

7 Summary, Conclusions, and Recommendations

Nearly 130 MGD of reuse is recommended and higher levels may be possible subject to further evaluation. Reuse alone cannot fully offset future water needs but will nicely complement other measures to meet future demands.

Various types of reuse were assessed in this feasibility study including urban irrigation, agricultural irrigation, industrial use, aquifer recharge, canal recharge, saltwater barrier, wetlands application, and direct consumption. In accordance with FDEP guidelines, four reuse alternatives were evaluated and included: maximum reuse (reuse more than 75% of the wastewater volume generated), medium reuse (reuse 40% to 75% of the wastewater volume generated), low reuse (reuse less than 40% of the wastewater volume generated), and no action. In addition, a reformulated alternative that combines elements from all of the reuse scenarios and comments from the regulatory agencies was evaluated.

In the year 2025, Miami-Dade County is expected to generate over 370 MGD of wastewater. Thus, significant volumes of wastewater would be reused even within the minimal reuse alternative. Since there is a practical limit to the amount of public access reuse (i.e., urban irrigation), a combination of reuse options was necessary to develop the reuse alternatives. Specific projects were identified and volumes of reuse water estimated. While there are many ways to combine the various projects, the approach used in this study was to identify those projects closest to the WWTPs and that had the fewest regulatory issues for the minimal reuse alternative. For the medium and maximum reuse alternatives, projects located farther away from the WWTPs were considered, as well as projects that provide significant benefits (irrigation of parks and golf courses, RITs, and canal recharge in wellfield protection areas; and rehydration of the Biscayne Bay Coastal Wetlands), but that may prove difficult to implement. Table 7-1 provides a summary of the reuse alternatives.

Table 7-1. Summary of Reuse Alternatives

Reuse Volume (MGD)	Alternative A (Maximum Reuse)	Alternative B (Medium Reuse)	Alternative C (Low Reuse)	Alternative D (No-Action)	Alternative E (Reformulated Alternative)
Total Wastewater Used for Reuse (MGD)					
NDWWTP	58.27	18.72	15.61	2.23	9.0
CDWWTP	114.54	96.04	16.14	9.73	10.63
SDWWTP	131	79.39	63.89	4.25	131.00
TOTALS	303.81	194.15	95.64	16.21	150.63
% of Total Reuse					
Existing Reuse	5.3%	8.3%	16.9%	100%	10.76%
Urban Irrigation	20.3%	25.1%	31.1%	0%	4.56%
Industrial Reuse	0.03%	0.05%	0.1%	0%	0.07%
Aquifer Recharge	37.6%	45.4%	50.9%	0%	52.58%
Canal Recharge	19.7%	20.6%	0%	0%	0%
Wetland Application	17.1%	0.5%	1.0%	0%	31.53%
Future Minimum Consumptive Use Offsets (MGD)					
Potential offset	19.67	163.8	99.29	0	60.67

Note: Consumptive use offsets are minimum values and higher offsets may be possible subject to modeling and further input from the SFWMD.

Key:

CDWWTP = Central District Wastewater Treatment Plant.
MGD = million gallons per day.
NDWWTP = North District Wastewater Treatment Plant.
SDWWTP = South District Wastewater Treatment Plant.

Following input on the draft report and issues associated with the low, medium, and high level reuse alternatives, a reformulated alternative (Alternative E) was developed for consideration and is also summarized on Table 7-1. Alternative E is part of the recommended plan.

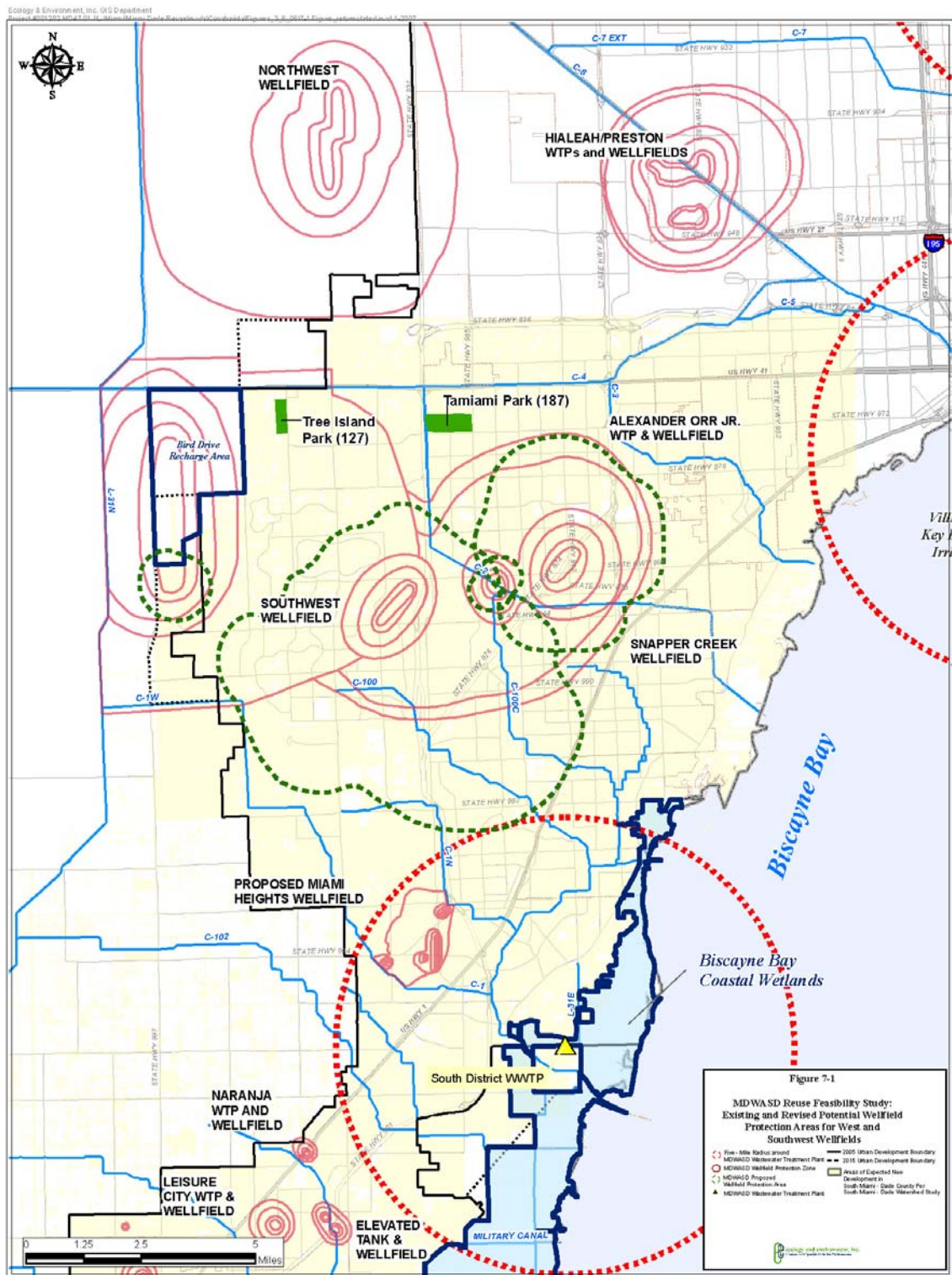
As part of this study, efforts were made to determine how much of the future water demand could be offset with reuse, since it is one form of alternative water supply. While FDEP strongly encourages all types of reuse, the SFWMD is keenly interested in reuse projects that replace existing potable water consumption, reduce reliance on the regional water supply system (i.e., recharge the wellfields), or help improve flows of groundwater or natural sheet flows to Biscayne Bay. Many of the projects that result in direct recharge of the wellfields and help Biscayne Bay cannot be readily implemented, and pilot projects will be conducted prior to the implementation of these types of projects in a larger scale. MDWASD is aware that if reuse does not provide offsets to the projected future water demands, other additional alternative water supplies, such as withdrawals from the Floridan Aquifer, will be needed. For the projects proposed in Alternative E, some reuse projects directly offset potable uses and others recharge the wellfields or help Biscayne Bay

For Alternative E projects recharging the South Miami Heights Wellfield, this study assumes that the reclaimed water will be delivered to the vicinity of the Metrozoo. In order to establish the precise location and layout of the trenches, a site hydrogeologic evaluation is recommended. For recharge at the Alexander-Orr wellfields, the Tamiami Park vicinity was identified. The FIU-University Park Campus is located just north of

Tamiami Park. It is recommended that MDWASD expand their reuse program with FIU to include the University Park Campus and increase the land available for RITs. For this area, hydrogeologic investigations are also needed to confirm hydraulic loading rates. The area around the Metro Zoo, Tamiami Park, and FIU-University Park Campus have sufficient open areas that lend themselves more favorably to the installation of RITs in comparison to a heavily developed corridor. Additional locations for RITs for aquifer recharge may need to be evaluated if hydraulic loading rates are less than assumed or site constraints limit the number of RITs that can be installed.

Another potential location for recharge of the Alexander-Orr wellfield is at the Tree Island Park. The Miami-Dade Parks and Recreation Department has expressed an interest in pursuing reuse within this park but there are a number of wetland areas and the park is located within the designated wellfield protection area for the Southwest and West wellfields. However, after reevaluating their actual pump rates and conducting preliminary groundwater modeling, the MDWASD has found that the currently designated WPAs for the Southwest and West wellfields are overly conservative and their footprints can be significantly reduced. Figure 7-1 shows the boundaries for the existing WPA and for the area based on actual projected pump rates. If the WPA boundary was reduced in size to be consistent with what will be pumped, then RITs may be feasible at Tree Island Park.

Based on a review of all the alternatives, it appears that the least potential for water offsets using reclaimed water is at the NDWWTP and the greatest is at the SDWWTP. By 2010, the SDWWTP will have the capability to produce 112.5 MGD of public access reuse quality water that could be used for irrigation of golf courses, aquifer recharge outside WPAs, and away from Biscayne Bay if studies show no adverse impacts. By 2012, the volume of public access reuse water quality is projected to increase to 131 MGD. The NDWWTP and CDWWTP only have limited capacity to treat to public access reuse quality. That capacity would need to be increased and additional treatment upgrades will be necessary to comply with pending regulations for ocean outfalls and deep well injection disposal. Regardless, given the unique and sensitive environmental receptors in Miami-Dade County (i.e., highly permeable sole source aquifer, close proximity of Biscayne Bay [a highly protected Aquatic Preserve and OFW] and the Everglades National Park), additional levels of treatment beyond public access reuse quality will be required for a number of reuse options such as aquifer recharge, canal recharge, or wetlands rehydration.



In conclusion, a number of regulatory issues complicate the implementation of the high (Alternative A) and medium (Alternative B) reuse scenarios in Miami-Dade County at this time. The low reuse alternative (Alternative C) while feasible, results in reusing less than 25% of the projected wastewater flow, which may be too low and would provide very little offset for future consumptive use. The No-Action Alternative (D) is not an option. Alternative E incorporates many elements of Alternatives A through C as described above, and also takes into account stakeholder input. It was developed as a result of continuous coordination with the SFWMD, FDEP, and DERM.

MDWASD recommends a plan that includes Alternative E as well as the pilot and demonstration projects discussed in Section 4.5. Other programs also can be implemented to create additional incentives for the public, continue MDWASD's efforts of implementing beneficial uses for treated wastewater, and obtain additional consumptive use credits.

One example could be the creation of "Reclaimed Water Reuse Zones." These would be established around sites where reclaimed water is recharging the aquifer via an RIT. Residents within this zone (a several mile radius) could be eligible for an incentive for the installation of private wells for residential irrigation. These incentives would encourage the use of reclaimed water that has recharged the groundwater and would eliminate reliance on the public water supply for irrigation. Rather than piping the reclaimed water to individual homes, it is less costly, from a construction standpoint, for homeowners to pump the reclaimed water from the recharge zone. This practice would reduce future demands from the Biscayne Aquifer and may serve as an offset. A comprehensive education program is recommended to promote the beneficial use of water and create a positive perception of reclaimed water and reuse as a whole.

The County should also consider implementing mandatory reuse zones around new areas of development where purple pipes will be installed. This would require developers to install localized distribution systems throughout their new developments, subject to final input by MDWASD.

The recommended plan will incorporate various reuse practices such as aquifer recharge (outside wellfield protection zones), irrigation, and wetland rehydration. Since many of the water supply offsets and more viable reuse opportunities exist in the southern portion of Miami-Dade County, Alternative E focuses on reusing all the wastewater generated at the SDWWTP and includes several additional implementable projects for the CDWWTP and NDWWTP. Pilot studies, demonstration projects, and other data-gathering efforts are proposed to help alleviate concerns or address technical issues related to levels of treatment. Also, continued partnering is recommended between FDEP, SFWMD, and DERM for the progress and success of this reuse plan and for further implementation of reuse throughout the County.

Projects need to be implemented in a manner that the rate payers can afford and thus the projects and systems upgrades will have to be phased in over time. Further rate analysis is

recommended to assess the impacts of different cost recovery strategies and, depending upon those efforts, higher levels of reuse may be feasible and affordable. Additional engineering analysis, including value engineering, is recommended before individual projects are implemented. As a result of these additional efforts, and based on further input from stakeholders, it is likely that some of the projects listed will not be deemed feasible, but additional opportunities may be identified.

As part of the recommended plan, the following specific actions are recommended for the near future:

- Enhance current partnerships with DERM, FDEP, and SFWMD. Based on experience, more formal partnering has proven to be beneficial in facilitating consensus building. This creates shared ownership and a vested interest in solving issues.
- Monitor the impacts of existing public access reuse for irrigation in Miami-Dade County (possibly at FIU) on the soil and groundwater and for aquifer recharge at the City of Homestead's wastewater treatment plant RIT system.
- Initiate the Aquifer Recharge Pilot Project. Provide a dual-stage package plant and analyze reclaimed water for microconstituents, nutrients, and drinking water standards and monitor impacts to the groundwater.
- Initiate the Coastal Wetlands Rehydration Demonstration Project and begin biological and ecological baseline monitoring. This effort will include the construction and operation of a state-of-the-art pilot-scale WWTP, and monitoring of the effluent quality and the impact to the coastal wetlands and Biscayne Bay. Not only will the demonstration effort help address the feasibility of applying reclaimed water in the proximity of the Biscayne Bay Coastal Wetlands, the data from the treatment plant will help address the issues of microconstituents and the feasibility of supplying reclaimed water to canals or in the proximity of wellfield areas.
- Reevaluate the designated wellfield protection areas for Southwest and West wellfields based on actual project pump rates to open up further opportunities for reuse.
- Conduct hydrogeologic investigations to confirm hydraulic loading rates for aquifer recharge projects most specifically in the area of the Metro Zoo, Tamiami Park, and FIU-University Park Campus. These are key sites/areas being considered for aquifer recharge.
- Determine/confirm Water Supply Offsets. While conservative (low) estimates were made regarding water supply offsets, modeling is likely needed to further address offsets, particularly for those projects outside WPAs. Some discussions between the SFWMD and MDWASD have already taken place.

Whatever model is used should focus on the issues at hand since a considerable amount of time and money can be spent on model development and calibration. Also, the possibility of creating Reclaimed Water Reuse Zones and what offsets could apply to those should be discussed further the SFWMD.

- Further investigate and implement alternative water supplies. MDWASD will finalize their 20-year water use plan and will continue working with agency stakeholders to develop a comprehensive plan for alternative water supply sources to offset future water demands. The plan will include offsets obtained by reuse practices, as well as by other types of projects such as use of the Floridan Aquifer.
- Conduct additional rate analysis. While a present-worth analysis was conducted for this study, it had to follow FDEP's criteria and is not necessarily consistent with how MDWASD assesses costs and develops rates. To further understand the implication of the costs on rates, different scenarios (varying impact fees and financing schemes) should be evaluated. A more comprehensive rate analysis needs to be conducted, but a less intensive effort as suggested may be appropriate at this time.
- Refine the project list and implementation schedule. A list of possible projects has been identified in each alternative, but additional input is expected from the regulatory agencies on each of these projects, and some may be dropped and others added. Also, while assumptions have been made regarding phasing of projects, these may need to change based on the results of the alternative water supply investigation, subsequent efforts, and Miami-Dade County priorities.

As mentioned in Section 1, this study only evaluates the feasibility of reuse. Further assessments will be conducted in the Water and Wastewater Facilities Master Planning process that MDWASD is currently developing. The information contained herein, and coupled with other efforts, will aid Miami-Dade County in determining how to address future consumptive use issues and the quantities and types of reuse that can be implemented in Miami-Dade County.

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