, and sediment management.

TIER 4. PUBLIC EDUCATION AND ONGOING MONITORING. SUSTAIN AND MEASURE

1. Hire an Outside Public Relations Consultant

Engage an outside PR consultant to develop and execute a comprehensive public education campaign on water quality issues, covering fertilizer reduction, irrigation best practices, and canal stewardship. The campaign should target both homeowners and landscaping professionals.

Supplement this work with water quality information included in monthly utility bills.

2. Irrigation Education and Smart Controllers

- Promote the IFAS Urban Irrigation Scheduler app and similar tools to homeowners and landscapers.

- Encourage installation of soil moisture sensors on irrigation systems.
- Consider converting median spray heads to subsurface drip or microspray systems to minimize reuse water overspray on impervious surfaces.
- Include fertilizer and irrigation education in monthly City water bills.

3. Monitor MS4 and 4E Plans

Monitor and evaluate Marco Island's MS4 stormwater management plan and the FDEP 4E alternative water quality plan. Track milestones, report progress publicly, and flag any reporting deficiencies to City Council.

4. Street Sweeping Program, Publish Results

Monitor results of the ongoing street sweeping program and publish findings publicly. Verify that inlet screens and sweeping are reducing nutrient and sediment loading entering the canal system.

5. Annual Water Quality Reviews

Continue conducting annual water quality reviews with outside, independent water quality consultants to monitor trends, review data, and provide future recommendations to City Council and the public.

6. Rain Sensors on All Reuse Water Users

Install rain sensors on all reuse water irrigation systems, including City owned properties, to automatically stop overwatering during rain events. Excess irrigation drives nutrient leaching and fungal or pest pressure, which in turn leads to additional chemical applications.

7. Jacobs Report, Outstanding Recommendations

Implement the remaining outstanding recommendations from the Jacobs Engineering Report:

- Conduct additional soil sampling of representative public access areas and golf courses to assess phosphorus levels and P Capacity Indexes.
- Install additional shallow groundwater monitoring wells to assess nutrient impacts to groundwater.
- Update irrigated area records for all reuse customers for more accurate tracking of irrigation and nutrient loading rates.
- Promote use of soil moisture monitoring sensors on irrigation systems with smart controllers.

- Convert median spray heads and rotors to subsurface drip or microspray systems to minimize reuse water application to road surfaces.

TIER 5. INSTITUTIONAL REFORM. STRUCTURAL CAPACITY TO SUSTAIN PROGRESS

1. Create a Department of Environment and Stormwater Management

The City should consider forming a dedicated department, separate from Public Works, focused exclusively on water quality and stormwater issues, and led by a licensed engineer. The current organizational structure does not provide sufficient dedicated institutional capacity to address these issues at the required scale.

2. Establish a Stormwater Utility District

Investigate adopting a Stormwater Utility District to assess modest fees and create a dedicated, sustainable funding source for water quality improvements.

Over 165 Florida cities and counties already operate Stormwater Utility Districts. Marco Island lacks a dedicated funding mechanism and relies instead on general fund appropriations that compete with other priorities. A utility district creates predictable, ring fenced revenue for this work.

Closing Note

This white paper is offered as a working set of discussion suggestions. The goal is not consensus on every point, but a serious, science based conversation about priorities. I welcome disagreement, refinement, and better ideas from residents, staff, and elected officials. What Marco Island cannot afford is to keep treating symptoms while the source inputs continue unabated.

Respectfully submitted,
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