

**STAFF AMENDMENT**

**TO**

**EXECUTIVE SUMMARY**

**UTILITY MASTER PLAN**

**March 2005**

## **Marco Island Utility Staff's Amendment to the Utility Master Plan**

The Utility Master Plan (UMP) prepared by MWH, the consultant hired by the City of Marco Island, addresses many infrastructure issues facing the City of Marco Island. To meet the future growth of the City of Marco Island, two principle issues include the expansion of the production of potable water, and expansion of the wastewater treatment plant. This Amendment to the UMP summarizes the key recommendations of MWH and the changes in the UMP proposed by MIU staff

### **Description of Existing Water and Wastewater Treatment Plants**

Potable water is produced at two water treatment plants on Marco Island. One plant uses reverse osmosis technology (called the RO Plant) to treat brackish water pumped from deep wells located on Marco Island. The brackish water is pumped under high pressure through plastic membranes that separates the water from the salt. The water that passes through the membranes is chlorinated before being distributed to the customers. The other water plant (called the Lime Plant) uses lime to soften surface water pumped from Marco Lakes (located at the northeast corner of Routes 41 and 951). After softening with the lime the water is filtered and chlorinated before being distributed to the customers.

The City also needs to increase the capacity of the Wastewater Treatment Plant (WWTP). The City of Marco Island has 8,530 building lots for private homes and approximately 5,600 of those lots are not served by sanitary sewer. The expansion of the WWTP must include the additional growth and also the additional wastewater flow from the expansion of the sanitary sewer system to the 5,600 unsewered lots.

### **Key Technical Difference of MIU Staff and Consultant MWH**

A major complication to expand the WWTP is that it shares the same site with the adjacent Lime Plant. During the development of the UMP, MWH continually reaffirmed its technical position that the WWTP could not be expanded from its current permitted capacity of 3.5 million gallons per day (mgd) to 5.0 mgd without demolishing the Lime Plant to provide the space needed for the expansion. During this time several engineering consulting firms arranged site visits of the plants with MIU staff to learn about the issues associated with expanding the plants and the potential design projects that would be identified at the completion of the UMP. Each consultant was asked about the ability to expand the WWTP (using new membrane based treatment technology). Every consulting firm believed that expansion of the WWTP with the available land was feasible. Over time MWH continually reaffirmed its belief that the WWTP expansion required demolition of the Lime Plant but MIU became convinced it could be expanded within the space available.

MIU has maintained its commitment to retaining the Lime Plant since the City has a large supply of surface water to feed the lime plant and it provides the lowest treatment cost to produce potable water. MIU hired CDM, an engineering consultant firm to complete a preliminary assessment that showed how the WWTP plant can be expanded without impacting the Lime Plant.

### **Summary of Technical Differences between MIU Staff and MWH**

MWH recommends demolition of the Lime Plant and construction of a new WWTP at the site of the Lime Plant using conventional treatment processes (i.e., no membrane based technology). However, before the Lime Plant could be demolished it is necessary to have a new water plant to make up for the loss of the water produced by the lime plant. Any technology for the new plant must be capable of treating the surface water from Marco Lakes (i.e., the same water used to feed the Lime Plant) since it is the only source of water available. The new water plant MWH proposes is based on nanofiltration technology. The nanofiltration membranes would be arranged in racks of tubes (containing the membranes) essentially identical to the tubes containing the RO membranes. In fact MWH proposes to convert two of the six RO membrane trains to nanofiltration trains plus add and additional two nanofiltration membrane trains. The new nanofiltration plant with four membrane trains should be capable of producing about 10 mgd. The remaining four RO trains have room to add additional tubes of membranes that would increase the potable water production from 1 mgd to about 1.2 mgd.

MIU staff propose to expand the WWTP capacity from 3.5 to 5.0 mgd in a phased approach with the existing plant site similar to the concepts proposed by CDM. The original plan proposed by CDM included a first phase of conversion of the 1 mgd package plant to a biological nutrient removal using membrane technology with a capacity of at least 3 mgd. The other two plants (each rated at 1.25 mgd) would not be modified during this phase. To fit the four membrane vessels within the site they proposed spacing them around the round vessel that comprises the 1 mgd facility. Since MWH completed the UMP CDM has confirmed that the lagoon adjacent to the 1 mgd plant can be partially filled and the four membrane vessels placed on the filled lagoon. This made a difficult construction far easier than originally though.

The idea to convert two of the RO membrane trains to nanofiltration to treat surface water from Marco Lakes was originally developed by MIU staff. MWH reviewed the idea and adopted that for its recommendation. MWH's proposal to add an addition two nanofiltration membrane trains was needed since they proposed demolition of the Lime Plant. MIU staff proposes just the conversion of one or two of the RO membrane trains to nanofiltration to provide the additional potable water needed for future growth.

### **Aquifer Storage and Recovery (ASR) System for Reuse Water**

MWH has proposed installation of an aquifer storage and recovery system for reuse water generated by the WWTP that is not needed by customers (such as during the rainy season). The intent would be to recover that water during the dry season when the current production of reuse water cannot always meet demand.

The system proposed by MWH is relatively very expensive for the amount of reuse water. As an alternate for increasing the amount of reuse available MIU staff proposes that the additional water for reuse could be obtained by filtered raw water from Marco Lakes (or the ASR system located there) through the filter system then through the chlorination system at the WWTP (requirement of FDEP). At this time during the dry season the filtration system at the WWTP is often hydraulically limited so that the

additional filtration could not be achieved. However, after the addition of the membrane system to the 1 mgd package plant at the WWTP, all the flow from that vessel will not need to be filtered. This will free up capacity for the filters so that raw water from Marco Lakes could be treated and converted to reuse water.

**Utility Capital Improvement Plan**

A copy of the Marco Island Water and Wastewater Utility Capital Improvement Plan Workshop is provided and the end of the Utility Master Plan. The last twenty one (21) slides of the Workshop include a listing of all the projects and the time when they are expected to be implemented.