White Paper: Request for Information (RFI) on Reuse Water

Councilman Rich Blonna, 8/25/22

Summary

As you'll read in this paper, there is lingering controversy regarding the role reuse water plays in our impaired water designation. This white paper was written in support of gathering additional information regarding this by inviting experts in the field to present their findings. The procedure for doing this involves having the City Council direct staff to issue a Request for Information (RFI)* from experts about technologies available for removing additional nutrients, especially Nitrogen and Phosphorus, from our reuse water. The City Council was asked to do this on six separate occasions in the past:

- Clean Marco Waters LLC (2021). Position Paper on the Marco *Island Nutrient Source Evaluation Project*, (Dr. Harper Study) sent to Marco Island City Council.

- Rola, J. (2022). Water Quality Priorities and Options – White Paper presented by Councilor Joe Rola, City Council Meeting. January 24th. 2022.

- Waterways Advisory Committee (WAC). (2022a). Motion passed at WAC Meeting Requesting the City to issue an RFI to Interested Parties for Information Related Best Technologies to Reduce Phosphorus in our Reuse Water. February 2nd, 2022.

- Waterways Advisory Committee. (2022b). WAC Recommendations, Water Quality Workplan. Presented at WAC Meeting, May 19, 2022.

- Waterways Advisory Committee (2022c). WAC Recommendations on Reuse Water, Presented at City Council-Sponsored Water Quality Workshop, May, 23rd, 2022.

- Waterways Advisory Committee. (2022d). Assessment of Applying FDEP Technology to Marco Island Waste Water Treatment. Presentation by member Gene Wordehoff at WAC Meeting, July 21st. 2022.

It is time to acknowledge these requests from a City Councilor, City Council-sponsored Committee, and the Clean Marco Waters LLC, a respected community organization, and direct the city staff to disseminate a Request for Information (RFI) and present their findings to the City Council.

What is Reuse Water?

All solids or liquids that you wash down your sink or flush down your toilet combine with water and work their way out of your home, condominium, or apartment, into a system of underground pipes, pumps, and lift stations, and ultimately wind up at the Wastewater Treatment Plant (WWTP) on the north end of Marco Island.

At the treatment plant the solids are separated from the liquids and through a system of filtration, aeration, and chemical treatment, are decontaminated. The process results in two valuable products, sludge and reuse water. The sludge is dried and trucked off of Marco Island where it is either sold or buried in a landfill. The reuse water is sold to the city, condominiums, and golf courses for application as irrigation.

All Wastewater Treatment Plants must obtain permits from the State of Florida, Department of Environmental Protection (FDEP) to process sludge and reuse water. There are many different types of permits, each with a set of standards for allowable levels of nutrients in the sludge and reuse water. For the sake of brevity, I will discuss the two main types of reuse water permits that are issued to Wastewater Treatment Plants.

The first type of permit is designed for facilities that discharge their reuse water directly into adjacent waterways. These permits set higher standards for the level of nutrients that are allowed in the reuse water because it ultimately gets discharged directly into local waterways.

The second type of permit is designed for facilities that do not directly discharge their reuse water into local waterways but instead use it for irrigation. These types of permits set a lower standard for nutrient content meaning they allow for higher levels of Nitrogen and Phosphorus in the reuse water that ultimately is used to irrigate lawns, farms, and golf courses.

Marco Island's Wastewater Treatment Plant is issued the second type of permit because its reuse water is intended to be used for irrigation and does not get directly discharged into our waterways.

What is Controversial About Reuse Water?

For lack of a better term, I will call it the "dueling experts." The City of Marco Island has spent close to $200,000.00 on two carefully constructed studies to examine the nature of our impaired waters, the origin of the nutrients that contribute to it, and recommendations for improving it. Both studies were constructed using impeccable designs and were conducted by water quality experts, each with over two decades of experience in the field. The controversy lies in the interpretation of their findings and recommendations regarding reuse water. While both agree on many things related to our waters, they differ in their interpretation of the role of reuse water in our impaired waters.

One reports that the nutrients in reuse (primarily Nitrogen and Phosphorus) seep into our waterways and contribute to their impaired status. The other reports that reuse water changes its chemical composition as it is filtered through our porous soil, and is "taken up" (absorbed) by the roots of grass, trees, and other plants after it is applied through irrigation. According to the second expert, very little Nitrogen and Phosphorus from reuse water every makes it into our waterways.

This difference in opinion of two highly-respected experts is the basis for requesting additional information about the role reuse water plays, or doesn't play, in our impaired waters and what technologies are available to remove even more nutrients from it.

It should be noted that our Water Treatment Plant, under the direction of Manager Jeff Poteet and his staff, has done an excellent job over the past few years reducing the level of Nitrogen from our reuse water. Our facility meets all of the standards set forth in the permits issued by the State of Florida, Department of Environmental Protection (FDEP) and the controversy over reuse water in no way implies that there are any problems related to our WWTP or the way it is managed. Citizens need to be reassured of this and be clear that this discussion is about going beyond the requirements of the reuse water permit by removing even more nutrients.

The Marco Island Nutrient Source Evaluation Project

In 2020, the Florida Department of Environmental Protection found Marco Island's waterways and the surrounding waters to be impaired. In April 2020, in response to the FDEP designating Marco Island's waterways as being impaired, the city contracted with Environmental Research and Design (ERD) to conduct a nutrient source evaluation and assessment study and provide recommendations for water quality improvement. The final study report, entitled *Marco Island Nutrient Source Evaluation Project (aka ERD Report)*, was submitted to the City in September 2021. The study's director, Dr. Harvey Harper presented his findings at a City Council Meeting on that date (Harper, 2021).

During that meeting the City Council passed a motion requesting that the City Committees and City Staff review the ERD Water Quality Study, and make recommendations regarding its implementation (City Council, 2021).

In his presentation to the City Council, Dr. Harper reported that in addition to other findings, reuse water was both a source of nutrient loading of our waterways, and a contributing factor to our impaired status (Harper, 2011). The ERD study focused on two key reuse water issues, (1) the level of reuse water applied to Marco Island's lawns, public spaces, and golf courses, and (2) the methods used to apply it.

His two main conclusions related to reuse water were:

- Overall, too much reuse water is being applied to lawns, public spaces, and golf courses.
- Improper application of reuse water on roadways and other impervious surfaces flows into waterways with no soil filtering or plant uptake.

His two main recommendations were:

- Reduce the overall amount of reuse water irrigation used on Marco Island.
- Assess and prove current application methods and consider using alternate reuse disposal methods such as deep-well injection and the sale of the water to off-island users.

In addition, Dr. Harper recommended that further studies were needed to clarify the role that reuse water played in the impairment of our city's waterways (Harper, 2021).

ERD Study Follow-Up

To follow-up on Dr. Harper's and citizens recommendation that additional research be conducted related to the role of reuse water, the City of Marco Island commissioned a second study, conducted by Jacobs Engineering, to examine two things:

1. The ERD Report's Overall Comments on:

    - Nutrient Enrichment within Canals versus Offshore
    - Interpretation of Stable Isotope Studies
    - Canal Water Age and Hypoxia Concerns

2. An Assessment of the ERD Report's Reuse Water Recommendations (Jorgensen, 2022).

Erik Jorgensen reported the Jacob Study results to the City Council during their meeting on May 23rd, 2022 (Jorgensen, 2022). His presentation showed that while the two studies agreed on many issues (the role of impaired surrounding waters, the need for continued testing, the lack of oxygenation of the complete water column in canals etc.), the Jacob's Study findings differed significantly from the ERD Study in relation to the role reuse water plays in the impairment of Marco Island's waterways.

The following is a summary of the differences in the ERD and Jacob's Reports in reference to the issue of reuse water. The numbered and quoted text is from the ERD Report. It is followed by the analysis done by the Jacob's report of the ERD findings.

1. "Reuse irrigation is currently being applied at rates which exceed the ability of turfgrasses to provide uptake of the water and nutrients, and results in a large amount of the reuse leaching past the root zone into groundwater (ERD, 2021). "

Jorgensen (2022) in his presentation refuted this and found that the annual average reuse water application rates to golf courses and other public access areas are similar to, or less than The University of **Florida's** Institute of Food and Agricultural Sciences (UF/**IFAS**) turfgrass irrigation requirements. Jorgensen also reported that the reuse water application rates are not excessive (Jorgensen, 2022).

2. "Even if a 50% reduction in concentration is achieved during movement through groundwater, the additional nitrogen loading from excess reuse is 8,312 kg/yr. which is 40% of the total annual nitrogen loading from groundwater in all sub-basins combined (ERD, 2021)."

Jorgensen, (2022) reported that reuse water is applied to less than 25% of total pervious area and only 14% of Marco Island's total land area The total nitrogen (TN) applied on Marco Island represents only 5% of the TN applied to all pervious areas on the island (Jorgensen, 2022).

3. "Alternative methods of reuse disposal should be evaluated, and reuse should be applied only as needed to meet evapotranspiration requirements. If reuse were applied only as needed, the

groundwater nitrogen impacts would be substantially reduced, resulting in a visible improvement in waterway water quality ERD, 2021).”

Jorgensen (2022) reported no alternative disposal methods needed to be evaluated. On average, the Jacob’s data indicates that reuse water is being managed appropriately regarding hydraulic and TN loading. He reported that the total Phosphorus (TP) loading exceeds the fertilizer ordinance maximum rate, but the actual impacts of this excess TP loading were not established in the ERD report. Jorgensen (2022) further reported that it is highly unlikely that discernable changes in waterway water quality could be detected within a reasonable time period (Jorgensen, 2022).

4. “However, at the irrigation rates indicated by annual reuse summary forms provided to FDEP, the irrigation rates also exceed evapotranspiration requirements, although not to the extent observed by reuse application in other public areas, and irrigation reduction should be considered to match evapotranspiration requirements (ERD, 2021)”.

Jorgensen (2022) reported that the annual average irrigation rates and total nitrogen application rates to golf courses are not excessive and are actually lower than UF/**IFAS** mean irrigation requirements. In addition, Jorgensen (2022) reported that the long-term GW monitoring data for Marco Island and Marco Shores golf courses demonstrate that nitrogen in the reuse water and applied fertilizers are managed in an environmentally sound manner (Jorgensen, 2022).

Conclusions

It is obvious from reading the previous section that it would be helpful to have additional information regarding reuse water and the role it plays in Marco Island’s impaired water quality. Because of this I am asking that the City Council move to task the Marco Island City Manager and staff to submit a public Request for Information for an engineering study of the alternative methods (costs, benefits and concerns) to reduce phosphorus and nitrogen in the WWTP reuse water to meet the standards requested by Councilman Rola in his White Paper (Rola, 2022).

*An RFI is a statutorily compliant method for gathering information about potential procurement actions. It is defined in FS 287.012(22). It is not a Request for Additional information (RAI) which is used by agencies to ask for additional information about a submitted permit application for instance

References

City Council (2021). Motion by Councilor Brechnitz, seconded by Councilor Irwin that the Environmental Research & Design, Inc. report be accepted and referred to the City Committees and Staff for follow-up action. Motion carried by unanimous vote. City of Marco Island, City Council Meeting. September 20th., 2021. Video Link: https://marcoisland.granicus.com/player/clip/1447?view_id=3&redirect=true&h=e30f8713f92122c452ef82bbc89e9d5d

Clean Marco Waters LLC (2021). Position Paper on the Marco *Island Nutrient Source Evaluation Project*, (Dr. Harper Study) sent to Marco Island City Council. PDF Document Link: Clean Marco Waters Position Paper 11-26-2021.pdf

ERD (2021). Marco Island Nutrient Source Evaluation Project: Executive Summary, (pg. 8). Environmental Research and Design. Florida: Orlando, September, 2021. Link to PDF document: file:///C:/Users/MIC/Downloads/Marco%20Island%20Final%20Report%20-%20September%202021.pdf

Harper, H. (2021). Marco Island Nutrient Source Evaluation Project - Final Report. Paper presented to the Marco Island City Council. 9/20/21. Video Link: https://marcoisland.granicus.com/player/clip/1447?view_id=3&redirect=true&h=e30f8713f92122c452ef82bbc89e9d5d

Jorgensen, E. (2022). Evaluation of Potential Reuse Nutrient Impacts and Nutrient Removal Strategies. Presentation of the Jacob's Engineering Report at City Council Meeting. May 23rd., 2022. All references are to slide 21 of his presentation. Video Link: https://marcoisland.granicus.com/player/clip/1540?view_id=3&redirect=true&h=04ec98e65b5624d801707872be065657

Rola, J. (2022). Water Quality Priorities and Options – White Paper presented by Councilor Joe Rola, City Council Meeting. January 24th. 2022. Video Link: https://marcoisland.granicus.com/player/clip/1492?view_id=3&redirect=true&h=643966ed21869a71b9a38e5ce2edf98f

Waterways Advisory Committee (WAC). (2022a). Motion passed at WAC Meeting Requesting the City to issue an RFI to Interested Parties for Information Related Best Technologies to Reduce Phosphorus in our Reuse Water. February 2nd, 2022. Video link: https://marcoisland.granicus.com/player/clip/1505?view_id=3&redirect=true&h=11201f418ddb976b67a26e069505a6cb

Waterways Advisory Committee. (2022b). WAC Recommendations, Water Quality Workplan. Presented at WAC Meeting, May 19, 2022. Video link: https://marcoisland.granicus.com/player/clip/1539?view_id=3&redirect=true&h=a5b7cb3b3d9e832eec92683a8b597c97

Waterways Advisory Committee (2022c). WAC Recommendations on Reuse Water, Presented at City Council-Sponsored Water Quality Workshop, May, 23rd, 2022. Video Link: https://marcoisland.granicus.com/player/clip/1540?view_id=3&redirect=true&h=04ec98e65b5624d801707872be065657

Waterways Advisory Committee. (2022d). Assessment of Applying FDEP Technology to Marco Island Waste Water Treatment. Presentation by member Gene Wordehoff at WAC Meeting, July 21st. 2022. Video Link: https://marcoisland.granicus.com/player/clip/1562?view_id=3&redirect=true&h=175d3d5e4fc9990a33de825d4a035630