

APPENDIX D

Capital Projects Work Plan

The Capital Projects Work Plan consists of this narrative and three exhibits: The projects' descriptions attached as Exhibit D-1 (including the separate list of Asbestos Cement force mains that make up Project 4.9 and the separate list of individual pump station improvement descriptions that make up Projects 5.14 through 5.18 inclusive); the projects' schedules with milestones attached as Exhibit D-2; and the projects' cost schedule attached as Exhibit D-3. Although the costs of individual projects (identified with a unique project number) are in 2012 dollars, the total cost of individual projects reflect a two percent (2%) annual inflation rate commencing in FY '14-'15.

Miami-Dade County's Water and Sewer Department ("MDWASD" or "the Department") held three (3) public workshops on September 24, 25 and 27, 2012 in the North, South and Central areas of the County, respectively, to receive community input on the capital improvement projects. The Department also solicited written comments on its website. The Department considered the public's comments prior to finalizing the list of capital projects shown in Exhibit D-1.

In establishing the schedules for the Capital Projects Work Plan shown in Exhibit D-2, MDWASD took into consideration operational and project implementation factors which include sequencing projects to keep the system operational and time to design, procure, construct and commission the projects.

These schedules reflect the need to maintain the operational viability of the Department's wastewater collection, pump stations, transmission, treatment and disposal systems in a manner that will minimize service interruptions, sanitary sewer overflows or non-compliance with effluent standards. The sequencing involves limiting the number of functional components that are out of service at one time at each of the plants and ensuring that flows can be directed away from plants with limited capacity due to repair and replacement work. This means that the work must be sequenced among the three plants as well as within each of the plants. Many of the projects must be done during the dry season when average daily flows are low, so that fact also extends the schedule for plant repairs. For the purpose of establishing priorities, the Department factored the criticality of each individual project in the context of public health, welfare and safety, operational constraints and environmental significance.

Based on this rationale, most of the collection, transmission and pump station projects have been assigned similarly high priorities and are scheduled to commence at the start of FY '13 - '14. A major exception to these is the Government Cut project. Phases 1 & 2 are currently budgeted and under construction. In addition, the preliminary design of Phase 3 is currently underway and is scheduled for completion during FY '12 - '13.

As shown on Exhibit D-2 of this work plan, almost all of the identified wastewater collection and transmission system projects, together with the wastewater pump stations system projects, are front-loaded and scheduled for completion within the first five years of the Consent Decree. The sole exceptions are the Collection System I/I Repairs project and the Replacement of Asbestos Cement Force Mains project. The former is part of an on-going program for which we are proposing funding throughout the life of the Consent Decree. Note that the Collection

System I/I Repairs project which includes inspection of approximately six thousand (6,000) miles of pipe will be performed concurrently with all other work. The Asbestos Cement Force Main project consists of the replacement of sixty-six (66) individual force mains which are projected to be completed by the end of the sixth year.

The schedule of each project includes time for engineering design, permitting, procurement and construction. Although the schedule allocates permitting time of one (1) year for each project, the actual time to obtain a permit will vary depending on the type and location of the project. For projects that are located within a municipality, MDWASD or its contractor must obtain a municipal building permit and has no control over each municipality's requirements and review time for issuing a permit. Additionally, there may be several types of permits required, including electrical, mechanical and structural permits. Permits are normally obtained as part of the design process so that construction bids will reflect the conditions imposed by permitting authorities for maintenance of traffic, allowable working hours, and site restoration requirements. Allocating one year should be sufficient time for obtaining all permits regardless of where the project is located. With regard to procurement, MDWASD intends to accelerate the County Commission's internal approval process but must comply with Florida's competitive bidding laws.

Scheduling of capital projects associated with the three (3) regional treatment plants presents the greatest challenge inasmuch as taking units and/or processes out of service needs to be done in a way that does not adversely affect the operational capacity of the plants. For this reason, a large number of these projects needs to be sequenced in a fashion wherein the unit or process is placed out of service during the dry season, normally from the end of November to the

end of May. Another scheduling variable taken into consideration is the need to divert flows from one treatment plant to another while work that limits the plant's hydraulic capacity is being performed. Finally, the State's Ocean Outfall Legislation is another factor to consider in scheduling the work at the Central and North District WWTPs. The legislation may impact the work schedule. The Ocean Outfall Legislation currently requires diverting almost all flows from the outfalls by 2025. This, in turn, requires adding at least High Level Disinfection (filtration and disinfection) to all of the North and Central District flows. In addition, the legislation requires significant reuse of these flows. Existing site constraints may well result in the need to construct one or more entirely new plants in more westerly locations, thereby potentially requiring alterations to the collection system. This Capital Projects Work Plan assumes that the existing plants will be overhauled in their present locations, an assumption that may need to be altered as the outfall plan develops. It is also possible that changes to the Ocean Outfall Legislation will be made during the next or future legislative sessions, and such changes could also impact the Work Plan. Although design activities for many of the treatment plants' projects are scheduled to commence shortly after the projected effective date of the Consent Decree, there are several projects whose completion extends beyond 10 years after said effective date. The following are explanations for the proposed length and completion dates of these specific projects.

Project 1.3 - SDWWTP Oxygenation Train Rehabilitation

This project does not start at the beginning of the Consent Decree because recent tank cleanings, minor structural rehabilitation, mixer replacements for energy efficiency and process modifications have improved the conditions of these units. However, the oxygenation trains will

require extensive maintenance during the proposed life of the Consent Decree. The construction phase for the extensive rehabilitation of these units is scheduled for mid-2018, which is well before deterioration would be severe enough to result in tank failure or compromise the treatment process. Construction will require seven (7) years for completion because the tanks are a critical part of secondary treatment that is highly sensitive to hydraulic conditions. Therefore, it is advisable for these units to be out of service during the dry weather periods of the year.

Additionally, in order to ensure that a tank can be fully rehabilitated during the dry season, and that firm plant capacity is maintained at all times, only one tank will be rehabilitated per year.

Projects 2.5 and 2.6 – Central District WWTP Plants 1 and 2 Oxygenation Train Rehabilitation

The construction phase of these projects will require six (6) years for completion because the tanks are a critical part of the secondary treatment that is highly sensitive to hydraulic conditions. Therefore, it is only advisable for these units to be out of service during the dry weather periods of the year. Additionally, in order to ensure that a tank can be fully rehabilitated during the dry season, and that firm plant capacity is maintained at all times, only one (1) tank will be rehabilitated per year.

Projects 2.7, 2.8, 2.9 and 2.10 – Central District WWTP Plants 1 and 2 Secondary Clarifiers and Return Sludge Pump Stations

Currently, fibrous and other material accumulations that include rags, paper, plastic and hair, and solids deposition result in failure of the sludge collection mechanism in the secondary clarifiers. The construction phases of the secondary clarifier projects are not scheduled to start

prior to the construction and full operation of the Central District WWTP's headwork project since this project will target rag and solids removal upstream of the secondary clarifiers.

Under normal circumstances it would be advisable to have only one (1) clarifier out of service per plant at the Central District WWTP. However, the physical pairing of a return sludge pump station with the corresponding secondary clarifiers at the Central District WWTP dictates that two (2) clarifiers and their paired pump station be rehabilitated at the same time for ease of construction. However, this pairing is also required in case the removal and replacement of badly corroded return sludge pipes from one clarifier causes damage to the adjacent clarifier's structure and return sludge pipes. The construction phase for each pair of clarifiers and their shared return sludge pump station will take approximately one (1) year. Since there are sixteen (16) secondary clarifiers and eight (8) return sludge pump stations at the Central District WWTP, the full construction phase of these two (2) projects is eight (8) years.

Projects 2.14 and 2.15 – Central District WWTP Plant 1 and 2 Digesters

The level of deterioration and complexity of the anaerobic digesters requires that each cluster of four (4) digester tanks be taken completely out of service for extensive masonry and steel structural repairs; complete replacement of pipes, valves, sludge mixing equipment, heat exchangers and pumps; demolition of failed floating covers and installation of new covers. Since these units were built at different times, the six (6) digester clusters reflect different design and construction methods. Accordingly, the rehabilitation of each cluster will require an individual design effort. For these reasons, the construction phase of each digester cluster has been conservatively estimated to take the better part of two (2) years. It must be emphasized that

this is an estimated construction time based on similar level of work being performed on each cluster. Until a detailed design for the rehabilitation required for each digester cluster is sufficiently complete, a more realistic construction time estimate for each cluster will not be available. The current estimate for the entire construction phase of all digesters is ten (10) years, with only one (1) digester cluster taken out of service at a time.

Projects 3.2 and 3.5 – North District WWTP Primary and Secondary Clarifiers

Currently, fibrous and other material accumulations that include rags, paper, plastic and hair, and solids deposition result in failure of the sludge collection mechanism in the primary and secondary clarifiers. The construction phase of the clarifier projects is not scheduled to start until the North District WWTP headwork project is completed because this project will target rag and solids removal upstream of the primary and secondary clarifiers. Also, the construction phase for these projects cannot commence until completion of the Central District WWTP's headwork project because that project will require a substantial diversion of flows to both the South District WWTP and the North District WWTP. Hence, the North District WWTP's full capacity must be made available during that time.

Both primary and secondary clarifiers at North District WWTP have a unique feature among the county's treatment plants in that the tanks are enclosed structures for odor control purposes. The voluminous metal enclosures create hot, humid and corrosive environments that attack exposed electrical, mechanical and air handling equipment along with metal and concrete structures. The resulting impacts are most prevalent in the primary clarifiers as the hydrogen sulfide concentrations are highest prior to oxidation in the oxygenation trains. For this reason the

primary clarifiers will be rehabilitated prior to the secondary clarifiers. Primary and secondary clarifiers will not be rehabilitated in tandem as the reduced capacity of primary clarifiers during construction will cause hydraulic conditions that could result in solids carry over into the secondary treatment process. Solids carry over would stress the surface loading rate of secondary clarifiers and the return sludge pumping operations. The additional hydraulic stress of having secondary clarifiers out of service at the same time will adversely impact activated sludge settling, and could result in high TSS/CBOD concentrations in the plant's effluent during said rehabilitation.

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